

# ECTMIH2015 Poster Sessions

## PSI Poster session I

### PSI.001

#### Predictors of late diagnosis of HIV among HIV positive adults coming for initial CD4 T-cell count to public health facilities, Northern Ethiopia

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**INTRODUCTION** Early HIV testing and timely initiation of ART decrease mortality and morbidity due to HIV/AIDS and improves the quality of life of people living with HIV. Despite an increased access to HIV/AIDS testing and treatment services late diagnosis is still a problem. Having identified a higher rates of Late HIV diagnosis, this study was aimed to determine determinants of late diagnosis of HIV among adult HIV patients presenting to Bahir Dar Felege Hiwot Referral Hospital in Bahir Dar, Northern Ethiopia.

**METHODS** An institution-based unmatched case-control study was conducted between January 2010 to December 2011 at Bahir Dar Referral Hospital. A risk set sampling in (1:1) ratio was used to select a sample of 534 clients (267 cases and 267 controls). Cases were adult people living with HIV/AIDS whose initial CD4 T cell count was  $<200/\mu\text{l}$  of blood. Controls were those with a CD4 T cell count of  $>200/\mu\text{l}$ . Trained staff nurses were involved in data collection using a semi-structured questionnaire. Data were entered and analyzed using SPSS version 20. Descriptive statistics and Binary logistic regression were performed.

**RESULTS** A total of 267 cases and 267 controls were studied. Subjects who hold a certificate and above (AOR = 0.26; 95% CI = 0.13–0.54), being initiated by friends, families and other socials to undertake HIV testing (AOR = 0.65; 95% CI = 0.29–1.48), who reported a medium and high knowledge score about HIV/AIDS and who undertake HIV testing while visiting a clinic for ANC (AOR = 0.40; 95% CI = 0.19–0.83) were less likely to be diagnosed late. Subjects who undertake HIV testing due to providers' initiation (AOR = 1.70; 95% CI = 1.08–2.68), who reported a medium internalized stigma (AOR = 4.94; 95% CI = 3.13, 7.80) and who reported a high internalized stigma score towards HIV/AIDS (AOR = 16.64; 95% CI = 8.29–33.4) had a high odds of being diagnosed late compared to their counterparts.

**CONCLUSION** Level of education, reason for undertaking HIV testing, knowledge about HIV/AIDS and internalized stigma were significantly associated factors with late diagnosis of HIV. Hence, education about HIV/AIDS particularly towards Testing and ART should be a priority. People should be taught to encouraged and motivate their social mates to undertake HIV testing timely. Organizations working on HIV/AIDS should pay attention to minimizing stigma on HIV/AIDS.

**KEYWORDS** Predictors, Late diagnosis, HIV/AIDS, Northern Ethiopia.

**DISCLOSURE** We authors declare that we have no conflict of interest.

### PSI.002

#### Asymptomatic malaria and associated factors among school children in Pawe District, Northwest Ethiopia

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**INTRODUCTION** A wide scale implementation of malaria control activities in recent years has resulted in a decline of malaria transmission, morbidity and mortality in many African countries. Ethiopia's plan is now to eliminate malaria from selected endemic areas by 2020. Asymptomatic carriage in endemic areas would pose a significant challenge for malaria elimination program. Therefore, the objective of this study was to determine the prevalence of asymptomatic malaria and associated risk factors among children in Pawe Town, northwest Ethiopia.

**METHODS AND MATERIALS** A cross-sectional study was conducted from January to March 2011. A proportionate systematic random sampling technique was used. A Pretested questionnaire was used to collect sociodemographic data. Capillary blood was then collected from each child. Thick and thin blood films were prepared and stained with Giemsa solution. Diagnosis of malaria and quantification was made by microscopic examinations. Data were entered and analyzed using SPSS 20.0 software. Bivariate and Multiple logistic regression were employed for assessing associated risk factor. A  $P$ -value  $< 0.05$  was taken as statistically significant.

**RESULTS** A total of 406 school children were included in this study. A 182 (45%) were females and 224 (55%) were males. The prevalence of asymptomatic malaria among children was 22/406 (5.3%). Of this 19/22 (86%) had low parasite count. *Plasmodium falciparum* infection accounted for 15 (68%) of all positive cases. The prevalence of malaria among 6–15 year-old children was higher than that among those who were older than 15 years ( $P = 0.002$ ). Grade level, age, reported recent intake of artemether-lumefantrine, bed net utilization, and proximity to river were associated with risk of asymptomatic malaria.

**CONCLUSION** Asymptomatic malaria carriage rate was high among the studied population. Individuals with asymptomatic parasitemia are likely to be most responsible for the ongoing transmission of malaria, because they do not receive treatment and can continue producing gametocytes for a long time. Indeed, to control malaria, all infections must be treated.

**DISCLOSURE** Nothing to disclose.

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## PS1.003

**Prevalence and clinical features of cutaneous leishmaniasis in Western Ethiopia: a cross-sectional study**H. B. Beyene<sup>1</sup> and M. D. Degifie<sup>2</sup><sup>1</sup>Microbiology, Addis Ababa University, Addis Ababa, Ethiopia; <sup>2</sup>Public Health, Wollega University, Nekemete, Ethiopia

**INTRODUCTION** Cutaneous leishmaniasis (CL) is a skin disease caused by *Leishmania* parasites and vectored by sandflies. It has been the cause of disfiguring for a significant number of populations in rural areas. The main aim of this study was to determine the prevalence of CL and its clinical features among permanent residents of Dembidolo district, Western Ethiopia.

**METHODS** A community based, cross sectional study was undertaken. A house-to house survey was conducted. In 487 houses 3166 persons were surveyed. A structured questionnaire was used to collect sociodemographic and clinical data. Clinical diagnosis was undertaken during the survey by clinicians. Skin slit samples were then collected from each subject for confirmation. Thick and thin skin smears were prepared. The diagnosis of CL was established by finding amastigote stage in skin sample.

**RESULTS** In 487 houses a total of 3166 persons were surveyed of whom 1670 (52.4%) were females and 1505 (47.6%) were males. The overall prevalence of CL in the communities was 132/3166 (4.2%). More than 80% of CL infected patients were children. Skin ulcers were found on facial sites in 72 (54.5%) of subjects. In 45 (34.6%) of cases the lesions appeared on the upper extremities. The ulcers were non-itchy in 24 (61.5%) of cases and were not painful in 20 (54%) of cases. Lesions 4–10 months old had a maximum yield of LD bodies. Sleeping outdoors at least once a week was associated with CL ( $P = 0.001$ ). Being younger than 24 years was also associated with CL ( $P = 0.03$ ).

**CONCLUSION** Based on this study it is concluded that CL is posted as a public health problem in Western Ethiopia particularly among young children. In order to reduce the prevalence of CL in such remote rural villages, Community Health Workers/CHW should be trained in identification of skin problems, as the people in remote rural settings do not have access to dermatologists.

**KEYWORDS** Prevalence, cutaneous leishmaniasis, clinical features, Western Ethiopia.

**DISCLOSURE** Nothing to disclose.

## PS1.004

**Efficacy of first and second-line antiretroviral therapies in HIV-1 infected children, a case-control study in Cambodia**H. Barennes<sup>1,2</sup>, V. Kang<sup>2</sup>, F. Rouet<sup>3</sup>, Y. Buisson<sup>2</sup> and U. Vibol<sup>4</sup><sup>1</sup>Agence Nationale de Recherche sur le VIH et les Hépatites, Phnom Penh, Cambodia; <sup>2</sup>Institut de la Francophonie pour la Médecine Tropicale, Vientiane, Lao People's Democratic Republic; <sup>3</sup>Institut Pasteur, Phnom Penh, Lao People's Democratic Republic; <sup>4</sup>University of Health Sciences, Phnom Penh, Cambodia

**BACKGROUND** Little is known about the efficacy of first and second-line antiretroviral therapies (ART) for HIV-1 infected children in Southeast Asian resources-limited settings. Previous studies showed that being orphan was a risk factor of virological failure (VF) in Cambodia. Since then, most of them had been switched off to second-line ART. We assessed the factors associated with VF among HIV-1 infected children at a referral national pediatric hospital in Cambodia.

**METHODS** A case-control study was conducted from February to July 2013 at the National Pediatric Hospital among HIV-1 infected children (aged 1–15 years) receiving ART based on second-line (cases) or first-line (matched controls at a ratio of 1:3) regimens. Children were included if a HIV-1 RNA plasma viral load (VL) result was available within the preceding 12 months. A standardized questionnaire explored family sociodemographics, HIV history, and adherence to ART. Associations between VF (HIV-1 RNA levels  $\geq 1000$  copies/ml) and the children's characteristics were measured using bivariate and multivariate analyses.

**RESULTS** A total of 232 children, 175 (75.4%) on first-line and 57 (24.6%) on second-line line ART for a median of 72.0 (IQR: 68.0–76.0) months, were enrolled. Of them, 40.5% were double orphans and 22.0% single orphans, and 33.2% were living in orphanages. 222 children (95.6%) were deemed adherent to ART. Overall, 18 (7.7%; 95% CI: 4.6–11.9) showed a VF, 13 (7.4%; 95% CI: 4.0–12.3) on first-line and 5 (8.7%; 95% CI: 2.9–19.2) on second-line ART ( $P = 0.7$ ). The majority (55.6%) were on WHO Stage II and median CD4 percentage was 8% (IQR: 2.9–12.9) at initiation of ART. Second-line children were older, more often double orphans, and had lower CD4 cells count at the last control.

In multivariate analysis, having the last CD4 count below 15% was the only factor associated with VF for ART regimen separately or when combined (OR: 51.8; 95% CI: 14.8–180). **CONCLUSION** VF among first and second-line ART children requires improved adherence evaluation as well as intensified monitoring of children with low CD4 counts.

**DISCLOSURE** Nothing to disclose.

## PS1.005

**Body fat maldistribution among human immunodeficiency virus-infected patients attending care and treatment clinics in Dar Es Salaam municipal hospitals**M. A. Njelekela<sup>1,2</sup>, R. Mpembeni<sup>3</sup>, N. Ullenga<sup>4</sup>, E. Aris<sup>4</sup> and F. Mugusi<sup>5</sup><sup>1</sup>Physiology, Muhimbili University Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania; <sup>2</sup>The Bernard Lown Scholars in CVD Health Program, Harvard School of Public Health, Boston, MA, USA; <sup>3</sup>Biostatistics, Muhimbili University Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania; <sup>4</sup>Management Development for Health, Dar es Salaam, Tanzania; <sup>5</sup>Internal Medicine, Muhimbili University Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania

**BRIEF INTRODUCTION** The pathogenesis of fat abnormalities in HIV-infected individuals is not well understood, but research to date suggests that it is multifactorial and is associated with HIV-related immune depletion and immune recovery. Long term side effects of HAART such as body fat maldistribution have not been reported in Tanzania. Likewise, perceptions and attitudes of HIV/AIDS patients on treatment on their body fat maldistribution has not been studied previously.

**METHODS AND MATERIALS** A total of 466 adult patients attending care and treatment clinics (CTCs) in three municipal hospitals: Ilala, Temeke and Mwananyamala were interviewed in this study.

**RESULTS** The prevalence of body fat malformation was found to be 20.7%. Of these 49.5% were having primary lipoatrophy, 12.6% primary lipohypertrophy and 37.9% were having mixed type. Bivariate analysis showed significant association between body fat mal-distribution and gender ( $P = 0.03$ ), age ( $P = 0.03$ ), education ( $P = 0.05$ ), use of HAART ( $P = 0.0001$ , type of HAART ( $P = 0.002$ ) and length of treatment ( $P = 0.04$ ).

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Stavudine and efavirenz containing drugs were associated with higher proportion of patients with lipodystrophy. Participants who were on treatment for more than 24 months were more likely to develop lipodystrophy though statistically was not significant (OR = 1.98; 95% CI 0.83–4.74). Among the participants 15.8% felt strongly that their current body outlook/image is worse compared to the way they looked before and 10.5% reported to dislike their mirror image.

**CONCLUSION** The prevalence of lipodystrophy is high in this population. Furthermore, Stavudine based drugs were found to have more patients with lipodystrophy compared to efavirenz and nevirapine containing drugs. Participants with lipodystrophy experienced negative perceptions against their body. These data highlight the urgent need for access to more affordable and less toxic ART regimens in resource-limited setting.

**ACKNOWLEDGEMENTS** Extended to Management Development for Health Project, and Management and Staff of Mwananyamala, Temeke and Ilala Municipal Hospitals.

**DISCLOSURE** Nothing to disclose.

**PSI.006****Genetic diversity and antiretroviral drug resistance among drug-naïve HIV type 1 infected patients attending clinics in Kinshasa, Democratic Republic of Congo**

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**BACKGROUND** The widespread use of antiretroviral (ARV) created the emergence of mutant strains resistant to treatment. Thus, the World Health Organization recommends epidemiological monitoring for newly infected patients with HIV. The objective of this work is to determine the genetic diversity of HIV Type 1 and the prevalence of mutations associated with resistance to ARV in treatment-naïve patients in Kinshasa.

**METHODS** 153 subjects diagnosed positive for HIV Type 1 by serology voluntarily participated in this study. They were recruited in different centers in Kinshasa. The inclusions were conducted from August 2013 to February 2014. Five milliliters (5 ml) of blood were collected in a tube with anticoagulant EDTA. Plasma was sent for analysis to the AIDS Reference Laboratory of the University Hospital of Liège (CHU-Liège) in Belgium. RNA was extracted from plasma 140 µl using the QIAamp RNA Mini Kit QIAGEN®. A Reverse Transcriptase PCR and Nested PCR enabled amplification of regions of interest on the Protease and Reverse Transcriptase (RT) for subsequent sequencing.

**RESULTS** The mean age of patients was 37 years, ranging from 18 to 65 years. The median values of Viral Loads (VL) and rate of CD4 lymphocytes were respectively 5.68 log<sub>10</sub> RNA copies/ml and 180 cells/ml. Protease and RT were amplified and sequenced, respectively, for 130 (84.9%) and 145 (94.8%) patients out of 153. Subtype A was dominant with 35 cases (22.9%); followed by CRF02\_AG (11.1%), C (9.8%), G (9.8%), K (9.8%), D (7.8%), H (7.8%) and J (5.0%).

**CONCLUSION** The results of our study confirm the high diversity of HIV Type 1 in Kinshasa. It reveals the heterogeneity of the virus and the presence of transmitted resistance associated with antiretroviral drugs. Several minor and major resistances

associated with Protease Inhibitors, as well as mutations associated with the Reverse Transcriptase Inhibitors have been detected in antiretroviral treatment-naïve patients.

**DISCLOSURE** Nothing to disclose.

**PSI.007****Virological profile of patients infected with HIV starting antiretroviral treatment in Kinshasa**

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**BACKGROUND** Viral Load (VL), CD4 T cells counts and clinical signs are significant parameters for the decision of starting Antiretroviral Treatment (ART). The aim of this study was to determine the Viral Load profile of eligible patients for ART in different centers according to the algorithm used in Kinshasa.

**METHODOLOGY** Our sample consisted of 153 HIV-positive patients naïve of ART. All patients aged over 18 years were included in the study without gender discrimination. The determination of the VL was done at the laboratory of Molecular Biology of the Faculty of Medicine of the University of Kinshasa (UNIKIN) using a previously described technique.

**RESULTS** Of the 153 patients included in the study, 92 (60.1%) were women. The age of the patients was in the range of 18–65 years with a mean of 37 years. Most patients (91.5%) were in clinical stage 3 for HIV infection according to the World Health Organization (WHO) classification while the rest (8.5%) were in clinical stage 4. The counts of CD4 T cells were between 8 and 915 cells/mm<sup>3</sup> with a median of 180 cells/mm<sup>3</sup>. Seventy nine patients (86.8%) had CD4 count below 500 cells/mm<sup>3</sup>. The median VL was 5.68 log<sub>10</sub> RNA copies/ml. The minimum and maximum values were respectively 0.37 and 7.95 log<sub>10</sub> RNA copies/ml. Ninety seven patients (63.4%) had a VL above 5.00 log<sub>10</sub> RNA copies/ml.

**CONCLUSION** The majority of patients (63.4%) in Kinshasa begins the ART with a poor prognosis. The VL are usually very high in these patients and the CD4 quite collapsed.

**DISCLOSURE** Nothing to disclose.

**PSI.008****Prevalence of malaria infection among people living with HIV in Kinshasa**

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**BACKGROUND** Infection with the Human Immunodeficiency Virus (HIV) and malaria are two infectious diseases which are among the leading causes of morbidity and mortality in sub-Saharan Africa and each a major public health problem. Data on malaria infection among people living with HIV (PLHIV) are

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poorly defined in Kinshasa as there are very few studies available on the subject.

**OBJECTIVE** To determine the rate of co-infection HIV/Malaria in Kinshasa to improve the care of PLHIV, this study was initiated to update the data.

**METHODOLOGY** This study was a prospective cohort. 123 volunteers participated in this study in the third month. 114 patients completed the 6-month visit. Malaria diagnosis by microscopy was performed at the two medical visits. A sample of 5 ml of blood was also drawn in a tube with EDTA for the determination of viral load and measuring the rate of CD4 T lymphocyte.

**RESULTS** In the third month of Antiretroviral Therapy (ART), we had 123 PLHIV (78 women and 45 men). Viral loads (VL) ranged from 390.79 copies/ml (2.59 log<sub>10</sub>) and 3854, 6691.53 copies/ml (6.59 log<sub>10</sub>). The CD4 ranged between 90 and 547 cells/mm<sup>3</sup>. 25 patients (20.33%) were positive for malaria. At 6th month of ART, there were 114 patients (75 women and 39 men). The CV of the population ranged from 0 copies/ml and 2693671.54 copies/ml (6.43 log<sub>10</sub>). The CD4 at 6th month were in the range between 421 and 984 cells/mm<sup>3</sup>. 20 patients (17.54%) presented positive thick smear for malaria.

**CONCLUSION** The prevalence rate of HIV/malaria co-infection varies between 17.54 and 20.33% in Kinshasa.

**DISCLOSURE** Nothing to disclose.

## PS1.009

### Comparison of the effectiveness and adverse event profile of tenofovir/lamivudine-verses zidovudine/lamivudine-based HAART regimen in Zaria, Nigeria

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**INTRODUCTION** The goal of antiretroviral therapy (ART) is to achieve viral suppression and immune reconstitution with minimal toxicity. The choice of first-line drugs is key to achieving this. We compared the effectiveness and adverse event profile of Tenofovir/lamivudine- and Zidovudine/lamivudine-based Highly Active Antiretroviral Therapy (HAART) in Zaria, Nigeria.

**METHODOLOGY** This was a prospective cohort study carried out at the HIV clinic of Ahmadu Bello University Teaching Hospital, Zaria. HIV patients started on standard doses of Tenofovir/lamivudine (300 mg/300 mg) daily plus Nevirapine 200 mg twice daily or Efavirenz 600 mg daily (cohort 1) and those on Zidovudine/lamivudine (300 mg/150 mg) twice daily plus Nevirapine 200 mg twice daily or Efavirenz 600 mg daily (cohort 2) were followed-up for 6 months and monitored for viral load, CD4+ cell count, adherence and hematological and biochemistry adverse events.

**RESULT** Proportion with viral suppression of <400 copies/ml was lower in cohort 1 compared to cohort 2 (68% vs. 84%, difference = -16%,  $\chi^2$ ,  $P = 0.04$ ). When adjusted for age, educational status, marital status and baseline viral load, the odds of achieving a viral suppression was 141% higher for cohort 2 (OR = 2.41, 95% CI 1.12–5.19,  $P = 0.03$ ). The proportion of who had a  $\geq 25/\text{mm}^3$  increase in baseline CD4+ cell count was not statistically significant between the cohorts (66% vs. 78%,  $\chi^2$ ,  $P = 0.10$ ). When adjusted for age, educational status, marital status and baseline CD4+ cell count, the odd of rise in baseline CD4+ cell count was 59% lower for cohort 2 (OR = 0.41, 95% CI 0.18–0.97,  $P = 0.04$ ). The

proportion of with adherence rate  $\geq 95\%$  was not statistically different between the two cohorts (76.5% vs. 82%,  $\chi^2$ ,  $P = 0.52$ ). More hematological adverse events were seen in cohort 2 compared to cohort 1 (grade 1–2 anemia, 4% vs. 0%; grade 3–4 neutropenia, 8% vs. 1%). More patients in Cohort 1 experienced a rise in baseline serum creatinine level compared to cohort 2 (53.1% vs. 47.5%).

**CONCLUSION** Tenofovir/lamivudine-based regimen appears less effective than Zidovudine/lamivudine-regimen in terms of viral suppression, but better than Zidovudine/lamivudine in terms of immunologic recovery. While the Tenofovir/lamivudine regimen may rise in serum creatinine, patients on Zidovudine/lamivudine are prone to anemia and neutropenia.

**DISCLOSURE** Nothing to disclose.

## PS1.010

### Quality of life in persons living with HIV: a longitudinal study over 12 months in Ouagadougou-Burkina Faso

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**INTRODUCTION** In Burkina Faso, very little is known about the quality of life of people living with HIV in their routine follow. The aim of the study was to measure the quality of life, in the routine follow-up of people living with HIV and its change over time.

**METHODS AND MATERIALS** 424 people living with HIV were followed up during 12 months in Ouagadougou-Burkina Faso. The quality of life was measured through three interviews over time, using the World Health Organization Quality of Life assessment brief tool in patients with Human Immunodeficiency Virus infection (WHOQOL HIV-BREF). The Friedman test was used to assess significant differences in quantitative variables at each of the three follow up interviews. Groups at baseline, at month 6 and at month 12 were compared using the Wilcoxon signed rank test for quantitative data and the McNemar test for qualitative variables. Pearson Chi-square was used when needed. Multivariable logistic regression models were fit to estimate adjusted odds ratio (OR) and 95% confidence intervals (95% CI). A  $P$ -value  $< 0.05$  was considered as significant.

**RESULTS** At baseline, the highest scores of quality of life were recorded in the domain of spirituality, religion and personal beliefs and the lowest scores were recorded in the environmental domain. This trend was maintained during the 12-months follow-up. The overall score increased significantly over time. Over the 12 months of follow up, the baseline factors that were likely to predict an increase in the overall score of quality of life were: not having support from relatives for medical care ( $P = 0.04$ ), be under Highly Active Anti Retroviral Treatment (HAART) ( $P = 0.001$ ), self-perception as healthy ( $P = 0.03$ ), and have a global score of quality of life under 77 ( $P < 0.001$ ).

**CONCLUSIONS** Our findings suggest it would be beneficial to conduct interventions linked to environmental domain to enhance the quality of life of people living with HIV/AIDS in Burkina Faso. Such interventions should be directed towards empowerment of people living with HIV, instead of making them dependent on ad hoc support. Particular attention could be paid to people without family support, not yet under HAART, and those who perceive themselves as ill.

**DISCLOSURE** Nothing to disclose.



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## PSI.011

**Effectiveness of a prevention mother-to-child transmission of HIV program in a rural area of Angola**

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Substantial progress has been made on implementation of programs of prevention of mother-to-child transmission of HIV (PMTCT) in Sub-Saharan Africa. Information about applicability of these programs in rural, resource-limited settings is scarce.

This is a descriptive, retrospective study, performed at Hospital Nossa Senhora da Paz, a 400-bed rural hospital located in Benguela Province of Angola. Women diagnosed of HIV infection before or during pregnancy and delivered live newborns from January 2007 to November 2012 were included. Clinical and epidemiological data of the mothers, as well as health status of the newborn at 1, 6, 12 and 18 months were recorded.

100 newborns, from 81 mothers were included, with a mean age of 28 years. 51 (63%) mothers had no or basic education. At deliverance, 79 (98%) were on highly-active antiretroviral treatment (HAART) and 51 (63%) had more than 350 CD4. 42 (52%) did not give birth in the hospital, so no intravenous zidovudine (AZT) was administered. Among the babies, 80 (80%) received exclusive breastfeeding only during the first 6 months, 77 (77%) received zidovudine in the first 4 weeks and 96 (96%) cotrimoxazole from 4th week to the end of breastfeeding, following the recommendations of the protocol. Nutritional parameters (median of z-score) were below the expected at every moment of follow-up. HIV serology was positive in 12 (12%) babies 6 months and at the end of monitoring (18 months) it remained positive in 2 (2%) babies. By then 10 (10%) had died and 20 (20%) were lost to follow-up or transferred. 68 (68%) completed follow-up, with negative HIV serology.

HIV transmission was low among the mothers and infants adhering to the PMTCT program. Nevertheless, loss to follow-up and mortality were very high. Targeted interventions to eliminate barriers and promote access to care in this context are urgently needed.

DISCLOSURE Nothing to disclose.

## PSI.012

**Urinary schistosomiasis: ultrasound changes and reinfections in a highly endemic area**

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**INTRODUCTION** The objective of schistosomiasis control programs is to reduce associated morbidity, but little is known about their impact on the evolution of lesions of the urinary tract in children in areas of high endemicity.

**METHODS** A prevalence study of urinary schistosomiasis among schoolchildren was performed between April and October 2013 in Cubal, in central Angola. Treatment with

praziquantel at dose of 40 mg/kg was given to every infected children; an ultrasound was offered to children of the first ten schools. International standard WHO protocol (Niamey 1996) was used for the assessment of urinary tract damage. Children were cited 6–8 months later for re-evaluation of infection and ultrasound findings. At this point, researchers were blind to previous findings.

**RESULTS** Initially, urine samples were taken from 1,425 children; 61% had eggs of *Schistosoma haematobium*. Ultrasound was offered to 726 infected children, of which 156 (21.5%) came. Mean age of participants was 10.4 years. 132 (85%) had any disorder in urinary tract, 129 (83%) in urinary bladder and 52 (33%) in ureters; 20 (13%) had hydronephrosis. According to WHO classification, the score was 3.4 for urinary bladder and 2.6 for high urinary tract, in the aggregate 6 points. 70 (44.8%) children came for a second ultrasound 6–8 months later, with a mean age of 9.9 years. At this point 15 (22%) had eggs of *S. haematobium*; referring to ultrasound abnormalities, 27 (38%) had at least one alteration: 19 (27%) in the bladder and 14 (20%) in ureters; no hydronephrosis was diagnosed. According to WHO classification, the score was 0.7 for urinary bladder and 0.9 for high urinary tract, making 1.7 points as a whole.

**CONCLUSIONS** Changes in urinary tract caused by *S. haematobium* are frequent in children in a highly endemic area as Cubal. Treatment improves rapidly the severity of lesions. Nevertheless, reinfections are common; public health measures and prolonged clinical controls are needed.

DISCLOSURE Nothing to disclose.

## PSI.013

**An assessment of TB-HIV collaborative activities in Alwar district of Rajasthan**

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**BACKGROUND** HIV and TB infections are very common in resource poor settings. In 2013, World Health Organization (WHO) estimates suggests that globally 9 million people developed TB while 1.5 million died of TB. Among these cases 1.1 million (13%) were coinfected with HIV and 360 000 died who were also HIV positive<sup>1</sup>. While in 2013, 35 million people are living with HIV/AIDS and 1.5 million people died with AIDS related ailments<sup>2</sup>. One third of people who are HIV positive globally have co-infection of Tuberculosis. It is estimated that an HIV positive person has 50% life time risk of developing TB in comparison to an HIV negative that have risk of only 10%. In India around 40% of over 5 million people who are HIV positive have co-infection of TB<sup>3</sup>.

**METHODS** In depth interviews were conducted of program managers of District AIDS Prevention & Control Unit (DAPCU) under National AIDS Control Program (NACP), Revised National TB Control Program (RNTCP) and NGOs. Records and reports from DAPCU (NACP) and DTO (RNTCP) office were reviewed.

**RESULTS** Around a quarter of HIV positive patients of district are co-infected with TB. District has poor implementation of TB-HIV collaborative activities especially in rural settings. Lack of commitment and shared accountability between general health administration and program managers of RNTCP and NACP are an impediment to effective collaboration. Though basic services (Screening, diagnosis & treatment) are available in both national programs for cross referral, cross referral services and follow up

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of cases give ground for concern. Stigma also plays a role, as both diseases carry social taboos which create hurdles in utilization of health services. The district lacks integration of NGOs for TB-HIV collaborative activities. Issues related to human resource especially retention, capacity and co-ordination among stakeholders, are key hurdles in TB-HIV collaboration and service delivery.

**CONCLUSION** TB-HIV collaboration in district calls for improvements which can be achieved by addressing availability of permanent, skilled staff and supportive supervision with commitment of collaboration from all stakeholders. Involvement of NGOs in collaborative efforts will help to ensure service delivery.

**DISCLOSURE** Nothing to disclose.

**PS1.014**

**The structure and health programs of Chreso Ministries, Lusaka, Zambia: an important backbone for successful HIV infection reduction**

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**INTRODUCTION** Zambia is a low-income country in Africa. HIV prevalence is high at 14.3%. The health care system is malfunctioning. There is a critical shortage of health care workers. CHRESO Ministries (CM) is a non-governmental organisation (NGO) which cooperates with the government of Zambia in health provision. CM was founded in 1994 and is the essential centre providing care for HIV/AIDS patients in Central, Lusaka and Southern provinces of Zambia.

**MATERIALS** CM runs five HIV/AIDS clinics with currently over 40 000 patients on care. Approximately 15 000 patients are receiving anti-retroviral therapy (ART). CM were the first to run several mobile clinics. In 2010 CM set up a university, which offers degrees in public health and diplomas in clinical methods. The setting up of CM's University is intended to overcome the critical shortage of healthcare workers. With ART coverage increasing, accompanied by mortality decline, there is an urgent need to address these shortages to uphold quality provision of health services. Yet, in some high-risk sub-groups ART coverage is still poor. CM has deliberately designed specific programs which focus on these groups. CM applies different approaches to encourage participation. HIV rapid tests are used during outreach activities. Clients testing HIV positive are asked to visit CM Clinics for a confirmation test and linkage to care.

**RESULTS** Currently CM has a total of 13 physicians, 18 community workers, 15 nurses, and 45 supporting staff employed. 5 mobile clinics leave CM sites everyday. Around 200 persons/month are tested in the field. Of those, around 50 are added on care and 30 persons are enrolled on ART. In 2010, a total of about 12 000 clients were on ART, reaching 15 000 in 2014. Adherence rates to medication are at 95%, and to clinical visits between 80 and 85%. Mortality declined from 218 in 2010 (1.8%) (among those treated) to 60 in 2014 (0.4%). CM uses combination ART for its clients.

**CONCLUSIONS** CM efficiently contributes to fight HIV and to fulfil the 90–90–90 goal of UNAIDS. Lack of well-trained health personnel is a growing challenge due to the extension of the programmes. Maintaining a high quality of care is increasingly getting difficult. Prolonged life expectancy leads to a growing number of chronic diseases, which need to be addressed by the

health system to avoid future threats to the population's health. CM started to collaborate with a German research centre to tackle this issue.

**DISCLOSURE** Nothing to disclose.

**PS1.015**

**How many chronic renal diseases remain unnoticed? A retrospective analysis in a large urban anti-retroviral therapy clinic in Lusaka, Zambia**

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**INTRODUCTION** While increased access to anti-retroviral therapy (ART) has led to considerable gain in life expectancy of HIV patients receiving ART, these patients are increasingly endangered to develop non-communicable diseases (NCDs), which may partly be attributed to some antiretroviral drugs. The objective of this study was to retrospectively analyze routine patient data to estimate the prevalence of renal diseases among HIV patients on ART at Chreso Clinic in Lusaka, Zambia.

**MATERIALS** Chreso Ministries is a faith based, non-governmental organization providing comprehensive HIV services since 2004. At its sites in Lusaka, Livingstone, Siavonga, Kabwe, and Circle of Hope, Chreso has more than 40 000 people on care, with around 15 000 people receiving ARVs. Chreso Clinic routinely assesses patients' hemoglobin, liver and renal function as well as CD4 levels. Data of all HIV positive adults (>18 year) registered at the Lusaka Clinic and on ART who had at least 2 readings of creatinine (Jaffé reaction) between January 2011 and December 2013 were included in this descriptive analysis. Baseline data was defined as the laboratory records closest to the date of HIV diagnosis. Based on the most recent creatinine we applied a formula (CKD Epi) to calculate the estimated glomerular filtration rate (eGFR) and classified the chronic kidney disease stages according to Kidney Disease Improving Global Outcomes (KDIGO).

**RESULTS** Results of 680 eligible patients (62.4% female) were available for analysis of whom 596 (87.6%) received Tenofovir containing ART. Median age at HIV diagnosis was 37 (IQR 31–44), baseline median CD4 ( $n = 522$ ) was 195 cells/ml (IQR 107–317), median BMI ( $n = 560$ ) was 22.2 (IQR 19.6–25.1), and the median Hb-level ( $n = 468$ ) was 11.7 g/dl (IQR 10.2–13.3).

Around one third of the patients were presenting any degree of renal impairment. 7.2% of patients had renal stage worse or equal to 3a (mildly to moderately decreased function).

**CONCLUSIONS** We found a higher proportion of moderately to severely impaired renal function among HIV patients on ART than previously reported in Lusaka, warranting further exploration. While in the past in particular in low- and middle-income countries the main focus was on survival, by now NCD comorbidities including renal impairment as a risk factor of cardiovascular morbidity should be considered in comprehensive HIV care.

**DISCLOSURE** Funding: Else Kröner-Fresenius Foundation, Germany; Center for Disease Control Zambia.

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## PS1.016

**The probability of acute malaria illness following *Plasmodium vivax* primary infection and relapse in a cohort of children in Papua New Guinea**A. Ross<sup>1,2</sup>, C. Koepfli<sup>1,2,3</sup>, P. Siba<sup>4</sup>, I. Felger<sup>1,2</sup>, I. Mueller<sup>3,5,6</sup> and M. Tanner<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland;<sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>Walter and Eliza Hall Institute of Medical Research, Parkville, Vic., Australia; <sup>4</sup>Papua New Guinea Institute of Medical Research, Goroka, Papua New Guinea; <sup>5</sup>University of Melbourne, Melbourne, Vic., Australia; <sup>6</sup>Barcelona Centre for International Health Research, Barcelona, Spain

**INTRODUCTION** *Plasmodium vivax* has the ability to relapse from dormant liver stage parasites. The probabilities of clinical illness following primary infection and relapse are unclear in people living in endemic areas. A major difficulty lies in the inability to distinguish primary infections and relapses on the individual level. The seasonal pattern of the incidence of primary infections and relapses has been shown to differ in an analysis of genotyping data in a cohort of children in Ilaia, Papua New Guinea. The differential seasonality can be used to gain leverage to estimate the probability of clinical illness following primary infection and relapse in the same cohort.

**METHODS** The children, aged 1–3 years at enrolment, were followed up over 16 months. Illness was detected during active case detection every 2 weeks and carers were encouraged to visit the study clinic if the child was ill at other times. *P. vivax* illness was defined as fever or reported fever in the last 48 h with a parasite density of 500/μl. We relate the number of observed *P. vivax* cases in each age-group and each 2 month time period to the expected numbers of primary infections and relapses, and use the expected cumulative number of lifetime genotypes seen as a proxy for clinical immunity. The expected numbers of primary infections and relapses are derived from a simulation model, parameterized by previous analyses of the same cohort and including the seasonal pattern of primary infections, differential biting by body surface area, the durations of blood-stage infections, the number and timing of relapses, and treatment. We assume relapses occurring when a blood-stage infection by the same genotype is present do not cause illness and are not counted.

**RESULTS AND CONCLUSIONS** The estimated probability of acute illness declined with the cumulative number of genotypes seen. For the ages in this cohort, the probability following primary infection ranged from 0.3 to 0.05, following the first relapse, 0.07–0.0006, and for the second or later relapse, the probability was low. The results can inform estimates of the burden of *P. vivax* and provide building blocks for mathematical models for predicting the impact of interventions against *P. vivax*.

**DISCLOSURE** Nothing to disclose.

## PS1.017

**Rise of *Plasmodium vivax* malaria diagnosis in 2014 in a referral university hospital of Northern Italy**R. Grande<sup>1</sup>, A. Di Gregorio<sup>1</sup>, M. R. Gismondo<sup>2</sup>, M. Galli<sup>3</sup> and S. Antinori<sup>3</sup><sup>1</sup>CLIMVIB (Clinical Microbiology, Virology and Diagnosis of Bioemergencies Lab), A.O. Luigi Sacco-Polo Universitario, Milan, Italy;<sup>2</sup>CLIMVIB (Clinical Microbiology, Virology and Diagnosis of Bioemergencies Lab), Milan, Italy; <sup>3</sup>Biomedical and Clinical Science, III Division of Infectious Diseases, Università degli Studi di Milano, Milan, Italy

**INTRODUCTION** Imported Malaria (IM) cases in Italy are caused mainly by *P. falciparum* (83%) because the origin of the infections are coming from Africa (93% of the total of imported

malariae). ‘L.Sacco’ University Hospital (HS) is a referral facility for the diagnosis and the treatment of IM in Italy with almost 500 diagnostic tests per year.

**MATERIALS AND METHODS** Positive IM attended in HS during the last 2 years were considered. 2013 positive cases were compared to 2014 positive cases as concerns *Plasmodium* species and countries of origin of the patients involved.

**RESULTS** In 2013 we attended 41 cases of IM: 78% were *P. falciparum* infections, 14.5% *P. vivax*, 2.4% *P. ovale* and 5.1% *P. malariae*. In 2014 the positive cases were 39, distributed as follows: *P. falciparum* 53.8%, *P. vivax* 33.3%, *P. ovale* 10.3% and *P. malariae* 2.6%. Patients affected by *P. vivax* malaria in 2013 came from these countries: Eritrea (16.6%), Brasil (16.6%), Bangladesh (16.6%), Aethiopia (37.2%), Burkina Faso (16.6%). In 2014 the countries involved were: Eritrea (69.2%), Pakistan (7.7%), Nigeria (7.7%) and Bangladesh (15.4%). Cases of Nigeria and Burkina Faso were involved in double parasitemia (*P. falciparum* + *P. vivax*). All diagnosis were confirmed by Italian Ministry of Health.

**CONCLUSIONS** Despite the observation on rising of *P. vivax* IM during the last year occurred only in our Infectious Diseases Department and not in others in Lombardia District, we underline that the biological features of *P. vivax* are more suited to adaptation in Italy than those of *P. falciparum*. In fact the last case of autochthonous malaria in Italy, in Tuscany in 1997, was substituted by *P. vivax*. Furthermore, we highlight the high percentage of Eritrean people affected by this microorganism: Eritrea, at this time, is sadly involved in a dramatic geopolitical situation that increased very much the migration from this geographic area to Europe, particularly in Italy. The two observations might suggest a further risk factor for the reintroduction of autochthonous malaria in Italy.

**DISCLOSURE** Nothing to disclose.

## PS1.018

**Assessing micro-heterogeneity of malaria transmission in Papua New Guinean villages using molecular indicators**N. E. Hofmann<sup>1,2</sup>, R. Wampfler<sup>1,2</sup>, L. J. Robinson<sup>3,4,5</sup>, S. Karl<sup>4,5</sup>, I. Mueller<sup>4,5,6</sup> and I. Felger<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland;<sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>PNG Institute of Medical Research, Madang, Papua New Guinea; <sup>4</sup>The Walter and Eliza Hall Institute of Medical Research, Parkville, Vic., Australia; <sup>5</sup>University of Melbourne, Victoria, Vic., Australia; <sup>6</sup>Barcelona Ctr. Int. Health Res. (CRESIB), Barcelona, Spain

Renewed emphasis on malaria control in Papua New Guinea (PNG) has resulted in drastic reductions in countrywide *Plasmodium* prevalence and incidence but substantial heterogeneity in transmission persists on small spatial scales. Parasite genotyping permits assessing population- and individual-based parameters such as prevalence of multi-clone infections, mean multiplicity of infection (MOI) and measures of genetic diversity or population structure, which are potential surrogates for local levels of transmission in cross-sectional studies. With the aim to judge their applicability in a setting of transmission micro-heterogeneity, we assessed these markers in a treatment-to-reinfection study in PNG children aged 5–10 years by high-resolution genotyping of *Pf-msp2* and *Pv-msp1F3* and relate them to a longitudinally determined measure of transmission, the molecular force of blood-stage infection ( $\text{molFOB}$ ).

At enrolment, *P. falciparum* and *P. vivax* PCR prevalence varied significantly between six neighbouring villages ( $P < 0.001$ ). Although heterogeneity in prevalence was more pronounced for



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*P. falciparum* (9–71%) than for *P. vivax* (38–67%), we observed significant between-village variation in MOI for *P. vivax* only ( $PvMOI$  1.6–2.9;  $PfMOI$  1.1–2.2). The proportion of single-clone infections varied significantly between villages for *P. falciparum* but not *P. vivax* ( $Pf$  43–86%;  $Pv$  39–71%). Allelic diversity was comparable between villages for both species and although the most frequent allele varied, the overall pattern of allele frequencies was similar between villages.

High inter-village variation was observed in the incidence of new infections by  $molFOB$  for both species ( $P < 0.001$ ). Village-specific *P. falciparum*  $molFOB$  correlated strongly with enrolment prevalence ( $R^2 = 0.98$ ) but not with other measures obtained at enrolment. In children treated with primaquine for clearance of hypnozoites, *P. vivax*  $molFOB$  represents new infections only and correlated strongly with *P. vivax* MOI at enrolment ( $R^2 = 0.92$ ). In contrast, *P. vivax* prevalence and other enrolment parameters correlated poorly with *P. vivax*  $molFOB$  after liver-stage treatment.

High micro-spatial heterogeneity in malaria transmission presents a major challenge for further interventions in PNG. Molecular monitoring offers precise data to guide surveillance-response interventions, yet different metrics seem preferable for different *Plasmodium* species and have to be validated carefully before their use in cross-sectional studies.

DISCLOSURE Nothing to disclose.

## PS1.019

### Occurrence of asymptomatic malaria and malaria prevention practices in selected rural communities in Ibadan, Nigeria

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**BACKGROUND** Asymptomatic falciparum malaria is common in endemic areas and carriers serve as potential reservoirs for malaria transmission in the community. Community-based research on malaria involving all age groups is limited. This study aimed at identifying possible risk factors to guide planning interventions and targeting the reservoirs of asymptomatic malaria in a community stands to reduce transmission and subsequently incidence of malaria.

**METHODS** A cross-sectional study was conducted among 986 participants in Ona-ara LGA, Southwest Nigeria, to study the occurrence of asymptomatic malaria and malaria prevention practices. Blood samples were collected by finger prick. Giemsa-stained thick blood smears were used to screen for malaria parasites. Participants with parasitaemia who gave informed consent were followed-up for 6 weeks to detect acute malaria; thereafter second blood samples were collected and tested.

**RESULTS** The overall prevalence of asymptomatic malaria was 26.3% and decreased with increasing age ( $P < 0.001$ ). Children had greater odds of being parasitaemic than adults (OR = 8.04, 95% CI = 5.86–11.04). The overall geometric mean parasite density of asexual *P. falciparum* was  $3979.50 \pm 653.26$  and the value decreased significantly among the age groups ( $F = 4.076$ ,  $P < 0.001$ ). Among 259 participants followed up, 87 (33.6%) developed acute malaria while 113 (43.6%) remained asymptomatic after 6 weeks. About 55.6% of the participants followed up gave consent for a second test; 76.4% of these still tested positive. Many households (87.0%) had no screen/nets on

their doors and windows. Only 9.0% used mosquito nets. About 71.0% had one or more mosquito breeding sources around their households.

**CONCLUSIONS** A high prevalence of asymptomatic malaria was found in this study area. Efforts to intensify environmental sanitation and use of mosquito avoidance measures in rural areas, especially among children, are recommended.

**KEYWORDS** Occurrence, Asymptomatic malaria, *P. falciparum*, Parasitaemia.

DISCLOSURE Nothing to disclose.

## PS1.020

### Transmission blocking effects of *Azadirachta indica* limonoids on early sporogonic development of *Plasmodium*: activity and bioavailability of seed fractions and isolated compounds

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*Azadirachta indica* (Meliaceae) possesses a wide spectrum of biological properties, conferred to the plant by secondary metabolites. *A. indica* seeds contain abundantly limonoid molecules such as azadirone, nimbin, salannin and azadirachtins (A to L), azadirachtin A (AzaA) being one of the most bio-active molecules. AzaA has been shown to inhibit *Plasmodium berghei* microgamete formation and an AzaA rich commercial kernel extract (NeemAza<sup>®</sup>) was found to completely block the transmission of *P. berghei* to *Anopheles stephensi* females when administered to gametocytomic mice at an AzaA dose of 50 mg/kg before exposure to mosquitoes. The present study was aimed at

- 1 elucidating early sporogonic stage specific effects of *A. indica* seed fractions and their main constituents;
- 2 assessing the bioavailability of a fraction rich in AzaA and the isolated AzaA molecule through a biological response-based assay.

*Ex vivo* and *in vitro* assays were performed with the murine malaria parasites *P. berghei* ANKA strain and *P. berghei* CTRPp.GFP. Fractions were obtained from *A. indica* seeds collected in Burkina Faso and from NeemAza<sup>®</sup> (NA, provided by Trifolio-M GmbH, Lahnau, Germany) by column chromatography. Constituents were identified by NMR spectroscopy.

NA, AzaA, nimbin and salannin rich fractions from unripe seeds tested at 50  $\mu\text{g/ml}$ , revealed inhibitory activity on early sporogonic stages *in vitro*. Nimbin and salannin were found to interfere with ookinete maturation while NA and AzaA showed multiple effects on early sporogonic development. The  $IC_{50}$  value determined for NA was 6.8  $\mu\text{g/ml}$  ( $CI_{95}$ : 5.95–7.86), about half of that of AzaA  $IC_{50}$  (12.4  $\mu\text{g/ml}$ ;  $CI_{95}$ : 11.0–14.04). The stronger activity of NA, when compared to AzaA, appeared not to be due to an additive or synergistic effect of other azadirachtins (B, D and I) present in NA, since the addition of these compounds at 50  $\mu\text{M}$  to AzaA did not evidence any decrease of the  $IC_{50}$ . Also, bioavailability of AzaA, administered as constituent of NA,



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compared to pure AzaA appeared to be increased. *Ex vivo* exflagellation tests using blood sampled from mice treated with NA at an AzaA dosage of 150 mg/kg, revealed a half life of NA anti-plasmodial compounds of up to 7 h.

Accumulated evidence on bioavailability and anti-plasmodial activity of limonoids against *Plasmodium* stages developing in the human and mosquito host, suggests *A. indica* as a valid resource for the design of limonoid dosed, transmission blocking phytomedicines.

DISCLOSURE The abstract has been submitted on 4th April, 2015 by Prof. Annette Habluetzel.

**PSI.021****Mapping fever aetiologies in malaria-endemic areas: an interactive, open-access, on-line map**

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**BACKGROUND** The causes of acute febrile illness are largely unknown in developing countries where diagnostic facilities for infectious diseases remain limited. With the shift to treatment of malaria based on parasite detection, it is now clear that a large proportion of patients with fever do not have malaria. Diseases such as dengue, leptospirosis, rickettsioses, community-acquired bacteraemia, and others are among the important causes of fever that require specific treatment approaches, but that currently cannot be diagnosed accurately in the vast majority of health care settings in tropical and subtropical regions.

**METHODS** A systematic review was conducted of studies published between 1980 and 2013 from sub-Saharan Africa and Southeast Asia, identifying major pathogens causing non-malaria febrile illness (NMFI) in these regions. Results of the literature review were compiled into a database, standardised using SNOMED Clinical Terms® and displayed in an interactive map that can be used to filter data by geographic region, patient age, study type, and other characteristics. A survey was conducted to seek feedback on the NMFI map from target users, including public health policy makers, programme implementers and funders, practitioners, epidemiologists, and clinical and implementation researchers.

**RESULTS** By June 2015, the map will be available on-line in open-access format, and also in an offline-capable format. Data have been extracted from 379 publications from 54 countries. The review highlights the high level of heterogeneity in methods studying fever aetiology. Depending on laboratory capacity, the proportion of pathogens identified varied substantially. Clear regional knowledge gaps were identified in sub-Saharan Africa. **CONCLUSIONS** Open-access global NMFI maps will provide both a central resource of known pathogen distributions, and a clear picture of how future focused research may most efficiently address the major knowledge gaps. Next steps include expanding the NMFI mapping project for global representation, to include the remaining tropical and subtropical regions of Asia, Central and South America, and the Caribbean; and including available data on antimicrobial resistance for the mapped pathogens. We

anticipate that this centralized data source will help to optimize the use of data on NMFI – both available and forthcoming – and to inform further work in this area.

DISCLOSURE Nothing to disclose.

**PSI.022****Disseminating research findings to inform malaria policy: examples from the ACT Consortium**

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Global health research aims to address the inequalities in health and improve the lives of populations at risk. But are research outcomes being effectively communicated to those who can put them into practice? An increasing number of funders see the value in allocating resources (budget and staff time) to the dissemination of research and results. Media professionals – from press and communications officers at research institutions to broadcast, print or online journalists – can make an important contribution in bridging the gap between academia and communities affected by global health issues. But many scientists still find themselves feeling frustrated about their work being simplified when it is communicated to wider audiences. In contrast, the open access movement and the social media revolution are paving the way for scientific knowledge to be broadly publicised. This presentation will be given by a former science journalist and current Technical Communications Officer at the ACT Consortium, an international research collaboration with 25 malaria research projects in 10 countries, funded by the Bill and Melinda Gates Foundation. It will include lessons learnt and examples from its communications and dissemination work, such as press releases, multimedia content, global advocacy, in-country outreach and translation.

DISCLOSURE Nothing to disclose.

**PSI.023****Efficacy and safety of intermittent preventive treatment with sulfadoxine-pyrimethamine (SP) and SP- piperaquine in schoolchildren in Kinshasa, The Democratic Republic of the Congo (RDC)**

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**BACKGROUND** In malaria endemic areas, asymptomatic malaria infection causes anemia, malnutrition and reduces cognitive abilities in schoolchildren. Intermittent preventive treatment (IPT) may be a suitable strategy to prevent malaria and its adverse effects in this specific group. The most appropriate drug regimen for IPT needs to be identified.

**METHODS AND DESIGN** A phase IIIb, randomised, controlled trial assessed the efficacy and safety of sulfadoxine-pyrimethamine (SP) and SP plus piperaquine (PQ) versus controls in asymptomatic congolese schoolchildren. Both treatments were given 4-monthly from baseline for a year as a single dose for SP and two doses at 24-h intervals for PQ. The primary endpoint was haemoglobin (Hb) concentration change over 12 months follow-up. Secondary endpoints were anaemia and clinical/malaria parasitaemia prevalence and incidence. A linear mixed model was used due to repeated measurements.

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**RESULTS** 616 children were enrolled in the trial of whom 410 (67%) were examined in the post-intervention survey 12 months later. Time had a significant effect on Hb level in all treatment groups [Control ( $F$ -test = 26.3,  $P < 0.001$ ); SP ( $F$ -test = 30.8,  $P < 0.001$ ); SP + PQ ( $F$ -test = 14.1,  $P < 0.001$ )]. A significant effect of interventions (IPs) on Hb was observed ( $F$ -test = 5.737,  $P < 0.01$ ) and Hb level was significantly higher in SP + PQ group than in the Control group [mean difference = 0.39 (95% CI: 0.12–0.66),  $P < 0.01$ ]. In contrast, no difference of Hb was found for other treatment group comparisons. SP + PQ treatment reduced anaemia, malaria parasitemia, and clinical malaria by 28% (95% CI: 19–37), 40% (95% CI: 26–52) and 58% (95% CI: 17–79), respectively, over 12 months. The corresponding protective efficacies of SP did not reach statistical significance. The time to onset of clinical malaria was significantly longer in the SP + PQ group than in the Control group [Time difference (TD) = 21.3 days (95% CI: 8.42–34.1),  $P = 0.001$ ] and in the SP group [TD = 17.3 days (95% CI: 3.8–30.9),  $P < 0.01$ ].

**CONCLUSION** SP + PS IPT offered substantial protection against anaemia, malaria parasitemia and clinical malaria in schoolchildren living in biyela health zone, indicating that SP + PQ can be a valuable alternative to SP alone for malaria prevention in schoolchildren living in a high-malaria-transmission setting.

**DISCLOSURE** Nothing to disclose.

## PS1.024

**Malaria, schistosomiasis and soil transmitted helminth burden and their correlation with anemia in children attending primary schools in Kinshasa, The Democratic Republic of the Congo**

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**BACKGROUND** Anaemia reduces cognitive potential in school children, retards their growth and predisposes them to other diseases. As there is a paucity of data on the current burden of *P. falciparum*, *S. mansoni* and soil transmitted helminths (STH) infections and their correlation with schoolchildren's anemia in the Democratic Republic of Congo (DRC), we collect these data.

**METHODS** This study reports baseline data collected from a randomized controlled trial investigating the impact of IPT with SP and SP-PQ on anemia and malaria morbidity in Congolese schoolchildren (Trial registration: NCT01722539; PACTR201211000449323.). *S. mansoni* and STH infections were assessed using Kato-Katz technique. Malaria infection and hemoglobin concentration were assessed using a blood smear and a Hemocontrol<sup>®</sup> device, respectively.

**RESULTS** 616 primary schoolchildren aged 4–13 years were enrolled. The prevalence of *Plasmodium* spp. infection was 18.5% (95% CI: 15.6–21.9). Amongst those infected, 24 (21%), 40 (35.1%), 40 (35.1%), 10 (8.8%), had light, moderate, heavy, very high malaria parasite density, respectively. Above 9 years of age ( $P = 0.02$ ), male and history of fever ( $P = 0.04$ ) were both associated with malaria infection. The overall prevalence of *S. mansoni* infection was 6.4% (95% CI: 4.4–9.1). Girls were associated with *S. mansoni* infection ( $P = 0.04$ ). *T. trichiura* was the most prevalent STH infection (26.3%), followed by *A. lumbricoides* (20.1%). Co-infection with malaria-*S. mansoni*

and malaria-STH was respectively 1.5% (CI 95%: 0.7–3.3) and 6.4% (CI<sub>95%</sub> 4.4–9.1). The prevalence of anemia was 41.6% (95% CI: 37.7–45.6) and anemia was strongly related with both *Plasmodium* spp. (aOR: 4.1; CI<sub>95%</sub>: 2.6–6.5;  $P < 0.001$ ) and *S. mansoni* infection (aOR: 3.3; CI<sub>95%</sub>: 1.4–7.8;  $P < 0.01$ ).

**CONCLUSION** Malaria and *S. mansoni* infection were strongly associated with high prevalence of anemia in schoolchildren.

Therefore, specific school-based interventions, such as intermittent preventive treatment or prophylaxis, LLITN distribution, anthelmintic mass treatment and micronutrient supplementation are needed to improve school children's health.

**DISCLOSURE** Nothing to disclose.

## PS1.025

**Explaining wide variation in malaria rapid diagnostic test uptake and adherence to test results: a multi-project analysis**

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**INTRODUCTION** Rapid diagnostic tests (RDTs) are being introduced in many countries, however the provision of tests alone, or with simple guidelines, does not automatically lead to their use, or adherence to their results.

**METHODS AND MATERIALS** Ten studies, connected under the ACT Consortium, undertook evaluations of interventions to introduce RDTs with various supporting interventions. A mixed methods synthesis approach was used to interpret variation in RDT uptake and adherence to positive and negative RDT results. Information about the interventions' content, their implementation and enactment, as well as their context was reviewed and transcripts of interviews with providers were analysed thematically.

**RESULTS** There was wide variation in all three outcomes. RDT uptake varied from 12% to 100%. Higher uptake was found when the providers were highly motivated to test, for example because they perceived the intervention to have enhanced their professional status, business income or respect within the community. This was found among volunteers or drug shop workers more than government health workers. Other factors associated with lower uptake included general lack of awareness about malaria testing (e.g. low prior use of microscopy, lack of community sensitisation), stockouts of RDTs, or staff feeling overworked. Adherence to positive RDT results ranged from 44% to 100%. More frequent stockouts of Artemisinin-based Combination Therapy (ACTs) were associated with lower adherence to positive results. Adherence to negative RDT results ranged from 27% to 99.9%. Higher adherence to negative results was associated with longer training, with more intervention components. Where providers had been used to relying on clinical judgement and the intervention failed to address this, or when there was a perceived lack of an acceptable alternative to anti-malarials, there was higher non-adherence. Lower adherence was also found where training messages placed less emphasis on the need to adhere to test results.

**CONCLUSION** A range of factors was associated with variations in RDT uptake and adherence to their results, beyond the intervention content alone. When introducing RDTs, it is important to consider the intervention package in terms of the context in which the tests are being introduced, as well as how they will be perceived and used by health workers.

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**DISCLOSURE** Nothing to disclose.

**PSI.026****Prototype positive control wells for malaria rapid diagnostic tests: training effectiveness, impact on RDT use and health worker perceptions in Lao PDR and Uganda**

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**BACKGROUND** Malaria rapid diagnostic tests (RDT) are widely used in health facilities and in community-based care settings in endemic countries. Reliable results from RDTs are critical, not only for patient management but also to maintain health worker (HW) confidence in RDT and ensure adherence to test results. Prototype positive control wells (PCW), plastic tubes containing critical concentrations of dried recombinant antigens (HRP2, pLDH, aldolase) that are reconstituted with water, have been developed for HW as tools to assess the quality of malaria RDT at the point of care.

**METHODS** HW routinely using RDT in Lao PDR ( $n = 269$ ) and Uganda ( $n = 289$ ) underwent standardized half-day training on the use of PCW; >70% were village health volunteers. After training, HW were supplied with PCW for 6 months, and recorded frequency and reason for PCW use and action taken. HW competency in PCW use was measured immediately after training and 3 and 6 months later. RDT use data were extracted from logbooks and impact was measured using a quasi-experimental study design with before and after comparison. Focus group discussions and interviews were also conducted.

**RESULTS** Immediately following training, 90% of participants in Lao and 80% in Uganda performed all critical PCW steps correctly; performance was generally maintained after 6 months. Most common errors were failing to fill the water dropper exactly to the measured mark, and to transfer exactly one drop of PCW solution to the RDT well. Overall, ≥91% of participants could correctly identify 'good' and 'bad' RDT and ≥89% could report appropriate action. 784 PCW were used during the study period in Lao PDR and 1679 in Uganda and >94% appropriate action based on PCW results. The most common reasons cited for performing PCW during routine work were receiving a new stock of RDT, and wanting to check on RDT stock quality. Initial field reports of negative RDT with PCW were not confirmed upon repeat testing. There was a 1.3 fold increase (RR 1.25, 95% CI 1.22–1.27) in RDT testing and improved adherence to test results (RR 1.00 95% CI 1.00–1.02) at health facilities with PCW. Facility based HW proposed PCWs be supplied separately from RDTs and frequency of checking not to be imposed.

**CONCLUSION** Prototype PCWs introduction with standard half-day training in diverse areas and diverse HW populations is feasible, acceptable and may improve HW confidence in RDT

results. It is planned for PCW to be commercially available in 2015.

**DISCLOSURE** Nothing to disclose.

**PSI.027****Trimethyl chitosan microparticles as drug delivery strategy for anti-folate drugs in the treatment of malaria**

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The rapid spread of *Plasmodium falciparum* strains that are resistant to chloroquine and pyrimethamine/sulfadoxine underscores the need for pharmacological initiatives to counter the resulting increases in malaria mortality and morbidity rates. Combination therapy is the cornerstone of malaria treatment primarily aimed to delay the development of resistance to the individual components. Although combinations including the anti-folate drugs proguanil and dapsone are effective, micro-encapsulation can be used to improve the bioavailability of these drugs. The objective of this study was the formulation and characterization of a proguanil hydrochloride and dapsone loaded trimethyl chitosan (TMC) microparticles to evaluate their *in vivo* bioavailability. TMC was synthesised by reductive methylation of chitosan accomplished by a chemical reaction between chitosan and iodomethane in the presence of sodium hydroxide. The TMC microparticles was synthesised by the ionic gelation technique from TMC. The *in vivo* bioavailability of the dapsone TMC formulation (3 mg/kg oral dose) relative to the normal dapsone formulation (3 mg/kg oral dose) was found to be 244% ( $n = 5$ ). The dapsone TMC microparticles were absorbed faster, i.e. the maximum concentration was attained 1 h after the administration of the dose relative to that of the normal dapsone formulation which reached its maximum concentration after 2 h. For the proguanil TMC formulation (16 mg/kg oral dose) relative to the proguanil formulation (16 mg/kg oral dose) was found to be 123% ( $n = 5$ ); whereas the bioavailability of cycloguanil obtained from 16 mg/kg of the proguanil TMC formulation oral dose was found to be 156%. Both proguanil formulations were absorbed quickly, and both attained the maximum formulation at 2 h after dose administration. Microencapsulating antimalarial drugs in TMC may increase the therapeutic potential of these drugs.

**DISCLOSURE** This research was partly funded by the NRF (South Africa). Any opinions, findings and conclusion or recommendations expressed in this material are those of the authors and therefore the NRF does not accept any liability in regard thereto.

**PSI.028****Pharmacokinetics/pharmacodynamics of intravenous artemisinin derivatives in *P. coatneyi*/rhesus monkey model for severe malaria**

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**INTRODUCTION** Severe malaria causes 40% mortality in untreated patients infected with *P. falciparum*. While quinine



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remains the standard of care in the US, resistance has been documented. Artesunate (AS) is widely used, but not available as an FDA-approved parenteral GMP product, and available formulations are unstable in aqueous solution. The US Army compared arteminic acid or artelinate (AL), a semi-synthetic derivative of artemisinin, to intravenous artesunate as potential GMP-formulated alternatives to replace quinine. We compared the pharmacokinetics (PK) and pharmacodynamics (PD) of AS and AL in a *P. coatneyi* rhesus macaque model of severe malaria.

**METHOD** *P. coatneyi* malaria causes a severe *P. falciparum*-like infection in splenectomized rhesus monkeys. Animals were inoculated with *P. coatneyi*-infected RBCs ( $5 \times 10^6$ /ml and 1% infected erythrocytes), treatment were initiated at day 6 at a parasitemia 3–14% or >200 000 parasites/ml, and the animals minimally symptomatic. Single, equimolar doses of 20 mmole of IV AS (8 mg/kg) or IV AL (11.8 mg/kg) were administered as a rapid bolus injection over a 1-min period, and heparinized blood was collected at 0, 5, 20, 40 min, 1, 3, and 6 h post-dose.

Aliquots of samples were made for simultaneous measurement of parent drug and primary metabolites by HPLC. The total antimalarial activity of the drug and all active metabolite(s) in plasma were measured by incubating samples from treated animals *ex vivo* against the W2 *P. falciparum* clone and expressed as dihydroartemisinin (DHA) equivalents.

**RESULTS** IV AS cleared 95% of *P. coatneyi* parasites significantly faster than IV AL (20.3 vs. 29.2 h,  $P = 0.01$ ). *Ex vivo* bioassay results showed that the anti-*Pf* activity of IV AS was higher than IV AL, attributable to both AS and its DHA metabolite. The PD of IV AS, parasites clearance time (7 days), was significantly correlated with the area under the curve of DHA ( $r^2 = 0.61$ ,  $P = 0.008$ ). IV AS was selected for further clinical development for the treatment of severe malaria based on a faster pharmacodynamic response against *P. coatneyi*, and greater anti-*Pf* activity *ex vivo*.

**DISCLOSURE** Nothing to disclose.

## PS1.029

## Optimal population-level deployment of artemisinin combination therapies

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**INTRODUCTION** Artemisinin-combination therapies (ACTs) are used worldwide as first-line treatment against confirmed or suspected *Plasmodium falciparum* malaria. ACTs together with vector control, individual protective measures against mosquitoes, prophylactic drug use, and improvements in health care capacity form the basis of modern malaria control and its elimination. Despite the recent success of these strategies at reducing the global burden of malaria, emerging resistance to artemisinin threatens those gains. Countering the onset of resistance may require deliberate tactics aimed at slowing the decline in ACT effectiveness.

**METHODS** Using a newly developed and recently validated individual-based microsimulation of regional malaria transmission, we revisit a classical dilemma in evolutionary epidemiology: how to apply a therapy as widely as possible

without also accelerating the erosion of its efficacy by drug resistance. We compare the simultaneous distribution of multiple first-line therapies (MFT) against strategies where ACTs would be cycled or used sequentially, either on a fixed schedule or when population-level efficacy reaches the WHO-threshold level of 10% treatment failure.

**RESULTS** We show that deploying multiple first-line therapies reduces the long-term number of treatment failures when compared to strategies where a single first-line ACT is recommended. We show that this result is robust to various epidemiological, pharmacological, and evolutionary features of malaria transmission. Additionally, we analyze the benefits of including a single non-ACT therapy in an MFT strategy and predict that this approach would have significant benefits in reducing the pressure on artemisinin-resistance evolution, delaying its emergence and slowing its spread.

**CONCLUSION** Adjusting national antimalarial treatment guidelines to encourage the simultaneous use of multiple first-line therapies is likely to extend the useful therapeutic life of currently available antimalarials resulting in long-term beneficial outcomes for patients.

**DISCLOSURE** Nothing to disclose.

## PS1.030

## In vitro metabolic profile of the antimalarial compound cryptolepine in humans and rats

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**INTRODUCTION** Cryptolepine is the main alkaloid in the root of the popular West African plant *Cryptolepis sanguinolenta* (Lindl.) Schltr, frequently used as an antimalarial, antidiarrhoeal and febrifuge remedy. The high use of the aqueous extract of the plant in traditional and hospital settings in Ghana has directed more studies investigating the pharmacokinetic and toxicological profile of the plant as well as its major alkaloids.

**OBJECTIVES** To characterize enzymes involved in the metabolism of cryptolepine and identify metabolites formed in rat and human hepatocytes.

**METHODS AND MATERIALS** The stability of cryptolepine in liver cytosol and S9 fractions was determined using the LC-MS/MS based on the parent depletion approach at various time points. The involvement of aldehyde oxidase (AO) in the metabolism of cryptolepine was confirmed using raloxifene (a nonspecific CYP-450 and a noncompetitive inhibitor of AO) and hydralazine (a time-dependent human AO inhibitor). To investigate the metabolites of cryptolepine formed in humans and rats, cryptolepine was incubated in human and rat hepatocytes and metabolites formed at 4 and 24 h identified with the LC-MS/MS.

**RESULTS** The percentage stability of cryptolepine in human S9 fraction in the presence and absence of NADPH cofactor was 58.5 and 63.9% respectively whereas in rat liver S9 fraction, the percentage stability in the presence and absence of NADPH was 62.8 and 62.9% respectively suggesting (a) non-NADPH dependent enzyme(s) involved in the metabolism of cryptolepine. In the enzyme phenotyping assay, raloxifene and hydralazine significantly reversed the metabolic instability of cryptolepine in rat and human S9 fractions. Nine (9) metabolites were identified in human and rat hepatocytes, resulting from metabolic pathways mainly involving hydroxylation (possibly by aldehyde oxidase), dihydroxylation (probably via epoxide intermediates

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from cytochrome P450 enzymes), and glucuronidation (possibly by UDP-glucuronyltransferase).

**CONCLUSIONS** These data taken together suggest that cryptolepine is a substrate for aldehyde oxidase and cytochrome P450 in rats and humans and UDP-glucuronyltransferase in humans.

**ACKNOWLEDGEMENT** I want to thank the D&I team of Novartis AG, Basel Switzerland for sponsoring my stay and research.

**KEYWORDS** Aldehyde oxidase; cryptolepine; *cryptolepis sanguinolenta*; malaria.

**DISCLOSURE** Nothing to disclose.

## PS1.031

## Mode of action of antimalarial peroxides

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Malaria is one of the most widespread infectious diseases which caused approximately 627 000 deaths worldwide in 2012. An advanced candidate in the antimalarial drug pipeline is OZ439, a synthetic peroxide, which has successfully finished phase IIa clinical trials. The mode of action of synthetic peroxides is still not fully understood. It has been shown that the peroxide bridge present in OZ439 – as well as in artemisinin – is needed for antimalarial activity. Therefore these two classes of compounds might have a similar mode of action. Our aim was to elucidate the mode of action of antimalarial peroxides such as OZ439 and OZ277.

In order to investigate the mode of action of OZ277 and OZ439 in *P. falciparum*, immunofluorescence experiments using monoclonal antibodies specific for adamantane-based antimalarials were performed to investigate whether the antibodies bind to target proteins in the parasite. Additionally, Western blotting and immunoprecipitation experiments were performed to identify target proteins.

Two monoclonal antibodies were identified that specifically bound to *P. falciparum* proteins in OZ-treated parasite cultures as based on immunofluorescence experiments. Distinct bands were observed in Western blot experiments. The identification of the target proteins is in progress.

The monoclonal antibodies used specifically bound to potential target proteins of OZ277 and OZ439 in *P. falciparum* but the respective proteins could not be identified so far by immunoprecipitation. As an alternative approach, a click chemistry strategy is currently under development.

**DISCLOSURE** Nothing to disclose.

## PS1.032

High level *Plasmodium falciparum* sulfadoxine-pyrimethamine resistance with the concomitant occurrence of the septuple haplotype in Tanzania

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**BACKGROUND** Tanzania abandoned sulphadoxine-pyrimethamine (SP) as the first-line treatment for uncomplicated

malaria in 2006 due to high levels *Plasmodium falciparum* resistance. However, SP is still being used for intermittent preventive treatment during pregnancy (IPTp-SP). Here, we assessed the pattern of *P. falciparum* dihydrofolate reductase (*Pf dhfr*), dihydropteroate synthetase (*Pf dhps*) mutations and haplotypes in areas with varied malaria epidemiology in mainland Tanzania.

**METHODS** A total of 264 samples were collected during cross-sectional surveys conducted between May–August 2013 in three districts of Muheza, Muleba and Nachingwea in Tanga, Kagera and Lindi regions, respectively. The *Pf dhfr*, *Pf dhps* haplotypes were amplified by using nested PCR and detected by sequence specific oligonucleotide probe-enzyme linked immunosorbent assay (SSOP-ELISA) assay.

**RESULTS** The triple *Pf dhfr* mutant haplotypes (CIRNI) were predominant in all sites with significantly higher frequencies at Muheza district (93.9%) than Muleba (73%) and Nachingwea (65.15%), ( $P < 0.001$ ). Overall, the wildtype *Pf dhps* (SAKAA) haplotype was significantly lower at Muheza (1.3%), ( $P = 0.002$ ). Double *Pf dhps* haplotype SGEAA was significantly abundant at Muheza (28%) and Muleba (22.1%) compared to none (0%) at Nachingwea ( $P < 0.001$ ). In contrast, the prevalence of triple *Pf dhps* SGEAA haplotype was significantly higher at Muheza (38.8%) as compared to Muleba (1.5%) and none at Nachingwea ( $P < 0.001$ ). In Nachingwea, significantly higher prevalence (65.9%) of another triple *Pf dhps* AGEAA haplotype was detected ( $\chi^2 = 39.9$ ,  $P < 0.001$ ). The combinations of *Pf dhfr*-*Pf dhps* as quintuple CIRNI-SGEAA ( $n = 25$ ), sextuple CIRNI-SGEAA ( $n = 24$ ) and CIRNI-AGEAA ( $n = 53$ ) haplotypes were detected including the emergence of a septuple mutant haplotype CIRNI-AGEAA ( $n = 9$ ) predominantly at Muheza.

**CONCLUSION** These results ascertain the high prevalence and saturation of *Pf dhfr* and *Pf dhps* haplotypes conferring SP resistance. The high prevalence of *Pf dhfr*-*Pf dhps* mutant haplotypes could undermine the efficacy of IPTp-SP leading to poor pregnancy outcomes. In these settings, additional control efforts are needed and evaluation of alternative drugs for IPTp is an urgent priority.

**DISCLOSURE** Nothing to disclose.

## PS1.033

## Efficacy and safety of retreatment with the same artemisinin-based combination compared to the recommended rescue treatments (QUINACT study)

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**BACKGROUND** Artemisinin-based combination treatments (ACTs) are recommended for 1st line treatment in uncomplicated malaria. Quinine + clindamycin (QnC) or another ACT is recommended as rescue treatment. In field circumstances, patients are often re-treated with the same antimalarial drug, with unclear evidence on the outcome and long term consequences. We assessed safety and efficacy of retreatment of clinical failures with the 1st line ACT compared to recommended other rescue treatments.

**METHODOLOGY** A randomized, open label, 3-arm clinical trial was conducted in the DR Congo (DRC) and Uganda. Patients

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aged 12–60 months with uncomplicated malaria were selected and treated with the recommended first line treatment, artemether-lumefantrine (AL) in Uganda and artesunate-amodiaquine (ASAQ) in DRC and followed up for 42 days. In a randomized clinical Trial (RCT), following a 2:2:1 ratio, eligible clinical failures were randomised to either ASAQ, AL or QnC. The outcome was assessed following WHO 2003 criteria. Data were pooled as retreatment or per regimen.

**RESULTS** Of the 2115 enrolled in the Pre-RCT, 571 were enrolled in the RCT after failing to ASAQ (DRC: 242) or AL (Uganda: 329). Among them 518 (90.7%) were assigned an efficacy outcome. The risk of crude treatment failure was lower after retreatment with an alternative ACT (42.9%, 97/228, HR = 1.6; 95% CI: 1.0–2.5,  $P = 0.03$ ) and may also be lower after retreatment with the same ACT (38.1%, 82/215, HR = 1.5; 95% CI: 0.9–3.1,  $P = 0.13$ ). When assessing per molecules, the risk of failure after treatment with ASAQ was 38.2% (78/204, HR = 1.5; 95% CI: 0.9–2.3,  $P = 0.10$ ) and 42.5% for AL (97/228, HR = 1.6; 95% CI: 1.0–2.5,  $P = 0.04$ ). Risk factors for crude failure were lack of mosquito net ( $P = 0.001$ ) and treatment with AL ( $P = 0.01$ ). After PCR-adjustment (only DRC), all treatments showed a similar efficacy with 7.0% (6/86), 9.3% (9/97, HR = 1.3;  $P = 0.61$ ) and 11.4% (4/35, HR = 1.5;  $P = 0.56$ ) recrudescence for ASAQ, AL and QnC respectively. Alternative ACT showed less drug-related adverse events ( $P < 0.001$ ). AL was better tolerated, compared to QnC ( $P < 0.001$ ) and ASAQ ( $P < 0.001$ ). No serious adverse events were reported in the RCT phase.

**CONCLUSION** QnC had lower risk of crude treatment failure compared to an alternative ACT. With observed treatment, QnC had thus higher prophylactic effect. After PCR adjustment -only in DRC available- recrudescence rate was comparable between all rescue treatments. NCT01374 581.

**DISCLOSURE** Nothing to disclose.

## PS1.034

### Uncomplicated malaria features and efficacy of artesunate-amodiaquine after 42 days of passive follow up in the Democratic Republic of Congo

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**BACKGROUND** In the Democratic Republic of Congo, artesunate-amodiaquine (ASAQ) and artemether-lumefantrine (AL) are recommended as first line treatment, but ASAQ is commonly used. We describe malaria features in Kinshasa and also constitute a cohort for a randomized clinical trial (RCT) to assess efficacy of ASAQ, AL and quinine + clindamycin as rescue treatment.

**METHODS** Patients aged between 12 and 60 months with uncomplicated falciparum malaria were treated with ASAQ and followed up for 42 days. During follow up, blood smears were only performed when patients were clinically suspected for malaria relapse and at completion. To distinguish new infections from recrudescence parasites, samples were genotyped using a stepwise strategy with up to three molecular markers (GLURP, MSP2 and MSP1). PCR-uncorrected and corrected day-42 cure rates were assessed. Multiplicity of infection (MOI) at individual and population level was assessed by the number of alleles detected on each sample.

**RESULTS** In total 2796 patients were screened of whom 49.9% were malaria positive. 866 were enrolled of whom 496 (57.3%) were sick at least once during the previous 2 months. Apart from (history of) fever (100%), clinical features were characterized by flu (59.9%) and weakness (59.4%). Geometric mean of parasite load was 230 007 (95% CI: 21 047–25 149). No clinical failure occurred before day 14. Crude efficacy of ASAQ was 55.9% (95% CI: 52.4–59.5) but PCR-adjusted efficacy was 92.8% (95% CI: 90.9–94.6). 83.3% of the recurrences were new infections. Lower mean parasitaemia at enrolment was correlated with crude failure ( $P = 0.003$ ) but not with recrudescence. Low hemoglobin at recruitment was predictor of failure ( $P = 0.001$ ). Polyclonal infections were more frequent (88.1% on day 0 and 80.1% in recurrences) compared to monoclonal infections ( $P = 0.005$ ). The median MOI of recurrence samples (MOI = 3; IQR: 1–5) were lower than the MOI for day 0 samples (MOI = 3.7; IQR: 0.7–6.7;  $P < 0.001$ ). Polyclonal infections were more often in pre-treatment samples than recurrences (OR: 1.8; 95% CI: 1.20–2.8).

**CONCLUSION** PCR-corrected efficacy of ASAQ is still above the required threshold of 90%. However, crude efficacy was relatively low, suggesting a poor prophylactic effect of amodiaquine in the study area. Assessment of AQ resistance profile as well as the consequences of the MOI are needed.

**DISCLOSURE** Nothing to disclose.

## PS1.035

### Estimating of the amount of artemether and lumefantrine excreted through breast milk

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**INTRODUCTION** Artemisinin based combination therapies (ACTs) are widely used and recommended by WHO as first-line therapy for uncomplicated *P. falciparum* malaria in nursing mothers. However, artemether-lumefantrine (AL, Coartem<sup>®</sup>) is not recommended for use during lactation (no breast feeding for at least up to 28 days after last dose) as the excretion of AL in breast milk has not been studied. Clinical data on dihydroartemisinin (DHA, metabolite of artemether) suggest clinically insignificant amount of DHA is excreted in breast milk (peak concentration of 35 ng/ml), after 200 mg artesunate oral dose. In the absence of clinical data, the amount of AL excreted into breast milk has been estimated based on the milk-to-plasma drug concentration ratio (M/P ratio) obtained from preclinical studies. Of note, in a pre-postnatal preclinical study there were no developmental changes in rat pups fed exclusively on the milk of mothers who received 50 mg/kg/day of AL (7.1 mg/kg artemether, 42.9 mg/kg lumefantrine) up to day 21 of lactation.

**METHODS** In rats the M/P ratio was estimated from distribution of radioactivity in mammary gland after oral administration of radiolabelled artemether and lumefantrine. The potential amount of each drug moiety excreted in mother's breast milk in 24 h was estimated by M/P ratio × maternal plasma C<sub>max</sub> concentration × 150 ml/kg/day (volume of milk consumed per day per kg body weight of infant).

**RESULTS** The maximum M/P ratios observed over 24 h for artemether and lumefantrine were 1.04 and 1.3, respectively. Over the recommended six doses of AL, the mean maximum plasma concentrations of artemether and lumefantrine were 186 ng/ml and 25.7 µg/ml, respectively, in malaria patients.



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Based on the M/P ratio and plasma levels of artemether and lumefantrine, the estimated daily cumulative consumption of artemether and lumefantrine by infants through breast milk following recommended AL doses in nursing mothers is 0.03, 5.01 mg/kg, respectively.

**CONCLUSION** In the current exploratory assessment, estimated amount of artemether and lumefantrine excreted per 150 ml (per day per kg milk consumption by infant) of breast milk is 0.03, 5.01 mg, respectively, which is ~270 and ~10 fold lower than the recommended daily dose (40 mg and 240 mg of artemether and lumefantrine dose respectively) for 5 kg body weight infants.

**DISCLOSURE** All the authors are employees of Novartis Institutes for Biomedical Research.

**PSI.036****Selective sweeps and genetic lineages of *Plasmodium falciparum* multi-drug resistance (*pfmdr1*) gene in Kenya**

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**INTRODUCTION** Artemether-lumefantrine (AL) has been the first-line treatment for uncomplicated falciparum malaria in Kenya since 2006. AL selects for K76 in *pfprt* and N86, 184F and D1246 in *pfmdr1* genes in recurring parasites compared to the baseline infections. Microsatellite (MS) analysis of loci flanking genes associated with antimalarial drug resistance has been used in defining the geographic origins and dissemination of resistant parasites. Kenya has diverse malaria transmission intensities with varying malaria endemicities. This study investigated evidence of selective sweep and genetic lineages in *pfmdr1* genotypes selected for by AL in treatment of malaria infections in Kenya.

**METHODS AND MATERIALS** Parasites (247) from different regions in Kenya (Kisumu, Kisii, Kericho and Malindi) were analyzed for polymorphisms at codons 86, 184 and 1246 in *pfmdr1*. Samples were typed for 8 NMS and 13 MS loci flanking *pfmdr1*.

**RESULTS** Full data set was obtained in 79% (186) of the samples. Overall, the prevalence of N86 and D1246 was highest at 85.1% and 90.5% respectively. The most prevalent haplotype was NFD at 53.2%, whereas the least prevalent was YFY at 1.1%. Per site, N86 was highest in Kisumu at 92.6% and lowest in Malindi at 65.1%. Kericho had the lowest prevalence of mutant alleles in all the loci whereas Malindi had the highest. Kisumu had the highest prevalence of NFD (63.4%) whereas Malindi had the lowest (29.7%). The mean  $H_E$  for NMS was 0.96 (SE 0.005) vs. 0.627 (SE 0.028) for the 13 MS indicating selection. Parasites carrying mutant alleles had reduced  $H_E$  compared to the wild type NYD except for NFD. Analysis of parasite genetic lineages is underway.

**CONCLUSION** Data show a high prevalence of NFD and NYD, difference in genetic diversity between sites and evidence of selection in *pfmdr1* gene that is statistically different between sites. Data indicate parasites are evolving differently in response to AL drug pressure from one region to another suggesting the rate at which AL tolerance will develop in different regions of Kenya might vary.

**DISCLOSURE** Nothing to disclose.

**PSI.037****Safety of artesunate-amodiaquine, artemether-lumefantrine and quinine + clindamycin as rescue treatment of uncomplicated *Plasmodium falciparum* malaria: an open-label, randomized trial in Kinshasa, the Democratic Republic of Congo**

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**BACKGROUND** Artemisinin-based combination therapy (ACT) is currently the best option for the treatment of uncomplicated malaria. Quinine is recommended for rescue treatment. However, patients are repeatedly treated with the same antimalarial drug and safety information on this practice is insufficient. To bridge this gap, we report safety data from the quinaact randomized clinical trial (RCT) that was designed to assess efficacy and safety of ASAQ, AL and quinine + clindamycin as rescue treatment after ASAQ treatment.

**METHODOLOGY** The trial was conducted in 3 phases with an informed consent for the 2 first. Males and females aged 12–60 months with uncomplicated malaria were treated with ASAQ and followed up for 42 days (pre RCT). Clinical failures were randomized to the mentioned treatments and followed up for 28 days (RCT). ASAQ was repeatedly used for subsequent failure (post RCT) until a 28-days follow up period without parasitaemia. The adverse events (AEs) were grouped according to the WHO adverse reaction terminology. Causality and severity assessment were done following WHO criteria.

**RESULTS** 866, 242 and 64 patients were recruited pre RCT, RCT and post RCT respectively. Pre RCT, 433 (50%) patients experienced at least one drug-related AE. The most reported AEs were anorexia (23.6%), asthenia (20%), and abnormal behavior (15%). Twenty nine AEs (3.5%) were reported to be severe. In RCT, at least one drug-related AE was reported in 57.7%, 21.5% and 40% of patient randomized respectively to ASAQ, AL and Quinine + clindamycin ( $P < 0.001$ ). AL was the best tolerated, except for gastro-intestinal disorders. Post RCT, 51.6 patients experienced at least one drug-related AE. Three serious adverse events occurred during the trial, but none of them was related to study medication.

**CONCLUSION** The proportion of AEs occurrence did not increase over the treatment courses with ASAQ. However, continuous safety monitoring is important.

**DISCLOSURE** Nothing to disclose.

**PSI.038****How is *Plasmodium falciparum* parasite invitro growth fitness affected by drug resistance associated *Pfprt* mutations?**

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**INTRODUCTION** Development and spread of *P. falciparum* malaria parasite resistance to commonly used antimalarial drugs is a major obstacle to achieve elimination. Several questions remain concerning the risk of selection of genetic alterations associated with resistance and how such alterations effect the parasite growth (fitness). We have performed an *in vitro* study

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on commonly used artemisinin partner drugs to determine to what extent and how increased resistance and decreased fitness simultaneously affect parasite competitiveness and selection. **MATERIAL AND METHODS** Genetically modified isogenic clones only differing in the crucial *P. falciparum* chloroquine resistance transporter gene (*pfcr*) will be used to explore the cost-benefit effect of two altered haplotypes (*pfcr* 72–76 CVIET and SVMNT) in comparison with parasites without the alterations (*pfcr* 72–76 CVMNK). The clones are determined for susceptibilities to five commonly used partner drugs (Amodiaquine, Desethyl-amodiaquine, Mefloquine, Piperaquine) as well as Chloroquine. Parasite drug susceptibilities are measured through HRP2- Elisa. Relative fitness is determined through pair-wise growth competition experiments between clones in separate cultures, in parallel cultures in indirect contact through transwell membranes and in mixed cultures in direct contact, where allele proportions are determined by pyrosequencing. From this data we will determine the fitness cost and the benefit of resistance and as such the risk of selection in relation to the drug concentration. **RESULTS** Preliminary data show that parasites with the alterations grow less per asexual cycle in separate cultures as compared to parasites without the alterations. Under low drug concentrations they grow less due to a predominant fitness cost, whereas beyond a cut-off concentration they grow more due to a benefit of increased resistance. Transwell cultures are on-going. **CONCLUSION** Information regarding the cost-benefit of antimalarial drug resistance is crucial to understand the selection of resistant *P. falciparum* parasites to possibly optimize drug policies and prevent re-emerging drug resistance. **DISCLOSURE** Nothing to disclose.

## PS1.039

## Therapeutic efficacy of a piperaquine-containing ACT during malaria recrudescence period in Ampandriakilandy (Madagascar)

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Malaria still remains a public health issue in the island of Madagascar. Since 2006, the official recommended antimalarial treatment for uncomplicated malaria is artemisinin-based combination therapy (ACT). In 2012, a malaria epidemic occurred in Ampandriakilandy – a rural commune within the health district of Antsohihy whilst local health facilities run out of ASAQ and RDTs. We suggested the use of the combination dihydroartemisinin + piperaquine phosphate + trimetoprim (DPT) commercially recorded in Madagascar. Following ethical clearance from the Ministry of Health, DPT was used in a tract and treat manner. Also, its therapeutic efficacy over 28 days was assessed. From May to June 2012, *Plasmodium falciparum*-infected patients aged >1 year with parasitemia  $\geq 500/\mu\text{l}$  were enrolled ( $n = 103$ ). DPT was orally administered under medical supervision at the recommended dose over 2 days. Patients were followed up until day 28. Adequate clinical and parasitological response (ACPR) was defined according to the standard WHO protocol. A 6 year old girl was dead on day 1 following convulsion. Her parasitemia on day 0 was 32 000/ $\mu\text{l}$ . Three patients (2.9%) were either excluded from follow-up. Among the 99 patients who completed the 28 day follow-up, 18.2% (18/99) were <5 years old. DPT was well tolerated. Per-protocol analysis

on day 28 shows that the cure rate (ACPR) was 94.9% before PCR correction. On day 3, two children (2%) aged 2 and 6 years old had positive smears (respectively 94 and 63 trophozoites/ $\mu\text{l}$ ). Five patients presented a late parasitological failure (5.1%). All recurrent parasitemia were re-infections and the PCR corrected efficacy rate was 100%. *P. falciparum* isolates examined were pfk13 wild-type. Our results demonstrate that DPT is highly efficacy. Given that piperaquine is providing post-treatment prophylaxis for re-infection thanks to its long half-life, we believe that piperaquine-containing ACT, different from the first-line treatment artesunate + amodiaquine, can be specifically used to control malaria epidemic in Madagascar. **DISCLOSURE** Nothing to disclose.

## PS1.040

## Ex vivo anti-malarial drug susceptibility of Plasmodium falciparum isolates from pregnant women in an area of highly seasonal transmission in Burkina Faso

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**INTRODUCTION** *Ex vivo* assays are usually carried out on parasite isolates collected from patients with uncomplicated *Plasmodium falciparum* malaria, from which pregnant women are usually excluded as they are often asymptomatic and with relatively low parasite densities. Nevertheless, *P. falciparum* parasites infecting pregnant women selectively sequester in the placenta and may have a different drug sensitivity profile compared to those infecting other patients. The drug sensitivity profile of *P. falciparum* isolates from infected pregnant women recruited in a treatment efficacy trial conducted in Burkina Faso was determined in an *ex vivo* study.

**METHODS AND MATERIALS** The study was conducted between October 2010 and December 2012. *Plasmodium falciparum* isolates were collected before treatment and at the time of any recurrent infection whose parasite density was at least 100/ $\mu\text{l}$ . A histidine-rich protein-2 assay was used to assess their susceptibility to a panel of seven anti-malarial drugs. The concentration of anti-malarial drug inhibiting 50% of the parasite maturation to schizonts (IC<sub>50</sub>) for each drug was determined with the IC Estimator version 1.2.

**RESULTS** The prevalence of resistant isolates was 23.5% for chloroquine, 9.2% for mefloquine, 8.0% for monodesethylamodiaquine, and 4.4% for quinine. Dihydroartemisinin, mefloquine, lumefantrine, and monodesethylamodiaquine had the lowest mean IC<sub>50</sub> ranging between 1.1 nM and 1.5 nM. The mean IC<sub>50</sub> of the tested drugs did not differ between chloroquine-sensitive and resistant parasites, with the exception of quinine, for which the IC<sub>50</sub> was higher for chloroquine-resistant isolates. The pairwise comparison between the IC<sub>50</sub> of the tested drugs showed a positive and significant correlation between dihydroartemisinin and both mefloquine and chloroquine, between chloroquine and

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lumefantrine and between monodesethylamodiaquine and mefloquine.

**CONCLUSION** These *ex vivo* results suggest that the currently available artemisinin-based combination treatments are efficacious for the treatment of malaria in pregnancy in Burkina Faso.

**DISCLOSURE** Nothing to disclose.

**PS1.041****No SVMNT haplotype found in the Democratic Republic of Congo**

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**INTRODUCTION** One of the current problems of malaria control is the emergence and spread of *P. falciparum* strains that become resistant to almost all drugs available. In the Democratic Republic of Congo (DRC), the artesunate-amodiaquine combination was chosen for 1st line malaria treatment.

Monitoring drug resistance is essential for early detection and subsequent prevention of the spread of drug resistance by timely changes of treatment policy. This study was conducted to explore amodiaquine (AQ) resistance through a molecular marker, the SVMNT haplotype on the *Plasmodium falciparum* chloroquine resistance transporter (pfcrt) gene, in DRC.

**METHODS AND MATERIALS** Three DRC provinces (Equateur, Kinshasa and Kasai-Occidental) were randomly selected in which 300 blood samples from asymptomatic individuals were collected on filter-paper. Malaria parasites identification was made by a real-time PCR assay. A 157 pb fragment of the Pfcrt gene, containing the region of interest, was amplified by a classic PCR and the amplicons were sequenced. The sequences were aligned using the GeneStudioTM<sup>®</sup> Professional software and were compared with the Pfcrt reference sequence by using the online BLAST tool.

**RESULTS** *P. falciparum* was correctly identified in 48% (144/300) of the samples. The K76T mutation was found in 61%, 67% and 71% respectively in Kinshasa, Kasai-Occidental and Equateur province. All mutants harbored the CVIET haplotype. The SVMNT haplotype was not found.

**CONCLUSION** This study was conducted to explore the presence of the SVMNT haplotype, related to AQ resistance in three provinces of the DRC. Our results suggest that AQ remains effective in this region but resistance surveillance studies must be repeated over time.

**KEYWORDS** SVMNT, Haplotype, DR Congo, resistance.

**DISCLOSURE** Nothing to disclose.

**PS1.042****The effect of hydroalcoholic extract of *Nigella sativa* on infected mice with *Plasmodium berghei*: evaluation of immune deviation and the serum level of IFN- $\gamma$  and IL-4**

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**INTRODUCTION** Malaria is one of the most widespread infectious diseases of tropical countries with an estimated 207

million cases globally. Treatment of malaria has become more difficult because of drug-resistant parasites. Therefore, safe and effective new drugs are needed. Traditional medicine is an important source for new drugs. Because of its simplicity, lower cost, lower rate of serious complications, and greater tolerability, there has been a great progress in using herbal medicines for treating diseases.

**OBJECTIVE** The aim of this study was to evaluate the anti-malarial and immune modulatory effects of *Nigella sativa* against *Plasmodium berghei* *in vivo*.

**METHODS AND MATERIALS** The powder was macerated in methanol, filtered with Bohnner hopper and solvent was separated in rotary evaporator. The toxicity of herbal extract was assessed on naive mice with high, average and low doses. Antimalarial efficacy and cytokines level of IFN $\gamma$  and IL-4 was investigated on five groups of *Plasmodium berghei* infected Balb/c mice.

Percentage of parasitaemia and surveillance were also evaluated.

**RESULTS** The results of this study showed no toxicity even with high concentrations of herbal extract. A significant reduction in percentage of parasitaemia was observed in the treatment group. Infected mice that have been treated with *Nigella sativa* have a significant increment in serum level of IFN $\gamma$  but not for IL-4.

Treated mice have higher surveillance.

**CONCLUSION** *Nigella sativa* extracts showed antimalarial effects against murine malaria with some efficacies on increasing surveillance. The immune regulation effects of treating *Plasmodium berghei* in mice may highlight a new treatment for brain malaria in humans. However, there is a need to evaluate the immune mechanism and also find the major component of this herbal extract through further studies.

**DISCLOSURE** *Nigella sativa* extracts increased the level of IFN- $\gamma$  & IL-4.

**PS1.043****Mapping sulphadoxine-pyrimethamine resistance markers in Nigeria between 2002 and 2014**

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**INTRODUCTION** Intermittent preventive treatment of malaria during pregnancy (IPTp) and in infants (IPTi) with sulphadoxine-pyrimethamine (SP) is a major strategy for malaria control in African countries where malaria is endemic, including Nigeria. However, the implementation of this strategy is faced with challenges such as timing of SP administration and rising levels of parasite resistance to SP in the general population. SP resistance is associated with mutations in the genes of dihydropteroate synthetase (dhps) and dihydrofolate reductase (dhfr). Three *Pfdhfr* mutations N51I, C59R and S108N, known as the triple mutation, and the *Pfdhps* mutations A437G and K540E, known as the double mutation, collectively form the quintuple mutations. The quintuple mutation and an additional mutation on the dhps (A581G) are known to confer high level of SP resistance. The World Health Organization (WHO) has recommended that prior to implementation of IPT-SP in any region with moderate to high malaria transmission, the prevalence of these markers of resistance with special emphasis on K540E should be determined and IPT-SP



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commenced only in regions with a prevalence rate <50%. Recent data show growing concerns of SP resistance in Nigeria (Oguike *et al.*, yet to be published) with emerging novel dhps haplotypes and the triple mutant (IRN) dhfr haplotypes but their effect on efficacy of IPT-SP is unknown. There is paucity of data on SP resistance markers in Nigeria. Therefore, there is need for continuous monitoring of these resistance markers over the years to provide comprehensive data that will guide implementation of IPT-SP in Nigeria.

**METHODS** We identified molecular markers of SP resistance by direct PCR sequencing in 1200 malaria positive blood spots collected from pregnant women and children attending hospitals across Southwest, Southeast, South south and Northeast Nigeria. **RESULTS AND CONCLUSION** Prevalence of markers in each site, and temporal patterns in these markers from 2002 to 2014 will be presented.

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**DISCLOSURE** Nothing to disclose.

## PSI.044

Distribution of target site resistance to pyrethroids in field populations of *Aedes aegypti* in Thailand

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**INTRODUCTION** DF and DHF are important public health problems in many regions including Thailand. In the absence of vaccine, insecticidal control of mosquito vectors is one practical option for disease management. Pyrethroids are used both as repellents and chemical control of *Aedes* vectors. However, emergence of resistance to pyrethroids has recently been noted in some areas. In this study, we detected insecticide resistance at generic level which should be useful for planning vector control programs.

**MATERIALS AND METHODS** Samplings were carried out in 48 provinces and 3 tourist islands in Thailand where *Ae. aegypti* larvae were collected. Mosquitoes were analyzed for pyrethroid resistance by PCR-RFLP method using voltage-gated sodium channel gene. Locations of larval collection were positioned by GPS in order to construct GIS maps. Relationship between insecticide resistance and the use of household insecticides was investigated by questionnaire.

**RESULTS AND CONCLUSION** Mosquitoes from 5 out of 48 provinces showed very high frequency of resistance; the percentages of homozygous resistance (RR) ranged from 60.0% to 73.3%. In contrast, 6 provinces showed low resistance level (0.0–16.7%). The high frequency of RR was found in 24 provinces and 1 tourist island (40.0–59.6%), while the moderate frequency was detected in 13 provinces and 2 tourist islands (21.0–39.8%). The trend of resistance emergence was presented as heterozygous susceptibility (RS) and the highest level reached 93.4%. Frequencies of homozygous susceptibility (SS) were reported from each of the study areas ranging from 7.0% to 76.6%. GIS maps showing collection sites and frequencies of RR, RS and SS to pyrethroids of *Ae. aegypti* mosquitoes were constructed. A total number of 390 questionnaires was analyzed and a significant correlation ( $F = 8.01$ ;  $df = 1, 11$ ;  $P < 0.017$ ) was found between the distribution of resistance and the household

use of pyrethroids. Results obtained could be used for future planning of DF and DHF vector control programs.

**DISCLOSURE** Nothing to disclose.

## PSI.045

## Is implementing full coverage of long-lasting insecticidal nets a good alternative strategy after indoor residual spraying with bendiocarb withdrawal in pyrethroid resistance areas?

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**INTRODUCTION** From 2008 to 2010, Indoor Residual Spraying (IRS) was implemented in the department of Ouémé in Benin. It was a large scale campaign highly successful with a drastic drop of 94% of the Entomological Inoculation Rate (EIR). But, considering the fact that the intervention was very expensive and burdensome, Benin National Malaria Control Program decided to shift IRS to Long-Lasting Insecticidal Nets (LLINs) in 2011. Olyset nets were distributed with a rate of one bednet for 1.9 people to the communities that were previously targeted by IRS. Did the LLINs strategy provide a better level of protection against malaria transmission than IRS?

**METHODS AND MATERIALS** This study was carried out in four districts of the department of Ouémé. Entomological surveillance carried out to assess indicators of transmission risk during the last year of IRS (2010) and the first year after the LLIN intervention (2011) was put in place. Mosquito biting rate was sampled by human landing collection. Females of *Anopheles gambiae* s.l. were dissected to estimate the parity rates. A subsample of the *An. gambiae* s.l. collected was tested for presence of *Plasmodium falciparum* sporozoites. In addition, window exit traps and pyrethrum spray catches were performed to assess exophagic behavior of *Anopheles* vectors.

**RESULTS** The spontaneous and widespread use of LLINs is a strategy as effective as IRS. In fact, Anopheline aggressiveness was the same during both periods (IRS and LLINs). Unlike, infectivity rates of *An. gambiae* for *Plasmodium falciparum* ( $CS^{+IRS} = 0.02$ ;  $CS^{+LLINs} = 0.029$ ) ( $P = 0.330$ ) did not increase after the replacement of IRS by LLINs. This is the same for the daily inoculation rate: EIR = 13 infective bites for a period of 9 months under IRS and 10.40 after IRS withdrawal for the same period. But, exophily decreased and parity rate increased after IRS cessation in all areas ( $P < 0.001$ ).

**CONCLUSION** The large-scale use of LLINs is an effective alternative to the cessation of IRS.

**DISCLOSURE** Nothing to disclose.

## PSI.046

## Operationalization of insecticide resistance monitoring on malaria and dengue vectors in the republic of the Philippines

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The wide-scale use of insecticide-based vector control strategies has led to concerns of development of resistance in malaria

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(*Anopheles flavirostris*, *Anopheles maculatus*) and dengue (*Aedes aegypti*) vectors in the Philippines. Insecticide susceptibility monitoring in the Philippines has been being undertaken despite challenges to have it operationalized to provide the program information for prevention and or implementation of resistance management strategies. To come up with sensitive detection method, attempts were made to establish discriminating doses of different insecticides for the local vectors, as well as modification to the WHO procedure to better see trends of resistance development.

Buffalo-baited traps collections of malaria vectors were conducted in 6 sentinel (Davao, Palawan, Mindoro, Kalinga, Isabela, and Agusan) 1 to determine susceptibility of adult malaria vectors. Ovitrap however were used to collect populations of *Aedes aegypti* on selected cities in Metro Manila for both larval and adult susceptibility tests.

Adult females were exposed to diagnostic doses of various insecticides: pyrethroids (Deltamethrin 0.05%, Etofenprox 0.5%, Permethrin 0.75%, Lambdacyhalothrin 0.05%, Cyfluthrin 0.15%); organochlorines (DDT); and organophosphate (Malathion 5%) for susceptibility tests using insecticide-impregnated papers following the standard WHO testing protocol.

Data showed that *An. flavirostris*, the primary vector of malaria, from sentinel sites remained susceptible to pyrethroid insecticides except Occidental Mindoro strain (89.33% mortality).

High population of *An. maculatus* (secondary vector of malaria) from Occidental Mindoro permitted testing for susceptibility. Results showed more than 98% mortality for deltamethrin, etofenprox and permethrin indicating susceptibility. However, resistance to lambdacyhalothrin, cyfluthrin and DDT (80 and 95% mortality) was recorded.

Insecticide susceptibility tests of *Ae. aegypti* (primary vector of dengue) collected from 3 barangays in Mandaluyong City shows complete susceptibility to malathion (100% mortality). Percentage mortalities to the other insecticides however were <80% indicating resistance of *Ae. aegypti* population to the other test insecticides.

The current resistance situation of disease vectors in the Philippines necessitates immediate implementation of insecticide resistance management measures.

DISCLOSURE Nothing to disclose.

## PSI.047

### Epidemiology and clinical significance of non-tuberculous mycobacteria in presumptive tuberculosis patients in Bagamoyo, Tanzania

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**BACKGROUND** Non-Tuberculous Mycobacteria (NTM) can cause pulmonary diseases particularly to patients with TB history, chronic obstructive pulmonary diseases and HIV-infection. This study aimed to determine the prevalence and clinical significance of NTM in a prospective cohort study of patients with presumptive TB in Bagamoyo, Tanzania.

**METHODS** Patients with presumptive TB were recruited and followed up for 18 months. Clinical assessment, chest X-ray and sputum samples were collected for microscopy, mycobacteria culture both Mycobacteria Indicator Growth Tube (MGIT) and Löwenstein Jensen (LJ) and molecular specification. For unidentified NTM species by Genotyping AS/CM (HainLifescience, Germany), the DNA was sequenced by

MicroSeq 500 16rDNA. American Thoracic Society (ATS) NTM diagnostic criteria were used for case definition.

**RESULTS** We recruited 494 adult patients with presumptive TB and 148 (30%) patients had at least one NTM isolated from the positive mycobacteria cultures. *Mycobacteria fortuitum* was the most common isolated NTM in 28 patients (20%), followed by *Mycobacteria intracellulare* (19%). NTM and *Mycobacterium tuberculosis* co-infection was found in 28 (19%). NTM only patients (120) had median age of 40 years (IQR: 30–53 years); 58.3% were female. Twenty five (20.8%) NTM only patients had a history of TB. The HIV prevalence among NTM only patients was 59 (49.2%) Compared to 115 (45.5%) of Non-TB and Non-NTM patients. Chest pain was the most common symptom, 93 (77.5%), among NTM only patients at recruitment followed by fever in 86 (71.7%). Compared to participants with no microbiologically confirmed NTM or *Mycobacteria tuberculosis*, excessive night sweat was significantly more frequent among NTM (71.7% vs. 59.3%,  $P = 0.02$ ).

Fourteen of (11.7%) of the 120 NTM only patients fulfilled the ATS diagnostic criteria. Smear positive was in 7 (5.8%) of which 4 (57.1%) had met the ATS diagnostic criteria. Three patients received TB treatment and were later on diagnosed with NTM. Among them, one patient was given modified treatment for NTM and responded. National guidelines have not yet addressed the treatment options for clinically significant NTM.

**CONCLUSION** NTM are common in Tanzania and may be in some cases clinically significant. Improved identification of NTM could result in better diagnosis and management of patients with clinically significant NTMs, especially in high burden setting where smear microscopy is still the sole TB diagnostic.

DISCLOSURE Nothing to disclose.

## PSI.048

### Prevalence and clinical relevance of respiratory viral co-infections among tuberculosis patients in urban Dar es Salaam, Tanzania

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**BACKGROUND** Animal models suggest that respiratory viral infections can have severe influence before and during tuberculosis (TB) infection through immunological mechanisms. The impaired immune response affects the clearance of *Mycobacterium tuberculosis* possibly resulting to severe clinical presentation. We aimed to document the relationship between respiratory virus infection and clinical phenotypes in TB patients in Dar es Salaam.

**METHODS** From an ongoing TB cohort study in Dar es Salaam (TB-DAR), we included; smear-positive adults (>18 years) TB patients and controls without TB from the households who were recruited in the Temeke District, Dar es Salaam, Tanzania, between November 2013 and March 2015. GeneXpert MTB/RIF ruled out TB in controls. Virus detection was done using a multiplex real-time PCR with a panel of 16 clinically relevant respiratory viruses (Seegene Anyplex RV16, South Korea). Descriptive statistics were used.

**RESULTS** We analyzed data from 344 TB patients and 188 controls. The median age was 34 years [interquartile range (IQR) 26–43] for TB patients and 34 (IQR: 27–41) for controls, respectively. Among TB patients, 233 (67.73%) were male

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(controls: 102, 54.3%), 74 (21.2%) were HIV-infected (controls: 13 (7%). A total of 71 (21.6%) TB patients were co-infected with any respiratory virus, compared to 35 (18.5%) among controls ( $P = 0.6$ ). Human Rhinovirus was the most common respiratory virus (7% in TB patients versus 6.9% in controls), followed by Influenza A virus (5% vs. 4.3%). Other viruses identified in <2% of the patients were adenovirus, coronavirus, picornavirus and respiratory syncytial virus A and B. Among TB patients, 11 (3.2%) were co-infected with two virus species. TB patients co-infected with any respiratory viral infection reported more frequently to have haemoptysis at the time of TB diagnosis, compared to patients without viral co-infections (29% vs. 18.5%,  $P = 0.055$ ), but there was no difference in other presenting symptoms (weight loss, fever, excessive night sweats), and age, sex, and body mass index (BMI, kg/m<sup>2</sup>). Influenza A co-infection was moderately associated with haemoptysis presentation 6 (8.7%) compared to influenza negative patients 10 (3.6%,  $P = 0.074$ ).

**CONCLUSION** Respiratory viruses are common among TB patients, and may potentially influence the clinical presentation at time of TB diagnosis. The effects on clinical outcomes during follow-up will need to be further evaluated in a larger sample.

**DISCLOSURE** Nothing to disclose.

## PSI.049

**Detection of *Mycobacterium tuberculosis* by EasyNAT™ diagnostic kit in sputum samples from Tanzania**

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**INTRODUCTION** Early and accurate diagnosis of tuberculosis (TB) and treatment are the mainstay of TB control. Smear microscopy, a sole TB diagnostic tool in resource-limited settings, is inadequate because of low sensitivity especially in high HIV burden settings. We therefore aimed to evaluate EasyNAT™, a Nucleic Acid Amplification Tests, in detecting of *Mycobacterium tuberculosis* (*M. tuberculosis*) from sputum smears of presumptive pulmonary TB patients in Bagamoyo, Tanzania.

**METHODS** From a TB cohort study of presumptive TB patients, one ml of frozen fresh untreated morning or spot sputum samples was used to evaluate EasyNAT against Ziehl Nielsen (ZN) smear microscopy, BACTEC *Mycobacterium* Growth Indicator Tube (MGIT) 960 and Löwenstein Jensen (LJ) culture. Molecular genotyping (Genotype MTBC, CM or AS; Hain Lifescience, Nehren) and MPT64 antigen confirmed *M. tuberculosis*.

**RESULTS** We analyzed sputum samples of 143 presumptive TB patients with mean age of 41 years (standard deviation = 15) and 78 (54.6%) were males. HIV prevalence was 46.2% [95% Confidence Interval (95% CI): 37.8–54.7%]. The sensitivity of EasyNAT against culture as a reference standard was 66.7% (95% CI: 51.6–79.6%). Controls (no symptoms at 5 months of follow-up and an alternative diagnosis established), were EasyNAT negative (specificity 100%, 95% CI: 95.2–100%). In culture-positive patients, PPV and NPV was 100% (95% CI: 89.1–100%) and 82.4% (95% CI: 73.0–89.6%) respectively.

One of the 10 smear-negative and culture-positive TB patients was EasyNAT positive (sensitivity 10%, 95% CI 0.3–44.5%). The sensitivity of EasyNAT was 81.6% (95% CI 65.7–92.3%) compared to ZN smear microscopy, and MGIT (66.7%, 95%

CI 51.6–79.6) and LJ (69.2%, 95% CI = 52.4–83.0%). No *M. tuberculosis* was detected by the EasyNAT assay in 10 patients with clinically diagnosed TB and in 10 patients who had the following *Mycobacterium* species and strains: *M. fortuitum* strain 1, *M. fortuitum* strain 2/*M. mageritense*, *M. malmoense*, *M. haemophilum*/*M. pasture*, *M. celatum* I/III, *M. simiae*, *M. celatum*, *M. intracellulare*, *M. asiaticum*, *M. scrofulaceum*, or *M. smegmatis*.

**CONCLUSION** EasyNAT detected *M. tuberculosis* with an excellent specificity and positive predictive value. The sensitivity was acceptable in smear-positive patients. However, the low detection rate in smear-negative, culture-positive sputum samples could be a limitation for wider clinical use and requires further evaluation in different TB-endemic regions.

**DISCLOSURE** Nothing to disclose.

## PSI.050

**Global genomic diversity and clinical consequences of *Mycobacterium tuberculosis* in a high-burden setting**

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**BACKGROUND** Human adapted *Mycobacterium tuberculosis* complex (MTBC) comprises 7 main phylogenetic lineages which differ in their geographical distribution. Whilst Lineage 2 and 4 are extensively studied, Lineage 1 and 3 remain unexplored. Lineage 2 and 4 are globally widespread thus considered the most successful. However, Lineage 1 and 3 are important drivers of TB epidemics along the rim of Indian Ocean. Further, evidence shows that the strain genetic background in MTBC has implications for clinical disease, treatment and diagnosis. Our aim is to define the global phylogenomic structure of Lineage 1 and 3 to infer their evolutionary history, and better understand their distribution and spread. Secondly, we want to assess phenotypic consequences of the MTBC strain genetic background in a high burden setting of Dar es Salaam Tanzania where Lineage 1 and 3 prevail.

**METHODS** We are combining single nucleotide polymorphism (SNP)-typing with whole genome sequencing (WGS) to characterize global MTBC clinical isolates. We use univariate and multivariate logistic regression models to search for genotype-clinical phenotype associations based on epidemiological data from Tanzania.

**RESULTS** We will present preliminary results on the global phylogenomic structure of MTBC Lineage 1 and 3, and a population-based phylogenomic study of MTBC in Tanzania. In addition, we will discuss clinical phenotypes associated with MTBC genotypes in Tanzania.

**CONCLUSIONS** Our findings will contribute to the understanding of the evolution of MTBC Lineage 1 and 3. The population structure of the MTBC in a high burden setting will inform us on the consequences of MTBC genomic diversity for clinical disease. Ultimately, we will have better insights into the biology and epidemiology of TB which will help foster global disease control.

**DISCLOSURE** Nothing to disclose.



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## PSI.051

**Detection of *Mycobacterium tuberculosis* in extrapulmonary biopsy samples using PCR targeting IS6110, *rpoB* and nested-*rpoB* PCR cloning**A. D. Khosravi<sup>1,2</sup>, H. Meghdadi<sup>3</sup>, A. A. Ghadiri<sup>3</sup>, A. H. Sina<sup>4</sup> and A. Alami<sup>3</sup><sup>1</sup>Microbiology, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>2</sup>Infectious and Tropical Diseases Research Center, Ahvaz, Iran; <sup>3</sup>Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>4</sup>Danesh Medical Laboratory, Ahvaz, Iran

**INTRODUCTION** Tuberculosis (TB) mainly affects the lungs, but the disease can potentially influence all organs of the body. Definitive and rapid diagnosis of Extrapulmonary TB (EPTB) is challenging since conventional techniques have limitations due to presence of small number of bacteria in specimens. We aimed to examine the diagnostic utility of PCR and nested PCR techniques for the detection of *Mycobacterium tuberculosis* (MTB) DNA in samples from patients suspected to EPTB. **MATERIALS AND METHODS** PCR amplification targeting IS6110, *rpoB* gene and nested PCR targeting *rpoB* gene were performed on the extracted DNAs from 70 formalin-fixed, paraffin-embedded samples. The strong positive samples were directly sequenced, but for samples with weak positive results in nested-PCR, TA cloning was performed by cloning the products into the plasmid vector with subsequent sequencing.

**RESULTS** By *rpoB*-PCR, 14 samples (20%) were positive, while 34 samples (48.6%), and 52 samples (74.3%) were positive by IS6110-PCR and *rpoB*-nested PCR respectively. The findings from TA cloning revealed positivity in 67 samples (95.7%). In certain clinical samples i.e. skin, colon, and soft tissue, TA cloning showed twice the positivity rate compared to *rpoB*-nested PCR alone.

**CONCLUSIONS** Our results indicate that *rpoB*-nested PCR combined with TA cloning is a useful method for the detection of MTB DNA in EPTB samples.

**DISCLOSURE** Nothing to disclose.

## PSI.052

**Molecular methods for identification of *Acinetobacter* species by sequencing of the partial *rpoB* and 16S rDNA genes and flanking spacers**A. D. Khosravi<sup>1,2</sup>, A. Hashemi<sup>3</sup>, P. Sadeghi<sup>3</sup>, P. Heidarieh<sup>4</sup> and N. Sheikhi<sup>5</sup><sup>1</sup>School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>2</sup>Infectious and Tropical Diseases Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>3</sup>Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>4</sup>Alborz University of Medical Sciences, Karaj, Iran; <sup>5</sup>Masoud Medical Laboratory, Tehran, Iran

**INTRODUCTION** *Acinetobacter* spp. are a diverse group of Gram-negative bacteria which are ubiquitous in soil and water and are an important cause of nosocomial infections. The purpose of this study was to identify the *Acinetobacter* spp. isolated from different clinical samples to species level by application of phenotypic and molecular methods and investigation of their antibiotic susceptibility patterns.

**MATERIALS AND METHODS** In total, 142 clinical isolates of *Acinetobacter* spp. from laboratories of university teaching hospitals in Ahvaz and 55 clinical isolates of *Acinetobacter* spp. from Tehran were collected. The bacterial species were identified using conventional biochemical tests and molecular technique of PCR-RFLP based on two regions of the genes *rpoB* and 16S rDNA and subsequent sequencing. Antibiotic susceptibility testing was performed for the isolates by disk diffusion method in final step.

**RESULTS** In this study, 197 clinical isolates of *Acinetobacter* spp. were identified to genus level using biochemical phenotypic tests. By application of molecular methods and sequencing, the total *Acinetobacter* isolates were identified as: *A. genomosp* 2 (*baumannii*) (131/66%) (*calcoaceticus*) (9/4.5%), *A. genomosp* 16 (8/4%), *A. genomosp* 13 (6/3%), *A. genomosp* 7 (*johnsonii*) (6/3%), and *A. genomosp* 8 (*lwoffii*) (5/2.5%). The remaining *Acinetobacter* species were each comprised of 4 strains (2%). The results from susceptibility testing revealed that among 131 *A. genomosp* 2 (*baumannii*) strains, 105 isolates (53%) presented high antibiotic resistance to ceftriaxone (91%), piperacillin (91%), piperacillin tazobactam (91%), amikacin (91%), and ciprofloxacin (81%).

**CONCLUSIONS** *A. genomosp* 2 (*baumannii*) was identified as the most prevalent species. Other identified species appearing at much lower frequencies ranged from 4 to 9 strains. *A. genomosp* 2 (*baumannii*) showed high antibiotic resistance and this may be a warning to enhance revision of therapeutic protocols for this isolate with an essential role in nosocomial infections.

**DISCLOSURE** Nothing to disclose.

## PSI.053

**Predictive statistical modelling to inform TB prevalence estimations**S. Alba<sup>1</sup>, E. Rood<sup>1</sup>, M. Straetemans<sup>1</sup>, M. Bakker<sup>1</sup> and C. Sismanidis<sup>2</sup><sup>1</sup>Biomedical Research, Royal Tropical Institute (KIT), Amsterdam, The Netherlands; <sup>2</sup>World Health Organization, Geneva, Switzerland

A total of 22 nationally representative tuberculosis (TB) prevalence surveys have been conducted between 1990 and 2013, providing direct estimates of TB burden. In countries without surveys the World Health Organization (WHO) currently estimates prevalence indirectly from estimated incidence and disease duration. In order to provide the WHO with alternative indirect estimates of TB prevalence, an ecological predictive statistical model was developed to predict prevalence in low and middle-income countries without survey data with an estimated prevalence over 0.1%.

We included 13 nationally representative surveys, 2 district level surveys in India and sub-national estimates for 5 surveys conducted between 2007 and 2013, resulting in 30 datapoints for model development (training set). Ecological predictors included TB surveillance and programmatic data, co-morbidities and socio-environmental factors extracted from online data repositories. We fitted a random effects multivariate binomial regression and predicted bacteriologically confirmed TB prevalence in 74 low to middle income countries across Africa, Asia and South America in 2013.

Out of the 166 ecological predictors considered, 37 were retained for model building (due to incompleteness or collinearity) and 7 were found significant in univariate analyses. The final multivariate model included 3 predictors: climate score, laboratory confirmed TB notification rates per 100 000 population, and BCG vaccination coverage. Cross-fold validations in the training set suggested average fit ( $R^2 = 0.57$ ). Out of sample predictions (all forms all ages) were on average consistent with WHO estimates (average difference –10 cases per 100 000), albeit with considerable scatter for individual countries.

Predictive ecological modelling can provide useful complementary estimates of TB burden and can be considered alongside other methods in countries with limited TB data. The predictive power of the model may be improved by including national and subnational estimates of 5 surveys which will become available

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in the coming year, as well as more complex spatial correlation structures to the model currently presented.

DISCLOSURE Nothing to disclose.

## PSI.054

### Diagnosis of tuberculous spondylitis through Xpert MTB/RIF assay in urine in rural Africa

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**INTRODUCTION** Extrapulmonary Tuberculosis (EPTB) is associated with high morbidity and mortality. Its diagnosis is challenging due to difficulties in obtaining samples and paucibacillarity of specimens. Skeletal tuberculosis (TB) accounts for 10–35% of all EPTB cases, with vertebral osteomyelitis (Pott's disease) accounting for around 50% of all cases. We present two cases of Pott's disease diagnosed through Gene Xpert MTB/RIF (Xpert) assay in urine from a rural Tanzanian hospital.

**CASE I:** A 49-year-old man, HIV-1 positive on antiretroviral therapy with TDF/3TC/EFV since 2009, presented to our hospital with lower back pain and progressive lower limbs weakness for 2 weeks. Physical examination revealed bilateral flaccid paraplegia with reduced reflexes. Lumbar X-ray showed focal spondylitis deformans at L4/L5. No signs of generalized tuberculosis were found. Xpert could not be tested in sputum due to lack of production, but detected *M. tuberculosis* in urine without resistance to rifampicin.

**CASE II:** A 76-year-old woman, HIV-1 negative, presented to our hospital with a 2 months history of lower back pain and progressive weakness of lower limbs. She had paraplegia with absence of reflexes. Lumbosacral X-ray showed general spondylitis deformans of the lumbar spine. No signs of generalized TB were found. Xpert detected *M. tuberculosis* in urine without resistance to rifampicin.

Both cases were started on co-formulated rifampicin/isoniazid/pyrazinamide/ethambutol hydrochloride adjusted to their weights. Transfer to a referral hospital for surgery was offered but refused due to economic constraints. Despite good initial response, both patients died during treatment at home, of causes not documented.

**DISCUSSION** The diagnosis of Pott's disease is established by microscopy and culture of infected material, which is difficult to obtain in rural African hospitals. In these settings, diagnosis relies on clinical and radiological findings, often leading to late recognition and poor prognosis. Xpert was endorsed by the WHO in 2010 and validated to be used in sputum and some EPTB samples, but not in urine, which reflects renal involvement in patients with disseminated TB. To our knowledge this is the first report of Pott's disease diagnosed through Xpert in urine in 2 patients without signs of generalized or renal TB. This approach may offer a practical alternative for diagnosis of TB osteomyelitis in rural Africa and should be further evaluated in larger case series.

DISCLOSURE Nothing to disclose.

## PSI.055

### Implementation of tuberculosis directly observed treatment in a resource-limited urban setting: a case of Rubaga division, Kampala, Uganda

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**BACKGROUND** Due to the increasing slum population and HIV/AIDS, Kampala city now carries about 15–20% of the Uganda's tuberculosis (TB) burden. In 2012, Rubaga division reported the highest (70%) proportion of patients on TB directly observed treatment (DOT). However, the achievement seems contrary to the significant reduction in the proportion of patients completing treatment; from 47% to 31% and defaulter rate of 4%. Therefore, this analysis explores the implementation of TB DOT in this setting.

**METHODS** A cross-sectional study of both quantitative and qualitative data collection was carried out from August to October 2014 in Rubaga division of Kampala city, Uganda. Data was collected from Kawala, Kitebi and Kisenyi health facilities. A sample of 201 New TB patients on treatment for not more than 16 weeks was estimated to participate in the study. Questionnaire and key informant interview guide were used to collect data from patients and three health workers respectively. For quantitative data, stata version 12 was used whereas qualitative data were analysed manually.

**RESULTS** The average age was 30 years (SD±7) and 58% were males. Patients were mainly of primary level of education and 34% had no income. 66% of patients reported their treatment being observed by someone. Relative/family members were the commonest treatment observers (82%). Lack of caretakers was the main reason for not being on TB DOT ( $n = 44$ , 77%). A quarter of patients had at least missed taking medication since start of treatment. Lack of transport to collect medication and stock outs were the main reason for missing doses. Patients on TB DOT were mainly married ( $P = 0.001$ ), higher education and were earning. In the adjusted regression analysis being married was significantly associated with being on TB DOT, adj.PRR = 1.4 (1.1–1.6). Patient with positive attitude towards TB DOT were significantly different from those with poor attitude; adj.PRR = 2.4, (1.6–3.6). Lack of community-based treatment supporters was the main suggested barrier to the implementation of TB DOT in Rubaga division.

**CONCLUSION** In this setting TB DOT is being implemented but patients without relatives/caretakers end up with no treatment observers. Transport costs to facilities are high and even when patients get there sometimes drugs are out of stock. The division lacks community-based treatment observers who would support the poor and those without caretakers.

DISCLOSURE Nothing to disclose.

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## PSI.056

**TBscore and suPAR – applicable methods to simplify and improve case finding and monitoring of tuberculosis patients in low resource settings**F. Rudolf<sup>1</sup>, A.-J. Wagner<sup>1</sup>, V. F. Gomes<sup>1</sup>, P. Aaby<sup>1</sup>, L. Østergaard<sup>2</sup>, J. Eugen-Olsen<sup>1,3</sup> and C. Wejse<sup>1,2,4</sup><sup>1</sup>Tuberculosis Research, Bandim Health Project, Bissau, Guinea-Bissau;<sup>2</sup>Department of Infectious Diseases, Aarhus University Hospital, Aarhus, Denmark;<sup>3</sup>Clinical Research Centre, Copenhagen University Hospital, Hvidovre, Denmark;<sup>4</sup>School of Public Health, Center for Global Health, Aarhus University, Aarhus, Denmark

**INTRODUCTION** Despite increased efforts to combat spread and mortality of tuberculosis (TB), the disease remains one of the world's deadliest, with approximate 9 million people developing TB, 1.5 million deaths due to it and an estimated 3 million TB cases remaining undiagnosed in 2013. Case finding of TB patients in high burden countries lacks structure and simple clinical measures. Whilst we await all high TB endemic countries to be adequately resourced with rapid and accurate point of care TB tests, smear microscopy, with its low sensitivity, remains the diagnostic test of choice where the TB-burden is highest.

**METHOD AND MATERIAL** The TBscore/TBscore II is a clinical tool consisting of easily assessable signs and symptoms while the soluble urokinase plasminogen activator receptor (suPAR) is a biomarker of disease severity and prognosis, measured in plasma.

We carried out an observational prospective follow-up study at Bandim Health Project in Bissau, Guinea-Bissau. The aim was to evaluate simple and applicable methods' (TBscore/TBscoreII and suPAR) separate and combined ability to predict mortality and pulmonary tuberculosis (PTB) diagnosis in adults seeking health care for cough, sputum production and/or weight loss (PTB suspects, PTBS).

**RESULTS** We included 1011 patients with a mean age of 34 years (95% CI 33–35 years). Females constituted 55.3% ( $n = 559$ ) and 161 (15.9%) of the PTBS were HIV infected. Ten percent ( $n = 101$ ) of the included PTBS were diagnosed with PTB; 24 (23.8%) sputum smear negative. Mortality during follow-up was 4.8% ( $n = 48$ ) with a mean survival time of 146 days (95% CI 113–178 days).

All predictors, combined and separate, predicted mortality significant adjusted for HIV infection and age and all were associated with the risk of being diagnosed with PTB. Of the 197 patients in the TBscore & suPAR high risk group (TBscore  $\geq 5$  and suPAR  $\geq 5$ ) 30 died [hazard ratio (HR) 13.43 (95% CI 4.03–44.49)], a significant increase compared to 3 patients among 419 in the low risk group (TBscore  $< 5$  and suPAR  $< 5$ ). Of the 101 patients finally diagnosed with PTB 51 had a suPAR  $\geq 5$  and TBscore  $\geq 5$  [HR 11.13 (95% CI 5.80 – 21.36)] while 53 were found in the 'TBscoreII  $\geq 3$  & suPAR  $\geq 5$ '-high risk group (HR of 16.65 (95% CI 6.66–41.66)).

**CONCLUSION** Combining TBscore/TBscore II and suPAR increases their predictive ability. The proposed composite score is a possible and easily applicable solution for the much-needed improvement of TB case finding and clinical monitoring.

**DISCLOSURE** Jesper Eugen-Olsen is the inventor behind the suPARnostic assay and co-founder and shareholder in ViroGates A/S. No other authors has any competing interests to declare.

## PSI.057

**Is the national TB detection program missing cases in Bangladesh?**S. M. A. Hanifi<sup>1</sup>, S. S. Mahmood<sup>1</sup>, S. Hoque<sup>1</sup> and A. Bhuiya<sup>2</sup><sup>1</sup>Centre for Equity and Health Systems, Dhaka, Bangladesh; <sup>2</sup>Office of Deputy Executive Director, ICDDR, B, Dhaka, Bangladesh

**BACKGROUND** TB is known as the disease of the poor. Bangladesh is one of the high TB-burden countries despite the existence of a national TB control programme (NTP) since 1993 in the country. NTP detects TB cases with help of the community health workers of BRAC known as the Shasthya Shebica (SS). The accuracy of this detection process is critical in controlling TB. In order to verify the precision of the detection process the current study thus analysed the verbal autopsy carried out by the health and demographic surveillance system (HDSS) of Chakaria, a rural area of Bangladesh and identified TB cases to find what proportion of the deceased were contacted by the NTP team.

**METHODS AND MATERIALS** Under NTP, the community workers visit all households in target area to screen for chronic cough. Confirmed TB cases are then provided with a short course of DOTS therapy. We analysed population-based mortality data collected from Chakaria HDSS in Bangladesh between 2010 and 2012. Chakaria is a remote rural area under Cox's Bazar district of Bangladesh. TB death cases were determined by using a Bayesian-based programme for interpreting verbal autopsy findings (Inter VA-4). Disease burdens were compared among the wealth quintiles. Next-of-kin of the deceased was asked whether they contacted SS of BRAC for treatment and vice-versa.

**RESULTS** A total of 128 deaths were identified as TB cases by Inter VA-4 in 217 167 person-years of observation between 2010 and 2012. Death rate due to TB was higher for males (67/100 000 PY) than females (51/100 000 PY). Age was highly associated with TB mortality. TB death was inversely associated with socioeconomic status (SES) ( $P < 0.003$ ), the mortality rate due to TB was 2.8 times higher in the lowest quintile compared to the highest. Only 21% of next-of-kin of deceased reported that BRAC SS contacted them for sputum collection. Contact rate was higher for males (23%) than females (15%).

**CONCLUSION** TB death case detection using Inter VA-4 TB shows that current NTP could detect only 20% of the TB cases in Chakaria as evident from the rate of contact among the deceased. A more rigorous assessment of the precision level of detection strategy needs to be conducted in order for NTP to achieve its optimal outcome. With large number of missing cases, the NTP is unlikely to make any difference in terms of controlling TB nationwide.

**DISCLOSURE** Nothing to disclose.

## PSI.058

**Review of 72 cases of tuberculous meningitis in adults in Antananarivo, Madagascar**

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**INTRODUCTION** Tuberculosis is highly endemic in Madagascar with 24 504 new cases notified in 2011. Tuberculous meningitis (TBM) is one of the most severe form of tuberculosis. However, it is not well known and probably underdiagnosed in



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Madagascar. In this study, we aimed to describe and assess short-term prognosis factors in TBM.

**METHODS AND MATERIALS** We reviewed case records of adult patients with the diagnosis of TBM between 2007 and 2014. Patients defined as definite or probable or possible TBM according to the case definition described by Marais S. et al. (Lancet Inf Dis. 2010) were included. Clinical, laboratory and radiological data were analysed. Univariate and multivariate logistic regression analysis were done.

**RESULTS** Seventy-two patients were included with 4 (5.6%) patients defined as definite TBM, 44 (61.1%) as probable TBM and 24 (33.3%) as possible TBM. Thirty-eight (52.8%) patients were male. The mean age was  $35.9 \pm 13.0$  years. All patients were tested for HIV and 3 were positive. On admission, 52 (72.2%) had altered consciousness and 6 (8.3%) were comatose. Seizure was found in 18 (25%) patients. White cells count (WCC) on cerebrospinal fluid (CSF) was  $\geq 200/\text{mm}^3$  in 14 patients (19.4%), with lymphocyte predominance ( $\geq 75\%$ ) in 50.7%. CSF protein was  $\geq 2.2$  g/l in 20 (28.2%) patients and glucose was  $< 1.2$  mmol/l in 25 (35.2%) patients. Chest X-ray was abnormal in 41/66 patients: military in 16 patients and active infiltration in 24. Brain scan was abnormal in 7/13 patients. Acid-fast bacilli were identified from sputum in 8 patients. Twenty-one (29.2%) patients died. On univariate analysis, age  $\geq 30$  years ( $P = 0.03796$ ), CSF glucose  $< 1.2$  mmol/l ( $P = 0.04965$ ) and CSF WCC  $\geq 200/\text{mm}^3$  ( $P = 0.01490$ ) were associated with short-term mortality. Multivariate logistic regression analysis did not show independent factor of mortality.

**CONCLUSION** Diagnosis of TBM remains a challenge in Madagascar. Only few patients had definite diagnosis. Diagnostic criteria based on clinical features, CSF WCC, glucose and protein levels and radiological findings should be developed to help clinicians as microbiological examination could not always be performed in resource-limited countries and often lack of sensitivity. In this study, age, CSF WCC and CSF glucose were associated with mortality in univariate analysis but not in multivariate analysis.

**DISCLOSURE** Nothing to disclose.

**PS1.059****Epidemiology of tuberculosis in the Indian Ocean Islands**

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**BACKGROUND** In Madagascar and Indian Ocean Islands (Comoros, Reunion, Mauritius and Seychelles) improved socio-economic and health conditions have helped in reducing the incidence of tropical disease to a level comparable with those observed in developed countries. However, tuberculosis (TB) remains a public health concern with the exception of Reunion. No systematic review of this evidence was available.

**OBJECTIVE** A systematic review of tuberculosis incidence in the Indian Ocean as well as the cost and effectiveness of treatment for multidrug-resistant tuberculosis (MDR-TB).

**METHODS** We searched for papers published in peer-review journals and grey literature using search terms in English and French. Last World Health Organization TB data as well as the French national health monitoring institute (InVS) data were included. Results on cost effectiveness approach by countries were extracted. Data from the identified studies were synthesized using probabilistic sensitivity analysis.

**RESULTS** From 2000 to 2012, the overall incidence of tuberculosis varied from 293 per 100 000 to 234 per 100 000 in Madagascar, from 39 to 34 per 100 000 in Comoros, from 37 to 30 in Seychelles, from 24 to 21 per 100 000 in Mauritius and from 12 to 6 per 100 000 in Reunion. Most areas lack data related to MDR-TB which remains a serious health concern in Madagascar. Socio-economic and health conditions remain highly disparate in Madagascar and Indian Ocean Islands. More data are needed about cost effectiveness of MDR-TB treatment.

**DISCLOSURE** Nothing to disclose.

**PS1.060****Incidence and predictors of recurrent pulmonary tuberculosis among successfully treated cohort under DOTS program in Bangladesh**

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**INTRODUCTION** Recurrent pulmonary tuberculosis (PTB) remains a major challenge to tuberculosis control program due to its lower cure rate compared to new case. This study aimed to estimate the incidence rate of recurrent PTB among new cases, rural urban variation and associated factors of recurrent pulmonary tuberculosis at selected BRAC implementing areas under National Tuberculosis Control Programme in Bangladesh.

**METHOD** A retrospective longitudinal study was employed among the cohort of new smear positive PTB patients ( $n = 987$ ) who were declared as cured or their treatment completed during July–September 2013. Two sputum samples were collected from each individual for *Xpert MTB/RIF* assay and AFB sputum smear microscopy after 12 months of completing PTB treatment. Each respondent was interviewed using a structured questionnaire. Respondents found positive in gene *Xpert* test were defined as recurrent PTB. We compared recurrent and non-recurrent cases to identify risk factors. Factors found significant ( $P < 0.05$ ) from univariate analysis were entered in to a stepwise logistic regression model to explore the independent risk factors.

**RESULTS** A total of 44 patients were diagnosed as recurrent tuberculosis revealing a recurrence rate of 4.5%. Higher incidence was noted in rural areas compared to urban areas (5% vs. 3.5%). Recurrent cases were mostly adult (79.5%), male (68%) and had no schooling (54.5%). Risk of developing recurrent tuberculosis was 4 folds higher in patients having positive sputum smear at 2 months of intensive phase treatment (OR: 4.39; 95% CI: 1.89–10.18). Cured person who lived with a tuberculosis patients in same household were twice more likely to develop recurrent PTB (OR: 2.84; 95% CI: 1.24–6.51).

**CONCLUSION** Although recurrent tuberculosis is rare in Bangladesh, adequately treated patients are still at risk for recurrent disease if they have positive sputum smear at 2 months and household tuberculosis contact. The programme should emphasize creating awareness and intensive follow up visits at household level.

**DISCLOSURE** Nothing to disclose.

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## PSI.061

**Clinical and laboratory markers of developing active tuberculosis in contacts of TB patients with latent *Mycobacterium tuberculosis* infection – a prospective cohort study**

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**BACKGROUND** Identifying those *Mycobacterium tuberculosis* (*Mtb*) latently infected individuals most at risk of developing active tuberculosis (TB) using routine clinical and laboratory tests remains a huge challenge in TB control efforts. We conducted a prospective longitudinal study of clinical and laboratory markers of developing associated with the risk of developing active TB in contacts with latent *Mycobacterium tuberculosis* infection.

**METHOD** A longitudinal study of HIV-negative household contacts ( $n = 286$ ) of newly diagnosed pulmonary TB patients and community controls ( $n = 186$ ) monitoring clinical features, full blood cell counts, TST, and chest X-rays were performed regularly during 2 years followup. Paired statistical tests, the Kaplan-Meier method and the Cox proportional hazard modeling were performed on variables between those contacts progressing or not progressing to developing active TB.

**RESULTS** 293 HIV-negative TB household contacts (HC) of 85 active TB index cases (IC) and 186 community controls (CC) were identified. The appearance of TB disease symptoms within 2 years in contacts was significantly associated with an elevated peripheral percentage of blood monocytes [adjusted hazard ratio (aHR) = 5.7; 95% confidence interval (95% CI) 1.50–21.5;  $P = 0.01$ ], a TST response  $\geq 14$  mm (aHR = 5.1; 95% CI 1.1–23.8;  $P = 0.04$ ) and an increased monocyte: lymphocyte ratio (aHR = 4.9; 95% CI 1.2–16.9;  $P = 0.03$ ). A strong association was found between elevated blood monocyte percentage and TST  $\geq 14$  mm with risk of progression to TB in the contacts (aHR = 28.3; 95% CI 6.5–62.0,  $P < 0.001$ ).

**CONCLUSION** Elevated percentage of peripheral blood monocytes plus an elevated TST response are potential biomarkers for identifying contacts of TB patients at risk of developing active TB. Further studies in different geographical locations are required to validate these findings.

**DISCLOSURE** Nothing to disclose.

## PSI.062

**Protocol: exploring the efficacy of filter paper based Gene Xpert MTB/RIF in diagnosing smear negative pulmonary tuberculosis cases**

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**BRIEF INTRODUCTION** Despite the availability of cheap and effective treatment, Tuberculosis (TB) still accounts for millions of cases of active disease and deaths worldwide. Smear negative TB cases accounts most of the missed cases and is very important to take under rapid diagnosis. At the primary healthcare level most of the smear negative pulmonary TB cases are diagnosed on the basis of clinical and radiological indicators. But this poses the increased chance of false positivity and

negativity rate which ultimately create drug resistance, delayed diagnosis and increased rate of mortality. So, it is very important to establish an effective method which will be easy to adopt at the peripheral level through existing program, policy and infrastructure. That is why, through our proposed research project we aim to identify the efficacy of Gene Xpert MTB/RIF on filter paper based sputum samples in diagnosing smear negative pulmonary tuberculosis.

## HYPOTHESIS

- 1 Gene Xpert MTB/RIF on filter paper based sputum sample is a sensitive and specific diagnostic tool in diagnosing smear negative pulmonary tuberculosis.
- 2 Gene Xpert MTB/RIF on filter paper based sputum sample is more sensitive and specific diagnostic tool than Gene Xpert MTB/RIF on sputum sample in diagnosing smear negative pulmonary tuberculosis.

**METHODS** Suspected smear negative pulmonary tuberculosis cases will be enrolled as per study criteria; collected sputum will be divided into three part and then culture and Gene Xpert MTB/RIF will be performed from both sputum and filter paper sputum sample. Collected data will be then analyzed.

**OUTCOME MEASURES** The sensitivity, specificity, positive predictive value, negative predictive value, accuracy of Gene Xpert MTB/RIF will be measured to find out the efficacy of both conventional and filter paper based procedure.

**ETHICAL ISSUE AND FUNDING** The study is selected for funding from WHO-SEARO and is under review for approval from Research Review Committee of ICDDR.

**DISCLOSURE** Nothing to disclose.

## PSI.063

**Post kala azar dermal leishmaniasis without history of visceral leishmaniasis: treatment with miltefosine and its outcome**

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**BRIEF INTRODUCTION** Post-Kala-azar Dermal Leishmaniasis (PKDL) is an unusual dermatosis usually occurs following an attack of Visceral Leishmaniasis (VL). But a number of cases have also been reported without any history of VL. In Indian the sub continent PKDL cases are more common in Bangladesh and among them 5% are without any history of VL. Unfortunately, there is no specific guideline to diagnose and treat these kinds of patients. This observational study conducted to identify management modalities for such kind of cases.

**METHODS AND MATERIALS** During the period of 2013–2014 six patients from Mymensingh attended the study clinic of icddr, b with rash like PKDL, rk39 strip test and PCR for *Leishmania donovani* DNA positive from skin specimen were referred to sub district hospital. On the basis of the diagnostic evaluation they were considered as PKDL cases and provided Miltefosine (MF) doses with 2.5 mg/kg body weight for 12 weeks.

**RESULTS** Among them four were below 18 years and 3 were female. 3 of them had skin rash only in the face and the others also had upper limb and trunk rash. They had no history of itching and skin sensitivity was present. All of them completed 12 weeks of treatment and 1 year follow up. Complete resolution of skin rash was observed for all cases. During treatment all the participants experienced nausea, vomiting and

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weakness which were managed by the community clinic. No serious adverse events occurred during treatment and follow up period.

**CONCLUSION** Miltefosine can be considered a safe and effective treatment option to treat PKDL patients who have no history of VL. Moreover, patients from a VL endemic region with skin rash without itching and with skin sensitivity and rk39 strip test positive can be considered cases of PKDL and should be provided with treatment.

**ACKNOWLEDGEMENT** We are grateful to Trishal Sub-district hospital authority to give us this opportunity for data collection.

**DISCLOSURE** Nothing to disclose.

## PSI.064

### Treatment of visceral leishmaniasis relapse cases with non liposomal amphotericin B: a retrospective hospital based data analysis

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**INTRODUCTION** Recent advances in kala-azar research resulted in development of new treatment regimens with liposomal amphotericin B, Miltefosine, Paromomycin and their combination for visceral Leishmaniasis worldwide. However, compared to new treatments, efficacy remains highest with non-liposomal amphotericin B. But its high toxicity keeps it as the option of last resort for treatment of VL in cases of treatment failure with existing drugs. So far there is no information regarding the efficacy and safety of non-liposomal amphotericin B for VL in Bangladesh. Here we aimed to analyze cure rate and safety of non-liposomal amphotericin B for VL in Bangladesh. **METHODS AND MATERIALS** VL patients who were treated in the Surja Kanta Kala-azar research Centre (SK KRC) in Mymensingh for the period 2013–2014 were reviewed and all VL cases who were treated with non-liposomal amphotericin B were included in this analysis. A total of 34 cases were identified during this period. All the cases were confirmed by microscopy of splenic aspiration and were treated with 1 mg/kg/day for 15 days. Cure assessment was done clinically at 6 months after completion of treatment.

**RESULTS** Mean age of the patients was  $20.56 \pm 14.73$  years and mean spleen size was  $8.09 \pm 4.13$  cm. During discharge above 50% regression of spleen size was occurred in 91% cases. Twenty four (70.59%) of them completed 6 month follow up and all achieved complete regression of spleen size and resolution of baseline signs and symptoms. During hospitalization 68% complained about fever with shivering, 35% about vomiting and 47% suffered from hypokalemia. No serious adverse event was occurred.

**CONCLUSION** So, NLAmB can be considered as an effective and safe treatment option in case of treatment failure with existing anti-leishmanial treatment regimens.

**ACKNOWLEDGEMENT** We are thankful to Mymensingh Medical College Hospital authority to give us this opportunity for data collection.

**DISCLOSURE** Nothing to disclose.

## PSI.065

### Cytokine levels during antituberculous treatment in children with HIV-infection and microbiologically proven tuberculosis in South-West Tanzania

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**BACKGROUND** For diagnostic purposes, the potential of *M. tuberculosis* (MTB) to induce a T cell response is used by different commercially available test, such as Interferon-gamma (IFN)-Release Assays. However, the role of IFN-gamma and other cytokines for TB-treatment monitoring has not been evaluated yet.

**METHOD** Paediatric presumptive TB cases were enrolled into a prospective cohort study in Mbeya, Tanzania. At day 0, 14, 28, 168 and 336 whole blood was stimulated for 24 h with RD-1 antigens, using the Quantiferon-TB-Gold test (QFT). In 31 children aged 6 month to 14 years of age with a positive response to the QFT at baseline, the supernatants were tested for additional cytokines. Twenty-three of the children were treated against TB, 11 of whom were co-infected with HIV. Eight children improved without receiving TB treatment, leading to the classification of 'latent' MTB infection. The QFT-supernatants were tested for Interleukin-1-Receptorantagonist (IL-1RA), IL-2, Interferon (IFN)-gamma, IFN gamma-induced protein (IP) -10, IL-10, IL-13 and IL-17, using the cytometric bead array method.

## RESULTS

- 1 Participants with 'latent' MTB infection had similar median levels for cytokines IL-2, IL-10, IL-13, IL-17, IFN-gamma, IP-10, TNF-alpha and IL-1RA at baseline, compared to children with active TB. No differentiation between active and 'latent' disease was therefore possible by measuring cytokine levels in QFT supernatant.
- 2 During TB treatment a decline was noted for IFN-gamma, IP-10 and IL-2 in the sub-group of children with active TB infection and ART-naïve HIV co-infection. This was not seen in HIV negative participants with TB disease or 'latent' MTB infection. In contrast, HIV negative children with active TB disease demonstrated an increase of IL-13 during TB treatment.

**CONCLUSION** Testing the supernatant of the QFT for IL-2, IL-10, IL-13, IL-17, IFN-gamma, IP-10, TNF-alpha or IL-1RA levels is not a useful method to differentiate between 'latent' MTB infection and active TB disease. In terms of treatment monitoring however, a decline over time was seen for IL-2, IP-10 and IFN-gamma in the subgroup of HIV/TB co-infected ART-naïve children and an increase for IL-13 in the HIV negative subgroups. Cytokine measurements might have the potential to be used for treatment monitoring but this needs to be further investigated.

**DISCLOSURE** Nothing to disclose.



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## PSI.066

**Survival of the resistant: rapid acquisition of multidrug resistance in longitudinal clinical *M. tuberculosis* isolates in Mumbai**

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**INTRODUCTION** Increase in Multidrug resistant (MDR), extensive drug resistant and total drug resistant tuberculosis (TB) in hotspots like Mumbai in India, threatens to grow into a drug resistant epidemic. While poor compliance has often been attributed to the emergence of multidrug resistance, we found the emergence of MDRTB in 49 patients who were non-MDR at onset of treatment and undertook a compliant *Directly Observed Treatment Shortcourse* (DOTS).

**METHODS** Drug susceptibility testing was performed using MGIT BACTEC 960. Genomic analysis included spoligotyping, MIRU-VNTR and whole genome sequencing (WGS). Global transcriptional profiling was performed using BuG@S MtbV3. Realtime analysis was performed using probes described previously.

**RESULTS** Of the 49 patients, 16 (33%) showed genetically identical pre- and post-DOTS *Mycobacterium tuberculosis* (*M.tb*). The MDR post-DOTS *M.tb* were found to have significantly higher expression of drug efflux pumps and DNA repair genes along with lower expression of metabolic genes as compared to the drug susceptible (DS) pre-DOTS *M.tb*. The MDR *M.tb* also induced faster and 7 fold higher levels of *recA* as compared to the DS strain in response to rifampicin. The genetically different longitudinal isolates may be due to initial mixed infection, or exogenous re-infection with a different strain. Patients with genetically identical longitudinal isolates, represent evolution of MDR during DOTS, and may be indicative of selection of MDR mutations under host and drug pressures.

**CONCLUSION** Endpoint diagnosis and absence of periodic national surveys fail to provide crucial information about rapidly evolving *M.tb* drug resistance. Using WGS it is possible to accurately measure multiple facets including microevolution, novel drug resistance mutations, transmission dynamics and phylogeography of *M.tb*. An increase in phylogenetically linked MDR *M.tb* in a population will be indicative of a clonal expansion of a fit MDR *M.tb* strain and would warrant a greater focus on reducing transmission. An increase in phylogenetically unrelated MDR *M.tb* would indicate operational deviations of DOTS administration, directing greater focus in DOTS compliance. Such focused and real-time public health strategies will be key to the outcome of our battle against MDR TB and antimicrobial resistance in general.

**DISCLOSURE** Nothing to disclose.

## PSI.067

**Treatment outcomes for multidrug resistant tuberculosis patients under DOTS-Plus: systematic review and meta-analysis**

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**INTRODUCTION** Anti-tuberculosis (TB) drug resistance is a major public health problem that threatens progress in TB care and control worldwide. The WHO aims to achieve a 90% treatment success rate for TB patients by 2015 and current studies on MDR-TB treatment have revealed a huge gap to reach

this target. The aim of this study was to assess and summarize the available evidence on MDR-TB treatment outcome under DOTS-Plus.

**METHODS** Literature based systemic review of observational studies was conducted. Original studies providing MDR-TB under DOTS-Plus program according to WHO-defined outcomes at the end of treatment and follow-up were identified using databases such as MEDLINE/PUBMED, Google Scholar and HINARI. The descriptions of original studies were made using frequency and forest plot. Heterogeneity across studies was checked using Cochrane Q test statistic and I<sup>2</sup>. Pool risk estimates of multi-drug resistance tuberculosis treatment outcome and sub-grouping analysis were computed using a Bayesian random effects meta-analysis.

**RESULT** Among articles identified, 13 met our inclusion criteria from 8 countries. In a pooled analysis, 55.62% (95% CI 54.34–56.89) of patients were cured and 43.48% (58.44–68.51) had successful outcomes, while 14.21% (11.60–16.81) defaulted, 12.6% (8.98–16.21) died, and 7.65% (5.63–9.68) were transferred out. Individualised treatment regimens had higher treatment success than standardized regimens. HIV infection, alcohol use and previous TB treatment were significantly associated with poor multi-drug treatment outcome.

**CONCLUSION** In general, the overall performance of DOTS-Plus was acceptable but it is still far behind the WHO treatment success target for 2015. In addition, we have identified high rates of default, which likely contributes to the development and spread of MDR-TB.

**DISCLOSURE** Nothing to disclose.

## PSI.068

**Practice and intention to use long acting and permanent contraceptive methods among married women in Ethiopia: systematic review and meta-analysis**Y. M. Mesfin<sup>1</sup> and K. T. Kibret<sup>2</sup><sup>1</sup>Public Health, Haramaya University, Harar, Ethiopia; <sup>2</sup>Welega University, Nekemte, Ethiopia

**BACKGROUND** The use of long-acting and permanent contraceptive methods (LAPMCs) has not kept in step with that of short-acting methods such as oral pills and injectables in Africa. Ethiopia is the second most populous country in Sub-Saharan Africa with high total fertility rate, and high maternal and child mortality rates. Therefore, this study summarized the evidence of practice and intention to use long acting and permanent family planning methods among women in Ethiopia using systemic review and meta-analysis.

**METHODS AND FINDINGS** Systematic review of the published literature of observational studies was conducted. Original studies were identified using databases of Medline/Pubmed, and Google Scholar. Heterogeneity across studies was checked using Cochrane Q test statistic and I<sup>2</sup>. Pool risk estimates of intention to use and practice of long acting and permanent family planning methods were computed using random effect model. **RESULT** Based on the 9 observational studies included in the meta-analysis, the pooled prevalence of intention to use long acting and permanent family planning methods among married women according to random effect DL model was 42.66% (95% CI 31.55–53.78%). On the other hand, the pooled practice of LAPMCs among the study participants was 13.5% (95% CI 8.2–18.7%).

**CONCLUSION** This meta-analysis revealed that women's intentions to use LAPMCs are generally good but their

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utilization is low. So it is recommended that LAPMCs have to be available and accessible to for the women who are in need of it at lower health service delivery levels.

DISCLOSURE Nothing to disclose.

## PSI.069

### Genetic diversity of *Mycobacterium tuberculosis* and mutation profiles in drug resistance associated genes in Bagamoyo District, Tanzania

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**INTRODUCTION** Tuberculosis (TB) is one of the most infectious diseases and major public health problem globally. The emergence of TB drug resistance aggravates the burden of this disease. In Tanzania, only few studies from specific localities have reported TB drug resistance. Moreover, there is no regular TB drug resistance surveillance and treatment is initiated without drug sensitivity testing. Hence, TB drug resistance in this country is largely unknown. Therefore, we assessed mutations associated with resistance to 1st-and-2nd line anti-tuberculosis drugs. Additionally, we determined the genetic diversity of *M. tuberculosis* isolates with a view to understand both drug resistance profiles and TB population structure in Bagamoyo district in Tanzania.

**METHODS** Overall, a total of 114 *M. tuberculosis* isolates from TB patients residing in Bagamoyo district in Tanzania were analyzed for genetic diversity, and assessed for drug resistance mutations in nine genes (KatG, inhA, ahpC-OxyR, rpoB, pncA, embB, rrs, rpsL and gyrA) associated with TB drug resistance by employing a rapid and high-throughput Sequenom's massARRAY system.

**RESULTS** We defined 14 *M. tuberculosis* haplotypes and 4 SNP clusters. Predominant haplotypes were BAG8 (36%), BAG14 (24%) and BAG6 (18%). On the other hand, we observed only 5% (3/61) of isolates with katG315 Ser->Thr mutation which is commonly associated with Isoniazid resistance. No other drug resistance associated mutations were detected. Nevertheless, we observed high rates of non-synonymous mutations at embB1054, Ser->Pro (14%), katG463, Arg->Leu (34%) and gyrA384, Ala->Val (21%).

**CONCLUSION** For the first time, this study demonstrated the genetic diversity of *M. tuberculosis* and presents haplotypes that may be valuable for molecular surveillance of TB transmission in the study area. Study findings confirmed low-grade of TB drug resistance in Bagamoyo district in Tanzania. We recommend for a countrywide study to assess the importance of these haplotypes in TB epidemiological studies in Tanzania and the rational use of TB treatments to prevent the emergence and spread of resistant strains.

**DISCLOSURE** This work was part of Emmanuel Mbuba's MSC project which was jointly sponsored by Ifakara Health Institute (IHI) and Optimus Foundation of the UBS Bank through The Novartis Institute of Tropical Diseases (NITD), Singapore.

## PSI.070

### Outbreak investigation of tuberculosis and multidrug-resistant tuberculosis in the central prison of Mbuji-Mayi the diamond capital of the Democratic Republic of Congo

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Tuberculosis (TB) is one of the fastest-growing epidemics in prison populations in sub-Saharan Africa, constituting a threat to both inmates and the wider community. Democratic Republic of Congo (DRC), with an estimated population of 68 million, is ranked 9th among the 22 TB High Burden Countries and has an estimated incidence and prevalence of TB of 326 and 549 per 100 000 inhabitants per year respectively. On January 5th, 2015 the National TB Program DRC was notified by the TB office of Kasai-Oriental about a potential outbreak of TB in the Mbuji-Mayi Central Prison. The Central Prison of Mbuji-Mayi is one of the largest of the Kasai-Oriental province with a capacity of 150 inmates. In response to this alert, the National TB Program launched an investigation and sent there a team of one microbiologist and public health officer and the MDR program advisor firstly to review the cases histories and to document the emergence of TB/multidrug-resistant (MDR-TB) cases and also to implement appropriate infection control measures. We did active case-finding by using Xpert MTB/RIF. Of the 918 inmates found out in the prison, we collected 350 sputum specimens. Among the 336 specimens tested, we retrieved 147 TB cases and 14 TB rifampicin resistant (TB-RR) cases. All TB and TB-RR have been put in treatment. However, these numbers are expected to change on the rise. With overcrowded conditions, poor ventilation, and malnutrition, the risk of ongoing spread is still very high.

DISCLOSURE Nothing to disclose.

## PSI.071

### Ethno-botanical survey in Sahel region of Burkina Faso: plants against malaria and mosquitoes

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**INTRODUCTION** Malaria remains a public health problem in Burkina Faso. People of Sahel Region, where transmission of malaria is periodic, use herbal medicine in addition to modern anti-malarial drugs. Identifying these plants could contribute to better define the traditional medicine in this region. Local anti-malarial plants were identified for the treatment of the disease but also as mosquito repellents in the Sahel region of Burkina Faso.

**METHODS** An ethno-botanical survey was carried out among traditional healers and/or practitioners of Sahel region by using questionnaires. Vernacular and scientific names of plants used in the treatment of malaria and/or against mosquitoes were recorded by administering to the participants the questionnaires.

**RESULTS** 80 traditional healers and practitioners were interviewed. 42 plants were identified as used in the treatment of malaria and 16 plants as mosquito repellents.

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**CONCLUSION** The Sahel showed a panel of plants locally used against the parasites but also against the vectors that can be investigated in the discovery and development of new drugs.

**DISCLOSURE** Nothing to disclose.

**PS1.072****Possession, use and maintenance of mosquito nets in a rural area of Equatorial Guinea**

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**OBJECTIVES** Malaria causes high morbidity and mortality in developing countries. The use of insecticide treated nets is considered an effective measure to prevent the disease. Organizations worldwide recommend their distribution in populations at risk. The aim of this study is to monitor a program of distribution of insecticide treated nets in a rural area of Africa.

**METHODS** A cross-sectional study was conducted in a rural area of Equatorial Guinea (Bolonzo) from March 2013 to April 2013. Population-related variables and nets-related variables were assessed by direct observation of housing conditions and a survey to the householders. A previous insecticide treated nets distribution and malaria training was performed in June and September of 2012 by an international NGO.

**RESULTS** We analyzed 59 houses, which represent 329 people (89.5% of the total population). 20% of the householders surveyed had family history of death related to malaria infection. Overall, 41 (70%) of households had at least one mosquito net, however this dropped to 23 (39%) when mosquito nets were required to be placed and well conserved. Pregnant women and children under 5 years sleeping without net the preceding night were 5 (62%) and 64 (72%) respectively. Literacy, knowledge of the mechanism of malaria transmission and training on the correct use of nets and their maintenance were found to be statistically associated with proper use of the mosquito nets.

**CONCLUSION** For an effective distribution of mosquito nets, campaigns should incorporate training programs, both about malaria key facts and the proper placement and maintenance of nets. Distribution campaigns should also incorporate a subsequent monitoring in order to identify weaknesses that need to be strengthened and to ensure its durability over time.

**DISCLOSURE** Nothing to disclose.

**PS1.073****Characterizing and interpreting malarial persistence, re-emergence and resistance of malaria in Colombia from 1960 to 2014, a comparative analysis: evidence for control and elimination strategies**

M. V. Valero-Bernal<sup>1,2</sup>, M. Tanner<sup>3</sup> and Poverty and System Theories

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<sup>3</sup>Epidemiology, Swiss TPH, Basel, Switzerland

**OBJECTIVES** This study was aimed at understanding malaria transmission and control in Colombia against the background of the changes of the health and social systems and the considering the structure of the health system as well as socio-economic determinants in malaria affecting the endemic regions over the past 50 years.

**METHODS** A comparative and descriptive study of the historical transformation of malaria control programs in Colombia was conducted. The first approaches considered a structural analysis from 1960 to 2014 from primary and secondary information complemented by a situation analysis of malaria trends. Then geospatial comparison between different regions was completed according to main social and economic determinants.

**RESULTS** Malaria transmission in Colombia can be reduced. Control strategies must consider systemic, complex perspectives. Each strategy towards elimination has to consider a broad number of additional ecological, epidemiological, demographic and health system approaches. The economic development models pursued in the country, region and localities are strongly associated with the level of malaria and more generally with low levels of well-being, i.e. social indicators such as poverty very high correlated with high rates of mortality. Improved models of access and coverage from the health system mainly from the surveillance system must be strengthened to reduce the rate of transmission close to zero, contain infection importation and differentiate asymptomatic cases from secondary prevention.

**CONCLUSIONS** Effective control and possibly elimination will only be achieved through substantially improved models of access and coverage within health and social services complemented by effective surveillance-response approaches that allow identification of pockets of transmission and well-tailored, timely intervention packages to stop transmission.

**DISCLOSURE** Nothing to disclose.

**PS1.074****Household ownership and use of insecticide-treated nets among school children in Ibadan, Oyo State, Nigeria**

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**BACKGROUND** In order to combat the burden of malaria, different strategies including insecticide treated nets (ITNs) have been put in place. Several ITNs have been distributed with support from international donors and this necessitates an increase in monitoring and evaluation efforts in order to determine its impact as well as prioritize future programmes. The current standards for estimating impact indicators of ITNs are household surveys such as the Demographic Health Survey and Malaria Indicator Survey which are expensive and are not conducted frequently enough. Collecting information from school children is a cheap and fast means for routine monitoring and evaluation of malaria control programmes in some sub-Saharan African countries. The study was conducted to explore school children's report of household ownership and use of ITNs in Akinyele Local Government Area (LGA), Oyo State, Nigeria.

**METHODOLOGY** A cross-sectional survey was conducted. A three-stage sampling technique was employed to select 611 pupils from 15 out of 88 primary schools in three selected wards within the LGA. Information on pupils' socio-demographics, report of household ownership and use of ITNs were obtained using a semi-structured interviewer-administered questionnaire. Data was analysed using descriptive statistics and Chi-square. Level of significance was set at 5%.

**RESULT** Respondents' mean age was 10.5 ± 1.7 years; 73.6% were within age 10–13 years; 52.7% were females, 84.6% were Yoruba and 65.3% had under-five children in their households. Most, (81.7%) of the respondents reported household ownership



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of at least one ITN. Majority of the respondents (76.4%) reported obtaining ITNs from mass distribution campaigns. Most, (89%) of the respondents reported household use of ITNs by member the night preceding the survey. More than half, (51.6%) of the respondents reported ITN use by under-five children. Class was significantly associated with reported household ownership of ITNs ( $\chi^2 = 9.217$ ,  $P < 0.010$ ). **CONCLUSION** Majority of the pupils could report household ownership and use of ITNs. They should be considered a potential medium to monitor ITNs ownership and use. **DISCLOSURE** Nothing to disclose.

**PSI.075****Data for decision making – experiences of the Red Cross movement in managing safe and dignified burials in Guinea, Liberia and Sierra Leone**

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The Ebola Virus Disease (EVD) outbreak in West Africa continues almost 1 year after it was officially declared on March 21, 2014. The International Federation of the Red Cross and Red Crescent Societies (IFRC) and the affected National Societies in Guinea, Sierra Leone and Liberia have been actively engaged since March in key components of the response, including case management, contact tracing, psychosocial support, social mobilisation, and safe and dignified burials, with over 6000 volunteers mobilised on the ground at the height of the epidemic. All of these activities are significantly contributing to ending the epidemic, but the Red Cross work in safe and dignified burials is at a scale never seen before.

To date, the Red Cross has safely, and with dignity, buried over 17 000 [1] people. At the height of the epidemic, the Red Cross consisted of 138 volunteer teams (over 1400 individuals) active in the three countries who were collecting approximately 1000 bodies a week. However, managing, implementing and coordinating across the sheer geographic spread of cases in two different languages presents a unique challenge to the operation, specifically in the ability to record, report and monitor these burials. In a public health emergency of this scale, information management and data analytics are critical when making decisions about resource allocation and deployment of response teams and activities.

This abstract outlines the ongoing challenges the Red Cross movement has in information management for safe and dignified burials, and how the IFRC is using real-time data collection and analysis to track these burials and make programmatic decisions around rapid resource prioritisation, improve accountability and develop program strategy.

[1] More bodies are managed than recorded as Ebola deaths because all deaths at a community level are managed as suspected cases and are tested for Ebola using an oral swab test. **DISCLOSURE** Nothing to disclose.

**PSI.076****From dead body management to safe and dignified burials. Experiences of the Red Cross movement in managing safe and dignified burials in Guinea, Liberia and Sierra Leone Ebola response**

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<sup>1</sup>International Federation of Red Cross and Red Crescent Societies, Geneva, Switzerland; <sup>2</sup>International Federation of Red Cross and Red Crescent Societies, Freetown, Sierra Leone; <sup>3</sup>International Federation of Red Cross and Red Crescent Societies, Monrovia, Liberia

The Ebola Virus Disease (EVD) outbreak in West Africa continues almost 1 year after it was officially declared on March 21, 2014. The International Federation of the Red Cross and Red Crescent Societies (IFRC) and the affected National Societies in Guinea, Sierra Leone and Liberia have been actively engaged since March in key components of the response including dead body management in all three countries. By identifying the key role that unsafe burials played in ongoing community transmission of EVD and addressing barriers to 'medical burials', the IFRC and partners have safely, and with dignity, buried over 17 000 [1] people across the three countries. Never before has the management of the dead had such an impact on the lives of the living.

At the height of the epidemic, the Red Cross consisted of 138 volunteer teams (over 1400 individuals) active in the three countries who were collecting approximately 1000 bodies a week. These teams were met with significant challenges when undertaking this high risk activity including resistance from communities, stigmatisation and at times, violence. This abstract details how the IFRC developed the activity of managing dead bodies that were suspected of Ebola into a full public health program that contributed significantly in turning the tide of the epidemic.

The Safe and Dignified Burial (SDB) program encompasses a range of activities aimed at increasing acceptance, limiting transmission and improving accountability with in the epidemic and now includes anthropologic assessments, community engagement and behaviour change, the safe integration of cultural practices, lab testing, case investigation and contact tracing as well as individual data collection for accountability and identification of bodies. Ensuring this wholistic approach has improved acceptance by the community and impacted on the overall case load of EVD by reducing the number of chains of transmission.

1 More bodies are managed than recorded as Ebola deaths because all deaths at a community level are managed as suspected cases and are tested for Ebola using an oral swab test. **DISCLOSURE** Nothing to disclose.

**PSI.077****Factors associated with mortality of health workers with Ebola virus disease in Kenema district, Sierra Leone**

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**INTRODUCTION** Ebola virus disease (EVD) in health workers (HWs) has been a major problem during the 2014–2015 epidemic in West Africa, especially in Sierra Leone where, as of April 1, 2015, the World Health Organization reports 303 cases

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and 221 deaths (case fatality 73%). We explored risk factors for fatal EVD in HWs in Kenema District in eastern Sierra Leone, with a focus on Kenema Government Hospital (KGH), where a large cluster of HW EVD cases occurred.

**METHODS** We obtained data from the Sierra Leone National Viral Hemorrhagic Fever Database, contact tracing records, hospital staff rosters, Ebola treatment unit (ETU) rosters, and burial logs. Univariate and multivariate logistic regression modelling were performed to calculate odds ratio of potential risk factors for death.

**RESULTS** We evaluated 94 HWs with EVD, 46 female and 45 male (3 missing data), with average ages of 41 and 39 years, respectively. Implementation of a triage system at KGH decreased the number of HW infections (83 before vs. 11 after,  $P < 0.0001$ ). The case fatality was 69%. Median times from symptom onset to ETU admission and death were 4 (IQR 2–6 days) and 9 days (IQR 6–12 days), respectively. Median ETU admission duration for fatal and non-fatal cases was 4 and 14 days, respectively. Surprisingly, HWs who presented for care before day 7 had higher odds of death than those who presented after (OR = 7.30, CI: 1.09–48.95), with the odds decreasing by 82% for each additional day lived after controlling for number of symptoms ( $P = 0.0009$ ). The odds of fever (OR = 2.00, CI: 0.49–8.13) and diarrhea (OR = 2.50, CI: 0.72–8.73) were higher in fatal cases, although not statistically significant, likely due to small sample size. The odds of death were not significantly different by facility in which the HW worked (OR = 0.83, CI: 0.26–2.64), working in or outside of an ETU (OR = 0.82, CI: 0.24–2.78), or working as clinical versus non-clinical staff (OR = 1.32, OR = 0.52–3.35).

**CONCLUSIONS** Mortality in HWs with EVD is similar to that seen in the general population. The disease evolves rapidly, with death in fatal cases just over 1 week of illness. The surprising finding of increased odds of death with earlier presentation may reflect the tendency of sicker patients with higher viral loads, and thus a poorer prognosis, being prompted to seek care earlier than those with milder disease and lower viral loads. An organized triage system is vital to prevent HW infection.

**DISCLOSURE** Nothing to disclose.

## PSI.078

## An analysis of suspect case definitions utilized in Guinea during the 2014 Ebola epidemic

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**INTRODUCTION** Rapid early detection and control of Ebola virus disease (EVD) is contingent on sensitive, consistent clinical case definition. Although the WHO definition is often used in Guinea, a challenge of identifying EVD patients is that different clinical case definitions are used in the field. Utilizing the Guinea EVD dataset, an analysis of the CDC and WHO clinical case definitions was conducted to assess their ability to predict laboratory confirmed EVD cases.

**METHODS** Eligible EVD patients ( $N = 1412$ ) during March 2014–October 2014 with documented EVD laboratory results and clinical symptoms were identified in the Guinea dataset. Laboratory confirmation by polymerase chain reaction assay differentiated cases from non-cases. Current case definitions included fever or an additional symptom (CDC definition) or fever and three other symptoms (WHO definition). Utilizing

cases and non-cases that satisfied the CDC and WHO clinical case definitions, the sensitivity, specificity, positive predictive values (PPV) and negative predictive values (NPV) were calculated and compared.

**RESULTS** Total cases and non-cases identified were 801 and 611, respectively. Among the totals, 458 cases and 232 non-cases satisfied the WHO clinical case definition with the following Results

Sensitivity = 57.2%; specificity = 62.0%; PPV = 66.4%; NPV = 52.5%. Among the totals, 789 cases and 604 non-cases satisfied the CDC clinical case definition with the following Results

Sensitivity = 98.5%; specificity = 1.1%; PPV = 56.6%; NPV = 36.8%.

**CONCLUSIONS** The CDC clinical case definition performed better in identifying laboratory confirmed EVD cases but misclassified non-cases while the WHO definition, while missing many laboratory confirmed cases, identified more non-cases. Differences may reflect objectives of the case definitions such as identifying more cases (CDC) or identifying non-cases (WHO). Definition choice may depend on the outbreak size, resources available and the extent which the outbreak has progressed.

**DISCLOSURE** Nothing to disclose.

## PSI.079

## The indirect effects of Ebola to the health system in Sierra Leone

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**BACKGROUND** During the current Ebola Viral Disease (EVD) outbreak, over 25 000 people have been infected and over 10 000 people have died of the disease. Sierra Leone, with about 12 000 cases, is the most affected country. Although the common efforts to fight the virus have been effective, the effect of the outbreak to the already weak health system is disastrous. Death among healthcare workers and the fear of contracting EVD, has increased the mismatch between healthcare needs and the availability of human resources. The scale of such indirect effects on health facility function is unknown. The aim of this survey is to explore EVD's effect on number of admissions before and after the start of the EVD epidemic.

**METHODS** Between September 2014 and January 2015, 21 Community Health Officers, collected weekly retrospective data from the inpatient admissions books. Data were retrieved from all facilities that were known to provide major surgeries. The study period was before (week 1–21, 2014) and during (week 22–52, 2014) the onset of the EVD outbreak in Sierra Leone. **RESULTS** From the 54 identified healthcare facilities, data from 42 were complete, 11 incomplete and for 1 location no data was available. The facilities were organized in three categories: governmental (21), private-non-profit (18) and private-for-profit (15).

On average, 1818 patients were admitted weekly before the EVD onset and 1176 after, an overall reduction of 35.4%. This decrease was even higher (49.5%) during the peak of the epidemic (week 37–41, 2014).

The reduction in admissions was more severe in the private-for-profit sector (49.2%) compared to the private-non-profit

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(38.5%) and governmental (31.7%) sector. The provinces most affected were Southern (43.9%), Eastern (36.1%), Northern (34.3%), while the Western area had a reduction of 30.6%. In addition, the decrease in admissions was more distinct for males (38.7%) than for females (32.7%).

**CONCLUSION** As a consequence of the current EVD epidemic, the number of admissions has decreased with 35.4% in Sierra Leone. The reduction differs between sectors, areas and patient sex. This reduction most likely reflects the collateral damage to the health system. Patients' fear of contracting Ebola, mistrust in the healthcare system and the high number affected health workers are likely contributing factors. Investment in human resources is essential to re-establish the Sierra Leonean healthcare system after the EVD epidemic.

**DISCLOSURE** The Non Governmental Organization, CapaCare, Norwegian University of Science and Technology and Karolinska Institute have paid for the data collection.

**PSI.080****Using community based surveillance for outbreak detection – Ebola Zaire in Guéckédou, Guinea**

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**BACKGROUND** In January 2014, a cluster of cases of severe diarrhoea, initially thought to be cholera was identified. By March 2014 reports of a serious illness of unknown origin were received. Laboratory-confirmed as Ebola Zaire in March 2014, the ongoing outbreak in Guéckédou, Guinea is estimated to be responsible for at least 420 suspect, probable and confirmed cases with a CFR of 70–80%. The first case was epidemiologically linked to a cluster of rural deaths in December 2013.

Médecins Sans Frontières (MSF) Switzerland has been present in Guéckédou since 2010. In collaboration with the Ministry of Health, MSF has implemented a comprehensive, multi-component malaria prevention and treatment program which has included a community-based mortality surveillance system to monitor malaria program activities.

**METHODS** We conducted a retrospective analysis of the data from a community-based mortality surveillance system between November 2013 and March 2014. Deaths are reported on a monthly basis by families to community health workers. Symptoms preceding death were recorded and deaths categorized as due to malaria/fever or another cause. Symptoms and reported causes of death were compared to the WHO case definition for suspected Ebola.

**RESULTS** From November 2013 to March 2014 a total of 142 deaths were reported in Guéckédou prefecture. Of these, 55 were categorized as malaria/fever deaths. 17 deaths had symptoms included in the WHO case definition for suspected Ebola patients. Among these, 4 reported hemorrhagic symptoms. Two of the 17 suspected Ebola deaths captured by the community-based surveillance system were laboratory-confirmed.

**DISCUSSION** Although the proportional mortality burden of Ebola was low, and the data had many limitations, the community-based system provided important information for malaria program implementation and could be used to identify clusters of other potential epidemic prone diseases. While the majority of deaths in the community continue to occur among cases of suspected malaria, the Ebola outbreak might have been

identified earlier had community-based surveillance for outbreak detection been in place.

**DISCLOSURE** Nothing to disclose.

**PSI.081****Evolution of Ebola treatment centre layout during the current West African Ebola outbreak: an example from a Médecins sans Frontières run centre in Sierra Leone**

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**INTRODUCTION** Since the declaration of the current Ebola outbreak a year ago, 25,000 cases and over 10 000 deaths were reported. MSF was the main patient care provider in previous and current outbreak. Due to the contagiousness, Ebola patients have to be isolated and cared for using strict barrier nursing and infection control measures to protect staff and other patients. Patients are treated in the so-called Ebola treatment centers (ETC) where patient flow and layout ensure staff safety, patient and staff comfort, and community acceptance. In the previous outbreaks, the maximum size of an ETC was 40 beds. In this outbreak, the patient number demanded larger structures. Often the ETCs started in or next to existing health structures, and increased in size by addition of new tents or structures. Maintaining safe patient flow became difficult and visual access from low-risk zone often impossible, impairing patient care. We are presenting an example of the layout of a 100 bed ETC, run by MSF in Freetown, Sierra Leone, which took in consideration lessons from other structures.

**METHODS** We describe the layout of the 100 bed Prince of Wales (PoW) ETC in Freetown.

**RESULTS** We choose the large grounds of POW school, located near the sea. School buildings were used for storage and offices, while the large empty sport field (1.8 acre) provided ample space for ETC construction. The plan of the lay-out was prepared at the head-quarters, using satellite imaging and advantages provided by the site. Large 300 m<sup>2</sup> tents with velum suspended ceiling and semi-permanent structures were used for patient's wards in high-risk zone (HRZ). All wards were oriented so as to allow good ventilation, using sea breeze, and with direct visual access from the low-risk zone. In addition, incursion corridors were built inside HRZ with plexiglass, allowing permanent monitoring of most severe patients by staff remaining in low risk zone (LRZ). Suspect area within HRZ was a semi-permanent wood-plastic sheeting structure with individual rooms, to reduce the risk of cross-contamination. Visitor's areas allowed safe communication with patients across the fence. First patients could be admitted in the ETC within 2 weeks.

**CONCLUSIONS** By taking into account lessons from previous structures, and having pre-prepared ETC design, we were able to rapidly construct better adapted structure. Layout with increased visibility from LRZ into HRZ allowed for better patient care and staff safety and comfort.

**DISCLOSURE** Nothing to disclose.



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## PSI.082

**Humanitarian nursing in a viral haemorrhagic fever outbreak: before, during and after deployment**S. Paillard-Borg<sup>1</sup>, P. Saaristo<sup>2</sup> and E. von Strauss<sup>3</sup><sup>1</sup>Public Health and Medicine, Swedish Red Cross University College, Stockholm, Sweden; <sup>2</sup>Water, Sanitation and Emergency Health Unit, The International Federation of Red Cross and Red Crescent Societies (IFRC), Geneva, Switzerland; <sup>3</sup>Swedish Red Cross University College, Stockholm, Sweden

**OBJECTIVE** To investigate how returnee nursing staff experienced deployment before, during and after working for Red Cross (RC) in West Africa during the Ebola virus disease (EVD) outbreak. The study will supply knowledge on how to better prepare staff for future viral haemorrhagic fever (VHF) outbreaks.

**BACKGROUND** RC staff and volunteers play an active role in responding to humanitarian crisis, including the EVD outbreak in West Africa 2014. RC is engaged in ensuring safe and dignified burials, contact tracing, and control/surveillance of deadly viruses at clinical and community level.

**METHODS** A pilot questionnaire with ten open-ended questions was sent via e-mail to ten nurses having returned after working with EVD patients in West Africa. It covered aspects of pre-deployment training, leadership styles, stress management, socio-cultural exposure, and personal health issues. Data was analysed using content analysis. The study is ongoing.

**PRELIMINARY RESULTS** Mean age of participants was 55.5 years, and eight had received ERU-training. All had previous experience from humanitarian work. Country of origin was northern/southern Europe or Oceania. They reported adequate health preparation and follow-up by RC, emphasizing the importance of previous related experience as well as trust and pride in RC. All were experienced leaders by profession, but none had worked as a leader during this deployment. Being focused on their duties during deployment and only allowing emotional reactions afterwards, they stressed the importance of social contact and support between colleagues. Future suggestions: workload reduction and improvement of work conditions potentially related to risk of security mistakes, and more in-depth information about VHF outbreaks given to family and colleagues back home.

**CONCLUSION** Participants were generally positive to their deployment in an acute VHF outbreak, however the necessity of ERU-training was emphasized. Support from colleagues was stressed as important. Information given to family and colleagues was relevant but not sufficient.

**DISCLOSURE** Nothing to disclose.

## PSI.083

**From Ebola emergency to health systems restoration: temporary infectious disease units in the Ebola campaign in Liberia**G. Froeschl<sup>1,2</sup><sup>1</sup>German Red Cross, Berlin, Germany; <sup>2</sup>Department of Infectious Diseases and Tropical Medicine, Klinikum der Ludwig-Maximilians-Universität, München, Germany

**INTRODUCTION** A delegation of the German Red Cross together with a contingent of the German Armed Forces has been deployed to Liberia in order to contribute to international efforts in the country in the fight against the Ebola epidemic. The German task force has taken over an Ebola Treatment Unit (ETU) with a 100 bed capacity in the country's capital city

Monrovia, which was formally inaugurated by the Ministry of Health of Liberia on 23 December 2014. At that stage of the epidemic the case prevalence, and hence the ratio of confirmed cases among all patients admitted to ETUs in Liberia, fell almost as dramatically as the numbers have increased just a few months earlier. After a race to increase the capacity of ETU beds in the country, now increasing numbers of beds stood vacant.

**METHODS** The German task force together with the Ministry of Health and Social Welfare of Liberia made use of the opportunity to re-dedicate the just inaugurated German ETU into an element that has been starkly missing in the Ebola campaign so far: a unit taking care of those many patients that fulfil Ebola case definition criteria and hence pose an a-priori risk to the local health care workers, yet turn out to be Ebola-negative and remain without adequate treatment options for their actual pathology, dreaded by the existing local health infrastructure. General agreement prevails that collateral morbidity and mortality due to Ebola will by far outnumber the morbidity and mortality by Ebola.

**RESULTS** The German ETU in Monrovia has ever since screened and tested patients with Ebola-like symptoms, assured coverage of Ebola treatment safe for patients and staff, and offered above-standard diagnosis and treatment for all those patients who tested negative. The unit has hereby increased acceptance in the community of the Ebola campaign's infrastructure. At the same time the unit contributes to a safe re-launch of the local health care system by a controlled re-referral of patients tested negative into local health care facilities.

**CONCLUSION** The presentation will highlight key concepts and assets of the Severe Infections Temporary Treatment Unit, and allow insight into current epidemiological conditions in the Ebola campaign in Liberia.

**DISCLOSURE** Nothing to disclose.

## PSI.084

**Accelerating innovation in diagnostics in response to the Ebola outbreak**A. C. Chua<sup>1,2</sup>, E. Piriou<sup>3</sup>, S. Wong<sup>3</sup>, C. Kosack<sup>4</sup> and M. Balasegaram<sup>1</sup><sup>1</sup>Access Campaign, Medecins Sans Frontieres, Geneva, Switzerland;<sup>2</sup>Department of Infectious Diseases, Institute of Infectious Diseases and Epidemiology, Singapore, Singapore; <sup>3</sup>MSF Operational Centre, Amsterdam, The Netherlands; <sup>4</sup>MSF International, Medecins Sans Frontieres, Amsterdam, The Netherlands

**BACKGROUND** Since the identification of the first Ebola Virus Disease (EVD) in 2014, rapid deployment of mobile laboratories from international organizations near Ebola management centers in Guinea, Liberia and Sierra Leone has been vital. Despite a turnaround time of 4 h from sample reception to results (by real-time PCR), time from patient sampling to results was much longer at times >48 h. Many factors contributed to the delays in diagnosis, including no availability of rapid point-of-care or simplified testing methods as well as weak surveillance systems and difficult access to centralized EMCs for patients. The lack of effective treatment and vaccines makes early identification with rapid, accurate diagnostics even more important to isolate and manage confirmed cases.

**METHODS** In recognition of the urgent need for improved Ebola diagnostics, and to guide diagnostic research and development (R&D), MSF pushed to develop a consensus target product profile (TPP) for a diagnostic EVD test together with WHO, FIND and other actors. The intended use of the test is to distinguish patients with acute EVD infection from those without EVD with very high accuracy without complex

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laboratory infrastructure, biosafety requirements and highly trained staff. Rapid development would also require that manufacturing can move at an accelerated pace. MSF played an active role in driving stakeholders including WHO, funders, manufacturers, and regulatory agencies to accelerate this process. **RESULTS** It is possible to accelerate R & D of diagnostic tests, with new EVD tests being available now and first laboratory based and field based trials have taken place. However, while exchange of information between stakeholders was extraordinary, coordination by WHO was inadequate. Critical to the development of rapid accessibility of test would be a well-communicated and coordinated international health agency which is clear not only in communicating the needs to researchers and developers but assessing new products in a standardized way and supporting health agencies and NGOs in need with clear instructions on use for end-users.

The timeliness of uptake of the new EVD tests remains crucial to the objective of this work.

**CONCLUSION** We need to recognize the lack of tools to address Ebola is a result of market failure. Beyond this outbreak, there should be continued effort to address the failure of the R&D system in diagnostic tools for diseases with outbreak potential.

**DISCLOSURE** Nothing to disclose.

**PSI.085****Ebola virus disease – clinical manifestations and management**

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Ebola Virus Disease (EVD) is a Filovirus Haemorrhagic Fever caused by the genus *Ebolavirus* which presence is known since 1976. From then on, sporadic outbreaks have mainly struck small villages in rural areas in Central Africa with various case fatality rates (CFR). The highest CFR has been reported for the species Zaire Ebola Virus (EBOV) with 90%. In the 2014/2015 West African Outbreak of EBOV the CFR varies from location and time between 65% and 40%. Several factors influence the CFR, mainly the clinical management of EVD. The cohort of EVD-patients evacuated to Europe and the US has a significant lower CFR. Patients with EBOV-Infection are either asymptomatic or develop EVD with various symptoms ranging from mild to severe up to fatal. The clinical manifestations present in different stages.

- 1 prodromal syndrome with fever, headaches, muscle aches and severe lethargy. Additional symptoms i.e. conjunctival injection and hiccups are characteristic for EVD. After a few days within stage one, stage
- 2 a gastrointestinal syndrome with massive fluid losses due to severe vomiting and diarrhea develops. Stage
- 3 usually begins with renal failure due to hypovolemic shock and then developing to multiorgan failure and death.

Bleeding from various body sites is sporadically seen. Additional respiratory symptoms can occur, neurological symptoms and a high percentage of miscarriage are reported. Resolution of symptoms and survival can present at any stage. The percentage and influence of concomitant diseases is unknown. Some survivors of EVD report long-lasting audio and visual impairment, arthralgias and lethargy, the level of psychological trauma is

unknown but seems to be common and high. The management of EVD to date is focused on fluid resuscitation, control and relief of symptoms such as fever, pain, vomiting and diarrhea, a presumptive treatment of co-infections, strong nursing care and supportive psychosocial care. Until there is no specific curative treatment available, these combined efforts, when started at an early stage are effective in a significant reduction of the CFR. The goal is to stabilize the organ functions until the immune system is able to develop an effective antibody response to clear the virus from the system. Early intensive care effectively stabilized evacuated patients with EVD and reduced mortality. Psychosocial support is important to overcome stigmatization and psychological trauma.

**DISCLOSURE** Nothing to disclose.

**PSI.086****Crimean-Congo Hemorrhagic Fever cases in Egypt: is it a warning sign for other viral haemorrhagic fever disasters?**

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Crimean-Congo Haemorrhagic Fever (CCHF) is a tick-borne disease caused by an arbovirus, which was first recognized during a large outbreak among agricultural workers in the mid-1940s in the Crimean Peninsula. Humans become infected through the bites of ticks, by contact with haemorrhage from nose, mouth, gums, vagina, and injection sites of a CCHF patient during the acute phase or follow-up, or by contact with blood or tissues from viremic livestock.

In Egypt so many genera and species of ticks are encountered. Ticks have specific role in transmission of zoonotic infectious diseases as well as tick paralysis. Recently, CCHF and babesiosis as well as infantile tick paralysis were identified as emerging diseases disaster. Junior physicians and natives in rural areas may not be aware of ticks and their pathogenic potential. This paper reports three human Crimean-Congo haemorrhagic fever cases, one in Almaza fever hospital and two in Gharbia Governorate. No doubt, distribution of tick-vector (*Hyalomma* spp.) Staff Nurses who first to see these patients must be alerted to these deadly diseases and take the first step in early detection by rapidly consulting an infectious disease specialist for confirmation and early management. Nursing Staff should make infection control measures a daily practice and wear personal protective equipment.

**AIM** To enhance and evaluate the nursing staff's knowledge and attitude towards the Viral Hemorrhagic Fevers in Almaza Fever Hospital.

**SETTING** 125 Nursing Staff were included in the study At Almaza Fever Hospital to assess their knowledge level regarding viral haemorrhagic fevers prevention and control.

**RESULTS** VHF programme for nursing staff, 12 were Bachelor Degree, 17 were Technical Institute and 69 were Nursing Diploma Degree. For all Nursing Staff a highly statistically significant results were found after programmed implementation and 3 months later on Total Knowledge Score regarding VHF, Nurses with bachelor degree of nursing have the got the highest Total Mean knowledge Score.

**CONCLUSION** Nurses have adequate knowledge of Basic Principles of Infection Control regardless of this Training, but had little knowledge regarding VHF before the training programme; this was improved after the programme.

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**KEYWORDS** Egypt, Crimean-Congo haemorrhagic fever, ticks.  
**DISCLOSURE** Nothing to disclose.

**PSI.087****Nigerian public sector strikes and inter-professional tensions in the time of Ebola – the impact of domestic politics in global health**

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**INTRODUCTION** Much has been made of Nigeria's effectiveness in containing its ebola outbreak; it was declared a success story across major international media. Less is however known about how the prevailing politics in the health sector in Nigeria influenced the course, containment efforts and impact of the outbreak. The outbreak occurred within the context of long-running and deep seated inter-professional antagonism and supremacy battles within the health sector in Nigeria, with consequent perennial industrial disputes and frequent shutting down of public sector hospitals. The outbreak on 20th July 2014 took place when all doctors employed by the Federal Government, the largest employer of doctors in the country, were on strike. This has raised important questions about

- 1 the possible course of the outbreak should the infected passenger have been taken to one of the government owned tertiary hospitals in Lagos, with larger patient volumes and poorer infection control procedures in place;
- 2 the inter-relationship between the outbreak and the strike actions; and
- 3 lessons for dealing with deep-rooted inter-professional antagonism in relation to the potential impact of preparedness plans and effective management of future outbreaks.

**METHODS AND MATERIALS** This work is based on documentary and policy analysis, and key informant interviews with key stakeholders directly involved in the response and containment efforts.

**RESULTS AND CONCLUSIONS** Through this work, we attempt to craft a more nuanced understanding of the dynamics of health systems by exploring the effects of such inter-professional tensions and the politicization of health on the Nigerian Ebola preparedness and response capacities.

**DISCLOSURE** Nothing to disclose.

**PSI.088****New approaches for research to policy and action for emerging infectious diseases: Ebola**

M. Roy

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**INTRODUCTION** Sound infectious diseases policies are needed to control the outbreaks of infectious agents like the Ebola Virus. The number of cases is constantly increasing due to Ebola outbreaks in different areas. The Ministry of Health assists in diagnostic and epidemiologic testing of biological samples for unique cases of viral pathogens. The 2014 Ebola epidemic was the largest since 1976. Thus early control and recognition are critical, as this virus spreads in many ways, the most common routes being through animals to humans and humans to humans (<http://www.cdc.org>).

**METHODS AND MATERIAL** The main reason for using community based intervention trials to prevent the Ebola

outbreak and new policy formation is for disease prevention. A total of 39 patients were suspected of suffering from Ebola Virus Disease but are at present in danger. The Director of Department of Community Health and chief Medical Officer is engaged in active preparedness in the United States for seeking detailed information on Ebola and for communities that have people traveling to Africa.

**RESULTS** Infectious diseases control and response are included in Prevention Programs of State Departments of Public Health policies. But these existing policies are not enough to control the infections that are ongoing and entering United States through travel.

**CONCLUSIONS** Federal and State governments are responsible for the surveillance of infectious diseases and reporting, but public health policies are needed to enforce the control by creating surveillance and control transmission and mortality and morbidity due to infectious diseases such as Ebola. By emergency preparedness, using public health policies and their modification can be used to control outbreaks in advance using current public health policies.

**DISCLOSURE** Nothing to disclose.

**REFERENCE**

1. <http://www.cdc.gov>.

**PSI.089****Bi-regional support for control and elimination of visceral leishmaniasis in Africa and Asia – developing an integrated approach of implementation and research**

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Leishmania parasites, spread through phlebotomine sand flies' bites, cause Visceral Leishmaniasis (VL). The illness is more widespread in displaced populations with poor housing, little sanitation and malnutrition and if left untreated an ultimately fatal disease in South Asia and several African countries.

Following the award of a substantial 4-year dedicated grant, a consortium of expert groups with substantial experience in VL (Medecins Sans Frontieres, Drugs for Neglected Diseases initiative, London School of Hygiene and Tropical Medicine, supported by Mott MacDonald) held extensive interviews with stakeholder, policy makers and research scientists in both endemic regions. The purpose was to develop an integrated approach to supporting the elimination (South Asia) and control (Africa) of Visceral Leishmaniasis. This involved identifying the crucial areas where direct support for implementation is required, forming the majority of the initiatives. However, it also focussed on identifying and developing the key areas of operational research required to provide evidence which could lead to impact within the life of the grant.

Although VL exhibits substantially different epidemiology and control challenges between the Asia and Africa two region, a number of transversal research priorities were identified. These included:

- 1 Mixed-methodology research to understand barriers to access for migrants, refugees (Africa) and females and marginalised religions (India/Bangladesh).
- 2 Developing a standardised methodology for identifying and classifying drug susceptibility in Africa and Asia.



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- 3 Generating pharmaco-epidemiological data for all treatment in both regions.
- 4 Developing evidence for rotating insecticides in National Programme IRS strategies (Asia).
- 5 Developing evidence for innovative vector control methods in Africa.

As a neglected disease, the challenge of attributing value to the importance of missing evidence and the resulting opportunity cost on programme implementation support will also be explored.

DISCLOSURE Nothing to disclose.

## PSI.090

### Identification of *Leishmania* spp. isolated from patients with American cutaneous leishmaniasis from Amazonian Brazil by *hsp70* PCR-RFLP

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The wide variety of *Leishmania* spp. responsible for American cutaneous leishmaniasis (ACL) combined with the mechanisms of the host immune response results in a large clinical and immunopathological spectrum of disease. In Amazonian Brazil, ACL is caused by seven recognized *Leishmania* spp., six belonging to the subgenus *Viannia* (*L. (V.) braziliensis*, *L. (V.) guyanensis*, *L. (V.) shawi*, *L. (V.) naiffi*, *L. (V.) lainsoni*, *L. (V.) lindenbergi*) and one to the subgenus *Leishmania* (*L. (L.) amazonensis*). In this region, Pará State is responsible for 41% of ACL cases. Due to the diversity of *Leishmania* spp., the identification of the parasite is of paramount importance for the patient treatment and follow-up. This study aimed to identify the parasites isolated from ACL patients by PCR-RFLP targeting sequences of *hsp70* gene. Sixteen strains of *Leishmania* spp. were isolated in RPMI culture medium from cutaneous lesions of ACL patients care at Reference Center for Diagnosis of Leishmaniasis, Evandro Chagas Institute, Belém-Pará state, Brazil. DNA extraction was performed with phenol-chloroform followed by precipitation with sodium acetate and ethanol method. DNA was quantitated and subjected to PCR. PCR products were purified and cleaved by the restriction enzyme *HaeIII* to detect polymorphisms in this sequence and compare with the reference strains belonging to subgenus *Viannia* and *Leishmania*. Results showed that eight of the sixteen *Leishmania* spp. were identified at the species level, four as *L. (L.) amazonensis*, three as *L. (V.) braziliensis* and one as *L. (V.) shawi*. PCR-RFLP assay targeting heat shock protein (*hsp70*) sequences showed to be a good discriminatory method, allowing the identification of the major species causing ACL in Pará state, Amazonian Brazil. The demonstrated capacity of *hsp70* PCR-RFLP to distinguish among closely related *Leishmania* spp. belonging to *Viannia* subgenus has a great value in this region.

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DISCLOSURE Nothing to disclose.

## PSI.091

### *In situ* IL-17 and IL-23 expression in the clinical-immunological spectrum of American cutaneous leishmaniasis caused by *Leishmania (Leishmania) amazonensis* and *Leishmania (Viannia) braziliensis*

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American cutaneous leishmaniasis (ACL) presents a wide spectrum of clinical and immunopathological manifestations resulting from the interaction between the different species of *Leishmania* and the mechanisms of the host immune response. *Leishmania (Viannia) braziliensis* and *Leishmania (Leishmania) amazonensis* are the species with the largest pathogenic potential for humans and medical importance in Brazil. The CD4<sup>+</sup>T cells can be differentiated into effector cell lines as Th1, Th2, Th17 and regulatory T. Th17 cells express high levels of IL-17, under the regulation of transcription factor ROR $\gamma$ t. IL-23 is essential for effector functions and maintenance of Th17 cells. The aim of this study was to evaluate the *in situ* IL-17 and IL-23 expression in patients with different clinical forms ACL caused by *L. (V.) braziliensis* and *L. (L.) amazonensis*.

Forty-five patients were examined, 7 anergic diffuse cutaneous leishmaniasis (ADCL<sup>DTH-</sup>); 6 borderline disseminated cutaneous leishmaniasis (BDCL<sup>DTH-</sup>) and 15 localized cutaneous leishmaniasis (LCL<sup>DTH+</sup>) all caused by *L. (L.) amazonensis*; 6 mucocutaneous leishmaniasis (MCL<sup>DTH++</sup>) and 11 from localized cutaneous leishmaniasis (LCL<sup>DTH+</sup>) both caused by *L. (V.) braziliensis*. Paraffin-embedded biopsies were submitted to immunohistochemistry and immunostained cells were counted by using an image analysis system. The comparison of IL-17<sup>+</sup> cells density in the spectrum ACL showed a progressive increasing starting from the central forms LCL/L. (*V. braziliensis* (232 mm<sup>2</sup>) and LCL/L. (*L. amazonensis* (197 mm<sup>2</sup>) towards the polar forms, ADCL<sup>DTH-</sup> (470 mm<sup>2</sup>)/L. (*L. amazonensis* and MCL/L. (*V. braziliensis* (372 mm<sup>2</sup>). The density of IL-23<sup>+</sup> cells showed a similar profile to that of IL-17 at the spectrum ACL: ADCL<sup>DTH-</sup> (687 mm<sup>2</sup>) BDCL<sup>DTH-</sup> (518 mm<sup>2</sup>) and LCL<sup>DTH+</sup>/L. (*L. amazonensis* (348 mm<sup>2</sup>); LCL<sup>DTH+</sup> (457 mm<sup>2</sup>) BDCL<sup>DTH-</sup> (609 mm<sup>2</sup>) and MCL<sup>DTH++</sup> (568 mm<sup>2</sup>) *L. (V.) braziliensis*. As control was used normal skin and mean density of IL17<sup>+</sup> and IL-23<sup>+</sup> cells was 81 mm<sup>2</sup> and 99 mm<sup>2</sup> ( $n = 5$ ), respectively.

The results suggest that IL-17 contributes to the persistence of inflammation and tissue damage, maintaining a dysregulated immune response that contributes to the maintenance of the lesion.

In conclusion, IL-17 and IL-23 seems to play an important role in the immunopathogenesis of different clinical forms ACL caused by *L. (V.) braziliensis* and *L. (L.) amazonensis*, characterized by an immune polarized response with different pathological expression.

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DISCLOSURE Nothing to disclose.

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## PSI.092

**Subtractive phage display selection from canine visceral leishmaniasis identifies novel epitopes that mimic *Leishmania infantum* antigens with potential serodiagnosis applications**

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Visceral leishmaniasis (VL) is a zoonotic disease that is endemic to Brazil, where dogs are the main domestic parasite reservoirs, and the percentages of infected dogs living in regions where canine VL (CVL) is endemic have ranged from 10% to 62%. Despite technological advances, some problems have been reported with CVL serodiagnosis. The present study describes a sequential subtractive selection through phage display technology from polyclonal antibodies of negative and positive sera that resulted in the identification of potential bacteriophage-fused peptides that were highly sensitive and specific to antibodies of CVL. A negative selection was performed in which phage clones were adhered to purified IgGs from healthy and *Trypanosoma cruzi* infected dogs to eliminate cross-reactive phages. The remaining supernatant nonadhered phages were submitted to positive selection against IgG from the blood serum of dogs that were infected with *Leishmania infantum*. Phage clones that adhered to purified IgGs from the CVL-infected serum samples were selected. Eighteen clones were identified and their reactivities tested by a phage enzyme-linked immunosorbent assay (phage-ELISA) against the serum samples from infected dogs ( $n = 31$ ) compared to those from vaccinated dogs ( $n = 21$ ), experimentally infected dogs with cross-reactive parasites ( $n = 23$ ), and healthy controls ( $n = 17$ ). Eight clones presented sensitivity, specificity, and positive and negative predictive values of 100%, and they showed no cross-reactivity with *T. cruzi*- or *Ehrlichia canis* infected dogs or with dogs vaccinated with two different commercial CVL vaccines in Brazil. Our study identified eight mimotopes of *L. infantum* antigens with 100% accuracy for CVL serodiagnosis. The use of these mimotopes by phage-ELISA proved to be an excellent assay that was reproducible, simple, fast, and inexpensive, and it can be applied in CVL-monitoring programs.

DISCLOSURE Nothing to disclose.

patients up to 18 months following treatment with a combination regimen.

**METHODS** This retrospective analysis included all patients with confirmed HIV-VL co-infection receiving combination treatment for VL at an MSF treatment centre between July 2012 and September 2014. Patients were treated with 30 mg/kg body weight intravenous liposomal amphotericin B (AmBisome®) divided as six equal dose infusions combined with 14 days of 100 mg/day oral miltefosine (Impavido®). All but eight patients started or were continued on antiretroviral therapy (ART). Kaplan-Meier and proportional hazard models were used to estimate cumulative incidence of death, relapse, poor outcome (relapse and/or death) and associated risk factors over an 18-month period following completion of treatment.

**RESULTS** 102 patients (76% males, 57% with known HIV-infection, 54% with a prior episode of VL) were followed-up for a median of 11 months (IQR: 4–18). Median CD4-count at VL-diagnosis was 169 cells/ $\mu$ l (IQR: 88–230). Overall tolerance to treatment was excellent. Sixteen patients died; 2 of them before completion of treatment and 2 others after a VL relapse. Another 6 patients had a VL relapse during the follow-up period. Cumulative incidence of all-cause mortality and VL relapse at 6, 12 and 18 months was 11.7%, 14.5%, 16.6% and 2.5%, 6.0%, 13.9% respectively. Cumulative incidence of poor outcome at 6, 12 and 18 months was 13.9%, 18.4% and 27.2% respectively. Not initiating ART and concurrent tuberculosis were independent risk factors for mortality and poor outcome. No factors were associated with relapse.

**CONCLUSIONS** In this Bihar based study, combination therapy appeared to be well tolerated, safe and effective and may be considered as an option for treatment of VL in HIV co-infected patients. Extended follow-up and multidisciplinary management is critical. Evidence from randomized clinical trials or larger prospective studies are essential to establish optimal treatment regimens.

DISCLOSURE Nothing to disclose.

## PSI.094

**Feasibility of eliminating visceral leishmaniasis from the Indian subcontinent**E. A. le Rutte<sup>1</sup>, L. E. Coffeng<sup>1</sup>, D. M. Bontje<sup>1</sup>, E. C. Hasker<sup>2</sup>, R. C. Hoekstra<sup>1</sup>, R. Bakker<sup>1</sup>, M. Boelaert<sup>2</sup> and S. J. de Vlas<sup>1</sup><sup>1</sup>Erasmus MC, Rotterdam, The Netherlands; <sup>2</sup>Institute of Tropical Medicine, Antwerp, Belgium

The neglected tropical disease visceral leishmaniasis (VL), transmitted by sand flies, is set for elimination as a public health problem on the Indian sub-continent (ISC) by 2017 (incidence of symptomatic cases <1/10 000 at (sub)district level). ISC-countries are committed to reaching this ambitious target and have set different intervention strategies, mainly focusing on early detection and treatment of symptomatic VL cases as well as vector control. We developed a mathematical model to investigate whether elimination may be achieved with current strategies, and what additional interventions might be required. Based on an existing model we created a deterministic compartmental model as well as a stochastic individual-based (IBM) variant. The IBM includes individual heterogeneities regarding exposure to the sand fly and health seeking behavior. Also, it allows for estimating elimination probabilities under the selected strategies. The model was fitted to the KALANET dataset from the highly endemic Bihar region (India) and was tuned to predict different transmission scenarios

## PSI.093

**Combination treatment for visceral leishmaniasis patients co-infected with human immunodeficiency virus in India**R. Mahajan<sup>1</sup>, P. Das<sup>2</sup>, P. Isaakidis<sup>3</sup>, T. Sunyoto<sup>1</sup>, K. D. Sagili<sup>4</sup>, M. A. Lima<sup>5</sup>, G. Mitra<sup>1</sup>, D. Kumar<sup>1</sup>, K. Pandey<sup>2</sup>, J.-P. Van Geertruyden<sup>6</sup>, M. Boelaert<sup>7</sup> and S. Burza<sup>1,6,7</sup><sup>1</sup>Médecins Sans Frontières, Delhi, India; <sup>2</sup>Rajendra Mamorial Research Institute, Patna, India; <sup>3</sup>Research Unit, Médecins Sans Frontières, Luxembourg, Luxembourg; <sup>4</sup>International Union Against Tuberculosis and Lung Disease (The Union), New Delhi, India; <sup>5</sup>Médecins Sans Frontières, Barcelona, Spain; <sup>6</sup>International Health, University of Antwerp, Antwerp, Belgium; <sup>7</sup>Institute of Tropical Medicine, Antwerp, Belgium

**INTRODUCTION** There are considerable numbers of patients co-infected with Human Immunodeficiency Virus (HIV) and Visceral Leishmaniasis (VL) in the VL-endemic areas of Bihar, India. These patients are at higher risk of relapse and death, but there are still no evidence-based guidelines on how to treat them. In this study, we report on treatment outcomes of co-infected

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(degree of endemicity, and equilibrium or outbreak situation). Our model predictions suggest that the target incidence of <1/10 000 can be achieved with the selected strategies for districts that currently experience endemicity levels at or below 10/10 000. Settings with higher baseline endemicities require additional efforts such as increased screening. Further, our simulations suggest that patients with post Kala-azar dermal leishmaniasis, which occurs months to years after symptomatic VL, may serve as a reservoir of infection when nearing the elimination target. Our findings are robust against alternative assumptions about duration of immunity and infectiousness of different disease states (e.g. asymptomatic infection). We conclude that elimination of VL on the ISC is feasible for most regions with current strategies, but the duration of control and monitoring and evaluation of transmission will be pivotal to prevent recrudescence of infection.

DISCLOSURE Nothing to disclose.

## PS1.095

### Anti-*Leishmania* antibodies in samples of blood donors from endemic areas of Brazil using ELISA with recombinant protein K39 of *L. infantum*

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**INTRODUCTION** In Brazil, in 2013, visceral leishmaniasis (VL) caused by *Leishmania infantum*, affected 3253 people throughout the country. In endemic areas, most individuals (around 95%) with VL are asymptomatic and may be undetected and accepted as blood donors. This study aims to assess the prevalence of anti-*L. infantum* rK39 IgG antibodies among blood donors, considered fit to donate, from endemic areas of Brazil.

**METHODS AND MATERIALS** IgG antibodies were surveyed by ELISA using recombinant antigen K39 kindly provided by the Infectious Disease Research Institute, USA (ELISA-rK39). Sensitivity was evaluated assaying 93 sera from parasitologically confirmed symptomatic VL patients with positive Direct Agglutination Test (DAT) and specificity, assaying 97 sera from DAT negative control samples from non-endemic area. The study was carried out with 4282 blood samples from 11 states: Alagoas (*N* = 189), Bahia (*N* = 604), Ceará (*N* = 312), Maranhão (*N* = 6), Mato Grosso do Sul (*N* = 270), Minas Gerais (*N* = 467), Pará (*N* = 211), Pernambuco (*N* = 481), Piauí (*N* = 272), São Paulo (*N* = 1123), Tocantins (*N* = 347). The reactivity index (RI = absorbance/cut-off) was calculated for each sample and the median (Md) values of RI ≥ 1.0 were determined for each state.

**RESULTS** ELISA-rK39 yielded 95.7% sensitivity and 100.0% specificity. Anti-rK39 IgG antibodies were detected in 274 out of 4282 samples (6.4%): Alagoas (19.0%, Md = 1.374), Bahia (5.1%, Md = 1.625), Ceará (5.4%, Md = 1.673), Maranhão (0.0%), Mato Grosso do Sul (10.4%, Md = 1.288), Minas Gerais (3.9%, Md = 1.450), Pará (4.7%, Md = 1.490), Pernambuco (11.6%, Md = 1.629), Piauí (7.4%, Md = 1.482), São Paulo (1.6%, Md = 1.460), Tocantins (11.5%, Md = 1.446) (chi square, *P* < 0.0001; Kruskal-Wallis, *P* = 0.0229). RI ≥ 1.0 varied from 1.005 to 10.166, Md = 1.460.

**CONCLUSIONS** The great prevalence of IgG antibodies achieved in blood samples from asymptomatic donors points out

to the risk of transfusional leishmaniasis in endemic areas. As in those areas, it is not easy to differentiate transfusion- or vector-mediated transmission; the occurrence of transmission by transfusion is probably underestimated and raises concerns on blood transfusion safety.

Supported by: CNPq (fellowship to HG), LIM-38, HC/FMUSP.

DISCLOSURE Nothing to disclose.

## PS1.096

### Surveillance of *L. infantum* infection in wild animals from Fuenlabrada, southwestern region of the Autonomous Community of Madrid (2011–2014)

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**INTRODUCTION** In recent years, there has been a significant increase in the number of cases of human leishmaniasis in Fuenlabrada, southwestern region of the Autonomous Community of Madrid (CAM), Spain. In fact, this event was considered as the largest community outbreak of leishmaniasis in Europe. The CAM is an endemic area where the *Leishmania* seroprevalence in dogs is about 8%. However, in the beginning of the outbreak, this region showed a lower rate than in rest of the CAM. The existence of other wild vertebrate reservoirs has been proposed as the origin of the outbreak. Indeed, xenodiagnosis of *Leishmania* infection in hares and rabbits from this focus proved that they are infective to *Phlebotomus perniciosus*. Therefore, we carried out the survey of *Leishmania* infection in wild animals from Fuenlabrada and surroundings by PCR.

**METHODS** Departments of Health and the Environment, Town Councils in the area, and Veterinary Health Surveillance Centre arranged the capture of animals. Leishmaniasis Unit, WHO Collaborating Centre for Leishmaniasis, Instituto de Salud Carlos III performed PCR analysis (amplification of small subunit ribosomal gen).

**RESULTS** From July 2011 to July 2014, 2308 biological samples were analysed (spleen, *n* = 1214; skin, *n* = 1094). These samples were obtained from 1238 animals from Fuenlabrada and surroundings (rabbits *n* = 595, hares *n* = 462 and cats *n* = 181). Out of the total animals tested, 246 were infected with *Leishmania*, and then the prevalence was 19.9%. However, the prevalence in hares (*Lepus* spp.) and rabbits (*Oryctolagus cuniculus*) was significantly higher than in cats (*Felis catus*), 21.9%, 22% and 7.7%, respectively. The DNA presence of *Leishmania* in skin versus spleen samples was compared in 1071 animals, 2.2% out of them showed *Leishmania* DNA in both tissue samples. There was a noticeable detection of positive cases by skin versus the spleen analysis, in rabbits the proportion was 16.5% vs. 9.7% and in rabbits, 16.1% vs. 6.4%. In contrast, this relationship was inverted in cats, 1.2% vs. 8.3%.

**CONCLUSION** The gregarious habits, longevity, high prevalence of *Leishmania* infection, and the area where they live (next to the urban area of Fuenlabrada), suggest that hares and wild rabbits can be recognized as reservoirs of *L. infantum* in this outbreak. Surveillance of *Leishmania* prevalence by PCR, in both wild and domestic animals, could help to know the current role of them in the leishmaniasis epidemiology.

DISCLOSURE Nothing to disclose.



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## PSI.097

**Development and impact of the *Leishmania* Antigen Detect™ ELISA as a direct detection test for visceral leishmaniasis**

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Visceral leishmaniasis (VL) can be fatal without timely diagnosis and treatment. Treatment efficacies vary due to parasite drug resistance, patient tolerance to drug toxicity and co-morbidities such as HIV infection. It is therefore important to monitor treatment responsiveness to confirm cure and curtail relapse. Currently, microscopy of spleen, bone marrow or lymph node biopsies is the only definitive method to evaluate long term cure. A less invasive test for treatment success is a high priority for VL management. Along with InBios International, Seattle, we developed a prototype capture ELISA based on detecting *Leishmania donovani* antigens in the urine of VL patients. The *Leishmania* Antigen Detect™ ELISA demonstrated >90% sensitivity on VL patient samples from Sudan ( $n = 64$ ), Bangladesh ( $n = 13$ ) and Ethiopia ( $n = 46$ ) and 88% on samples from Brazil ( $n = 43$ ). The ELISA was also highly discriminatory for VL, based on results using samples from healthy individuals ( $n = 58$ ) and patients with other diseases ( $n = 30$ ), with a demonstrated specificity of 100%. To confirm utility in monitoring treatment, urine samples were collected from 42 VL patients in Ethiopia at days 0, 30 and 180 post-treatment. For the *Leishmania* Antigen Detect™ ELISA, positivity was high at day 0 at 95%, falling to 21% at day 30. At day 180, all samples were negative, corresponding well with clinical cure. The ELISA was much more sensitive than KAtex, the only existing urine *Leishmania* antigen detection test on the market, which had a sensitivity of 50–60% on the above samples at a specificity of 92%. It also has practical advantages over KAtex such as not requiring the boiling of urine, thus shortening the time of assay as well as improving convenience. The *Leishmania* Antigen Detect™ ELISA provides a standardized, user-friendly, quantitative and non-invasive test to detect *Leishmania* antigens during acute infection as well as to monitor its clearance upon cure and is a clear improvement over existing options. The *Leishmania* Antigen Detect™ ELISA is a valuable tool to fill current gaps in VL management. It is important to establish its impact in the field through Phase II studies and make it available to clinics as soon as possible.

DISCLOSURE Nothing to disclose.

## PSI.098

**Enabling discovery and development of new antileishmanials in an academic drug discovery unit through appropriate screening cascades, early exploration of pharmacokinetics and close collaboration with the pharmaceutical industry**

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Drug Discovery Unit, University of Dundee, Dundee, UK

Visceral leishmaniasis is a significant health problem in several countries of the developing world, causing approximately 30 000 deaths annually. Treatments exist but are associated with many drawbacks ranging from high cost to resistance and toxic-

ity. There is an urgent need for new drugs that are safe, affordable and can be administered orally. The Drug Discovery Unit at the University of Dundee is a fully integrated biotech style drug discovery operation. Over the last 6 years we have developed an innovative and efficient drug discovery engine for new antileishmanials which we present here. Our *in vitro* screening cascade combines the robustness and throughput required for screening large libraries with the physiological relevance required to have confidence that compounds will show efficacy in *in vivo* models. This cascade includes both axenic and intracellular *Leishmania* assays, as well as toxicity counterscreens. Unlike many standard axenic assays, our novel axenic amastigote assay differentiates between compounds with a cytotoxic and a cytostatic effect and allows us to screen large compound collections in a relatively short time with good translation of activity in the gold-standard intracellular *Leishmania* assay. We aim to obtain proof of concept in animal efficacy studies as quickly as possible. To achieve this we assess the pharmacokinetic properties of hits at an early stage through a set of *in vitro* and *in vivo* assays. In order to swiftly progress promising series through lead-optimisation and pre-clinical development we actively collaborate with a pharmaceutical partner (GSK) and the product development partnership that will ultimately take on clinical development (DNDi).

Drug discovery for visceral leishmaniasis is highly challenging. Our experience of working in this area for several years has resulted in the drug discovery path that we present here, and in the successful identification of novel compound series with the potential of becoming new drugs for visceral leishmaniasis.

DISCLOSURE Nothing to disclose.

## PSI.099

**Comparison of the proteome profiling of Iranian isolates of *Leishmania tropica*, *L. major* and *L. infantum* by two-dimensional electrophoresis (2-DE) and mass-spectrometry**

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**BACKGROUND** The mechanisms of virulence and species differences of *Leishmania* parasites are under the influence of gene expression regulations at post transcriptional stages. In Iran, *L. major* and *L. tropica* are known as principal agents of cutaneous leishmaniasis, while *L. infantum* causes visceral leishmaniasis.

**METHODS** As a preliminary study, we compared the proteome mapping of the above three Iranian isolates of *Leishmania* species through the 2-dimension electrophoresis (2-DE), and identified the prominent proteins by Liquid Chromatography (LC) mass spectrometry.

**RESULTS** We reproducibly detected about 700 protein spots in each species by using the Melanie software. Totally, 264 proteins exhibited significant changes among 3 species. 49 protein spots identified in both *L. tropica* and *L. major* were similar in position in the gel, whereas only 35 of *L. major* proteins and 10 of *L. tropica* proteins were matched with those of *L. infantum*. Having identified 24 proteins in the three species, we sought to provide possible explanations for their differential expression patterns and discuss their relevance to cell biology.

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**CONCLUSION** The comparison of proteome profiling pattern of the 3 species identified limit up and limit down regulated or absent/present proteins. Also the LC-MS data analysis showed that most of the protein spots with differential abundance in the 3 species are involved in cell motility and cytoskeleton, cell signaling and vesicular trafficking, intracellular survival/proteolysis, oxidative stress defense, protein synthesis, protein ubiquitination/proteolysis, and stress related proteins. Differentially proteins distributed among the species maybe implicated in host pathogenecity interactions and parasite tropism to cutaneous or visceral tissue macrophages.

**DISCLOSURE** Nothing to disclose.

**PSI.100**

**Evaluation of immunochromatographic assay with recombinant antigen K39, using whole blood, serum and oral fluid, in the diagnosis of visceral leishmaniasis in Brazilian endemic areas**

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**INTRODUCTION** The immunochromatographic or rapid diagnostic tests (RDT) with recombinant antigens are considered a good option in the laboratory diagnosis of visceral leishmaniasis (VL), due to their easy application in point of care. In Brazil, RDT with rk39 (Kalazar Detect™ Rapid Test, Inbios International) have only been validated with serum specimens (SE), so we aim to validate the test for use with fingertip whole blood (WB) and oral fluid (OF).

**METHODS AND MATERIALS** The study was carried out on 243 individuals: 145 with symptomatic VL confirmed by positive parasitology and/or direct agglutination test (DAT)  $\geq 3200$ , and 98 controls (DAT  $< 3200$ ) including 81 healthy individuals from endemic area and 17 infected with other diseases. RDT were carried out in Campo Grande, Bauru, Aracaju, Natal and São Paulo, where WB, OF and SE were collected. At the Tropical Medicine Institute DAT, RDT, IFAT and ELISA were performed with serum samples.

**RESULTS** RDT yielded the following sensitivity: Campo Grande, 91.67% (WB and SE), 80.56% (OF); Bauru, 90.48% (WB and SE), 76.19% (OF); Aracaju, 90.91% (WB and SE), 81.82% (OF); Natal, 75.76% (WB and SE), 42.42% (OF); all cities, 87.59% (WB and SE), 71.72% (OF). Comparing the three fluids, OF sensitivity was significantly lower than that of WB and SE, considering every locality (chi square,  $P = 0.0002$ ). Comparing the sensitivity in the localities, there was no difference between WB and SE (chi square,  $P = 0.1265$ ). RDT with WB yielded 100.0% specificity in all cities. Comparing the three fluids in VL samples, the color intensity of the bands was significantly lower for OF (Friedman, paired samples,  $P < 0.0001$ ). There was no significant difference in specificity among WB, SE and OF (chi square,  $P = 0.3724$ ). Considering all localities, in samples from VL patients, ELISA was significantly more sensitive than IFAT (Fisher exact test,  $P = 0.0083$ ) and in

control samples, IFAT was more specific (Fisher exact test,  $P < 0.0001$ ).

**CONCLUSIONS** The immunochromatographic test with fingertip whole blood (WB) proved to be promising as it showed the same sensitivity as with serum did in the four localities, giving an alternative to quicken the VL point of care diagnosis. Moreover, oral fluid showed a lower sensitivity and lower color intensity of the bands in the four localities.

Supported by: Ministério da Saúde (SICONV N° 084727/2010), CNPq (fellowship to HG), LIM-38, HC/FMUSP.

**DISCLOSURE** Nothing to disclose.

**PSI.101**

**Serum cytokines responses over the entire clinical-immunological spectrum of human *Leishmania (L.) infantum* chagasi-infection in Amazonian Brazil**

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The clinical-immunological spectrum of human *Leishmania (L.) infantum* chagasi-infection in Amazonian Brazil was recently reviewed based on clinical, DTH, and IFAT-(IgG) evaluations that identified five infection profiles, three of them asymptomatic: Asymptomatic Infection (AI); Subclinical Resistant Infection (SRI); and Indeterminate Initial Infection (III), and two symptomatic: Symptomatic Infection [SI = American visceral leishmaniasis (AVL)]; and Subclinical Oligosymptomatic Infection (SOI). The TNF- $\alpha$ , IL-4, IL-6 and IL-10 serum cytokine responses of these five profiles were analyzed using a multiplexed Cytometric Bead Array examining 161 samples from an endemic area in Pará State, in the Brazilian Amazon: SI (AVL) (21 cases), III (49), SRI (19), SOI (12), AI (36), and CG (24). Higher IL-6 serum levels were observed in the SI profile (AVL) than in the other profiles, and also than those of IL-4 and TNF- $\alpha$  in the same profile, SOI and III ones. Positive correlations were found between IL-6 and IL-10 in the SI (AVL) and III profiles, and between IL-6 and TNF- $\alpha$  in the III. These results provide strong evidence for associating IL-6 and IL-10 cytokines with the immunopathogenesis of the pathogenic SI profile (AVL), and for clarifying the role of these cytokines within the entire clinical-immunological spectrum of human *L. (L.) i. chagasi*-infection.

**DISCLOSURE** Nothing to disclose.

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## PSI.102

**Patient perceptions of new treatment modalities for visceral leishmaniasis in Bihar, India: a qualitative study**S. Burza<sup>1,2,3</sup>, M. Jeleff<sup>4</sup>, V. R. Das<sup>5</sup>, T. Sunyoto<sup>1</sup>, R. Mahajan<sup>1</sup>, M. A. Lima<sup>6</sup>, M. Boelaert<sup>2</sup>, J.-P. Van Geertruyden<sup>3</sup>, D. Burtcher<sup>4</sup> and P. Das<sup>5</sup><sup>1</sup>Médecins Sans Frontières, Delhi, India; <sup>2</sup>Institute of Tropical Medicine, Antwerp, Belgium; <sup>3</sup>International Health, University of Antwerp, Antwerp, Belgium; <sup>4</sup>Medecins Sans Frontières, Vienna, Austria; <sup>5</sup>Rajendra Mamorial Research Institute, Patna, India; <sup>6</sup>Médecins Sans Frontières, Barcelona, Spain**BACKGROUND** Until recently a standard regimen of

- 1 28 days of oral miltefosine was first line treatment for visceral leishmaniasis (VL) in the Indian subcontinent, where the World Health Organisation recommends several new low-dose regimens;
- 2 single intravenous infusion liposomal amphotericin B;
- 3 combination of 10 days daily intramuscular paromomycin with oral miltefosine; and
- 4 combination of a single intravenous infusion of liposomal amphotericin B with 7 days of oral miltefosine.

All these treatment regimens have been shown to be highly efficacious in phase 3 trials, however there is little information on the utility of these treatments from the patients' perspective. We aim to document patient's perception on these four different treatment regimens for VL.

**METHODS** Through purposeful and maximum variation sampling, we selected 54 participants with a confirmed history of VL and treated with one of the four treatment modalities of interest within the previous 12 months. A flexible participatory technique was applied using non-participant observation as well as in-depth interviews guided by semi-structured questions. Results were transcribed from field notes and interview records and coded thematically using inductive and deductive techniques.

**RESULTS** The study findings showed that patients preferred a single-dose liposomal amphotericin B injection due to its perceived effectiveness, limited travel to and time spent at health centres resulting in lower costs, and fewer risks for female patients. The combination therapy of a single dose amphotericin B (AmBisome) and 7 days oral miltefosine was perceived as effective and appreciated for its short duration. Less accepted was the combination therapy 10-day oral miltefosine with 10 days of intramuscular injections of paromomycin where patients complained about the hidden costs and loss of income caused by frequent travel. The least acceptable was the 28-day oral miltefosine treatment, which was perceived as lengthy with increased side effects.

**CONCLUSIONS** This study helps understand patients' understanding and perspectives on four different treatment options for VL. This information can be valuable for decision-making while developing health policy for VL management in the Indian Sub-continent.

**DISCLOSURE** Nothing to disclose.

## PSI.103

**Sero-epidemiological survey of canine visceral leishmaniasis (CVL) among dogs in central west parts of Iran using direct agglutination test (DAT)**K. Manouchehri Naeini<sup>1</sup>, M. D. Ghasemi<sup>1</sup>, S. Kheiri<sup>2</sup>, M. Mohebbi<sup>3</sup> and B. Akhoundi<sup>3</sup><sup>1</sup>Parasitology, Mycology and Entomology, Shahrekord University of Medical Sciences, School of Medicine, Shahrekord, Iran; <sup>2</sup>Biostatistic, Shahrekord University of Medical Sciences, School of Medicine School of Health, Shahrekord, Iran; <sup>3</sup>Parasitology and Mycology, Tehran University of Medical Sciences, School of Health, Tehran, Iran

**INTRODUCTION** Mediterranean Visceral Leishmaniasis (MVL) is one of the most serious and fatal neglected infectious diseases in different parts of Iran, including Chaharmahal va Bakhtiari province. In Iran, canines are considered as the reservoirs of disease. So, we aimed to investigate the sero-prevalence of anti-*Leishmania infantum* antibodies in dogs as the main reservoirs of MVL.

**MATERIALS AND METHODS** The cross-sectional non-randomized study was carried out on 533 serum samples collected from dogs all over the province to determine the sero-prevalence of Anti-*Leishmania infantum* antibodies using a direct agglutination method. Analysis of the data was done using SPSS ver.20 and Chi-square test, and *P*-values < 0.05 were considered significant.

**RESULTS** Of these 533 sera, 324 (60.8%) and 209 samples (39.2%) belonged to male and female dogs aged 3–120 months (mean  $36.3 \pm 24.8$  months), respectively. The study was also carried out on the sera obtained from 385 (72.2%) tribal sheepdogs, 100 (18.8%) rural dogs and 48 (9%) stray dogs. In 86 of the total samples (16.1%) of the sera, there were varying levels of anti-*Leishmania infantum* IgG antibodies titrated (ranged) between 1/80 and 1/2560. The highest sero-prevalence rate (21.9%) of these antibodies was found in dogs aged 37–84 months and there was a significant correlation between the seropositivity against *L. infantum* and the age group (*P* = 0.011). Sero-prevalence of anti-*Leishmania infantum* antibodies varied in different areas of the province: from 41.7% in Shahr-e-kord to 1% in Lordegan. There was also a significant relationship between the seroprevalence rate of the antibodies and the counties which studied (*P* = 0.001). The sero-prevalence rate of anti-*Leishmania infantum* antibodies was significantly higher in stray dogs than tribal and rural sheepdogs (*P* = 0.042).

**CONCLUSION** *L. infantum* infection was found in dogs from different parts of the province, particularly stray dogs. These could be considered as one of the main reservoir hosts for human visceral leishmaniasis. Therefore, VL should be considered as an important health problem in this region of Iran.

**DISCLOSURE** Nothing to disclose.

## PSI.104

**Seroprevalence and risk factors of Toxoplasma infection in patients with malignancy in central and south central areas of Iran compared with control group using enzyme-linked immunosorbent assay (ELISA)**K. Manouchehri Naeini<sup>1</sup>, H. Hanifepoor<sup>1</sup>, S. Kheiri<sup>2</sup> and G. Javanmardi<sup>3</sup><sup>1</sup>Parasitology, Mycology, and Entomology, Shahr-e-kord University of Medical Sciences, Shahr-e-kord, Iran; <sup>2</sup>Biostatistic, Shahr-e-kord University of Medical Sciences, Shahr-e-kord, Iran; <sup>3</sup>Isfahan University of Medical Sciences, Laboratory of Sayyed-O-Shohada Hospital, Isfahan, Iran

**INTRODUCTION** *Toxoplasma gondii* is one of the most serious infectious agents in patients with cancer. The study was carried



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out to determine the seroprevalence and risk factors of *Toxoplasma* infection in patients with malignancy compared with control group.

**MATERIALS AND METHODS** A total of four hundred and forty serum samples were collected from patients with cancer and healthy individuals from Isfahan and Chaharmahal va Bakhtiari provinces who had been referred to the Sayyed -O- Shohada hospital of Isfahan (i.e. each group consisted of 220 samples). The demographic data were collected via questionnaire forms and the sera were examined for the specific anti-*Toxoplasma* antibodies (IgM, IgG), using ELISA method. The SPSS ver.20 software was used and the results were analysed by Chi-square, *t*-student and logistic regression model tests.

**RESULTS** Out of 220 sera belonged to the patients with cancers, 133 (60.5%) and 4 (1.8%) serum samples were positive for anti-*Toxoplasma* IgG and IgM antibodies, respectively. However, these positivity rates were 41.4% (91) and 1.4% (3) for anti-*Toxoplasma* IgG and IgM in the control group. There was a significant relationship between the two groups for the antibodies ( $P < 0.001$ ). Amongst the patients with cancer, the highest and lowest rates of anti-*Toxoplasma* IgG antibodies were found in patients with AML (11.81%), ALL (9.09%) and uterus cancer (0.45%). The specific anti-*Toxoplasma* IgM antibodies were found in four patients with acute myelocytic leukemia (AML) (0.45%), acute lymphocytic leukemia (ALL) (0.45%), stomach cancer (0.45%) and ovary cancer (0.45%). There was a significant difference between seroprevalence rate of anti-*Toxoplasma*.

IgG-antibodies and the variables, age, sex, residence, job, diet and in case and control groups ( $P < 0.05$ ).

**CONCLUSION** With respect to the findings, It is likely that the majority of *Toxoplasma* infections in patients with cancer have been occurred prior to their malignancy. However, malignancy and its therapeutic regimens, particularly chemotherapy, may reactivate the latent *Toxoplasma* infections and predispose the patients for acute systemic infection.

**DISCLOSURE** Nothing to disclose.

## PS1.105

## The burden of leishmaniasis in Iran: findings from the global burden of disease from 1990 to 2010

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**INTRODUCTION** Leishmaniasis, as parasitic neglected tropical disease, threatens the public health with a morbidity and occasionally mortality rate which is virtually found on every continent except Australia and Antarctica. In this study, we aimed to estimate the burden of leishmaniasis in Iran; as one of the main endemic foci of leishmaniasis in the world by using the measures of the global burden of disease (GBD) results 2010 compared to leishmaniasis data registered from all provinces of Iran.

**MATERIALS AND METHODS** Data obtained from the GBD and Institute for Health Metrics and Evaluation (IHME) during 1990–2010 to estimate disability-adjusted life-years (DALYs) and deaths and fatality rates of leishmaniasis. We compared the results of GBD's burden for leishmaniasis with the same available data was registered by MOHME.

**RESULTS** The GBD was estimated 229 714 DALYs due to leishmaniasis in the Iranian people of all ages and both sexes. The total numbers of visceral leishmaniasis (VL) or kala-azar deaths were 3391; and deaths caused by VL were decreased significantly in recent years. The Iran's death registration data of MOHME revealed that almost 20 deaths registered from 1990 to 2010. Underreporting of kala-azar deaths is always more pronounced.

**CONCLUSIONS** Findings indicate that the GBD estimation of mortality rates was surprisingly higher than the MOHME's data. The burden of leishmaniasis decreased significantly during 1990–2010 in both data sources. The reason of this decrease has been gained by establishment of VL surveillance system in various parts of Iran particularly in the endemic areas.

**DISCLOSURE** Nothing to disclose.

## PS1.106

Arginase activity in pathogenic Iranian strains of *Leishmania* spp. and non-pathogenic *L. tarentolae*

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**INTRODUCTION** *Leishmania* spp. are obligate intracellular protozoan parasites requiring a suitable milieu for their growth and invasion within host macrophages. Arginine uptake and arginase (ARG) activity of host and parasites are crucial in survival and proliferation of *Leishmania* infection in the host cells. We tested the hypothesis that ARG of *Leishmania* spp., an enzyme associated with growth, establishing and maintaining of leishmanial infection within host cells, might have had a hallmark role in the pathogenesis of healing and non-healing leishmaniasis. Therefore, we characterized in detail the ARG of Iranian strains of *Leishmania* spp. at the genomic and transcriptomic levels and assessed arginase activity at the in-vitro level.

**MATERIALS AND METHODS** After confirmation and identification of the ARG gene of Iranian strains of *Leishmania* spp. by PCR, the ARG gene was cloned and characterized from *Leishmania* spp. and finally was sequenced. Expressions of ARG were assayed by RT-PCR. ARG activity was measured in amastigotes and promastigotes of parasites.

**RESULTS** The ARG sequence showed significant homology to ARG proteins from other organisms and the complete nucleotide sequence of the ARG open reading frame (ORF) was obtained. RT-PCR analysis demonstrated that the gene is strongly expressed during the logarithmic and stationary phase of the parasite. We showed that in promastigotes of pathogenic Iranian strains of *L. major* and *L. tropica*, ARG activity is higher than non-pathogenic *L. tarentolae* in logarithmic phase. Surprisingly, ARG activity in the logarithmic and stationary phase of promastigotes of *L. tropica* was higher than other strains. ARG activity in supernatant of amastigotes forms of the above parasites are all in the same level but in the cell lysate of *L. major* and *L. tarentolae* is lower than *L. tropica*.

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**CONCLUSIONS** It is suggested that ARG, by enabling establishing and maintaining of *Leishmania* parasites within host macrophages, may contribute to *Leishmania* pathogenicity and severity, thereby representing potential targets for novel therapeutic strategies.

**DISCLOSURE** Nothing to disclose.

**PS1.107****Morphological and molecular identification of *Naegleria* spp. from water resources of Rasht City, Gilan province**

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**INTRODUCTION** *Naegleria* spp. are free-living amoeboflagellates that belong to Vahlkampfiidae family. These amphizoid protozoan parasite causes meningoencephalitis called primary amoebic meningoencephalitis (PAM). These widespread amoebae could be found in environmental sources particularly in water resources of tropical and subtropical regions.

**MATERIALS AND METHODS** In the present study 60 samples were collected from water resources of Rasht city, Gilan province, Iran. After filtering and culturing of samples, plates were examined by microscopic method and according to the page criteria. DNA of vahlkampfiids positive samples were then extracted using phenol-chloroform method. *Amoebae* were identified by molecular methods (PCR and sequencing). In this study ITS primer was used for PCR amplification and positive PCR products were submitted to sequencing.

**RESULTS** 7 (11.6%) of 60 total samples were positive for *Naegleria*.

**CONCLUSIONS** The present research reflect the occurrence of *Naegleria* spp. in water sources of Rasht city that can be potential hazard for native people and tourists. Warning signs in recreational places could be an option for decreasing the risk. To the best of our knowledge this is the first report regarding the occurrence of *Naegleria* in Rasht city, Gilan province.

**DISCLOSURE** Nothing to disclose.

**PS1.108****The burden of vaccine-preventable diseases – measles, tetanus, diphtheria and whooping cough – in Iran: findings from the GBD study 2010**

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**INTRODUCTION** Vaccination has been one of the most successful and cost-effective public health interventions in the last century that saved millions of lives. In 1984, the Expanded Program on Immunization (EPI) was launched in Iran as one of the main components of Primary Health Care (PHC). We aimed to investigate the burden of four vaccine-preventable diseases from 1990 to 2010 in Iran.

**MATERIALS AND METHODS** GBD study 2010 includes death rates, Years of Life Lost (YLLs), Years Lived with Disability

(YLDs), and Disability Adjusted Life Years (DALYs). YLLs is calculated through multiplying the number of deaths in each age group by a reference life expectancy for the same age group, while YLDs can be obtained from the prevalence of a disease multiplied by the disability weight (DW) for the same disease. The sum of these two indices develops DALYs. In the present study, We tried to produce new graphs and explain more about the results of Iran, in addition to describing the GBD study limitations.

**RESULTS** Regardless of gender differences, DALYs rates for measles at all ages were 86.1220 and 5.5703 per 100 000 in 1990 and 2010, respectively. It means about 94% decrease in this disease. The maximum and minimum rates of deaths from whooping cough for males aged under 5 was 4.0674 and 0.2713 per 100 000 in 1990 and 2000, respectively.

**CONCLUSIONS** This study demonstrated that vaccination had a positive impact on the control of communicable diseases, but the results of this study has some limitations similar to GBD study. May pave the way for making decision about other public health interventions. Moreover, since measuring the impact of various diseases on health plays an important role in public health, it can be an important step toward prioritization in health.

**DISCLOSURE** Nothing to disclose.

**PS1.109****Visceral leishmaniasis cases in non-endemic districts in Nepal: imported or local transmission?**

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**INTRODUCTION** In Nepal, the incidence of visceral leishmaniasis (VL) is decreasing significantly, from over 1200 cases in 2008 to only 339 reported new native cases in the (fiscal) year 2014. The majority of these cases comes from the 12 program districts in the south-eastern plains of the *Terai* (lowlands).

Over the last years, the number of cases reported from non-program districts has been increasing, and now represents a considerable proportion of cases (44, or 13%). In 2014 and 2015, an outbreak investigation team visited cases in seven non-endemic districts: Bhojpur, Okhaldhunga (Eastern Region); Palpa (Western Region); Sukhet (Mid-Western Region); Doti and Kailali (Far Western Region) in order to collect epidemiological, entomological and microbiological data on *L. donovani* infection and transmission.

**METHODOLOGY** Study villages were identified on the basis of official reporting data, number of VL cases reported and accessibility. On the spot, a geographical unit (usually village or hamlet) was defined around the case(s), followed by a house-to-house survey to document possible unreported cases, take blood samples of all consenting household members (age  $\geq 2$  years), and collect data on household and individual characteristics through pre-tested questionnaires. Special focus was put on work and travel history.

CDC light traps and aspiration method were used to collect sand flies. Blood samples were taken from domestic animals as well. Blood was tested on presence of *L. donovani* antibodies using the direct agglutination test, and on *Leishmania* parasites through PCR.

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**RESULTS** Phlebotomus sandflies, the vector of *L. donovani* were found in all villages irrespective of elevation from sea level (500–1500 m). In the eastern region, sero-prevalence in the selected villages was high, comparable with that found in endemic villages in the Terai. *Leishmania* PCR was positive in several samples, *L. donovani* could be confirmed through sequencing in two human samples and one sand fly. At the time of writing of the abstract, the investigation team was still on the field in Western Nepal collecting data.

**CONCLUSIONS** Our study demonstrates that occasionally imported *L. donovani* infections into districts currently considered non-endemic can set off local transmission despite the altitude. Awareness, surveillance and control activities should therefore be extended in order to assure VL elimination in Nepal.

**DISCLOSURE** Nothing to disclose.

## PSI.110

### Canine visceral leishmaniasis and arginase activity in the sera and reticuloendothelial tissues

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**INTRODUCTION** Visceral leishmaniasis (VL) is a zoonotic parasitic disease caused by *Leishmania infantum* which is mainly transmitted by sand flies. Domestic dogs are the main reservoir that manifest as asymptomatic or as a symptomatic disease characterized by hepatosplenomegaly, fever, weight loss. Arginase-induced L-arginine metabolism act as a potent mechanism of immuno suppression and high arginase activity is a hallmark of nonhealing disease. Here for the first time, levels of arginase activity in the sera and reticuloendothelial tissues of symptomatic and asymptomatic dogs were assessed and compared with healthy dogs.

**MATERIALS AND METHODS** Dogs were grouped as symptomatic, asymptomatic, and healthy animals according to their PCR confirmation and clinical statue of each dog. After blood collection, the dogs were euthanized and reticuloendothelial tissues including lymph node, spleen, liver and kidney were removed. The enzymatic activity of arginase was measured and normalized according to protein content. Data were analyzed by Kruskal-Wallis and Mann Whitney tests and differences were considered statistically significant at  $P < 0.05$ .

**RESULTS** The analyzed data indicated that arginase levels in kidney were significantly higher in infected dogs than healthy ones. Symptomatic dogs had higher arginase levels than asymptomatic ones, but the difference was not significant. Moreover, in different tissues including liver, spleen and lymph node, we observed higher level of arginase activity in infected dogs but it was not significant in compare with healthy animals. The level of arginase activity in the PBMC and PMN was also higher in infected dogs in compare to healthy animals.

**CONCLUSION** Among different tissues, kidney is more sensitive to illustrate the function of arginase as an enzyme caused immunosuppression. Unlike to human VL cases, we did not observed any differences in the level of arginase activity in PBMC and PMN, although there are 5 fold increases in the sera of infected animals in compare with healthy dogs.

**DISCLOSURE** Nothing to disclose.

## PSI.111

### Evidence on the intradomiciliar transmission of American cutaneous leishmaniasis due to *Leishmania (Viannia) lainsoni* in the periphery of metropolitan region of Belém, capital of Pará State, Amazonian Brazil

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American cutaneous leishmaniasis (ACL) due to *Leishmania (Viannia) lainsoni* received notorious epidemiological worth in Amazonian Brazil during recent 1990's, when arose the first cases of ACL in the periphery of metropolitan region of Belém, the capital of Pará State, mainly in the municipalities of Ananindeua, Marituba and Benevides. Afterwards, the disease was also confirmed in the western and southeastern regions of Pará State, as well as in Amapá, Acre and Rondônia States, all in Amazonian Brazil, but also in the neighboring countries of Peru, Bolivia, French Guyana and Surinam. However, considering that the parasite transmission in nature is carried out by *Lutzomyia ubiquitalis* (Psychodidae: Phlebotominae), a poorly anthropophilic sand fly species, the disease seems to be little frequent in man. We demonstrate herein that ACL due to *L. (V.) lainsoni* can be intradomiciliarly transmitted in Amazonian Brazil. In the last 2 years, seven ACL patients due to *L. (V.) lainsoni* were attended in the ambulatory of Leishmaniasis Laboratory 'Prof. Dr. Ralph Lainson', in Ananindeua municipality, Pará State, Brazil, all from the 'Mosqueiro Island', an administrative district situated about 70 km from Belém, capital of Pará State. The phenotypical characterization of *L. (V.) lainsoni* was based on isoenzyme electrophoresis. In order to confirm the transmission of disease, it was carried out a sand fly collection (6:00 p.m. to 6:00 a.m.) using four CDC light traps in the interior of a home (two bedrooms) of an ACL patient. This sand fly capture revealed the identification of three female of *Lu. trinidadensis* and twelve of *Lu. ubiquitalis*. These results represent strong evidence on the sinanthropic capacity of the sand fly *Lu. ubiquitalis*, a proven vector of *L. (V.) lainsoni* in Amazonian Brazil, to transmit intradomiciliarly this parasite to man.

**DISCLOSURE** Nothing to disclose.

## PSI.112

### The cost and cost-effectiveness of IgG1 as point-of-care rapid diagnostic tests to detect relapse of visceral leishmaniasis

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Visceral leishmaniasis (VL) is ultimately a fatal disease if left untreated. Diagnosis of VL in patients presenting with suspected relapse is a challenge in resource-limited settings. Currently diagnosis of relapse necessitates invasive tissue aspirates of spleen, bone-marrow or lymph node, which requires skilled HR and the capacity to identify *L. donovani* amastigotes histologically. These skill sets are rare in the majority of the rural settings in areas endemic for VL.



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Splenic aspirate is the gold standard with high sensitivity (96%) however it is complex, carries risk of bleeding and is contraindicated in patients with very low hemoglobin or platelets, both of which are not uncommon in VL. Although safer, lymph node (50%) and bone-marrow (65%) have relatively low sensitivity. Recently a point-of-care rapid diagnostic test (RDT), the IgG1 K-SeT, was evaluated in India and Nepal. Though still in development phase, preliminary results showed sensitivity of 83–100% and a specificity of 80% of detecting VL relapse in symptomatic patients.

In this study we use a decision tree model to compare the cost and cost-effectiveness of presumptive treatment, invasive parasitological diagnosis (spleen biopsy, lymph node and bone marrow aspirate) and the IgG1 RDT to confirm relapse of VL in symptomatic patients in South Asia. Primary data on the cost of diagnostic tests is combined with data from the literature, unpublished studies and expert opinion. We calculate the cost per patient correctly diagnosed as well as average and incremental cost-effectiveness ratios expressed as cost per death averted. Probabilistic sensitivity analysis is applied to assess the robustness of the cost-effectiveness results.

DISCLOSURE Nothing to disclose.

## PSI.113

## Development and performance evaluation of enzyme linked immunosorbent assay and lineblot for serological diagnosis of leishmaniasis in dogs

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Canine leishmaniasis is a zoonotic disease by the protozoan parasite *Leishmania* transmitted by the bite of an infected phlebotomine sandfly. *Leishmania infantum* is the most common and important cause of canine leishmaniasis worldwide. Other *Leishmania* spp. reported from dogs include *L. mexicana*, *L. donovani*, and *L. braziliensis*. Leishmaniasis can be categorized by two types of diseases in dogs: a cutaneous reaction and a visceral reaction also known as black fever, the most severe form of leishmaniasis.

Infection does not invariably lead to illness. In fact, most infected dogs remain asymptomatic and may never develop clinical manifestations. In endemic regions, the prevalence of disease is often <10% and only about 1 in 5 infected dogs are considered likely to develop clinical disease.

Diagnosis of canine leishmaniasis is based on the presence of clinical signs together with positive specific antibody assay. Due to the close contact of dogs and humans it is important to monitor the presence of *Leishmania* in the animal population in order to secure safety for humans.

The aim of this work was to develop a serological ELISA and Lineblot assay to detect IgG and IgM antibodies against *Leishmania* in serum or plasma samples derived from all mammals.

Microtiterplates were coated with antigen preparations of *Leishmania infantum*. The presents of antibodies against *Leishmania* is detected by protein A/G-HRP. A sample collection of about 200 positive samples and 400 negative samples was used for development and evaluation of the assay.

Samples were taken from dogs all over the world and performance of different antigen preparations (native *L. guyanensis*; native *L. major*; recombinant *L. chagasi* and recombinant *L. donovani*) where compared with the final assay utilizing *L. infantum* antigens. High throughput screening can be done

with ELISA while determining individual can be performed with the Lineblot without the need of special lab equipment.

Here we show the performance characteristic of the newly developed assays. Due to the improved antigen design, purification method and test setup a superior assay performance was achieved compared to other test methods.

DISCLOSURE This work was performed at a company.

## PSI.114

Analysis of growth kinetics and RNA-Seq gene expression profiles in *Leishmania infantum* transfectant promastigotes over-expressing protein phosphatases 1 (PP1)

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*Leishmania infantum* is the protozoan pathogen responsible for zoonotic visceral leishmaniasis (VL) in the Mediterranean Basin. Infections in mammals are acquired via sand flies of the genus *Phlebotomus*. The signaling pathways that control the differentiation processes from extracellular promastigotes in the sand fly host into intracellular amastigotes in the mammalian host have not been characterized so far. The PP1s are essential serine/threonine phosphatases in regulating diverse cellular functions in eukaryotic organisms and its role in *Leishmania* has not yet been described. The comparative sequence alignment of the PP1 of *L. infantum* codified by chromosome 34 showed relevant amino acid differences in the N-terminal regions and an invariable catalytic core. The predicted three-dimensional structure of LinJ34.0840 did not significantly differ from the widely studied mammalian orthologues. The gene expression of PP1 analyzed throughout the life cycle of *L. infantum* by qRT-PCR displayed a regular expression level of PP1 during the promastigotes' growth curve. However, several PP1 – LinJ15.0240, LinJ34.0820, LinJ34.0850 – were found to be up-regulated in the infective promastigotes obtained from the natural sand-fly environment. Immunofluorescence studies of axenic promastigotes evidenced the subcellular localization of PP1 in the flagellar region (LinJ15.0240) and flagellar pocket (LinJ34.0840). Stable transfectant promastigotes for the over-expression of genes LinJ15.0240 and LinJ34.0840 were generated in their full length and N-terminal truncated versions with the integrative vector pIR-mcs. First, growth kinetic was altered in the LinJ34.0840 and truncated LinJ15.0240 transfectants. Western blot analysis showed a sharp decrease of PP1 over-expression after 48 h of incubation. Furthermore, the expression profiles of PP1 transfectants analyzed by RNA-Seq revealed a different expression levels compared with wild type promastigotes being found down-regulated more than 500 genes in LinJ34.0840 transfectant. Interestingly, significant over-expression of genes related with ribosomal protein was detected in the truncated LinJ15.0240 and LinJ34.0840 transfectants. Indeed, the over-expression of PP1 resulted in cellular stress and disturbance in the rate translation due to the essential inhibitory functions of PP1 in signaling pathways. These observations suggest that PP1 may play an essential role in the differentiation processes of *L. infantum*.

DISCLOSURE Nothing to disclose.



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## PS1.115

**Analysis of global gene expression of *Leishmania infantum* under Insulin-like growth factor I stimulus**E. M. Ramos-Sanchez<sup>1,2</sup>, A. H. Nerland<sup>2</sup> and H. Goto<sup>1</sup><sup>1</sup>Instituto de Medicina Tropical de São Paulo, Universidade de São Paulo, São Paulo, Brazil; <sup>2</sup>Department of Clinical Science, University of Bergen, Bergen, Norway

Visceral Leishmaniasis (VL) is a serious infectious disease caused by *Leishmania (Leishmania) infantum*, which affects the mononuclear phagocyte system. There is a large gap in the knowledge of various aspects of the disease pathogenesis. Many of these manifestations and clinical changes in VL may be related in part to certain changes in the control of gene expression. Our group has shown results that suggest the presence of mechanisms of post-transcriptional regulation in leishmaniasis, observing high mRNA levels of insulin-like growth factor I (IGF-I) in the liver in dogs naturally infected by *L. infantum*, but a decreased serum levels of this factor suggesting a post-transcriptional regulation. The molecular pathogenic mechanisms involved in the infection with *L. infantum* have not yet been fully elucidated, so the aim of this study was to analyze a profile of global changes in the expression of mRNA in *L. (L.) infantum* under IGF-I stimulus. To achieve these objectives it was used next-generation sequencing techniques. *L. infantum* promastigotes were grown in M199 culture medium supplemented with 10% heat-inactivated fetal calf serum and incubated at 26°C. For the experiment promastigotes were maintained during culture period with IGF-I stimulus or only for 5 min or without 50 ng/ml recombinant human IGF-I stimulus. When the parasites were in the stationary growth phase, they were washed twice with phosphate buffered saline 0.01 M pH 7.2 and the mRNA was extracted. mRNA was used to prepare cDNA library and was sequenced in GS Junior System Roche. Data analysis was performed using software package from GS Junior System and Blast program (NCBI). We observed 1025 different mRNA corresponding to 1035 different genes IGF-I stimulus maintained during all culture period, 780 different mRNA sequences corresponding to 780 different genes with 5 min IGF-I stimulus and 235 different mRNA sequences corresponding to 235 different genes when without IGF-I stimulus. These results suggest that different genes are transcribed or dynamically regulated under the stimulation of IGF-I. These changes identified at the molecular level can be used to understand the role of IGF-I during the infection and identify therapeutic targets in *Leishmania* infection.

Supported by CAPES/SIU, FINEP, LIM-38.

DISCLOSURE Nothing to disclose.

## PS1.116

**Insulin-like growth factor-I expression in the pathogenesis of pancytopenia in canine and hamster visceral leishmaniasis**F. A. Pinho<sup>1,2</sup>, A. R. A. Torres<sup>1</sup>, I. M. Carvalho-Dantas<sup>1</sup>, S. I. Miyashiro<sup>3</sup>, M. K. Hagiwara<sup>3</sup> and H. Goto<sup>1</sup><sup>1</sup>Instituto de Medicina Tropical de São Paulo, Universidade de São Paulo, São Paulo, Brazil; <sup>2</sup>Centro de Ciências Agrárias, Universidade Federal do Piauí, Teresina, Brazil; <sup>3</sup>Faculdade de Medicina Veterinária e Zootecnia, Universidade de São Paulo, São Paulo, Brazil

**INTRODUCTION** Pancytopenia is an important alteration in visceral leishmaniasis (VL) which pathogenesis is poorly known. We assessed the factors involved in the pathogenesis of pancytopenia in *Leishmania (Leishmania) infantum*-naturally infected dogs and experimental VL in hamster.

**MATERIAL AND METHODS** We examined 5 infected dogs with pancytopenia and 8 with bicytopenia and 10 non-infected control dogs. In hamster, 10 animals were infected intraperitoneally with  $2 \times 10^7$  *L. (L.) infantum* amastigotes. Myelogram and growth factor and/or cytokine mRNA expression were analysed in bone marrow samples.

**RESULTS** All infected dogs had normocytic normochromic anaemia, leukopenia and/or thrombocytopenia. In myelogram, we observed dysgranulopoiesis (100%), dyserythropoiesis (100%) and dysmegakaryopoiesis (53.8%). VL dogs presented an increase in the myeloid:erythroid ratio compared with non-infected dogs. Infected pancytopenic dogs had greater erythroid maturation index when compared with infected bicytopenic dogs. Addressing the growth factors and cytokines, increased mRNA expression of IFN- $\gamma$ , GM-CSF, IL-7 and TNF- $\alpha$  was observed that seemingly play an important role in bicytopenic dogs. In contrast, pancytopenic dogs had a significantly decreased IGF-I mRNA expression compared with other groups. When we extended our study to *L. infantum* amastigote-infected hamsters, we observed significant haematological alteration such as pancytopenia from 90 days post-infection. In myelogram alterations similar to those seen in VL dogs were observed. IGF-I expression in bone marrow of hamster was higher at 90 days that decreased at 120 days of infection when compared with non-infected controls, coinciding respectively with normal or diminished blood hemoglobin concentrations.

**CONCLUSION** Low IGF-I expression in infected dog or hamster with patent pancytopenia suggests possible involvement of this factor in the pathogenesis of haematological alteration during VL.

DISCLOSURE Supported by FAPESP, CAPES, CNPq, LIM-38 (HC-FMUSP).

## PS1.117

**Specie-specific differentiation of *Leishmania* through real time PCR and high resolution melt**R. E. C. Silva<sup>1</sup>, L. Farias<sup>1</sup>, D. B. Dias<sup>1</sup>, E. O. Mello Silva<sup>1</sup>, S. R. C. Soares<sup>1</sup> and J. A. L. Lindoso<sup>1,2</sup><sup>1</sup>Laboratório de Seroepidemiologia, Instituto de Medicina Tropical de São Paulo, Universidade de São Paulo, São Paulo, Brazil; <sup>2</sup>Instituto de Infectologia Emilio Ribas, São Paulo, Brazil

**INTRODUCTION** According to WHO estimates worldwide there are 1.5–2 million new cases per year of leishmaniasis. Clinical manifestation varies according to the subgenus and species of *Leishmania*. Currently, the diagnosis is made through laboratory tests that have variable sensitivity and inability to differentiate the species causing the disease. Molecular techniques have been an alternative in the improvement of the diagnosis and several targets have been evaluated for this purpose, however, so far none has been able to discriminate *Leishmania* species in the New World using real-time PCR only (qPCR), feature that we seek in the target heat shock protein 70 (hsp70), because it is a single-copy gene and there are point mutations detected by sequencing, present in different species.

**MATERIAL AND METHODS** Cultures of standard strains from eight species of *Leishmania* available at Laboratory of Seroepidemiology from Institute of Tropical Medicine from São Paulo (*Leishmania (L.) amazonensis*, *Leishmania (L.) infantum*, *Leishmania (L.) major*, *Leishmania (V.) braziliensis*, *Leishmania (V.) guyanensis*, *Leishmania (V.) shawi*, *Leishmania (V.) naiffi* and *Leishmania (V.) lainsoni*) were used to DNA extraction by phenol-chloroform. Based on the mutations present in hsp70,

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primers to use by qPCR were designed. The reactions were performed with the addition of other trypanosomes (*L. seymouri*, *Chritidia fasciculata*, *Trypanosoma cruzi*, *Trypanosoma brucei*, *Toxoplasma gondii* and *Plasmodium vivax*) to check the target specific for the genus *Leishmania*. RESULTS Melt curve analyzes, amplification cycles and HRM dispersion plot showed that the target was effective in the differentiation between *Leishmania* sp. and other pathogens and differentiation of subgenus, differentiating *Viannia* from *Leishmania* subgenus only using qPCR, and that there was differentiation between species of the subgenus *Leishmania* (*L. infantum*, *L. major* and *L. amazonensis*). For other pathogens, there was DNA amplification of *Leptomonas seymouri*, but no DNA amplification from *C. fasciculata*, *Trypanosoma cruzi*, *Trypanosoma brucei*, *Toxoplasma gondii* and *Plasmodium vivax*.

CONCLUSION Our results suggest that the target hsp70 with the primers used in this study, is a good marker to differentiate the two subgenus of *Leishmania* and to differentiate the species inside the subgenus *Leishmania*, but is not able to discriminate between species inside the subgenus *Viannia*.

DISCLOSURE Nothing to disclose.

## PSI.118

### Diffent genotypes of *Leishmania infantum* occurring in visceral leishmaniasis in HIV and not-HIV-infected patients from the new world

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INTRODUCTION Genetic diversity has been analyzed to determinate the distribution of different strains of *Leishmania infantum* and possible origins of the parasite, as well as the spread of the disease. Another important point is related to possibility to identify specific polymorphism of *Leishmania infantum* from different reservoir or so far related to severity and HIV infection. Here we evaluated different genotypes of *Leishmania infantum* from patients presenting visceral leishmaniasis alone or coinfectd with HIV relating to relapse or lethality.

MATERIAL AND METHODS Bone marrow aspirates from VL patients were obtained from a shaved blade. DNA was extracted according to the specific protocol for bone marrow and it was amplified using the primers LINR4 and LIN19, generating a 720 bp fragment. This generated fragment was digested using restriction enzymes: RsaI and HpaII. The product of restriction was transformed in a binary matrix and it transformed into a distance matrix by the RESTDIST program. This distance matrix was used to construct a dendrogram by the UPGMA method using the NEIGHBOR program. A graphical representation was performed by PhyloDraw, version 0.8, thereby determining the genetic similarity of the minicircle classes among the samples. RESULTS From 62 samples of bone marrow aspirate, 40 had their genetic material amplified (six HIV-positive and 34 HIV-negative), and the kDNA restriction patterns from the 34 clinical isolates were used for cluster analysis. The groups diverging at the left-hand side of the dotted line could be reliably obtained (i.e., in inter-experiment replicates, the same isolate was

consistently linked to the same cluster), while divisions occurring at the right-hand side could often be attributed to inter-experiment variation. Based on the standard deviation of the branches and the consistency of the clustering, 14 kDNA fingerprint types were recognized among the 34 clinical isolates. Two group B isolates branch off at the base of the tree, separate from the others.

CONCLUSION We observed that there was not a correlation between specific genotypes of *Leishmania* sp. and coinfection or lack of coinfection with HIV. Most likely, *Leishmania infantum* is highly conserved, and for this reason, there are some clusters that hinder both the determination of the relationship among the different clusters and the outcome of the patient or the pathogenicity.

DISCLOSURE Nothing to disclose.

## PSI.119

### Use of pentamidine as secondary prophylaxis to prevent visceral leishmaniasis relapse in HIV infected patients

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BACKGROUND Visceral leishmaniasis (VL) has become an important opportunistic infection in persons with HIV-infection in VL-endemic areas. The co-infection leads to profound immunosuppression and an annual VL recurrence in 67% of the patients. This study assessed the effectiveness, safety and feasibility of monthly pentamidine infusions to prevent recurrence of VL in HIV co-infected patients.

METHODS A single-arm, open-label trial was conducted at two leishmaniasis treatment centers in northwest Ethiopia. HIV-infected patients with a VL episode were included after parasitological cure. Monthly infusions of 4 mg/kg pentamidine-isethionate diluted in normal-saline were started for 12 months. All received antiretroviral therapy (ART). Time-to-relapse or death was the primary end point.

RESULTS Seventy-four patients were included. The probability of relapse-free survival at 6 months and at 12 months was 79% and 71% respectively. Renal failure, a possible drug-related serious adverse event, occurred in two patients with severe pneumonia. Forty-one patients completed the regimen taking at least 11 of the 12 doses. Main reasons to discontinue were: 15 relapsed, five died and seven became lost to follow-up. More patients failed among those with a CD4+ cell count  $\leq 50$  cells/ $\mu$ l, 5/7 (71.4%) than those with counts above 200 cells/ $\mu$ l, 2/12 (16.7%), ( $P = 0.005$ ).

CONCLUSION Pentamidine secondary prophylaxis led to a 29% failure rate within 1 year, much lower than reported in historical controls (50–100%). Patients with low CD4+ cell counts are at increased risk of relapse despite effective initial VL treatment, ART and secondary prophylaxis. VL should be detected and treated early enough in patients with HIV infection before profound immune deficiency installs.

DISCLOSURE Nothing to disclose.

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## PSI.120

**Observations from a field visit for leishmaniasis in two tribal villages of West Bengal, India**

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**INTRODUCTION** Kala-azar (KA) is presently endemic in 54 districts in India including 11 of West Bengal. Government of India targets aim to eliminate KA by 2015. In 2010, six people of Golamighat and Burodanga villages in Bolpur block of Birbhum district were diagnosed with KA. All were treated with miltefosine for 28 days.

**METHODS AND MATERIALS** A team surveyed villages Golamighat (population 200) and Burodanga (population 250) in February 2015 for active KA and post Kala-azar dermal leishmaniasis (PKDL) case detection. One visceral leishmaniasis (VL) and 3 PKDL cases (all fresh) were identified in Golamighat. Also, one patient (previously treated for VL and now showing faint macular lesions) was suspected as PKDL. One VL and no PKDL cases were identified in Burodanga. Blood samples were collected from VL, PKDL and suspect patients. Skin biopsy of PKDL and suspect were taken. Blood samples were also collected from 2 cured VL and 5 healthy controls (HC) from Golamighat and 2 HC from Burodanga. The blood samples were tested for rk39, conventional parasite ELISA and antigen based PCR assay. Skin biopsies were tested for internal transcribed spacer 1 (ITS1) PCR. Subsequently, all definite cases were treated with liposomal amphotericin B.

**RESULTS**

- 1 All the PKDL and VL samples were positive in rk39, Parasite ELISA and PCR tests. All HC and 2 cured VL were negative.
- 2 The suspect PKDL case showed a faint band in rk39 and positive in PCR and Parasite ELISA.
- 3 ITS-1PCR of skin biopsies of clinical and suspect cases of PKDL were positive.

**CONCLUSIONS**

- 1 Finding of new cases of VL and PKDL highlights importance of periodic active surveillance.
- 2 PCR based tests can supplement clinical evaluation and rk39 tests for early diagnosis of cases.

**ACKNOWLEDGEMENT** The work was permitted by Department of Health & Family Welfare, Government of West Bengal.

**DISCLOSURE** Nothing to disclose.

## PSI.121

**Predicting zoonotic cutaneous leishmaniasis outbreaks in Tunisia: is an early warning system feasible?**

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**BACKGROUND** Leishmaniasis transmission results from complex interactions between the parasite, rodent reservoirs, human hosts, and sand fly vectors, all of which are influenced by

climate variability and environmental factors. The objectives of this study were to investigate the relationship between climatic and environmental factors and zoonotic cutaneous leishmaniasis (ZCL) transmission and to study the possibilities of an early warning system implementation; based on climatic and environmental parameters.

**METHODS** Monthly ZCL notifications were obtained from an active surveillance system. We collected monthly minimum, maximum and mean temperatures, relative humidity during the day and at night, monthly cumulative rainfall quantity, wind direction, wind speed and rodent density. The association between ZCL occurrence and climate and environmental variables was investigated by univariate and different multivariate analysis (multiple linear regression, negative binomial regression and autoregressive integrated moving average).

**RESULTS** The ZCL number peaked in October and November. In univariate analysis, positive associations were found for the maximum, mean and minimum temperatures lagged for 3 and 6 months, with a high correlation coefficient for the mean temperature lagged for 6 months ( $r = 0.837$ ,  $P < 10^{-3}$ ). All multivariate analyses showed positive association between monthly ZCL incidence and the 6 month moving average temperature ( $t_m$  (M–6)) with high correlation coefficients and very small significant level, whereas negative association was observed for the cumulative rainfall of the last year (rainfall (Y–1)).

**CONCLUSIONS** This study illustrated that ecological early warning system for ZCL is a feasible application providing first, a long-time planning of sustained environmental surveillance and ZCL monitoring, and second the use of the appropriate functional form to introduce climate variables and the best approach for modeling the relationship including seasonality.

**DISCLOSURE** Nothing to disclose.

## PSI.122

**Zoonotic cutaneous leishmaniasis prevalence among farmers in Central Tunisia**

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**BACKGROUND** Zoonotic cutaneous leishmaniasis (ZCL) is endemic in central Tunisia. It is more prevalent in rural agricultural areas. The aim of this work was to determine ZCL prevalence among farmers and to test their availability to take ownership of the problem and participate actively in the fight.

**METHODS** We carried out a cross sectional study within an endemic rural area to ZCL in the governorate of Sidi Bouzid, Central Tunisia; in May and June 2014. A group of farmers was chosen randomly from three lists which were stratified by the quantity of water consumption for irrigation. Farmers were interviewed using a standardized questionnaire about occurrence and the date of lesion onset of ZCL among their family members. We also collected information about their knowledge of the disease, the elements of the transmission cycle and risk factors, structures of ZCL control and their availability to contribute fighting this disease.



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**RESULTS** ZCL occurred in at least one of the family members of 38.5% of interviewed farmers. The disease is endemic with recurrent epidemics every 4 or 5 years. 76% of the farmers were aware of the disease and 60% knew that ZCL is transmitted by sand fly bites. For 80% of interviewed farmers, health care facilities are the most credible structure to address ZCL; 38% of farmers were aware of the existence of the nongovernmental organization (NGO), and 21% of them think that this NGO is the most effective organism to fight against ZCL. With regard to ZCL preventive measures, the majority of farmers agreed and was ready to collaborate (93.1%), to follow health care facilities instructions (73.1%) and to join NGO (56.9%). However, they did not agree to reduce irrigation activities (3.1%) mainly at night (4.6%), to live far from their irrigated fields (0.8%) and to go or sleep outside at night (6.2%).

**CONCLUSIONS** Agricultural activities, mainly irrigation, are favorable conditions to ZCL transmission. Farmers don't agree to reduce their activity to avoid exposure to the sand fly bites. Thus, we should work with the population to address ZCL.

**DISCLOSURE** Nothing to disclose.

**PSI.123****A Leishmaniasis Virtual Laboratory to contribute to leishmaniasis surveillance**

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**INTRODUCTION** Leishmaniasis is one of the world's most neglected diseases; it is caused by protozoan parasites of the genus *Leishmania*, and transmitted by the bite of phlebotomine sandflies. Its complex epidemiology poses a challenge to control. The disease is currently spreading because of three escalating risk factors:

- 1 anthropogenic and environmental changes;
- 2 immune compromise of human hosts (mainly HIV co-infection);
- 3 drug resistance.

The worldwide spread of leishmaniasis may be related to environmental and/or climate changes; the northward spread of the disease in endemic areas and to previously non-endemic areas in Europe is an actual cause for concern. Accurate identification of the etiological agents and their vectors at the species and population level is decisive for surveillance and control strategies.

**METHODS AND MATERIALS** The Leishmaniasis Virtual Laboratory (LVL) is one of the use cases of the EUBrazilCloudConnect project (<http://www.eubrazilcloudconnect.eu/>) and brings together experts from the field of leishmaniasis and cloud computing to create a public access platform devoted to the molecular surveillance of leishmaniasis. The LVL adapts GIS tools and process pipelines

for molecular analyses on the EUBrazilCC distributed cloud through its programming framework; integrates classical and molecular data from different collections (including the *Leishmania* Collection from Instituto Oswaldo Cruz-CLIOC, the sandfly Collection-COLFLEB from FIOCRUZ, species-Link, WHO-Collaborating Centre for Leishmaniasis-Spain-Collection; GenBank and PubMed).

**RESULTS** The LVL allows exploring these data using GIS tools to generate an atlas of parasite/vector increasing the knowledge on their distribution. It also includes automated tools for *Leishmania* species identification based on the *hsp70* gene, and for *Leishmania infantum* population studies based on MultiLocus Sequence Analysis. Vector species identification is performed using an additional DNA barcoding pipeline based on the *coi* gene.

**CONCLUSIONS** The LVL will contribute to leishmaniasis surveillance by enabling public health workers and researchers to access and supply relevant and in-depth information or data on the parasite and vector responsible for leishmaniasis.

**DISCLOSURE** Funding: EUBrazil Cloud Connect (614048) is a Small or medium-scale focused research project (STREP) funded by the European Commission under the Cooperation Programme, Framework Programme Seven (FP7). Esse projeto é resultante do Edital MCT/CNPq N°13/2012-Programa de Cooperação Brasil-União Europeia na Área de Tecnologias da Informação e Comunicação-TIC.

**PSI.124****IgG and IgM antibodies prevalence by the indirect fluorescent antibody test (IFAT) and enzyme-linked immunosorbent assay (ELISA) over the entire clinical-immunological spectrum of human *Leishmania (L.) infantum* chagasi infection**

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Although American visceral leishmaniasis (AVL) is considered the main manifestation between *Leishmania (L.) infantum chagasi* and human immune response, it was identified in Amazonian Brazil the broadest spectrum of infection into five clinical-immunological profiles: three asymptomatic (Asymptomatic Infection – AI, Sub-clinical Resistant Infection – SRI, and Indeterminate Initial Infection – III), and two symptomatic (Symptomatic Infection – SI (=AVL) and Sub-clinical Oligosymptomatic Infection – SOI). The aim of this study was to evaluate the IgG and IgM antibodies prevalence by IFAT and ELISA over the entire spectrum of infection. There were used 600 serum samples of individuals (both genders and ≥1 year old) living in Bujará municipality, northeastern of Pará State, Brazil: 105 with previous diagnosis of infection [AI (60), SRI (16), III (13), SOI (6) and SI = AVL (10)], and 495 non infected individuals (IFAT-IgG-/DTH-). IFAT and ELISA were based on species-specific *L. (L.) i. chagasi*-antigens, amastigote-antigen for IFAT (anti-IgM conjugate) and promastigote-soluble antigen for ELISA (anti-IgM and anti-IgG conjugates). The overall prevalence revealed an ELISA-IgG rate (25.2%) higher ( $P < 0.05$ ) compared to that of IFAT-IgG (7.5%), as well as an ELISA-IgM rate (4%) also higher than that of IFAT-IgM (1.3%). The prevalence between infected (105) and non infected (495) individuals presented an ELISA-IgM rate (2.5%) higher compared to that of IFAT-IgM (1%), but no difference between IFAT (7.5%) and



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ELISA (9.3%) IgG rates. With regards to the prevalence of symptomatic and asymptomatic profiles, it was found an ELISA-IgM rate in the AI profile (1.3%) higher ( $P < 0.05$ ) than that by IFAT-IgM (0.0%), while in the other profiles, SRI (0.0 × 0.0%), III (0.3 × 0.0%), SOI (0.3 × 0.5%) and SI = AVL (0.5 × 0.5%), there was no difference ( $P > 0.05$ ). By the other side, the ELISA-IgG rate (3.3%) in the AI profile was also higher ( $P < 0.05$ ) compared to that by IFAT-IgG (0.0%), however, the IFAT-IgG (2.1%) rate in the III profile was higher ( $P < 0.05$ ) than that by ELISA (1.0%), while in the other profiles, SRI (2.3 × 2.6%), SOI (1.0 × 1.0%) and SI = AVL (1.6 × 1.6%), there was no difference ( $P > 0.05$ ). This is the first diagnostic approach in Brazil concerning the IgG and IgM antibodies prevalence by IFAT and ELISA over the entire spectrum of human *L. (L.) i. chagasi*-infection, allowing an analysis on the epidemiology of symptomatic and asymptomatic infection in endemic area.

DISCLOSURE Nothing to disclose.

**PSI.125****New epidemiologic profile of visceral leishmaniasis in an urban endemic/epidemic area of Brazil**

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**INTRODUCTION** Visceral leishmaniasis (VL) is a significant public health problem due to its severity and difficulty to control. This study analyzed the time-space distribution of VL in a city with long-standing transmission to provide data that might contribute to the identification of factors hindering its control.

**METHODS AND MATERIALS** This was an ecologic study conducted in Jequié, Brazil, using census tract and calendar years as units of analysis. Data collected from official systems of information on human VL (HVL) and canine infection (CI) were georeferenced and plotted using a digital map. The temporal tendency (1990–2011) was assessed by simple linear regression. The global Moran's index examined spatial autocorrelation in the HVL incidence rates (100 000 inhabitants) and prevalence of CI. Linear spatial regression assessed the association between HVL incidence and CI prevalence, as well as between the living conditions index and incidence of HVL.

**RESULTS** Both the incidence of HVL ( $\beta = -0.8$ ;  $P = 0.11$ ) and prevalence of CI ( $\beta = -0.7$ ;  $P = 0.01$ ) exhibited a decreasing tendency. Spatial autocorrelation was found among the VLH incidence rates corresponding to 1990–1999 ( $I = 0.11$ ;  $P = 0.01$ ) and 2000–2011 ( $I = 0.12$ ;  $P = 0.00$ ), as well as among the CI prevalence rates corresponding to 2006–2011 ( $I = 0.39$ ;  $P = 0.00$ ). Significant association was found between HVL incidence and CI prevalence ( $0 = 0.00$ ) and between LCI and HVL incidence ( $P = 0.03$ ). Intense urban expansion and a wide geographic distribution of HVL and CI were identified.

**CONCLUSIONS** HVL and CI exhibited a slight decreasing tendency in Jequié and was associated with poor living conditions. The wide spatial distribution of this disease indicates that transmission is no longer focal, possibly hindering the effectiveness of actions implemented for disease control. Public health needs to develop new strategies for prevention and control of LV to face this new epidemiological reality.

DISCLOSURE Nothing to disclose.

**PSI.126****Evaluation of the diagnostic performance of enzyme-linked immunosorbent assay on filter paper blood sample for diagnosis of visceral leishmaniasis**

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**INTRODUCTION** Restricting disease transmission is the corner stone in achieving the goal of kala-azar elimination program (KEP) in resource limited endemic zones. Since consolidation phase will be headed with a view to sequestering kala-azar cases through active surveillance, during this phase a reliable, highly sensitive and cost effective diagnostic tool is prerequisite for mass screening. Besides, conventional serology-based methods involve blood collection, transportation and serum separation which can actively subvert the surveillance strategy due to lack of resources in field settings. To address the current pitfalls, collection of capillary blood following preservation in filter paper can be a potential ancillary to streamline mass screening. In our pilot study, we compared the efficacy of three *Leishmania* antigens through enzyme-linked immunosorbent assay (ELISA) using dried blood spot (DBS). Thus, we determined the sensitivities and specificities of ELISA based on rk28, rk39 and rkrp42 antigens.

**METHOD AND MATERIALS** Age and sex matched 31 clinically defined visceral leishmaniasis (VL) patients and 30 healthy individuals were enrolled in our study. All participants are inhabitants of Muktagacha, a hyper endemic zone in Bangladesh. Capillary blood from all participants was collected through finger prick and stored in filter paper. Then ELISA was performed using the filter paper elute.

**RESULTS** The sensitivity and specificity for rk39 ELISA and rKRP42 ELISA were found to be equal and were 83.79% and 90.90% respectively. For rk28 ELISA the sensitivity and specificity were found to be 77.50% and 100% respectively. Poor diagnostic sensitivity and moderate specificity have been observed in rk39 and rKRP42 ELISA. rk28 ELISA also showed weak diagnostic accuracy.

**CONCLUSIONS** From this study, it can be inferred that none of the antigens can be an effective biomarker for mass screening using filter paper blood sample. Because of insufficient sensitivity, for dried blood spot based surveillance, we need to identify new potential serology-based biomarker or to improve present diagnostic methods.

DISCLOSURE Nothing to disclose.

**PSI.127****Cost-effectiveness of diagnostic-therapeutic strategies for pediatric visceral leishmaniasis in Morocco**

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Visceral leishmaniasis (VL) is a neglected parasitic disease that is fatal if left untreated. VL is endemic in Morocco and other countries in North Africa where it mainly affects children from rural areas. In Morocco, the direct observation of *Leishmania* parasites in bone marrow aspirates is used to diagnose VL and Glucantime (Sb for 20 days) is the first line of treatment. In this study we evaluate the cost and cost-effectiveness of alternative diagnostic-therapeutic strategies for pediatric VL in Morocco. In

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particular we evaluate the use of liposomal amphotericin B (L-AmB), the safest and most efficacious anti-leishmanial drug.

A decision-analysis model was used to estimate the cost-effectiveness of using RDT and/or short course L-AmB to manage VL pediatric cases in Morocco compared to the current clinical practices. Incremental cost-effectiveness ratios (ICERs), expressed as cost per death averted, were estimated by comparing costs and effectiveness of the alternative algorithms with the current practices.

This study shows that using RDT and/or implementing short course L-AmB treatments would be cost-effective in the Moroccan context according to WHO criteria. In particular, if L-AmB is purchased at a preferential price (18 US\$ per vial) the use of this drug to treat pediatric VL cases would be less expensive than Glucantime.

The results of this study should encourage the implementation of RDT and/or short course L-AmB treatments for pediatric VL in Morocco and other countries in North Africa facing similar challenges.

DISCLOSURE Nothing to disclose.

## PSI.128

### Control of visceral leishmaniasis: perceptions, acceptance and weaknesses of indoor insecticide spraying (IRS) campaign

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**INTRODUCTION** Visceral Leishmaniasis (VL) is a fatal vector borne infectious disease transmitted by *P. argentipes* sand flies. The elimination program targets on vector control by indoor residual spraying (IRS) using DDT twice a year. As per our another survey conducted in the 50 villages in the highly endemic district of Muzaffarpur in India, the IRS coverage increased from 17% in 2010 to 70% in 2013. However, even in the villages with 100% coverage vector density did not reduce significantly. We conducted this study to determine the perception and acceptance for IRS program by the community and identify weaknesses in its current practical execution. **METHOD** We conducted 15 focus group discussions (FGD) among the residents of 5 out of the 50 endemic villages. Three villages were with low coverage (<60%) and two with higher coverage (>85%). Male and female household heads representing a wider section of the community in terms of socio-economic status, education, and caste formed heterogeneous groups. One more FGD was also conducted with the spray team members. **RESULTS** Our FGDs identified several ditches between the planning and monitoring of IRS program including poor quality of insecticide, diluted solution, inadequate spraying of wall and peri-domiciliary areas and no spraying in remote houses. IRS was done only once in a year. Pungent bad odor, stain on the walls, contamination of food items and occasional illicit demands from spray team were the main factors for the non-acceptance in the low coverage villages. Denial of spraying in washrooms, no prior information, unknown team members and purdah by the rural women were other common reasons. Spray team complaints were about the refusal by the owners of well-built houses, and resistance from Musahar caste. Both community and spray team advocated for awareness campaign and prior announcement, involvement of ASHAs/ANMs in IRS activities, spraying at least twice a year and improving quality of

spray solutions. The spray team demanded increased and timely payment and upgraded equipment.

**CONCLUSION** We did not observe major trouble and discomfort in the community towards the IRS program, however people felt IRS to be grossly ineffective. The program should immediately focus on improving the IRS campaign as deficient coverage may also develop resistance against the insecticide.

DISCLOSURE Nothing to disclose.

## PSI.129

### Th2-skewed response depends on Insulin-like growth factor I in *Leishmania* (*Leishmania*) major-infection

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In *Leishmania* infection specific and non-specific factors contribute to its evolution, including growth factors such as insulin-like growth factor-I (IGF-I). We have shown that extrinsic IGF-I favors the parasite proliferation and the infection development, but this factor is constitutively present in macrophages which effect is not known in leishmaniasis. To study the role of constitutively expressed macrophage intrinsic IGF-I in *Leishmania* infection, we evaluated the parasitism and IGF-I mRNA expression in *Leishmania* (*Leishmania*) major-infected RAW 264.7 macrophage cell line upon IGF-I mRNA silencing with 150  $\mu$ M small interfering RNA (siRNA) and in some experiments with Th2 cytokine IL-4 (2 ng/ml) and IL-13 (5 ng/ml) stimuli. siRNA treatment of cells resulted in 70% reduction of IGF-I mRNA expression (qRT-PCR). The parasitism (by optical microscopy) in the control without IGF-I siRNA was 149 (median) parasites per 100 cells. With siRNA treatment it decreased to 93 ( $P < 0.05$ ). Cells under IL-4 plus IL-13 stimuli had the parasitism increased to 160. In siRNA-treated cells with IL-4 and IL-13 stimuli instead of an increase we observed a decrease to 102. Using individual cytokine stimulus, IL-4 stimulus increased the parasitism to 171 but in siRNA-treated cells IL-4 stimulus did not induce an increase but a decrease to 87. Similarly IL-13 stimulus increased the parasitism to 157 but in siRNA-treated cells even with IL-13 stimulus it decreased to 76. Expression of IGF-I mRNA expression accompanied the increase or decrease of parasitism. By replacing the IGF-I with recombinant IGF-I (50 ng/ml) in the all cytokine-stimulated culture and in the cells treated with siRNA, an increase in the parasite number was observed that reached the level similar to the controls. These results suggest that IGF-I is directly related to parasitism and that even with the cytokine stimuli the presence of IGF-I is required to promote susceptibility, strongly suggesting the dependence of the presence of IGF-I for the effect of Th2 cytokines in *Leishmania* infection.

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DISCLOSURE Nothing to disclose.

## PSI.130

### Characterization of ubiquitin-activating (E1) and ubiquitin-conjugating (E2) genes over-expressed in the infective stage of *Leishmania infantum*

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Leishmaniasis, a disease caused by protozoa of the genus *Leishmania*, affects about two million people all over the world. The

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main clinical forms are cutaneous, mucocutaneous and visceral (VL). In Europe, the visceral disease is caused by *L. infantum* and constitutes a zoonosis transmitted through the bite of sand flies of the genus *Phlebotomus*.

At the infective stage of *Leishmania*, in the insect vector, a certain number of genes are overexpressed and may be related with its infection ability. Between these genes are the ubiquitin-activating enzyme E1 and the ubiquitin-conjugating enzyme E2. The ubiquitin-activating enzyme (E1) catalyzes the first step of the ubiquitination reaction that marks proteins for degradation via the proteasome. At the beginning of the ubiquitination cascade, E1 enzyme binds ATP-Mg<sup>2+</sup> and ubiquitin. In the next step, a catalytic cysteine of E1 enzyme attacks the ubiquitin-AMP complex formed through an acyclic substitution, simultaneously creating a thioester bond, releasing AMP. Finally, the E1-ubiquitin complex transfers the ubiquitin to the catalytic E2 enzyme through a transesterification reaction. The E2 enzyme accepts ubiquitin from the E1 complex and catalyzes its covalent attachment to other proteins.

Both genes, the ubiquitin-activation enzyme E1 (LinJ.07.0010) and the ubiquitin-conjugating enzyme E2 (LinJ.33.2910), have been cloned in pQE-30 vectors and expressed in *Escherichia coli* strain M15. Optimal expression conditions were 2 h at 30°C for LinJ.07.0010 gene and 4 h at 37°C for LinJ.33.2910 gene. These proteins have been purified using affinity chromatography and are currently being characterized. For functional studies a polyclonal antibody has been obtained.

Protein modeling was performed using the program PyMol and the protein structures have been compared with the corresponding human ones. The E1 enzyme seems to be a homodimer structure and is similar to the A and B chains of the human protein. The E2 enzyme displays a similar structure to the A chain of the human orthologous. The alignments against the orthologous sequences have been performed using ClustalW and BlastP. In the case of the ubiquitin-activating gene (LinJ.07.0010), the homology with *Leishmania major* and *Leishmania braziliensis* is approximately 90%. In the case of *Trypanosoma cruzi* the homology is 41%. The ubiquitin-conjugating gene (LinJ.33.2910) shows a homology of 92% with *L. major* and 82% with *L. braziliensis*. With *T. cruzi*, the homology drops to 68%.

DISCLOSURE Nothing to disclose.

## PSI.131

## Pharmacokinetics and pharmacodynamics of oral oleylphosphocholine in a hamster model of visceral leishmaniasis

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**INTRODUCTION** Oleylphosphocholine (OIPC) is in the same chemical class as miltefosine (MIL) and was shown to be of superior efficacy and safety at equivalent doses (Fortin et al. 2012; 2014). In the current study, the pharmacokinetic (PK) properties of OIPC were evaluated in hamsters following single oral dose administration. The prophylactic activity of the drug was also explored to establish exposure-activity relationships. Finally, based on knowledge gained on PK, the curative efficacy

of a 2 × 5 days administration of 20 mg/kg was tested in the context of a longer post-treatment evaluation period.

**METHODS** Female golden hamsters (4–8/group) were administered single oral doses of 20, 50 and 100 mg/kg and blood samples were collected after 2, 6, 24, 32, 72 and 168 h for analysis. For prophylactic studies hamsters (6–7/gr) were given a 100 mg/kg single-dose on day –7, –4, –1 or –4 h prior to infection. The animals were infected on day 0 with 2 × 10<sup>7</sup> amastigotes of *L. infantum* and parasitic burdens were measured in the liver, spleen and bone marrow on day 21. In the curative model, the animals (6/gr) were infected on day 0 and treatment started on day 21. OIPC and MIL were orally dosed at 20 mg/kg for 2 × 5 days. Amastigote burdens were determined on day 42 (10 days post end of treatment, dpt) or day 72 (40 dpt).

**RESULTS** OIPC had an elimination t<sub>1/2</sub> of ~50 hrs and dose-proportionality was seen between 20, 50 and 100 mg/kg. A one-compartment disposition model with first-order absorption and elimination fitted best the data. The prophylactic activity of OIPC was in agreement with respective drug exposures, showing dose-dependent residual activity. Interestingly, a 100 mg/kg single dose administered on –4 day still reduced the overall parasitic burden by ~50%. In the curative model, a ≥99% clearance of the infection was observed at 10 dpt in all OIPC-treated animals and remained the same at 40 dpt. For MIL, a good efficacy was measured at 10 dpt (98, >99 and 90% of reduction in liver, spleen and bone marrow), but the parasite loads had increased at 40 dpt (67, 99 and 79%, respectively), reflecting relapse of the infection and inferiority to OIPC.

**CONCLUSION** This study reveals that total OIPC plasma exposure is a good predictor of the prophylactic and curative efficacy in the hamster VL model. Translated to human, these results suggest that the daily dosing of OIPC will be adjustable to avoid side effects while retaining maximum drug efficacy.

**DISCLOSURE** A.F. works as consultant for Dafra Pharma R&D; T.D. is Scientific Advisory Board member for Dafra Pharma R&D. All other authors: none to declare.

## PSI.132

Clinical evidence on the role of *Leishmania (V.) braziliensis* and *Leishmania (L.) amazonensis* driving dermal dendritic cell function in American cutaneous leishmaniasis

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In Brazil, *Leishmania (V.) braziliensis* and *Leishmania (L.) amazonensis* are the main pathogenic species causing American cutaneous leishmaniasis (ACL); they are implicated with the most frequent clinical form, localized cutaneous leishmaniasis (LCL<sup>DTH+/++</sup>), but also with the mucocutaneous leishmaniasis (MCL<sup>DTH++++</sup>) and anergic diffuse cutaneous leishmaniasis (ADCL<sup>DTH–</sup>), the more severe ACL clinical forms. Between the central LCL and the two polar MCL and ADCL, they can also produce the intermediary borderline disseminated cutaneous leishmaniasis (BDCL<sup>DTH±</sup>). This study evaluated the dermal dendritic cell (dDC) expression within the clinical-immunological spectrum of ACL; dDC [MHC<sup>+</sup> class II (Langerin<sup>+</sup>) and MHC<sup>+</sup> class I (Langerin<sup>+</sup>)] is regarded as the main presenting cell of species-specific parasite-antigens to T-cell immune response, being responsible for the activation of the innate and adaptive immune responses. The sample examined consisted of 26 patients with

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ACL-clinical forms: ADCL and BDCL, both due to *L. (L.) amazonensis* and with negative DTH<sup>(-)</sup>, five cases of each; LCL due to *L. (L.) amazonensis*, divided into two groups: five cases with negative DTH<sup>(-)</sup> and three with positive DTH<sup>(+)</sup>; and eight cases of LCL due to *L. (V.) braziliensis*, all with positive DTH<sup>(+)</sup>. Paraffin-embedded biopsies of cutaneous lesions were carried out for immunohistochemical analysis of immunostained cells (CD11c<sup>+</sup>), using rabbit anti-human CD11c McAb (ab52632 Abcam). A Zeiss image analysis system was used to quantify dDCs<sup>+</sup> in 5–8 fields per histological section (400×). dDC expression was analyzed by Mann-Whitney test using Biostat 5.0 ( $P < 0.05$ ). The dDC<sup>+</sup> cell density showed an increased expression from the central LCL<sup>(DTH+/++)</sup> due to *L. (V.) braziliensis* to the sub-polar BDCL<sup>(DTH-)</sup> and polar ADCL<sup>(DTH-)</sup> due to *L. (L.) amazonensis*: LCL/L.b.<sup>(DTH+/++)</sup> = 358 cells/mm<sup>2</sup> → LCL/L.a.<sup>(DTH+/++)</sup> = 244 cells/mm<sup>2</sup> → LCL/L.a.<sup>(DTH-)</sup> = 310 cells/mm<sup>2</sup> → BDCL/L.a.<sup>(DTH-)</sup> = 517 cells/mm<sup>2</sup> → ADCL/L.a.<sup>(DTH-)</sup> = 674 cells/mm<sup>2</sup>, thus revealing more significant expression ( $P < 0.05$ ) in the BDCL and ADCL compared to that of LCL. These results strongly suggest that, although dDC is regarded as the main activator cell of innate and adaptive immune responses, the species-specific *Leishmania*-antigens within the subgenera *Viannia* and *Leishmania* are determinant for modulating the T-cell immune response-type; i.e., the role of dDC depends on the *Leishmania*-antigenic environment in which it is interacting.

DISCLOSURE Nothing to disclose.

## PSI.133

***P. papatasi*: does it prefer it hot?**

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A longitudinal entomological survey was carried out in four demographically different provinces at West of Alexandria governorate, Egypt from May to November 2010. Standardized sampling with oiled paper 'sticky traps' was employed during the breeding season to determine monthly trends in species composition, density and sex ratio. Temperature and relative humidity were recorded by manual thermo-hygrometer once per month in each province, during application of sticky traps. *Plebotomus papatasi* was the only anthropophilic species found. One hundred and 43 *P. papatasi* were collected; the highest prevalence was 44.8% in Al-Hawareya, followed by 29.4% in Al Agamy then 25.8% in old King Mariout while Marakya was free of sandflies, with male to female sex ratio 1:1.6 and two peaks of abundance in both July and September. Of the collected sandflies, 51.7% were from interior traps while 48.3% were from exterior traps. Adult sandflies showed increased activity during months of high humidity and relatively high temperature; the highest number of sandflies was recorded in both July and September at a temperature of 29–30°C and RH ranging from 60% to 73%, while the lowest monthly abundance of sandfly was in November at a temperature of 23–25°C and RH ranging from 55% to 60%. The monthly population densities of sandflies in west Alexandria were calculated; the average internal density was highest at 11% in July and lowest at 2% in November. The average external density was highest at 9% in July and lowest at 2% in October. The number of sandflies per trap was greatest (10) in July and lowest (2.75) in November; and the number of sandflies per square meter was highest with 83.3 in July and lowest with 22.9 in November.

KEYWORDS *P. papatasi*, Sticky traps, Internal and external densities, Temperature and Humidity.

DISCLOSURE Nothing to disclose.

## PSI.134

**Arginase activity in lesions of acute and chronic cases of cutaneous leishmaniasis due to *Leishmania tropica* and *Leishmania major***

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**INTRODUCTION** *Leishmania* (L) species are human pathogens that infect more than 12 million people worldwide. The disease can present with a wide range of clinical syndromes that may be cutaneous or visceral. Cutaneous leishmaniasis (CL) is one of the most important vector-borne disease in Iran and is highly endemic. CL in Iran is caused by *L. major* and *L. tropica*. Activation of macrophages is an important step for killing of intracellular pathogens and they produced two key enzymes that regulate the killing ability of macrophages, inducible nitric oxide synthase (iNOS) and arginase.

**METHODS AND MATERIALS** In the present study, we evaluated the arginase activity in the lesion, PBMC, PMN and sera of 32 cases of acute (<3 years), 11 cases of chronic CL (more than 3 years) and 11 cases of healthy controls. All CL samples were first diagnosed by Nested PCR and determined the causing *Leishmania* strain.

**RESULTS** The arginase activity in the acute lesion of CL samples was higher than chronic samples and significantly higher than healthy control. There are no significant differences in arginase activity of the lesion between *L. tropica* and *L. major* as causing agent. There are no significant differences between the numbers of lesions. The assessed arginase activity levels in PBMC and sera of both acute and chronic patients were not statistically increased and no differences with healthy controls. In contrast, PMN of both acute and chronic cases showed higher levels of arginase activity in comparing to PBMC and sera. **CONCLUSIONS** These results suggest that increased arginase expression in the lesion might contribute to persistent disease in patients presenting with cutaneous leishmaniasis. There is a hope by therapeutic intervention through regulating the arginase activity might be useful in the treatment of cutaneous leishmaniasis.

DISCLOSURE Nothing to disclose.

## PSI.135

**Proteome analysis reveals expression profile differences in elongation factors and the trypanothione reductase – peroxidase system between *Crithidia fasciculata* and *Leishmania infantum***

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Differences species of culicids are hosts of the monogenetic trypanosomatid parasite *Crithidia fasciculata*. They are non-pathogenic to mammals and comparison with evolutionary close species of trypanosomatids that develop digenetic life cycles and cause chronic severe sickness to millions of people worldwide is of outstanding interest. First, the growth kinetics is slightly faster



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in *C. fasciculata* than in *Leishmania* spp. Second, as *L. major* and *L. infantum* promastigotes are able to agglutinate with peanut lectin (PNA) and non-agglutinating parasites are more infective, the PNA agglutination properties were evaluated in *C. fasciculata*, what revealed that choanomastigotes of *C. fasciculata* are able to agglutinate with PNA and a non-agglutinating subpopulation can also be isolated. Consequently, the behavior in the presence of the lectin is similar. Finally, proteome analysis has revealed substantial differences in abundance of proteins involved in catabolism, redox homeostasis, intracellular signalling, and gene expression regulation. Logarithmic phase choanomastigotes of *C. fasciculata* over-express CACK, enzymes involved in redox homeostasis (TDR1, TryP, catalase and Fe-SOD), the translation factors eIF5a, EF1 $\beta$  and EF2 and most of the glycolytic enzymes catalyzing irreversible reactions and the enzymes of the non-oxidative phase of the pentose-phosphate pathway. The abundance of the translation factors (EF1 $\alpha$  instead of EF1 $\beta$ ) and of the enzymes involved in redox homeostasis (TryR instead of TDR1) increases again in the PNA<sup>-</sup> subpopulation, as a difference with *L. infantum*. These changes in abundance may have a role in growth in the nutrient rich environment at the logarithmic phase and a role in differentiation in the minor PNA<sup>-</sup> subpopulation within the population in stationary phase.

DISCLOSURE Nothing to disclose.

## PS1.136

## Spatial analysis of malaria distribution in the Union of Comoros

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**BACKGROUND** Malaria remains endemic in Comoros. In 2006, malaria was the leading cause of mortality, morbidity and consultation in hospitals. The Government of the Union of the Comoros is committed in the fight against malaria through the establishment of a National Strategic Plan in 2007 that was later updated for the period 2012–2016. The results of these efforts show that the disease is in a pre-elimination phase. Despite a clear decline of malaria several aspects of its epidemiology should be clarified including the identification of endemic areas. **METHODS** Monthly cases, as reported by the 'Programme National de lutte Contre le paludisme' (PNLP) from 2010 to 2014, were geo-referenced in each island at the sanitary district level. The incidence of malaria by district was calculated using population data from the National Census. We completed the spatial database with data on environmental and social factors including meteorology, physical geography, land use (analyzed by remote sensing of SPOT 5 satellite images), population characteristics, and health care facilities. We performed statistical analyzes to show the relationships between the variables and the prevalence of malaria.

**RESULTS** The mapping of malaria incidence between 2010 and 2014 shows its heterogeneity among the 17 sanitary districts. Five districts (Hambou, Centre, Fomboni, Mutsamudu and Pomoni) reveal a high endemicity. Also we have highlighted the spatial relationships between malaria incidences and environmental and socio-demographic variables.

**CONCLUSION** This work is the first spatial analysis of the epidemiology of malaria in Comoros. It contributes to a better

understanding of the spatial dynamics of malaria to help the Ministry of Health to eradicate malaria by 2016.

**KEYWORDS** malaria; incidence; spatial analysis; GIS; Union of Comoros.

**DISCLOSURE** Nothing to disclose.

## PS1.137

## Systematized review on spatial analysis of environmental risk factors of malaria transmission

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Malaria is still the major parasitic disease in the world, with approximately 600 000 deaths in 2013. Environmental risk factors of malaria have been widely studied, however, there are discrepancies on the results about their influence on malaria transmission. Recently, manuscripts have been published about spatial analysis of environmental risk factors of malaria, in order to explain why malaria varies from place to place. Our primary objective was to identify the environmental variables most used in the spatial analysis of risk factors of malaria. The secondary objective was to identify geo-analytic methods and techniques, as well as geo-analytic statistics commonly related to environmental risk factors and malaria. To assess the current state of knowledge, we conducted a systematized review of articles published from January 2004 to March 2015, within Web of Science, Pubmed and Scielo databases. Initially 676 articles were found in these databases, after inclusion and exclusion criteria, were selected 41 manuscripts. Among these selected studies, precipitation, vegetation and temperature were the most frequent variables related to malaria, among others. As for geo-analytic methods, Bayesian geostatistical models were the most applied. On the other hand, Kriging interpolations, as well as Kulldorff's spatial scan, were the techniques more widely used. The main objective of many studies was to use these methods and techniques to create risk maps, showing their importance. In recent years, spatial analysis performed with satellite images and geo-referenced data are increasing in relevance due to the use of remote sensing and Geographic Information System (GIS). The combination of these new technologies identifies more accurately environmental risk factors, and the use of Bayesian geostatistical models allows a wide diffusion of malaria risk maps. It is known that precipitation, temperature and vegetation play a critical role in malaria transmission; however, other environmental risk factors have also been identified. Risk maps have a tremendous potential to enhance the effectiveness of malaria-control programs.

**DISCLOSURE** Tiago David Canelas Ferreira acknowledges a mobility grant from the Government of Andorra, AM2014-0024-AND.

## PS1.138

## Land use, an environmental risk factor for very high malaria transmission

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**INTRODUCTION** The goal of the study was to investigate if local agricultural practices have an impact on malaria transmission in four villages located in the same geographical area within a radius of 15 kilometers in southern Benin. Among

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the villages, one (Itassoumba) is characterized by the presence of a large fish farming area on which several fish ponds are dug. The three others (Itakpako, Djohoukollé and Ko-Koumolou) are characterized by traditional food-producing agriculture.

**MATERIAL AND METHODS** Human biting rate (HBR) was evaluated using human-landing catches, two nights per month from July 2011 to June 2012. Collected mosquitoes were identified morphologically. Species molecular identification was also performed using PCR. Female *Anopheles* mosquitoes were tested for the presence of *Plasmodium falciparum* antigen using ELISA technique in order to determine the sporozoitic index (SI). The entomological inoculation rate (EIR) was also calculated ( $EIR = HBR \times [SI]$ ).

**RESULTS** *Anopheles coluzzii* (93.7%) was identified as the main malaria vector. The EIR ranged from 9.7 to 21.7 infected bites of *An. gambiae* per human per year in Djohoukollé, Itakpako and Ko-Koumolou against 1159.7 in Itassoumba ( $P < 0.0001$ ).

**CONCLUSION** The heterogeneous character of malaria epidemiology was confirmed. Land use through fish ponds creation contributed to the development of suitable and permanent breeding sites for *Anopheles* mosquitoes. That led to a drastically high malaria transmission in Itassoumba. We recommend that the human dwellings be located far from these fish farming activities so that the populations can avoid to be exposed to the high rate of infected bites. It is also important to target the exact areas where high transmission is persisting such as Itassoumba so that the control operations can be more prioritized and focused in these areas.

**ACKNOWLEDGEMENTS** We are grateful to the Bill & Melinda GATES Foundation which supported financially this study.

**DISCLOSURE** Nothing to disclose.

## PSI.140

### Bayesian-based risk profiling of the prevalence and intensity of hookworm infection in Champasack province, Lao People's Democratic Republic

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**INTRODUCTION** In terms of public health impact, hookworm is the most significant of the three common soil-transmitted helminths. Prior research conducted in Champasack province in south Lao People's Democratic Republic found high prevalence rates of hookworm infection. Depending on infection intensity, the morbidity may range from mild symptoms to severe disease. The aim of the current study was to predict the spatial distribution of hookworm infection and intensity in Champasack province and to determine underlying risk factors.

**METHODS AND MATERIALS** We conducted a cross-sectional parasitological and questionnaire survey in 51 randomly selected villages in Champasack province. People were invited to provide a single stool sample that was subjected to duplicate Kato-Katz thick smears for the diagnosis of hookworm infection. Data on demography, people's socioeconomic status, access to water and sanitation, and hygiene behaviour were combined with remotely sensed environmental data. Bayesian mixed effects logistic and negative binomial models were utilized to assess risk factors and spatial distribution of

hookworm infection and intensity, and to make predictions for non-surveyed locations.

**RESULTS** 3371 individuals had complete data records. The overall hookworm prevalence was 48.8% with more than 90% of the infections being of light intensity (1–1999 eggs/g of stool). Infection risk was somewhat lower in the lowlands, mostly along the western bank of the Mekong River, while infection intensity was homogeneous across the Champasack province. Infection was negatively associated with socioeconomic status and the lowest infection levels were found in preschool-aged children. While females were at lower risk of infection than males, women aged  $\geq 50$  years harboured the heaviest hookworm infection intensities.

**CONCLUSIONS** Our spatially explicit risk maps of hookworm infection and intensity for Champasack province can help guiding control interventions. Particular attention should focus on the mountainous areas.

**DISCLOSURE** Nothing to disclose.

## PSI.141

### Exploring the relationship between climatic factors and ITN use in 17 African countries

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**BACKGROUND** While there is much anecdotal evidence of climatic factors such as rainfall and temperature affecting insecticide-treated net (ITN) use, there is little actual data demonstrating this association. Qualitative research has reported decreased ITN use during the dry season due to perceptions of being too hot, and increased use during the rains due to increases in perceived nuisance biting. This analysis uses data from national household surveys, as well as remotely-sensed climate data, to assess how factors such as ITN use is influenced in different ecological environments at different times of the year.

**METHODS** The most recent national survey with available geographic location data was obtained for 17 African countries. Monthly rainfall estimates (mm) at a roughly 4 km resolution were acquired, and the mean rainfall estimate at each survey cluster location for the month in which the survey was conducted was merged with the national survey dataset. Logistic regression was run to assess whether there was a significant relationship between estimated rainfall quantile and ITN use in each of the study countries.

**RESULTS** Preliminary results suggest that in 10 of the 17 countries surveyed in this analysis, there is a significant association between estimated rainfall and ITN use. In some countries, higher quantiles of estimated rainfall increased the odds of net use significantly (Benin – OR: 1.45,  $P = 0.001$ ). However, in a few countries, higher quantiles were associated with decreased odds of using an ITN when controlling for access to an ITN in the household (Senegal – OR: 0.75,  $P = 0.024$ ).

**CONCLUSIONS** Further studies are necessary in order to understand what additional climatic factors, such as land surface temperature, nocturnal dew point, and relative humidity, play a role in ITN use, as well as the reasoning behind these associations and what they mean for in-country malaria prevention programs.

**DISCLOSURE** Nothing to disclose.

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## PSI.142

**Evaluating the ability of temporal aberration-detection algorithms to detect simulated disease outbreaks in routinely collected cattle mortality data**R. Struchen<sup>1</sup>, J. Zinsstag<sup>2</sup> and F. Vial<sup>1</sup><sup>1</sup>Veterinary Public Health Institute, Bern, Switzerland; <sup>2</sup>Swiss Tropical & Public Health Institute, Basel, Switzerland

**INTRODUCTION** High-resolution mortality data are routinely collected in national livestock identification systems ('Tierverkehrsdatenbank' or TVD in Switzerland). Such data may be used for the continuous real-time monitoring by aberration-detection algorithms to detect temporal or spatial mortality clusters potentially indicative of a disease outbreak. The objective of our study was to evaluate the performance of temporal outbreak detection algorithms retrospectively applied to Swiss cattle mortality data.

**Methods and materials:** We extracted the daily number of on-farm cattle deaths from the TVD between 2009 and 2011. Negative binomial regression models were used on the historical data to simulate baseline time-series, into which we injected simulated disease outbreaks of different size, duration and shape ( $n = 60\,000$ ). The performance of Shewhart, cumulative sum (CuSum) and exponentially weighted moving average (EWMA) control charts were assessed based on several measures including sensitivity (the ability to detect an outbreak when it occurs), false positive rate (FPR – the probability of sounding an alarm when there is no outbreak) and time to detection (TTD). Control charts were evaluated separately, under different combination rules, and using different detection limits.

**RESULTS** Sensitivity and FPR generally decreased with increasing detection limit, but the strength of this effect was not the same for all three algorithms and depended on the size and shape of the outbreaks. EWMA exhibited overall the highest sensitivity. The Shewhart algorithm was the best performer in terms of FPR, but required a longer TTD compared to EWMA. CuSum was between Shewhart and EWMA for most performance measures. The combination rules (two or three out of three algorithms, respectively) only marginally lowered FPR without improving the system's overall performance.

**CONCLUSIONS** None of the algorithms showed a superior performance in detecting outbreak signals. For the prospective use of routinely collected cattle mortality data in Switzerland, output from both EWMA and Shewhart should be concomitantly used by decision-makers when interpreting statistical alarms. Surveillance systems have intrinsic statistical trade-offs, as illustrated by the trade-off between sensitivity, FPR and TTD that we observed. Algorithms need to be carefully optimised for a particular data stream before their integration into a national early detection system.

**DISCLOSURE** This work is part of a PhD project included in a grant 1.12.12 'Development of a syndromic surveillance system to enhance early detection of emerging and re-emerging epizootics and zoonoses' funded by the Federal Food Safety and Veterinary Office.

## PSI.143

**Mapping the malaria impact of dams in sub-Saharan Africa**S. Kibret<sup>1</sup>, J. Lautze<sup>2</sup>, M. McCartney<sup>3</sup> and G. Wilson<sup>1</sup><sup>1</sup>Ecosystem Management, University of New England, Armidale, NSW, Australia; <sup>2</sup>International Water Management Institute, Pretoria, South Africa; <sup>3</sup>International Water Management Institute, Vientiane, Lao People's Democratic Republic

**BACKGROUND** While there is growing recognition for the malaria impacts of dams in sub-Saharan Africa (SSA), assessment of the aggregated malaria impacts of water reservoirs associated with current and future water resources development in SSA has not been extensively investigated.

**OBJECTIVE** To estimate the current, and predict the future, impact of dams on malaria in different eco-epidemiological settings across Sub-Saharan Africa.

**METHOD** Large dams in sub-Saharan Africa were mapped against the malaria stability index (stable, unstable and no malaria). *Plasmodium falciparum* infection rate (PfIR) was determined for populations at different distances (<1, 1–2, 2–5, 5–9 km) from associated water reservoirs using the Malaria Atlas Project (MAP) and WorldPop databases. Results derived from MAP were compared with results obtained from literature for each stability stratum.

**RESULTS** Currently, dams enhance malaria transmission particularly in unstable areas of the sub-Saharan Africa. Dams in unstable areas increase malaria cases more than 4-fold. Nearly 15 million people are at risk of malaria in communities in close proximity (< 5 km) to human-made reservoirs. The variation in mean PfIR in communities at different distance from reservoirs was significant in unstable areas, but not in stable areas. A total of 1.1 million malaria cases annually are attributable to dams in sub-Saharan Africa.

**CONCLUSION** Dams are among important malaria risk factors particularly in unstable areas of sub-Saharan Africa. Dam building thus demands proper planning and design to incorporate measures to reduce malaria risk.

**DISCLOSURE** Nothing to disclose.

## PSI.144

**Spatial distribution and risk factors of diarrhoeal diseases among children under 5 years in an urban community of Mbour, Senegal**S. Thiam<sup>1,2,3</sup>, A. N. Diène<sup>3</sup>, I. Sy<sup>1,2,4</sup>, J. A. Dione<sup>4</sup>, O. Faye<sup>3</sup>, J. Utzinger<sup>1,2</sup> and G. Cissé<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute (Swiss TPH), Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>Université Cheikh Anta Diop, Dakar, Senegal; <sup>4</sup>Centre de Suivi Ecologique, Dakar, Senegal

**INTRODUCTION** In 2010, diarrhoeal diseases accounted for 17% of deaths in children below the age of 5 years in Senegal. This high burden of disease is likely to be unequally distributed in a country characterised by rapid, partly informal urbanization and wealth disparities among the local population. The objective of this study was to assess the spatial distribution of diarrhoeal episodes and to identify household risk factors in children under 5 years of age in the city of Mbour in coastal Senegal.

**MATERIALS** In February 2014, a cross-sectional survey was carried out in eight neighbourhoods of Mbour to assess episodes of diarrhoea in children under 5 years of age, using a 2 weeks recall period. A semi-structured questionnaire was administered to the children's caretakers interrogating on respondent and household characteristics. Households were geo-located using a hand-held global positioning system receiver. Reported diarrhoea

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cases were mapped using a geographical information system. Logistic regression was employed to assess household risk factors for diarrhoeal episodes.

**RESULTS** A total of 596 households and 1136 children under 5 years enrolled in 8 out of 27 neighbourhoods in the survey. For about a fifth of the children (21.6%), caretakers reported at least one episode of diarrhoea in the 2 weeks preceding the survey. An episode of diarrhoea was significantly associated with the mother being a housewife (odds ratio (OR) 3.95, 95% confidence interval (CI) 1.43–10.93). Mother's age above 40 years (OR 0.38, 95% CI 0.22–0.65) and high educational attainment by a household member (OR 0.44, 95% CI 0.26–0.74) were negatively associated with diarrhoeal episodes of among children in these households. The occurrence of diarrhoeal episodes was particularly high in three of the eight neighbourhoods; two of which are characterised by high population density and lack of safe sanitation, and the third being an informally developed neighbourhood in the heart of the city devoid of basic services.

**CONCLUSIONS** The study identified household risk factors for diarrhoeal episodes in young children. The spatial distribution of diarrhoeal cases showed considerable heterogeneity between neighbourhoods. Spatial analyses are an important tool to identify high-risk areas, especially if accompanied by analysis of underlying risk factors. The results help to plan control intervention against diarrhoeal diseases in Mbour and similar coastal settings in Senegal.

**DISCLOSURE** Nothing to disclose.

**PSI.145****Spatial patterns of schistosomiasis in Burkina Faso: relevance of human mobility and water resources development**

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We study the spatial geography of schistosomiasis in the African context of Burkina Faso by means of a spatially explicit model of disease dynamics and spread. The relevance of our work lies in its ability to describe quantitatively a geographic stratification of the disease burden capable of reproducing important spatial differences, and drivers/controls of disease spread. Among the latter, we consider specifically the development and management of water resources which have been singled out empirically as an important risk factor for schistosomiasis. The model includes remotely acquired and objectively manipulated information on the distributions of population, infrastructure, elevation and climatic drivers. It also includes a general description of human mobility and addresses a first-order characterization of the ecology of the intermediate host of the parasite causing the disease based on maximum entropy learning of relevant environmental covariates. Spatial patterns of the disease were analyzed about their disease-free equilibrium by proper extraction and mapping of suitable eigenvectors of the Jacobian matrix subsuming all stability properties of the system. Human mobility was found to be a primary control of both pathogen invasion success and of the overall distribution of disease burden. The effects of water resources development were studied by accounting for the (prior and posterior) average distances of human settlements from water bodies that may serve as suitable habitats to the intermediate host of the parasite. Water developments, in combination

with human mobility, were quantitatively related to disease spread into regions previously nearly disease-free and to large-scale empirical incidence patterns. We conclude that while the model still needs refinements based on field and epidemiological evidence, the framework proposed provides a powerful tool for large-scale, long-term public health planning and management of schistosomiasis.

**DISCLOSURE** Nothing to disclose.

**PSI.146****Crowd-crafted geolocations for quality assurance in Health and Demographic Surveillance Systems (HDSS)**

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**INTRODUCTION** Detailed and up-to-date maps are not available for many rural areas in low and middle income countries. This makes the planning and implementation of field studies, but also routine surveillance in Health and Demographic Surveillance Systems (HDSSs) a challenge in these places. In particular, ensuring coverage of the complete population by intervention and surveillance measures has proven difficult in the past.

Unlike maps, high-resolution satellite images are available for most places. We used a crowd-sourcing approach to collect geolocations of houses in the study area of the Majete Integrated Malaria Project in Malawi in order to establish the coverage of a baseline enumeration for the HDSS which was set up to support the project.

**METHODS** We developed a web-application and used the <http://crowdcrafting.org/platform> to recruit volunteers to help with the analysis of satellite images. Volunteers were asked to perform tasks which consisted of visually inspecting a small section of the study area and marking houses on the satellite image. These geolocations were compared with the GPS-based coordinates collected by the study team. A sample of houses which were identified on satellite images but not by GPS was visited by a supervisor for ground-truthing to determine the nature of these potential discrepancies and to estimate the coverage of the population during the census.

**RESULTS** Several hundred volunteers contributed to the geolocation effort, and the analysis of the study area was completed within 4 months. Ground-truthing showed that the vast majority of houses which appeared on the satellite images but were absent from the GPS database were either structures not used for housing (e.g. church, store, etc.), abandoned or no longer existed.

**CONCLUSIONS** The results suggest that a high coverage of the population in the study area was reached during the census. This approach is easily transferable to other areas, and could be used to estimate coverage in any surveillance system which collects geo-locations of houses.

**DISCLOSURE** Nothing to disclose.



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## PSI.147

**Building an investment case for leprosy elimination: considerations, approaches and challenges**A. Tiwari<sup>1</sup>, R. Baltussen<sup>2</sup> and J. H. Richardus<sup>3</sup><sup>1</sup>Department of Public Health, Erasmus MC, Rotterdam, The Netherlands; <sup>2</sup>Radboud University Nijmegen, Nijmegen, The Netherlands; <sup>3</sup>Erasmus MC, Rotterdam, The Netherlands

**INTRODUCTION** After achieving leprosy control, stakeholders are looking towards elimination, which is a resource demanding exercise. Moreover, pre-requisite for elimination planning is a long term political and budgetary commitment, which is often difficult to secure in developing countries. Moreover, policy makers need solid arguments to divert resources from other priorities to leprosy. Thus, an investment case is essential to assess the social cost and benefit of elimination for informed decision making. This paper attempts to summarize the considerations, approach and challenges in building an investment case for leprosy.

**METHODS** A search was performed on Pub Med Central, The Cochrane Library and Google Scholar to identify literature on leprosy, neglected tropical disease and elimination. The literature on leprosy was categorized under following themes

- 1 Epidemiology
- 2 Socioeconomic burden
- 3 Effectiveness of strategies
- 4 Programmatic challenges.

Next, elimination literature was categorized into:

- 1 Guiding principles;
- 2 Economic evaluation;
- 3 Elimination examples of leprosy from other countries; and
- 4 Investment cases for neglected tropical diseases.

**RESULTS** A rich literature is available on epidemiology and socioeconomic burden of leprosy, describing epidemiological challenges and limitation of disability weights, while calculating disease burden. Next, results from several clinical trials suggests that post-exposure chemoprophylaxis is an effective and feasible strategy for elimination. The national leprosy programs of chief epidemic countries are slow in transitioning into elimination mode after achieving control. Literature on elimination illustrates on guiding principles, which should be considered while building a case for leprosy.

**CONCLUSION** An investment case is a collection of scientific evidences, investigating the feasibility, process and impact of elimination on important social and economic parameters. The leprosy case should be built on the theory of social welfare, rather than standalone micro-economics. Current estimates exclude some social costs e.g., stigma, depression of caretaker, etc.; thus the actual economic burden of leprosy is underestimated.

**DISCLOSURE** Nothing to disclose.

## PSI.148

**Leprosy new case detection trends and the effect of preventive interventions in Pará State, Brazil: a modeling study**H. J. de Matos<sup>1,2</sup>, D. J. Blok<sup>2</sup>, S. J. de Vlas<sup>2</sup> and J. H. Richardus<sup>2</sup><sup>1</sup>Instituto Evandro Chagas, Belem, Brazil; <sup>2</sup>Erasmus MC, University Medical Center Rotterdam, Rotterdam, The Netherlands

Leprosy is still a public health problem in Brazil. Although the overall number of new cases is declining, there are still areas with a high disease burden, in particular Pará State. We aim

to predict future trends in new case detection rate (NCDR) and explore the potential impact of contact tracing and chemoprophylaxis with single-dose rifampicin on NCDR in Pará State.

We used SIMCOLEP, an existing individual-based model for the transmission and control of *M. leprae* in a population structured by households. The model was quantified to mimic the NCDR trend of leprosy in Pará state between 1990 and 2012. The baseline scenario (i.e. continuation of current control) includes multidrug therapy, passive case detection and BCG vaccination of infants. Leprosy data was obtained from the SINAN databases. We also investigated the impact of two interventions: 1) contact tracing, and 2) contact tracing in combination with administering chemoprophylaxis to contacts. All interventions start in 2015 with predictions made until 2050.

The modelled trend in Pará State after 2012 shows a continuous downward trend, reaching the official elimination target of 10 per 100 000 annual new cases by 2028. Systematic contact tracing in combination with chemoprophylaxis to household contacts would bring the achievement of elimination forward to 2026. Contact tracing would increase the number of detected cases in the first 9 years, but in the long run would drop below the number in the baseline scenario. Administering chemoprophylaxis would prevent almost 10% of new detected cases since the start of the intervention in the long run.

Our study indicates that the leprosy incidence will further decrease in Brazil. Elimination of leprosy as a public health problem can possibly be achieved around 2028 in Pará state. This moment could be brought forward by 2 years through systematic contact tracing in combination with chemoprophylaxis.

**DISCLOSURE** Nothing to disclose.

## PSI.149

**Building a data-sharing platform for schistosomiasis treatment data: opportunities and challenges**A. Julé<sup>1,2</sup>, A. Garba<sup>3</sup>, P. Guérin<sup>2,4</sup>, T. Lang<sup>1,2</sup> and P. Olliaro<sup>2,5</sup><sup>1</sup>The Global Health Network, University of Oxford, Oxford, UK; <sup>2</sup>Centre for Tropical Medicine and Global Health, Nuffield Department of Medicine, University of Oxford, Oxford, UK; <sup>3</sup>Control of Neglected Tropical Diseases, World Health Organization, Geneva, Switzerland; <sup>4</sup>WorldWide Antimalarial Resistance Network (WWARN), University of Oxford, Oxford, UK; <sup>5</sup>Intervention & Implementation Research, UNICEF/UNDP/World Bank/WHO Special Programme on Research & Training in Tropical Diseases (TDR), Geneva, Switzerland

**BACKGROUND** Treatment guidelines for schistosomiasis are supported by systematic reviews and meta-analyses based on aggregated study data. Limitations of this approach are methodological flaws and variations in trial design, enrolled subjects (age, gender, pregnancy, co-morbidities), diagnostic approaches (diagnostic test, number of tests) and data analysis (efficacy expressed as cure rate, or arithmetic or geometric mean egg reduction rate). Access to individual data and use of standardised methods would permit more in-depth analyses and strengthen evidence for treatment and control.

**METHODS** A consultation with relevant stakeholders (data generators and users in the research and control communities) is being undertaken regarding a datacentre for schistosomiasis, which would enable curation and storage of datasets with close or open access, and facilitate joint analyses and discussions over methodology or research questions. As a start, we searched systematic reviews for eligible studies and we are building a pilot version of the database, using approximately 4700 individual data donated by the authors of 15 praziquantel trials.

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**RESULTS** Cochrane reviews include ~18 300 subjects treated for *S. mansoni* or *S. haematobium* in randomised trials (Danso-Appiah et al., 2013; Kramer et al., 2014). A meta-analysis (Zwang and Oliaro, 2014) counts ~19 500 subjects treated with praziquantel for *S. mansoni*, *S. haematobium* or *S. japonicum*; of them, ~7600 participants were included in 25 studies with results published after the year 2000.

Based on those 3 reviews, we identified 52 studies (including trials and epidemiological studies) published after 2000, which correspond to ~20 000 individual patient data. This initial list of studies is being updated to include information from most recent published and unpublished trials including data from schistosomiasis control programmes, but early assessment already suggests there is scope for a sizable and informative shared database.

**CONCLUSIONS** The review of eligible studies and pilot database will serve as a basis for discussions with stakeholders in September 2015. Contributions and inputs will be taken into account during the subsequent database development, in order to meet expectations from prospective data users and address concerns and barriers to data sharing. We will present the review of eligible studies, the pilot database and the outcome of the ongoing stakeholders' consultation.

**DISCLOSURE** Institutional support is provided by the UNICEF/UNDP/World Bank/WHO Special Programme on Research & Training in Tropical Diseases (TDR); AJ is supported by the Medical Research Council, UK.

**PSI.150****What is needed to eradicate lymphatic filariasis? A model-based assessment on the impact of scaling up mass drug administration programs**

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Lymphatic filariasis (LF) is a neglected tropical disease for which more than a billion people in 72 countries are thought to be at risk. At a global level, the efforts against LF are designed as an elimination programme. However, current efforts appear to aim for elimination in some but not all endemic areas. With the 2020 goal of elimination looming, we set out to develop plausible scale-up scenarios to reach elimination and eradication. We predict the duration of mass drug administration (MDA) necessary to reach local elimination for a variety of transmission archetypes using an existing model of lymphatic filariasis transmission, estimate the number of treatments required for each scenario, and consider implications of rapid scale-up. We have defined four scenarios that differ in their geographic coverage and rate of scale-up. For each scenario, country-specific simulations and calculations were performed that took into account the pre-intervention transmission intensity, the different vector genera, drug regimen, achieved level of population coverage, previous progress towards elimination, and programmatic delays due to mapping and administration. Our results indicate that eliminating LF by 2020 is uncertain. If MDA programmes are drastically scaled up and expanded, the final round of MDA for LF eradication could be delivered by 2029 after 4.159 billion treatments. However, if the current rate of scale up is maintained, the final round of MDA may not occur until 2050. While our analysis indicates that rapid scale up of MDA will decrease the amount of time and treatments required to reach eradication, it may also propel the programme towards success, as the risk of failure is likely to increase with increased programme duration.

**DISCLOSURE** Nothing to disclose.

**PSI.151****Praziquantel dose-finding and pharmacokinetic studies in school- and preschool-aged children infected with *S. mansoni***

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**INTRODUCTION** Neglected tropical diseases (NTDs) affect millions of people worldwide, often resulting in lifelong physical pain, social stigma and abuse. One of the prominent NTDs, schistosomiasis, is caused by blood-dwelling flukes of the genus *Schistosoma*. Chemotherapy with praziquantel, administered through preventive chemotherapy programs, targeting school-aged children is a mainstay of schistosomiasis control. Discussions are on-going whether to expand access to praziquantel to younger children (<6 years). However, pharmacokinetic (PK) data, crucial for establishing safe and effective praziquantel dose for young children, are lacking.

**METHODS AND MATERIALS** A dose-finding clinical trial was carried out in Côte d'Ivoire with 20, 40 and 60 mg/kg of praziquantel (versus placebo), including 160 preschool- and 160 school-aged children infected with *S. mansoni*. Two stool samples with 2 Kato-Katz thick smears were obtained at baseline and 21 days post-treatment. Blood samples were collected at multiple time points using dried blood spots (DBS) technology and concentration of praziquantel in blood was measured over time using the liquid chromatography tandem mass spectrometry method (LC-MS/MS).

**RESULTS** The LC-MS/MS method developed exhibited excellent accuracy, precision and recovery, allowing elucidation of primary PK parameters of praziquantel for both age groups of infected children. I will present first results, including the relationship between PK parameters, arising from developmental differences between age groups and dose versus concentration versus effect profiles.

**CONCLUSIONS** Our results are of great importance as a tool guiding clinicians establishing safe and effective praziquantel dose for preschool-aged children. Effectively treating the infection in preschool-aged children is an important step on the way to eradication of schistosomiasis, as they might have a role in maintaining local transmission of the disease.

**DISCLOSURE** Nothing to disclose.

**PSI.152****A bitter pill to swallow? How taste masking and assessment of praziquantel can contribute to the treatment of schistosomiasis in pre-school children**

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**PURPOSE** Praziquantel (PZQ) has been utilized as a gold standard drug for Schistosomiasis. However, the currently available PZQ tablet used for school-children and adults is not

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suitable for pre-school children (3 months to 6 years) as small children have difficulties swallowing the large tablet. The drug is also not registered for this age group. In addition, the severely bitter taste of the existing PZQ tablet induces vomiting. The current active pharmaceutical ingredient (API) is a racemic (Rac-PZQ) mixture of the two enantiomers L-PZQ and D-PZQ. In order to tackle this important public health problem, the Pediatric Praziquantel Consortium was created to develop and register a suitable pediatric PZQ formulation for the treatment of Schistosomiasis in pre-school children.

**METHODS AND MATERIALS** The Consortium is working in parallel on the development of two oral disintegrating tablets (ODTs), one containing the Rac-PZQ, the other containing the L-PZQ API. By removing the pharmacologically inactive and more bitter D-PZQ, the L-PZQ ODTs are expected to decrease the required dose for treatment while reducing the bitter taste of the formulation. Several conventional excipients and manufacturing processes were tested to produce suitable candidates. In order to compare the ODTs and the current commercial PZQ tablets, a taste study is being conducted in Tanzanian school age children. Palatability is being measured by marking a line on a visual analogue scale incorporating a 5-point hedonic scale.

**RESULTS** Development of L-PZQ API was conducted by Merck Serono. Astellas implemented the formulation development of the ODTs and reached key characteristics of the initial formulation: small tablet size; rapid disintegrating property; expected reduction of bitterness; and acceptable stability profile. Comprehensive technology transfer from Astellas to Merck Serono and Farmanguinhos and optimization of the manufacturing process at the receiving partners was completed. The clinical trial material was successfully produced and distributed to the taste study site in Tanzania. The results of the taste study in children is being presented and discussed.

**CONCLUSION** The new PZQ formulations were successfully developed for pediatric use as a joint effort of the partners and the palatability of these formulations was tested in African children. The outcomes of the studies are important to advance the development of a suitable medication for a population in need.

**DISCLOSURE** All activities have been conducted on behalf of the Pediatric Praziquantel Consortium and are financed through grants of the Bill & Melinda Gates Foundation and the Global Health Innovative Technology Fund.

**PS1.153****Gaps in health capacities for the case management of schistosomiasis and soil-transmitted helminths infections in Burundi**

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**INTRODUCTION** Since 2007, mass drug administrations (MDA) of praziquantel and albendazole for schistosomiasis (SCH) and soil-transmitted helminth infections (STHs) has been established in Burundi in endemic areas. Alongside MDAs, STH case management is performed in health facilities (HFs) but SCH case management is still a challenge. Routine surveillance is needed to allow the detection of new SCH foci of infection. We assessed

the HFs capacity to treat STHs cases and to integrate SCH control in the routine activities.

**MATERIAL AND METHODS** In 65 HFs, located in SCH and STHs endemic areas, data were collected made via semi-quantitative questionnaires targeting HF managers, staff responsible for patient triage and referrals, staff in charge of disease surveillance, laboratory technicians and pharmacists.

**RESULTS** Abdominal pain (69.2%) and diarrhea (60.0%) were mentioned by the care providers as the main signs of STHs infection. For SCH, bloody diarrhea and bloody stools were instead mentioned by only 13.9% and 7.7%. Compared to A3 diploma holder, superior diploma holder knew better diarrhea ( $P = 0.008$ ) and hematuria ( $P = 0.04$ ) as symptoms of SCH mansoni and haematobium infection respectively. Being trained on SCH improved the knowledge of blood in stools as a symptom of SCH mansoni ( $P = 0.01$ ). The availability of guidelines for diagnosis of SCH improved the knowledge of hematuria as a symptom of SCH haematobium infection ( $P = 0.01$ ). Guidelines for management of SCH and STHs were available in 33.9% of HFs, and laboratory procedures to confirm SCH and STHs were available in 29.3% and 63.1% of HFs, respectively. The direct smear microscopy is the unique test used for the diagnostic of SCH and STHs. The status of HFs (hospital, health centre, confessionnal, public, private) influences the costs of the consultation ( $P < 0.001$ ) and the direct smear ( $P < 0.001$ ) for SCH and STH. Albendazole and mebendazole were available in HFs but praziquantel was not. Finally, health staff considered their SCH case management very poor due to lack of disease knowledge, insufficient laboratory equipment and unavailability of praziquantel outside national MDAs.

**CONCLUSION** The current health capacities for SCH case management and mainly for SCH and STHs detection are not adequate to establish a routine surveillance system for these diseases. Improvement of knowledge, detection and resources are strongly warranted for SCH and STHs control integration into HFs routine activities.

**DISCLOSURE** Nothing to disclose.

**PS1.154****Elimination of urogenital schistosomiasis in Zanzibar: challenges for an integrated multidisciplinary research programme**

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**INTRODUCTION** In Zanzibar, various institutions and stakeholders have joined forces to eliminate urogenital schistosomiasis transmission within 5 years. In a randomized intervention trial, we aim to compare the impact of biannual mass drug administration (MDA) of praziquantel to the whole at-risk population (arm 1), MDA plus snail control interventions (arm 2), and MDA plus behaviour change interventions (arm 3) in a total of 45 shehias (small administrative areas) each on Unguja and Pemba island.

**METHODS** Since the onset of the project in November 2011, six MDA rounds have been conducted across both islands with a reported coverage of around 80%. Snail control started in



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August 2012 and more than 200 natural freshwater bodies in 30 shehias are treated regularly with niclosamide when intermediate host snails (*Bulinus globosus*) are present. Behaviour change interventions were designed together with the communities in additional 30 shehias. Implementation of safe play activities for children, teacher's packages, urinals and laundry platforms commenced in October 2012.

**RESULTS** The baseline survey in 2011/2012 indicated overall Schistosoma haematobium prevalences in 9–12 year old children of 4.3% and 8.9% on Unguja and Pemba, respectively.

Arithmetic mean infection intensities were 1.0 and 9.7 eggs per 10 ml urine, respectively. Annual follow-up parasitological surveys have been conducted in 2013, 2014 and 2015.

Prevalences and infection intensities decreased in some shehias and years but increased in others, regardless of the intervention arm. *B. globosus* returned to treated water bodies but were present in low numbers and few snails were infected. In the behaviour change shehias, children's knowledge about the transmission and prevention of schistosomiasis improved.

**CONCLUSIONS** The focality of urogenital schistosomiasis in Zanzibar is highlighted by the persistence of 'hotspots' of infection. Challenges for the success of the project include time, costs, the use of diagnostic tools with low sensitivity, infection hotspots with high reinfection potential, the focal application of snail control and behavioural interventions, migration of people between (non-) targeted shehias, and suboptimal adherence to drug intake. To achieve elimination, interventions will need to focus on all infection hotspots across the islands and infected people will need to be identified with sensitive diagnostic tools and treated immediately and adequately.

**DISCLOSURE** Nothing to disclose.

## PSI.155

**Spatiotemporal effectiveness of a 5 year albendazole mass drug administration programme at reducing prevalence and intensity of soil-transmitted helminth infections in Burundi: a geostatistical analysis in variation**

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**INTRODUCTION** Since the mapping of soil-transmitted helminth infections (STHs) performed in 2007, Burundi has been organizing albendazole mass administrations (MDAs) twice a year in endemic areas. Between 2007 and 2011, impact studies to assess the effect of these treatments, were performed. After 2011, MDAs continued until December 2014, when a national reassessment of STHs was completed. In this paper, analysis of the epidemiological data collected during the years 2007–2011, and distribution of STHs infections over space and time are presented, and compared with the recent reassessment.

**METHODS** Impact studies were carried out by regular follow up of two cohorts of children in 31 primary schools. Data from the surveys were combined with environmental and ecological information to produce semivariograms for each infection, and risk prevalence maps. For the STH national reassessment, 225 schools were randomly selected in the whole country, and STHs prevalence assessed.

**RESULTS** In both cohorts, hookworm and *A. lumbricoides* showed significant reductions, from a maximum prevalence at baseline of 17.59% and 19.63%, to a minimum prevalence of 3.90% and 8.85%, respectively, achieved in 2011. For *T. trichiura*, decrease of prevalence was found not significant (max baseline–min 2011: 9.62–1.99%, respectively). Intensity reduction was also achieved, with statistically significant results for *A. lumbricoides* (from medium to low intensity, as per WHO definitions). Semivariograms showed 100% and 76% spatial dependence between infection prevalence and environmental factors for *T. trichiura* and *A. lumbricoides*, respectively, whilst no spatial dependence was evident for hookworm infection. Comparison between the impact data collected in 2011 and the national reassessment in 2014 demonstrated the absence of further decrease in prevalence for all the STHs, with a national average of 15.5%, 3.6%, and 4.5%, for *A. lumbricoides*, hookworm and *T. trichiura*, respectively.

**CONCLUSIONS** These results demonstrate the impact of a 5-year MDA programme on prevalence and intensity of STHs in school age children, and their spatial correlation. Although our results confirm the importance of repeated MDAs to reduce STHs burden in Burundi, the recent epidemiological reassessment highlight the challenges to further reduce these infections, even though routine treatment is delivered.

**DISCLOSURE** Nothing to disclose.

## PSI.156

**Hookworm-related cutaneous larva migrans in the Urban Amazonia- a disease of the poorest of the poor**

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Hookworm-related Cutaneous Larva Migrans (HrCLM) is an ectoparasitic skin disease, which is prevalent in many tropical and subtropical countries. Little is known about prevalence and Risk Factors of HrCLM in endemic countries.

We conducted a cross-sectional study in a resource-poor neighbourhood (favela) in Manaus, Brazil. All participants were examined clinically and interviewed using a pretested questionnaire. An asset index was formed using principal component analysis to categorize households according to socio-economic status. Odds ratios with 95% confidence intervals were calculated for possible risk factors. All variables that showed weak evidence of an association with HrCLM were entered in a multivariate stepwise logistic regression model.

A total of 806 persons living in 262 households in the study area were admitted to the study. The median age was 18 (0–72 years). Sixty-six persons [8.2% (95% CI 6–10%)] were diagnosed with HrCLM, in children <15 years the prevalence was 12.8% (95% CI 10–16%). The disease was associated with important clinical pathology. HrCLM was independently associated with age under 15 [OR 3.2 (95% CI 1.61–6.18)], male sex [OR 2.31 (95% CI 1.30–4.10)], a low asset index [OR 2.47 (95% CI 1.08–5.66)], the presence of animal faeces on the compound [OR 2.70 (95% CI 1.36–5.35)] and walking barefoot on sandy ground or earth [OR 14.25 (95% CI 4.73–42.99)].

People in this resource-poor community suffered from a high HrCLM-associated disease burden. The disease burden was highest in the poorest of the poor.

**DISCLOSURE** Nothing to disclose.



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## PSI.157

**Strongyloides stercoralis is a cause of abdominal pain, diarrhea and urticaria in rural Cambodia**V. Khieu<sup>1,2,3</sup>, S. Srey<sup>1</sup>, F. Schär<sup>2,3</sup>, S. Muth<sup>1</sup>, H. Marti<sup>2,3</sup> and P. Odermatt<sup>2,3</sup><sup>1</sup>National Center for Parasitology, Entomology and Malaria Control, Ministry of Health, Phnom Penh, Cambodia; <sup>2</sup>Swiss Tropical and Public Health Institute (Swiss TPH), Basel, Switzerland; <sup>3</sup>University of Basel, Basel, Switzerland

**INTRODUCTION** Strongyloidiasis is endemic in areas where sanitary conditions are poor and where the climate is warm and humid. The clinical manifestations of strongyloidiasis vary greatly according to infection intensity and the immune-status of the patient. More than 50% of all infections remain asymptomatic. We document clinical manifestations of 21 patients with high infection intensities of *S. stercoralis* infections from a community in rural Cambodia, both before and 3 weeks after ivermectin (200 µg/kg, single oral dose) treatment.

**MATERIALS AND METHODS** In early 2010, in a community-based survey in Rovieng district (Preah Vihear province), stool examinations were conducted for individuals in randomly selected households. Two stool samples were obtained on two consecutive days from each person and examined with Baermann and Koga agar plate culture (KAP) techniques for the presence of *S. stercoralis* larvae. Patients with more than 250 larvae in one of the Baermann examinations were revisited and a detailed clinical assessment was performed.

**RESULTS** Out of 21 patients, 20 (95.2%), 18 (85.7%) and 14 (66.7%) reported frequent abdominal pain, diarrhea and periods of sensation of itching, respectively, during the previous 6 months; epigastric (11, 55.0%) and peri-umbilical (13, 65.0%) pains were most frequent. Five patients (23.8%) reported having experienced urticaria the week preceding the examination. One patient suffered from extended urticaria. Three weeks after treatment, most symptoms had been almost entirely resolved.

**CONCLUSIONS** In rural communities of Cambodia, strongyloidiasis with high parasite load is endemic. It is associated with substantial symptoms and clinical signs, particularly abdominal pain, diarrhea and urticaria. Access to adequate diagnosis and treatment is a pressing issue that needs attention.

**DISCLOSURE** Nothing to disclose.

## PSI.158

**Prevalence of helminths among children under 5 years admitted with diarrhoea in Manhiça District, Southern Mozambique**D. C. Vubil<sup>1</sup>, S. Acacio<sup>1,2</sup>, B. Sigauque<sup>1,2</sup>, T. Nhampossa<sup>1,2</sup>, M. Garrine<sup>1</sup>, P. Alonso<sup>1,3</sup> and I. Mandomando<sup>1,2</sup><sup>1</sup>Manhiça Health Research Centre (CISM), Manhiça, Mozambique;<sup>2</sup>National Institute of Health, Maputo, Mozambique; <sup>3</sup>Barcelona Centre for International Health Research (CRESIB), Barcelona, Spain

**INTRODUCTION** Helminths are an important cause of diarrhoeal disease in most developing countries with poor sanitation and limited access to safe drinking water.

In Mozambique, the importance of helminths and other intestinal parasites as causative of diarrhoea is barely known due to diagnostic limitations. Here we show a baseline study of prevalence of helminths in a case/control diarrhoeal study among children under 5 years of age in Manhiça District, Southern Mozambique.

**MATERIALS AND METHODS** A case/control surveillance study of aetiology of diarrhoea in infants and young children was conducted in Manhiça District, from November 2011 to

November 2012. Age was stratified in months in three groups (0–11, 12–23 and 24–59). Stool samples were collected and sent to the Microbiology Laboratory for bacterial culture and for further tests. A multiplex qPCR was used for detection of *Ascaris lumbricoides*, *Strongyloides stercoralis* and hook worms (*Ancylostoma duodenale* and *Necator americanus*).

**RESULTS** From November, 2011 to November, 2012, we collected 1267 stool samples from 518 cases of diarrhoea and 749 from controls. The overall prevalence of helminths was 138 (10.89%), of those 59 (11.39%) from cases of diarrhoea and 79 (10.55%) from controls. The high prevalence was observed for elder children (24–59 months) with 24.77% (for cases) and 19.34% (for controls), suggesting that age might be a risk factor for infection. In general, *Ascaris lumbricoides* was the most prevalent pathogen with 5.21% for cases and 5.6% for controls, followed by *Strongyloides stercoralis* with 4.24% for cases of diarrhoea and 2.67% for control group.

**CONCLUSIONS** Here we show a baseline data on the prevalence of helminths among children under 5 years with and without diarrhoea in a rural area of Mozambique. The present data suggests that helminths might represent an important contribution for cases of diarrhoea in elder children. The predominance of asymptomatic carriers is alarming because may increase the risk of human-to-human transmission.

**DISCLOSURE** Nothing to disclose.

## PSI.159

**High prevalence of large trematode eggs in schoolchildren in Cambodia**P. J. Bless<sup>1,2</sup>, F. Schär<sup>1,2</sup>, V. Khieu<sup>1,2,3</sup>, S. Kramme<sup>1,2</sup>, S. Muth<sup>3</sup>, H. Marti<sup>1,2</sup> and P. Odermatt<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland;<sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>National Center for Parasitology, Entomology and Malaria Control, Ministry of Health, Phnom Penh, Cambodia

**INTRODUCTION** In Southeast Asia intestinal helminth and protozoa multiparasitism poses a serious challenge for parasitological diagnosis. In 2009, large trematode eggs (LTE) resembling *Fasciola* spp. eggs were found in the stools of schoolchildren in Kandal province, Cambodia. With a focus on *Fasciola* spp. we reassessed the situation in the concerned school by determining the prevalence of LTE among schoolchildren, ascertaining the trematode species and identifying potential risk factors for infection.

**METHODS AND MATERIALS** We performed a cross-sectional study among the affected schoolchildren including an in-depth questionnaire and parasitological diagnosis. Three stool samples were examined per child using Kato-Katz and formalin-ether concentration techniques. Blood serum ELISA and coprological PCR were conducted for trematode species clarification. Cattle droppings of the school's environment were examined by cup sedimentation and coprological ELISA. The livers of slaughtered cattle of a nearby slaughterhouse were also examined.

**RESULTS** Overall 70.2% of schoolchildren were diagnosed with an intestinal parasitic infection. Among those 33.8% were infected with more than one species. LTE were observed in 46.5% of schoolchildren's stools. A first ELISA revealed that two blood serum samples of the schoolchildren were positive for *Fasciola hepatica*. The results could not be confirmed by immunofluorescence antibody tests. Out of 221 PCR samples, only one tested positive for *Fasciola* spp. and none for *Fasciolopsis buski*. Among the investigated risk factors the consumption of raw aquatic plants (OR = 3.3, 95% confidence interval: 1.3–8.5)

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and fermented fish sauce (OR = 2.1, 95% confidence interval: 1.0–4.4) were significantly associated with the presence of LTE in the stool. In 18.3% of examined cattle livers ( $N = 191$ ) *Fasciola* spp. flukes were detected and 88.8% of cattle droppings ( $N = 205$ ) were tested positive for *Fasciola* spp. eggs.

**CONCLUSIONS** Although nearly half of the schoolchildren had LTE in their stools only two were tested positive for *Fasciola* spp. and none for *F. buski* with specific molecular diagnostics. From the lack of diagnostic evidence for *Fasciola* spp. and *F. buski* it can be concluded that the majority of microscopically observed LTE are from *Echinostoma* spp. However the transmission of *Fasciola* spp. from cattle to humans might be possible given the widespread cattle faeces contamination in close proximity to humans.

**DISCLOSURE** Nothing to disclose.

**PSI.160****Perception of and treatment strategies for acute gastroenteritis and campylobacteriosis at the Swiss primary care level**

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**INTRODUCTION** In Switzerland, campylobacteriosis cases reported to the National Notification System of Infectious Diseases (NNSID) increased during the last decade. The interpretation of the Swiss surveillance data is challenging as it is unknown how acute gastroenteritis (AG) and campylobacteriosis present in the general population and which determinants lead to campylobacteriosis case registration in the NNSID. We conducted a qualitative study among Swiss primary care physicians to investigate these determinants.

**METHODS AND MATERIALS** Primary care physicians were interviewed between May and August 2013 using a semi-structured questionnaire including the following key topics: physicians' perception of AG and campylobacteriosis in daily practice, their diagnostic and treatment approaches and drivers for related decisions. Transcribed interviews underwent inductive content analysis and the semi-structured questionnaire was repeatedly adapted to emerging topics to achieve saturation.

**RESULTS** Physicians generally attributed AG and campylobacteriosis little relevance for public health and their daily work. They see both diseases as self-limiting or easy to treat. However, vulnerable individuals like infants, elderly or individuals with co-morbidities need to be paid particular attention. Based on physicians' experiences, AG occurs generally wave-like throughout the year and campylobacteriosis specifically during summer months and over the festive season in December. Up to 60% of patients consult their physician by telephone only and of the ones seen at the practice less than half are prescribed a stool diagnostic. Antibiotic therapy is considered useful besides the common symptomatic treatment. Stool diagnostics ('test') and antibiotic therapy ('treat') comprise four strategies:

- 1 'Wait & See',
- 2 'Treat & See',
- 3 'Treat & Test', and
- 4 'Test & See'.

The selection of the strategy depends on general condition, disease presentation, co-morbidities and physicians' preferences and experiences. A large part of patients affected by AG or campylobacteriosis are incapable of working for several days.

**CONCLUSIONS** The management of AG patients is multifaceted and involves triage steps directly affecting the case numbers reported to the NNSID. Our findings partly explain the processes and determinants leading to registration of campylobacteriosis in the NNSID and allow a better interpretation of notified case numbers in relation to the general population.

**DISCLOSURE** The study was funded by the Swiss Federal Office of Public Health, Bern, Switzerland.

**PSI.161****Impacts of water, sanitation and hygiene (WASH) interventions on intestinal helminthiasis of school-aged children in Ogun State, South-Western Nigeria**

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**INTRODUCTION** The Water, Sanitation and Hygiene (WASH) programme is one of the intervention strategies to improve access to safe water, sanitation and good hygiene in developing countries. Assessment of progress and evaluation of intervention impacts on intestinal helminthiasis are unknown in most states in Nigeria.

**METHODS AND MATERIALS** Eight rural primary schools were randomly selected from an helminthiasis endemic local government area of Ogun State, Nigeria. Three of the schools (WASH schools) were benefiting from WASH intervention and five (non-WASH schools) were not. WASH interventions were assessed using WHO/UNICEF guidelines and impact of interventions on helminthiasis was assessed by examining stool samples of 428 consenting pupils across the selected schools for intestinal helminth ova. WASH officers at the state level were also interviewed on the progress and challenges of implementation. Data obtained were uploaded and analyzed using SPSS 20.0 software.

**RESULTS** Intestinal helminthiasis burden were significantly lower ( $P < 0.05$ ) in WASH schools (27.4%) compared to the non-WASH schools (37.5%). Also, significant differences ( $P < 0.05$ ) exist in the provision of safe water and environmental hygiene for WASH schools (100% and 73.3%) and non-WASH schools (16% and 26.9%) respectively. However, there exist no significant differences ( $P > 0.05$ ) in the sanitation condition between WASH schools (44.4%) compared to non-WASH schools (20.0%). Interview findings also showed that the state's water and sanitation coverage rates stagnated at 43% and 36% since 2006 and 2012 respectively.

**CONCLUSIONS** This study provides evidences that WASH interventions have the potential to reduce intestinal helminthiasis burden in school-aged children. Nevertheless, the coverage rates and conditions of these interventions are not in line with WHO/UNICEF standards. Therefore scaling up, monitoring of adequacy and conditions of interventions are important, requiring funding and resource allocation.

**DISCLOSURE** Nothing to disclose.

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## PSI.162

**The road towards sustainable control of schistosomiasis in the Democratic Republic of Congo: pre-assessment of staff performance and material resources in endemic regions**S. Linsuke<sup>1</sup>, L. Mpabanzi<sup>2</sup>, S. Nundu<sup>1</sup>, F. Mukunda<sup>3</sup>, P. Lutumba<sup>1,4</sup> and K. Polman<sup>2</sup><sup>1</sup>Epidemiology, Institut National de Recherche Biomédicale, Kinshasa, The Democratic Republic of the Congo; <sup>2</sup>Institute of Tropical Medicine (ITM), Antwerpen, Belgium; <sup>3</sup>Programme National de Lutte contre la Bilharziose et Parasitoses Intestinales, Kinshasa, The Democratic Republic of the Congo; <sup>4</sup>Tropical Medicine Department, University of Kinshasa, Kinshasa, The Democratic Republic of the Congo

Schistosomiasis remains a public health problem in the Democratic Republic of Congo (DRC). Adequate case management is key to efficient and sustainable control. We evaluated the knowledge of the health staff on schistosomiasis, and the availability of diagnostic tools and treatment at different levels of the health care system in two endemic provinces of DRC (Kinshasa and Bas-Congo). Interviews were performed with staff from 35 healthcare facilities in 11 health zones. Health staff knew the common symptoms of schistosomiasis, but advanced symptoms were more accurately cited in Bas-Congo. Kato-Katz technique and urine filtration were unavailable in both provinces. They mainly used direct smear. PZQ was obtainable in 70% of the health facilities, all situated in Bas-Congo. Diagnosis and treatment mostly relied on symptoms. While knowledge on schistosomiasis among health staff appears sufficient, substantial efforts are needed to improve availability of diagnostic tools and treatment in the health facilities in DRC.

DISCLOSURE Nothing to disclose.

## PSI.163

**Schistosomiasis and soil transmitted helminths in school-aged children: epidemiological profile in Kinshasa and Bas-Congo provinces of the Democratic Republic of Congo**S. Linsuke<sup>1</sup>, S. Nundu<sup>1</sup>, K. Kanobana<sup>2</sup>, F. Mukunda<sup>3</sup>, R. Inocêncio da Luz<sup>4</sup>, K. Polman<sup>5</sup> and P. Lutumba<sup>1,6</sup><sup>1</sup>Epidemiology, Institut National de Recherche Biomédicale, Kinshasa, The Democratic Republic of the Congo; <sup>2</sup>Institute of Tropical Medicine (ITM), Antwerpen, Belgium; <sup>3</sup>Programme National de Lutte contre la Bilharziose et Parasitoses Intestinales, Kinshasa, The Democratic Republic of the Congo; <sup>4</sup>International Health Unit, University of Antwerp, Antwerpen, Belgium; <sup>5</sup>Unit of Medical Helminthology, Institute of Tropical Medicine (ITM), Antwerpen, Belgium; <sup>6</sup>Tropical Medicine Department, University of Kinshasa, Kinshasa, The Democratic Republic of the Congo

The lack of epidemiological data on schistosomiasis (SCH) and soil-transmitted helminthes (STH) in the Democratic Republic of Congo (DRC) hampers effective disease control, although these diseases have a significant impact on population health.

In 2009–2010 we conducted a random survey in school-aged children (3rd grade) in 11 health areas of the provinces Kinshasa and Bas-Congo. We collected socio-demographic data and examined stool and urine samples of each child.

A total of 2399 children (1559 children from Kinshasa and 840 from Bas-Congo) were included. The median age was 10 years (range: 5–19 years). The overall prevalence of SCH was 13.5%; CI95%: 12.1–14.8. The highest prevalence of SCH was found in Bas-Congo province (32.1; CI95%: 29–35.3). A total of 61.3% (CI95%: 59.4–63.3) school-aged children were infected STH with a predominance of *A. lumbricoïdes*. This prevalence was higher in Kinshasa (64%; CI95%: 61.6–66.4) compared to Bas-Congo province (56.3%; CI95%: 53.4–60).

The data generated in this study provide baseline data for the formulation of control strategies on SCH and STH infections in Kinshasa and Bas-Congo. More work is needed in other provinces.

DISCLOSURE Nothing to disclose.

## PSI.164

**High prevalence of *Schistosoma mansoni* in six health areas of Kasansa health zone, Democratic Republic of the Congo: a short report**S. Linsuke<sup>1</sup>, S. Nundu<sup>1</sup>, S. Mupoyi<sup>2</sup>, R. Mukele<sup>3</sup>, F. Mukunda<sup>4</sup>, M. Mbuyi Kabongo<sup>5</sup>, R. Inocêncio da Luz<sup>6</sup>, J.-P. Van Geertruyden<sup>6</sup>, M. Van Sprundel<sup>7</sup>, M. Boelaert<sup>8</sup>, K. Polman<sup>9</sup> and P. Lutumba<sup>1,3</sup><sup>1</sup>Epidemiology, Institut National de Recherche Biomédicale, Kinshasa, The Democratic Republic of the Congo; <sup>2</sup>Recherche, Programme National de Lutte contre la Bilharziose et Parasitoses Intestinales, Kinshasa, The Democratic Republic of the Congo; <sup>3</sup>Tropical Medicine Department, University of Kinshasa, Kinshasa, The Democratic Republic of the Congo; <sup>4</sup>Programme National de Lutte contre la Bilharziose et Parasitoses Intestinales, Kinshasa, The Democratic Republic of the Congo; <sup>5</sup>Georgia State University, Atlanta, GA, USA; <sup>6</sup>International Health Unit, University of Antwerp, Antwerpen, Belgium; <sup>7</sup>University of Antwerp, Antwerpen, Belgium; <sup>8</sup>Unit of Epidemiology and Control of Tropical Diseases, Institute of Tropical Medicine (ITM), Antwerpen, Belgium; <sup>9</sup>Unit of Medical Helminthology, Institute of Tropical Medicine (ITM), Antwerpen, Belgium

School-aged children suffer the most from schistosomiasis infection in sub Saharan Africa due to poverty and limited sanitary conditions. Mapping of disease burden is recommended and there is a need of updating prevalence data which is as old as 20 years in the Democratic Republic of Congo. An epidemiological and parasitological study was carried out in 2011 in the health zone of Kasansa. Six health areas (HA) were included in the study. In each health area, one primary school was selected. School-aged children were screened for *S. mansoni* infection using parallel Kato-Katz and direct microscopy techniques. A total of 335 school-aged children were screened. The average prevalence was 82.7% and ranged between 59.5% and 94.9%. Four of the six HAs had a prevalence level over 91%. Of all infected children, about half 112 (43.2%) had light parasite density. These results demonstrate that *Schistosoma mansoni* infection is a bigger problem than anticipated and there is an urgent need to implement effective control measures.

DISCLOSURE Nothing to disclose.

## PSI.165

**Snakebite envenoming in South Sudan: a true public health emergency**G. Alcoba<sup>1,2</sup>, E. Sterk<sup>1</sup>, K. Powell<sup>3</sup>, B. Rusch<sup>1</sup>, M. Tamannai<sup>3</sup>, M. Rull<sup>1</sup>, I. Ciglenecki<sup>1</sup>, J. Potet<sup>4</sup>, U. Kuch<sup>5</sup> and F. Chappuis<sup>2</sup><sup>1</sup>Médecins Sans Frontières Switzerland, Geneva, Switzerland; <sup>2</sup>Division of Tropical and Humanitarian Medicine, Geneva University Hospitals, Geneva, Switzerland; <sup>3</sup>Médecins Sans Frontières Switzerland, Agok, South Sudan; <sup>4</sup>Access Campaign, Médecins Sans Frontières, Paris, France; <sup>5</sup>Institute of Occupational Medicine, Social Medicine and Environmental Medicine, Goethe University Frankfurt, Frankfurt, Germany

**INTRODUCTION** Incidence and case-fatality rates of snakebite are rarely monitored in Sub-Saharan Africa including South Sudan. Recent studies estimate the total number of deaths due to snakebite to be at least 100 000–125 000 per year worldwide, comparable to measles or meningitis. Moreover, life-saving



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polyvalent antivenoms are extremely expensive (more than 200 Euros/treatment), often unavailable, and subject to gaps in production. In the 120-bed hospital supported by Médecins Sans Frontières in Agok, on the border of Warrap and Abyei states in South Sudan, an alarming increase of snakebite admissions was recently reported, reaching 90 patients/month in May 2014 and triggering a specific monitoring.

**METHODS** We conducted a retrospective analysis of snakebite data from Agok hospital. Data was collected from June 2014 on patients' demographic and clinical characteristics, circumstances of bite, and outcomes.

**RESULTS** A total of 119 patients were admitted due to snakebite between 16 June 2014 and 13 March 2015 (mean: 13.2 admissions/month with a maximum of 24 in September); 45.4% of victims were female, and 36% children below 16 years. Most patients (68%) did not see the snake after being bitten and snake descriptions were heterogeneous. Most patients were bitten around dusk or dawn (83%), mainly on the lower limb (85%). Twelve (10%) presented severe cytotoxic or hematotoxic envenoming; among these, 10 received polyvalent antivenom and fully recovered, but two children aged 4 and 12 years old (CFR 1.6%) died during the first hour after admission before receiving antivenom. Causes of death were a massive cytotoxicity with necrosis of the lower abdomen and a rapid hematotoxic syndrome including spontaneous bleeding from the eyes. The overall median time between snakebite and admission was 3 h (range: 0.5–79 h) but was longer (5.5 h) in patients with severe envenoming (range: 1–79 h).

**CONCLUSIONS** Life-threatening presentations after snakebite are frequent in the Agok area of South Sudan, and the risk appears to be magnified by long delays before admission. Therefore MSF is planning a snakebite epidemiological survey. Raising public awareness about protective footwear, rapid transport of victims, as well as improved training of health professionals on snakebite management are needed in South Sudan. More generally, steady production of appropriate and affordable antivenoms for sub-Saharan Africa must be considered as a global health priority.

**DISCLOSURE** Nothing to disclose.

## PSI.166

Investigation on the role and mechanisms of artesunate against *Schistosoma japonicum*-induced liver fibrosis

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**INTRODUCTION** The primary cause of death in schistosomiasis is the formation of liver egg granulomas and secondary hepatic fibrosis. The objective of this study was to investigate the role and mechanism of artesunate against *Schistosoma japonicum* egg-induced liver fibrosis.

**METHODS** The BALB/c mice model of hepatic fibrosis which infected by cercariae of *Schistosoma japonicum* were randomly divided into 4 groups:

- 1 Group A as a blank control,
- 2 Group B as a model,
- 3 Group C as a insecticide treatment control,
- 4 Group D as a antifibrotic therapy with artesunate, respectively.

Every group hasd 10 mice. Group C and D was orally given praziquantel at a dose of 250 mg/(kg.d) for consecutive 3 days,

on 42 days after the infection. And then group D administered with artesunate at 30 mg/(kg.d) for 14 days of continuous administration on 56 days after the infection as antifibrotic therapy. All the mice were killed at the end of the adminisysion. Serum hyaluronic acid (HA), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were detected; hydroxyproline in liver tissues was detected; areas of egg granuloma and degrees of hepatic fibrosis were observed via HE and Masson staining; the expressions of TGF- $\beta_1$ mRNA,  $\alpha$ -SMA mRNA and VEGF mRNA in liver were detected by RT-PCR. The expressions of VEGF, type I and type III collagen were examined by immunohistochemistry.

**RESULTS** Compared with the blank control Group A, the egg granuloma appeared obviously, the collagen deposit and fibrosis occurred in liver tissues of Group B, C, D. The levels of ALT, AsT, HA in sera and HYP in liver tissues were significantly higher ( $P < 0.01$ ). However, the levels of ALT, AST, HA and HYP in the treatment group D were significantly lower than that in the infection group B and insecticide group C ( $P < 0.01$ ), the areas of egg granuloma, the collagen deposits and the degrees of hepatic fibrosis in group D were significantly lower than that in the infection group B and insecticide group C ( $P < 0.01$ ). The expressions of TGF- $\beta_1$ mRNA,  $\alpha$ -SMA mRNA, VEGF mRNA, VEGF, type I and type III collagen were decreased in artesunate treatment groups.

**CONCLUSION** Artesunate has significantly antifibrogenic effect through inhibited the progress on schistosomiasis japonica liver fibrosis, probably by down-regulation the expression of TGF- $\beta_1$ mRNA,  $\alpha$ -SMA mRNA, VEGF mRNA, VEGF, type I and type III collagen protein.

**KEYWORDS** *Schistosoma japonicum*; Artesunate; Liver fibrosis; Mice.

**DISCLOSURE** Nothing to disclose.

## PSI.167

Investigations of an FDA-approved compound library for potential drugs against *Schistosoma mansoni*

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**BACKGROUND** Plans to expand mass drug treatment campaigns to fight schistosomiasis are underway, yet worries about potential praziquantel resistance motivate the investigation for novel antischistosomal compounds. While targeted *de novo* drug development for helminths is still in its infancy, drug repurposing might be an inexpensive and effective source of novel antischistosomal leads.

**METHODOLOGY** In the framework of a Gates-funded project overseen by the Drugs for Neglected Diseases initiative, we investigated the antischistosomal potential of a library of 1600 FDA-approved compounds. Compound *in vitro* activity was characterized on newly transformed schistosomula (NTS) and adult *Schistosoma mansoni*. Access to pharmacokinetic and toxicity data was leveraged in combination with our *in vitro* data to select compounds for *in vivo* studies.

**RESULTS** The *in vitro* screen identified 121 and 36 compounds active against the NTS stage and adult stage, respectively. Hits were further characterized with *in vitro* kinetic onset of action and dose-response studies on adult worms, and profiled against the available pharmacokinetic and toxicity data. In total, 11 candidates were singled out for *in vivo* testing. Two compounds,



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doramectin (10 mg/kg) and clofazimine (400 mg/kg), reduced worm burden *in vivo* by 60.1% and 82.7%, respectively.

**CONCLUSION** The work presented here expands the inventory of antischistosomal properties of existing compounds. The two *in vivo*-active drugs, doramectin and clofazimine are commonly used: doramectin is still predominantly a veterinary compound whose use as an anti-nematodal is starting to be explored, while clofazimine, a WHO essential medicine, is already being used to treat leprosy. Both drugs represent novel antischistosomal drug classes which serve as starting points for further investigation.

**DISCLOSURE** Nothing to disclose.

## PSI.168

The influence of host serum factors on the development of *S. mansoni* in its definite host

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Schistosomes are unique among the helminths since adult worms live in the blood vessels of their definite host where they are exposed to the full scale of cellular and humoral immune attacks. Nevertheless, they survive under such hostile conditions i.e. potentially harmful serum factors for up to 10 years. This demonstrates they have developed strong and broad immune evasion mechanisms during co-evolution which step into place during all stages of their development. The main focus of this work was to understand in detail how and when the resistance of *S. mansoni* against host serum factors arises. We therefore employed an established *in vitro* assay in which cercariae are mechanically transformed into and cultivated as skin and lung schistosomulae (also called 'newly transformed schistosomulae' (NTS)). Up to now, the viability of NTS depended on media containing fetal-calf serum (FCS) and therefore serum factors. We advanced this system to serum-free condition allowing us to add different host-sera and serum components under well-defined conditions.

We detected drastic differences in the viability of NTS when incubated with sera of different species. Whereas human serum propagated NTS maturation up to gut-developing worm stage (day 18 onwards), NTS incubated with media containing FCS developed only to the lung migratory stage. In contrast serum of in-bred C57BL/6 and outbred NMRI mice efficiently killed the NTS within 5 days. Further, addition of mouse serum into survival-propagating conditions also induced NTS-killing which could point towards the presence of active component(s) within mouse serum. With sera from other species we could observe either the improved maturation (i.e. swine) or killing phenotype (i.e. rhesus monkey) in different degrees.

Finally, we investigated the influence of the complement factor C1q as this was previously indicated to be inactivated by schistosomes. However, mouse serum deficient of C1q did not alleviate the NTS killing process and no influence was observed in the development of adult worms in *S. mansoni* infected C1q-deficient animals.

Our current studies focus on defining host-specific serum factors responsible for either survival or killing of the NTS as well as on the role of other complement factors such as C3, C4 and C5 on the development of NTS *in vitro*.

**DISCLOSURE** Nothing to disclose.

## PSI.169

Circulating cathodic antigen (CCA) urine rapid test for diagnosis of *Schistosoma mansoni* infestation: preliminary data of a cohort study of Egyptian patients coming from an endemic area

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**BRIEF INTRODUCTION** The lack of symptoms and the small number of *Schistosoma* eggs in patients coming from endemic countries make diagnosis of chronic/active schistosomiasis difficult to perform. A new rapid test detecting Circulating cathodic antigen (CCA) of *Schistosoma mansoni* in urine was commercialized. CCA seems to have same sensibility as Kato-Katz method in affected areas.

**METHODS AND MATERIALS** 45 Egyptian patients, with a known positive serology for *Schistosoma* and increased total IgE, were assessed for CCA (A&B rapid test schistosomiasis Ag, Lucca Italy) from February 2014 till March 2015 in San Raffaele Hospital, Milan. Five subjects never exposed to *Schistosoma* were identified as negative controls, while 10 patients with active schistosomiasis diagnosed in Saint Michel Centre (Central African Republic) were included as positive controls. Among 45 Subjects, 43 received specific treatment.

**RESULT** As expected, 5/5 negative controls had negative CCA test, while all positive ones were CCA-positive. 45 patients were tested for CCA. All treated patients yield negative results. 2 untreated patients were positive to CCA test and were subsequently treated with praziquantel 40 mg/kg/die (2 doses for 3 days). Following treatment CCA test became negative in both patients. *Schistosoma* serology for one CCA-positive patient was tested, with discordant results, in 3 different hospital laboratories of Milan (S. Raffaele, Niguarda and Policlinico Hospitals). Total IgE measurements were in range for all laboratories. Finally, all patients who had already received one or more treatment courses with praziquantel tested negative for CCA, albeit with a serology still positive for *Schistosoma*.

**CONCLUSION** This preliminary data seems to confirm CCA test sensitivity and specificity for *Schistosoma mansoni* active infestation. In patients already treated for *Schistosoma*, a negative CCA-test associated with positive serology, regardless of total IgE values, may represent a sign of previous infection, with a long-lasting immunological memory. On the contrary, patients who never received treatment had both positive serology and CCA-test, suggesting an active infestation. Moreover, negativization of CCA test after specific treatment with praziquantel further supports these findings. Further studies are needed to better assess the role of rapid CCA test to avoid unnecessary treatment of patients with persistent positive *Schistosoma* serology.

**DISCLOSURE** Nothing to disclose.

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## PSI.170

**Development of a Markov transition probability model to predict changes in schistosomiasis infection following treatment**

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The last decade has seen significant progress in the large-scale control of schistosomiasis and soil-transmitted helminth (STH) infections. Even greater expansion is required to achieve the coverage and morbidity reduction targets set for 2020. A crucial tool in this scale-up will be the ability to monitor the impact of control programmes. Specifically, being able to identify areas not responding to treatment as expected will allow adjustments to be made to the programme design and help ensure their longer-term success. However, to date, there are very few tools available that would allow the identification of such areas whilst at the same time being user-friendly. An STH Markov model developed at the World Health Organization (WHO) used data from Vietnam to predict changes in STH prevalence following successive rounds of deworming treatment. In addition, a user-friendly interface was also developed to help ensure the model is used as widely as possible by programme managers. Data collected by the Schistosomiasis Control Initiative and its country partners from several countries in sub-Saharan Africa have enabled the validation of this model for STH infection, its extension to include schistosomiasis infection, and the addition of robust confidence intervals around the predicted changes in prevalence. It is hoped that the output of this model could potentially provide an early warning of where treatment campaigns are not achieving their aims (for example due to poor coverage, adherence, or putative resistance) and enable programme managers to make the necessary changes to meet the expected targets. The performance of the model will be discussed, with particular reference to the utility of stratifying the model outputs by parasite species, location, underlying endemicity, and host age. In addition, we will discuss the results of a model comparison exercise between the predictive capacity of the Markov model and other models currently available.

DISCLOSURE Nothing to disclose.

## PSI.171

**Prevalence of *Schistosoma mansoni* among school-age children in a small rural area of north-western Ethiopia**

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INTRODUCTION Although Ethiopia is highly endemic for schistosomiasis, no active control programs have yet been

established. *S. mansoni* primarily affects rural populations at 1300–2000 m high but, as in others countries, migration to cities has resulted in the spread of the parasite. A nationwide mapping of schistosomiasis was planned for 2013, but there is still a need for surveys to estimate the real burden, in order to establish appropriated policies, according to World Health Organization recommendations.

METHODS AND MATERIALS We perform a study in a rural area, belonging to the city of Bahir Dar, located 1800 meters above sea level, in the north-western part of Ethiopia. The area is in a frame made up of by the south shoreline of Lake Tana, the biggest lake in the country, and the Blue Nile River, that rises in the lake. The rainfalls in this area take place during the months of June to October. The rest of the year is marked by a dry season. Eight primary schools were randomly selected, being 30 km the farthest distance of city. One in a peninsula located in the lake; three located alongside the Blue Nile; two sited near the lake, but not under the influence of the river; and two placed in an area out of the direct influence of the river and lake, though swampy in the rainy season. From October to November 2013, at the end of the rainy season, 396 stool samples were collected and processed in the laboratory. A formol ether concentration was performed, by using a filtration-concentration device (Blomaprep MINI<sup>®</sup>, Leti Diagnósticos, Barcelona, Spain), based on a modification of Ritchie's method.

RESULTS No infections were detected in the two schools of the swampy area; in the schools near the lake the prevalence was 2% and 4% respectively. Interestingly, the prevalence in the school in the middle of the lake was also 2%. In the three schools located alongside the river the prevalence was 20%, 29% and 64%, ( $P < 0.001$ ) being the highest one located in a bend in the river closer to the lake than the other two.

CONCLUSIONS As expected, *S. mansoni* in our sample shows a clear pattern around the course of the river, but the significant difference between the three schools near the river and even the prevalence in the school in the lake indicates that further studies must be carried out, to analyze risk factors related to the contamination, in order to achieve the mapping of the infection and fill gaps for control programs.

DISCLOSURE Nothing to disclose.

## PSI.173

**In vitro activity of antiplasmodial compounds against *Schistosoma mansoni* larval stage**

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INTRODUCTION Schistosomiasis is considered one of the parasitic diseases with tremendous impact on morbidity, surpassed only by malaria. In 2012, 249 million people required preventive treatment for Schistosomiasis, and a further 42.1 million required medical intervention due to active disease. More than 90% of worldwide prevalence is imposed on the African population. Treatment and preventive chemotherapy rely solely on a single drug; praziquantel (PZQ). Large-scale PZQ deployment particularly in sub-Saharan Africa increases the risk of emerging drug-resistance, necessitating a pressing need for alternative treatment strategies.

Drug repurposing is straightforward drug development strategy, as considerable information on the compound's properties and activities is already known. Artesunate and mefloquine, two antimalarial drugs, have been shown to be active against *Schisto-*

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soma. Antimalarial compounds are a good starting point in the search for new hits in the drug development process.

We provide a comprehensive overview of the activity of compounds with reported antiplasmodial properties for their *in vitro* activity against the *Schistosoma* larval stage.

**MATERIALS AND METHODS** A collection of compounds with antiplasmodial activity has been tested *in vitro* against *Schistosomula* for 7 days. Viability was assessed by microscopy, lactate level and resazurin.

**RESULTS** Of the 20 compounds tested, 5 compounds show IC<sub>50</sub> below 10 micromolar.

**CONCLUSIONS** Candidates with IC<sub>50</sub> values below 10 micromolar need to be further tested against adult *Schistosoma* to allow a final judgment on their antischistosomal properties.

**DISCLOSURE** For the doctoral thesis I got a stipendium from IZKF of Tübingen. Thank you very much!!!

## PSI.174

### Optimization of Schistosomiasis clinical management in institutional settings in non-endemic areas: protocol proposal

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**INTRODUCTION** Microscopy and/or tissue biopsy fail to diagnosis active *Schistosoma mansoni* infection and assess response to therapy in non-endemic areas. Since acute and chronic infection with no or low eggs can be missed by conventional methods, alternatives such as immunodiagnosis and DNA detection have been applied. Nonetheless, in most institutional settings, there is no consensus toward the use of these approaches. The study aim was to evaluate a clinical protocol with includes immunodiagnosis and DNA detection for schistosomiasis diagnosis and post-therapy response in institutional settings from non-endemic areas.

**MATERIAL AND METHODS** Fecal samples were tested by Kato-Katz and by Real-Time PCR and serum IgG1 levels measured by ELISA in blood samples from 29 adult individuals with history of previous exposure to *S. mansoni* living in non-endemic area. Tissue samples were also obtained.

**RESULTS** Active *Schistosoma* infection was confirmed by K-K and/or tissue and/or IgG1 and/or PCR positivity in 26/29 (89.66%) individuals. Egg excretion was detected in 12/24 individuals while tissue specimens confirmed active infection in 11 out of 12 tested. *S. mansoni* DNA was detectable in 20 out of 21 individuals tested, being 10 out of 20 coproscopy negative. And 26 out of 27 individuals tested had augmented immunoreactivity although 10/26 individuals had no egg excretion. In KK-positive individuals, IgG1 levels ranged from 1.20 to 3.86 A.U. (mean:  $2.28 \pm 0.82$  A.U.) and in the absence of egg excretion, IgG1 levels varied from 1.48 to 3.60 A.U. (mean:  $2.05 \pm 0.82$  A.U.). After treatment, both KK and PCR achieved 100% of cure rate. Immunoreactivity pre-therapy (mean:  $2.102 \pm 0.814$ ; 95% CI: 1.48–2.78) progressed to low IgG1 levels (mean:  $1.870 \pm 0.513$ ; 95% CI: 1.48–2.26) post chemotherapy use.

**CONCLUSIONS** Inclusion of immunodiagnosis and DNA-based assays in clinical protocols improves detection of individuals without egg-patent infection without being invasive. Also, PCR is a suitable marker of drug response in individuals with no risk of reinfection.

**DISCLOSURE** Nothing to disclose.

## PSI.175

### Control of *Schistosoma mansoni* in Western Côte d'Ivoire: baseline findings before the implementation of a randomised trial

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**BACKGROUND** In Africa, more than 230 million people require preventive chemotherapy against schistosomiasis annually. We report baseline findings before the onset of a randomised intervention trial designed to assess the impact of three different school-based treatment schedules using praziquantel for the control of schistosomiasis mansoni.

**METHODS** The study was conducted in 75 schools of western Côte d'Ivoire with moderate *Schistosoma mansoni* endemicity, identified through an extensive eligibility survey done in more than 260 schools. At the eligibility survey, a single stool sample was collected from 50 children aged 13–14 years in each school. Stool samples were subjected to duplicate Kato-Katz thick smears. A total of 75 villages with a prevalence of *S. mansoni* ranged between 10% and 24% were randomly assigned to one of three treatment arms. At the baseline survey in these 75 schools, a single stool sample was collected among first-grade children (5–8 years), while three consecutive stool samples were obtained from children aged 9–12 years and examined by duplicate Kato-Katz thick smears. A questionnaire was administered to school directors to collect information on the social-ecological characteristics of local communities.

**RESULTS** A total of 12 431 children (4953 first-graders and 7478 children aged 9–12 years) participated. The overall *S. mansoni* prevalence among first-graders in treatment arms A, B and C were 4.7%, 4.7% and 6.8%. The respective prevalence among children aged 9–12 years were 18.8%, 20.5% and 27.2%.

**CONCLUSION** This study describes the baseline situation of a 5-year intervention trial with the purpose to determine the most effective control approach to achieve and sustain *S. mansoni* prevalence reduction to below 10% among school-aged children. Our findings highlight the influence of the age of study participants and stool sampling and diagnostic effort within large-scale schistosomiasis control programmes.

**DISCLOSURE** Nothing to disclose.



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## PSI.176

**Urinary schistosomiasis and intestinal helminthiasis among school children and out-of-school children in an endemic community in Nigeria**B. Adewale<sup>1</sup>, M. Sulyma<sup>1</sup>, T. Idowu<sup>2</sup>, D. Akande<sup>1</sup>, M. Ajayi<sup>1</sup> and M. Mafe<sup>1</sup><sup>1</sup>Public Health Division, Nigerian Institute of Medical Research, Lagos, Nigeria; <sup>2</sup>Zoology Department, University of Lagos, Lagos, Nigeria

**INTRODUCTION** The current status of urinary schistosomiasis and intestinal helminthiasis was assessed in Ipogun, a rural agrarian community in Nigeria, as part of a longitudinal study to monitor praziquantel resistance in the control of schistosomiasis.

**METHODS** Urine and faecal samples were collected from children in the community to determine the parasites prevalence and intensity. Filtration technique using Swinnex filter was employed in examining the urine specimen and the intensity of infection was recorded as egg output per 10 ml of urine. The Kato-Katz technique was used in examining the faecal samples. Individual egg output was expressed as eggs per gram faeces.

**RESULTS** Of the 430 children aged 5–18 years examined for *Schistosoma haematobium* and other intestinal helminthic infections, 25.1% were infected with *S. haematobium*. The prevalence of infection of *S. haematobium* was 26.1% in school children and 18.6% in out-of-school children. Only 17.6% of the children had moderate intensity of infection (>50 eggs/10 ml but <500 eggs/10 ml of urine) while the remainder had low intensity (<50 eggs/10 ml of urine). Intensity of infection based on geometric mean egg count per 10 ml of urine was higher in females (18.2 eggs/10 ml urine) than in males (11.7 eggs/10 ml urine). There was no significant difference in the prevalence of infection between males (26.7%) and females (23%) ( $P = 0.3$ ). 26.3% had single infection of intestinal helminths while 4.7% had multiple infection. 13.7% had severe intestinal helminth infections (>400 eggs/gram faeces).

**CONCLUSION** The immediate and long term public health and socioeconomic implications of this on the cognitive ability of these children, school absenteeism and drop-out rates could be enormous. This could result in a generation of adults disadvantaged by irreversible sequelae of infection.

**DISCLOSURE** Nothing to disclose.

## PSI.177

**The effect of high-voltage pulse current on the infectious of schistosome cercariae in water**

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The effect of high-voltage pulse current on the infectious of schistosome cercariae in water was investigated. The infected rate and intensity in mice were regarded as the infectious indicators of schistosome cercariae after treated by various parameters of high voltage pulse current. The results showed that the voltage and frequency of electric current, and the distance from electrode to water surface, were important factors influencing the effects of cercariae infectious. The higher the voltage, the higher the frequency, and the narrower the distance, the better the effects of cercariae killing. The result implied that the high voltage pulse current can inactivate schistosome cercariae and can be applied in schistosomiasis control under certain circumstances.

**DISCLOSURE** Nothing to disclose.

## PSI.178

**Urinary schistosomiasis in Guinea Bissau**M. C. Botelho<sup>1</sup>, A. Machado<sup>2</sup>, A. Carvalho<sup>3</sup>, M. Vilaça<sup>1</sup>, O. Conceição<sup>1</sup>, H. Alves<sup>1</sup>, J. Richter<sup>4</sup>, M. E. Bottazzi<sup>5</sup> and A. A. Bordalo<sup>2</sup><sup>1</sup>National Institute of Health Dr. Ricardo Jorge, Porto, Portugal;<sup>2</sup>ICBAS, Porto, Portugal; <sup>3</sup>Santo Antonio Hospital, Porto, Portugal;<sup>4</sup>Medical Faculty, Heinrich-Heine University, Dusseldorf, Germany;<sup>5</sup>Section of Pediatric, Tropical Medicine & Molecular Virology & Microbiology, Baylor College of Medicine and Texas Children's Hospital, Houston, TX, USA

Urogenital schistosomiasis due to *Schistosoma (S.) haematobium* is among the most prevalent parasitoses in sub-Saharan Africa. The pathology is characterized by serious and irreversible lesions in the urogenital tract induced by chronic infection with the parasite that can eventually lead to renal failure due to hydronephrosis and to squamous cell carcinoma of the bladder. Considering the frequency and severe morbidity observed already in young children, the purpose of this pilot study was to assess the prevalence and morbidity of *S. haematobium* infection in Guinea Bissau.

A baseline survey was conducted during September 2011. A randomly selected sample of 90 children aged 6–15 years old was included in this study.

Prevalence of *S. haematobium* infection was 20% (18/90). It was higher in older children (median age in years:  $15.4 \pm 2.71$  vs.  $9.3 \pm 2.22$ ;  $P < 0.001$ ), a significant gender difference in prevalence and intensity was not found. The predominant symptom was haematuria (87.1%), this symptom being strongly associated with *S. haematobium* infection ( $P < 0.01$ ).

Anthropometric examination revealed that growth in infected boys was impaired as compared to non-infected boys (median height in cm:  $123.3 \pm 21.07$  vs.  $134.71 \pm 15.1$ ) ( $P < 0.05$ ).

To our knowledge this is the first epidemiologic report of *S. haematobium* infection in Guinea Bissau. Considering the high prevalence of *S. haematobium* infections in Guinea Bissau and the long-term risks, including renal failure and bladder cancer, our results indicate that this population should be targeted for follow-up and implementation of measures for treatment and control of schistosomiasis.

**DISCLOSURE** Nothing to disclose.

## PSI.179

**Draining ditches at Dongting Lake control *Oncemelania* breeding**W. Wangyuan<sup>1,2</sup> and W. Kailin<sup>1</sup><sup>1</sup>Human Institute of Science and Technology, Yueyang, China; <sup>2</sup>Hunan Institute of Schistosomiasis Control, Yueyang, China

**OBJECTIVE** To evaluate the effect on snails by reducing the soil moisture content of a beach.


**METHODS** From November of 2009 to November 2012, we chose the snail infested beach of Yueyang Jail in the East Dongting Lake area and Junshan District as research fields, designed a prospective control study, then dug ditches in the shape of 'H' by excavator, and compared the effect of soil moisture content on snails.

**RESULT** Before the intervention, the average soil moisture content of both beaches was 35.56%; after the intervention, the average soil moisture content was 26.53% on the intervention site, significantly lower than the 35.56% at the control site ( $F = 6.53$ ,  $P < 0.05$ ). Before the intervention, the natural mortality rates of snails were 0.98% and 0.89%, (year 2009  $\chi^2 = 0.09$ ,  $P > 0.05$ ), but the snail density in the intervention site fell year by year and vanished naturally 3 years later after the



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intervention. The natural mortality rate was significantly different between the two sites (2010  $\chi^2 = 597.99$ ,  $P < 0.05$ , 2011  $\chi^2 = 656.85$ ,  $P < 0.05$ , 2012  $\chi^2 = 693.16$ ,  $P < 0.05$ ). Before the intervention, the number of young snails in the intervention area was 129.5/m<sup>2</sup>, and 184/m<sup>2</sup> in the control site; over 3 years, the number of young snails at the intervention site fell to 48.5/m<sup>2</sup>, 9.5/m<sup>2</sup> and 1.5/m<sup>2</sup>, whereas it did not change in the control area. The density of aqua snails at the two sites ( $T_1 = 59.5$ ,  $T_2 = 76.5$ ,  $P > 0.05$ ) did not change. In 2009, the amount of snail from both sites cultured in the lab was 37.33/0.11 m<sup>2</sup> ( $u = 0.131$ ,  $P > 0.05$ ). According to the data from lab exam, the average number of young snails from the two sites was 37.33/0.11 m<sup>2</sup> in 2009 ( $u = 0.131$ ,  $P > 0.05$ ). The number was 8/0.11 m<sup>2</sup> in exam site and 57.67/0.11 m<sup>2</sup> in control site after the intervention of 2010 ( $u = 11.110$ ,  $P < 0.05$ ; in 2012, no snails were found at the intervention site and 64.33/0.11 m<sup>2</sup> at the control site ( $u = 13.890$ ,  $P < 0.05$ ).

**CONCLUSION** “” shaped ditches can drain water from a beach rapidly, lowering the ground water level such that the average soil moisture content in the dry season is significantly lower than in undrained sites. This changes ecological conditions for snail to such an extent that they vanished within 3 years.

**KEYWORDS** Japanese schistosomiasis, Snail, Drain Opener, Elevation, Soil moisture content.

**DISCLOSURE** Nothing to disclose.

## PSI.180

### Experimental infection of the pig with *Mycobacterium ulcerans*: a novel model for studying the pathogenesis of Buruli ulcer disease

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Buruli Ulcer caused by *Mycobacterium ulcerans* infection is characterized by necrosis of subcutaneous tissues giving rise to chronic, progressive ulcers. Current treatment consists of a daily dose of rifampicin and streptomycin for 8 weeks, followed by surgical debridement and skin grafting, if necessary. In remote rural regions of West Africa where populations are mostly affected, such a treatment is difficult and morbidity remains high and disabilities occur frequently.

Because the mode of transmission of Buruli ulcer (BU) is not clear, only limited information on the early pathogenesis of the disease is available. The mouse foot pad model, which is to date the most used animal model for BU vaccine and drug development studies, only poorly reflects infection of the human skin tissue. In search for a more suitable animal model to study early pathogenesis of *Mycobacterium ulcerans* infection, we evaluated the pig (*Sus scrofa*) as experimental infection model for BU. Pigs were therefore infected subcutaneously with different doses of *M. ulcerans* and infected skin sites excised and processed for histopathological analysis. With doses of  $2 \times 10^7$  and  $2 \times 10^6$  colony forming units (CFU) we observed the development of nodular lesions that subsequently progressed to ulcerative or plaque-like lesions. The observed macroscopic and histopathological changes closely resembled those found in *M. ulcerans* disease in humans. At lower inoculation doses signs of infection found after 2.5 weeks had spontaneously resolved at 6.5 weeks.

Our results demonstrate that the pig can be infected with *M. ulcerans*. Productive infection leads to the development of lesions that closely resemble human BU lesions. The pig infection model therefore has great potential for studying the early pathogenesis of BU and in particular the development of new thera-

peutic and prophylactic interventions might benefit from the porcine *M. ulcerans* infection model [1].

#### REFERENCE

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**DISCLOSURE** Nothing to disclose.

## PSI.181

### Impact of the SAFE strategy on trachomatous scarring among children in Ethiopia

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The SAFE strategy (surgery, antibiotics, facial cleanliness and environmental improvements) is recommended for the elimination of blinding trachoma. Previous studies have assessed the impact of the AFE interventions on trachoma transmission by monitoring infection and trachomatous inflammation among children. We aimed to determine whether interventions had any impact on the prevalence of cicatricial trachoma among children living in a trachoma hyperendemic area of Ethiopia.

Data from a combined sample size of 25 221 children in 589 communities from four cross-sectional, population-based surveys conducted between 2000 and 2011 were analysed to determine age-specific patterns of trachomatous scarring (TS) among children aged 1–10 years. We assessed the impact of the AFE interventions by comparing the odds of TS at each year of age among children examined after interventions with those examined prior to interventions in a multi-level logistic regression model, controlling for secular variation between survey years, various potential confounder variables, and random effects due to clustering at community and household levels.

The prevalence of TS declined from 24.9% in 2000 to 2.2% in 2011 among children aged 1–10 years. Children aged 1–9 years after implementation of A, F and E interventions were less likely to have TS when compared to same age children examined before interventions began. The greatest impact observed was among children 5 years of age, those born in the first year interventions began and who had lived for 5 years under intervention.

Our results indicate that the SAFE strategy is preventing the risk of blinding trachoma by reducing the development of scarring among the most vulnerable age groups.

**DISCLOSURE** Nothing to disclose.

## Abstracts of the 9th European Congress on Tropical Medicine and International Health

## PSI.182

**Immunohistochemical monitoring of wound healing in Buruli ulcer patients treated with RIF/STR**M.-T. Ruf<sup>1,2</sup>, A. Andreoli<sup>1,2</sup>, G. E. Sopoh<sup>3</sup>, P. Schmid<sup>1,2</sup> and G. Pluschke<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland;<sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>Centre de Depistage et de Traitement de l'Ulcer de Buruli d'Allada, Allada, Benin

Buruli ulcer (BU) the third most common human mycobacterial disease is a necrotising skin disease caused by *Mycobacterium ulcerans*. Pathogenesis of BU is mediated primarily by the macro-lide toxin mycolactone, which destroys the host tissues at the site of infection. While traditionally surgery has dominated the clinical management of BU, the introduction of the effective dual antibiotic therapy greatly improved treatment and reduced recurrence rates. However extensively ulcerated lesions often persist after successful therapy and wound management remains a challenge, in particular in rural areas of the African countries which carry the highest burden of disease. For reasons not fully understood, wound healing is delayed in a proportion of antibiotic treated BU patients. Therefore, we have performed immunohistochemical investigations to identify markers which may be suitable to monitor wound healing progression. Tissue specimens from BU plaque patients were collected before, during and after chemotherapy and were analysed by immunohistochemistry for the presence of a set of markers associated with connective tissue neo-formation, and epidermal activation. Several target proteins turned out to be suitable to monitor wound healing.  $\alpha$ -SMA positive myofibroblasts only emerged during the healing process and were present in large quantities at the end of chemotherapy. These cells produced extracellular matrix proteins, such as collagen-1 and tenascin and were present in fibronectin rich areas. After successful antibiotic treatment many cells, including myofibroblasts, revealed an activated phenotype as they showed ribosomal protein S6 phosphorylation, a marker for translation initiation. Increased cytokeratin 16 expression in the epidermal skin layer indicated a stronger involvement of the epidermal layer than expected. Here we identified a set of marker that allow monitoring of wound healing in antibiotic treated BU lesions by immunohistochemistry [1]. Further studies with this marker panel may help to better understand disturbances responsible for wound healing delays observed in some BU patients.

## REFERENCE

- Andreoli A\*, Ruf M-T\*, Sopoh GE, Schmid P, Pluschke G. Immunohistochemical monitoring of wound healing in antibiotic treated Buruli ulcer patients. PLoS Negl Trop Dis. 2014; 8: e2809. doi:10.1371/journal.pntd.0002809.

\*Both authors contributed equally.

DISCLOSURE Nothing to disclose.

## PSI.183

**Prevalence of *Toxoplasma gondii* antibody and oocyst shedding in stray cats of Khorramabad City, West of Iran 2014**M. Fallah<sup>1</sup>, S. Bajalan<sup>2</sup>, A. Maghsood<sup>1</sup>, A. Zamani<sup>3</sup> and K. Sepahvand<sup>4</sup><sup>1</sup>Parasitology and Mycology, Hamadan University of Medical Sciences, Hamadan, Iran; <sup>2</sup>Hamadan University of Medical Sciences, Hamadan, Iran; <sup>3</sup>Immunology, Hamadan University of Medical Sciences, Hamadan, Iran; <sup>4</sup>Lorestan University of Medical Sciences and Health Services, Khorramabad, Iran

**BACKGROUND AND OBJECTIVE** *Toxoplasma gondii* is a worldwide distributed parasite that can infect the central nervous system of warm-blooded animals, including humans. The infection is acquired mainly by eating food or water contaminated with oocysts excreted by cats, or tissue cysts of *T. gondii* in under-cooked meat. The most common clinical form of human toxoplasmosis is lymphadenitis but the major clinical problem of toxoplasmosis is congenital infection of fetuses, resulting from primary infection during pregnancy, as well as ocular toxoplasmosis and the reactivated form in immunocompromised patients. *T. gondii* is a main cause of abortion in TORCH syndrome and therefore, one of the most important infection agents causing the abortion and congenital abnormalities in the human. The aim of this study was determining the prevalence of *T. gondii* antibodies and oocyst shedding in a population of stray cats in Khorramabad city, capital of Lorestan province, west of Iran.

**MATERIALS AND METHODS** A total of 125 Stray cats trapped from different parts of the city and were brought to the research laboratory for taking blood and feces specimens. The blood samples of the cats (71 males and 54 females) were assayed for the prevalence of *T. gondii* antibody using the IgG-ELISA kit, and their fresh fecal samples collected and sugar floatation concentration method was applied for detection of oocysts.

**RESULTS** From 125 cats, 71 (56.8%) were male. *T. gondii*-like oocysts were detected in only 3 of 125 samples tested from cats' stool by direct microscopy and floatation methods (the oocyst size was out of the range). Antibodies were found in 80 out of 125 cats (64%). The prevalence of seropositivity in the male cats (69%) was higher than females (57.4%), but the difference was not significant. there was no significant difference in the *T. gondii* antibody titers between males and females, or between cats living in different parts of city, but prevalence rate between different age groups were significant statistically (0.021).

**CONCLUSION** A significant proportion of cats from Khorramabad city, west of Iran, have been exposed to *Toxoplasma*. The result of this study may have implications for the human health promotion, especially for pregnant women in this area.

**KEYWORDS** *Toxoplasma gondii*, prevalence, oocyst, ELISA, cat.

DISCLOSURE Nothing to disclose.

## Abstracts of the 9th European Congress on Tropical Medicine and International Health

## PSI.184

**Understanding the ecology of *Mycobacterium ulcerans* to facilitate strategies for prevention and control of Buruli ulcer in Ghana**

S. Y. Aboagye<sup>1,2</sup>, K. Ampah<sup>1,3</sup>, P. Asare<sup>1</sup>, E. K. Danso<sup>1</sup>, I. O. Darko<sup>1</sup>, K. Röltgen<sup>3</sup>, G. Pluschke<sup>3</sup>, J. Fyfe<sup>4</sup> and D. Yeboah-Manu<sup>1</sup>

<sup>1</sup>Bacteriology, Noguchi Memorial Institute for Medical Research, University of Ghana, Accra, Ghana; <sup>2</sup>Environmental Microbiology, Institute for Environmental and Sanitation Studies, University of Ghana, Accra, Ghana; <sup>3</sup>Molecular Immunology, Swiss Tropical and Public Health Institute, Basel, Switzerland; <sup>4</sup>Mycobacteriology, Victorian Infectious Disease Reference Laboratory, Melbourne, Vic., Australia

**BACKGROUND** Knowledge gaps still exist on the transmission of *Mycobacterium ulcerans* (MU), the causative agent of Buruli ulcer (BU). To better understand the ecology of MU, this study aimed to identify MU from different environmental sources.

**METHOD** Samples were collected from BU endemic and non-endemic communities along the Offin and Densu river valleys by random sampling taking into consideration the season and sites of frequent human activities. DNA was extracted directly from samples using the FastDNA SPIN kit for soil and analysed for MU DNA by detecting the insertion sequences IS2404, IS2606 and the ketoreductase gene by PCR. Positive samples were decontaminated using NaOH/Oxalic acid method and inoculated on in-house selective Lowenstein-Jensen (LJ) modified with PANTA- mycobactin J and acid-fast bacilli isolates were characterised.

**RESULTS** A total of 1951 samples from 17 communities have been screened, 1617 from the Offin and 334 from the Densu river valley. We found *M. ulcerans* DNA in 147 (7.5%) samples. There was no difference in positivity comparing BU endemic with non-endemic communities. Moss 4/20 (20%), vegetation 67/882 (7.6%) and soil 47/730 (6.4%) samples were found to contain higher proportions of MU DNA than other sources. Seasonal variation in MU distribution was observed; the positivity rate in the wet season 46/279 (16.5%) was significantly higher than in the dry season 101/1672 (6.0%) ( $P < 0.001$ ). Of the 147 MU confirmed samples cultivated, 48 (32.7%) yielded mycobacterial growths; 74 (50.3%) had no bacterial growth and 9 (6.1%) had all the inoculated tubes contaminated. We identified by *hsp* analysis one *M. ulcerans* strain among the isolates, which was cultivated from a moss sample obtained from a palm front. In addition, a broad spectrum of other mycobacterial species was isolated.

**CONCLUSION** The observed high proportions of *M. ulcerans* DNA in soil and vegetation is a concern since children and farmers are mostly exposed to soil and vegetation without adequate protection. Therefore, sensitization of the public on the use of protective clothing will contribute to the control of BU in Ghana.

**ACKNOWLEDGEMENT** This work was supported by the Stop Buruli Initiative funded by the UBS -Optimus Foundation.

**DISCLOSURE** Nothing to disclose.

## PSI.185

**The hydrogenosome proteome of a neglected human parasitic protozoan: *Pentatrichomonas hominis***

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<sup>1</sup>Department of Parasitology, Chang Gung University, Taoyuan, Taiwan;

<sup>2</sup>Department of Biochemistry & Molecular Biology, Chang Gung University, Taoyuan, Taiwan

**INTRODUCTION** *Pentatrichomonas hominis* has been regarded as a commensal of the human large intestine and cecum.

However, accumulated clinical evidence has shown that *P. hominis* is pathogenic. In addition to humans, this parasite can also infect felines and canines. The wide host range and the confirmed pathogenicity of *P. hominis* qualified this parasite as a neglected tropical disease. In the present study, we elucidated the hydrogenosome proteome of *P. hominis* by using an integrated bioinformatics and multi-dimensional liquid chromatography/MS/MS approach.

**METHODS AND MATERIALS** Intact hydrogenosome was isolated from mid-log phase *P. hominis* cells by using gradient centrifugation. The purity of the isolated hydrogenosome was verified by using western hybridization against the hydrogenosome specific protein rubrerythrin and the enzyme activities of lactate dehydrogenase, acid phosphatase and malic enzyme. Crude lysates of the highly purified hydrogenosome was then subjected to multi-dimensional LC/MS/MS for peptide identification. Since the complete genome of *P. hominis* has not been decoded, we constructed an in-house peptide database based on high-throughput next generation RNA sequencing.

**RESULTS** Around 160 million reads obtained by RNA sequencing were assembled to 40 639 putative transcripts. These transcripts were annotated by using the FASTannotator package and transformed into an in-house peptide database for the Mascot search engine. A total of 2925 proteins separated by LC/MS/MS were identified. Around 20% of these peptides are small GTPases related to signal transduction. Proteins related to amino acid metabolism, antioxidation, iron sulfur protein cluster assembly and energy metabolism were also identified. The remaining 40% of these identified peptides are hypothetical proteins that have a conserved domain with unknown functions.

**CONCLUSIONS** In conclusion, the transcriptome and the hydrogenosome proteome datasets established in the present study not only extended our knowledge on the biology of *P. hominis* but also will provide a foundation for the ongoing whole-genome sequencing project and comparative transcriptomic/proteomic analyses to identify potential drug targets against *P. hominis* infection.

**DISCLOSURE** Nothing to disclose.

## PSI.186

**Maximizing microscopy as a diagnostic tool in peripheral health centres of Buruli ulcer endemic areas in Ghana**

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**BACKGROUND** Buruli ulcer (BU) disease, a skin condition caused by *Mycobacterium ulcerans*. *M. ulcerans* is endemic in remote rural areas. Disease diagnosis on clinical basis alone can be misleading, requiring definitive diagnosis based on laboratory tests. Resource constraints in BU endemic areas make microscopy for the detection of acid fast bacilli (AFB) an important and useful method. It is rapid, user-friendly, convenient and cheap. Despite its usefulness, its performance is relatively low. This study investigated modifications of the current method aimed at improving its performance. Forty (IS) 2404 polymerase chain reactions (PCR) positive BU samples were processed by eight physical (centrifugation & overnight sedimentation) and chemical (phenol ammonium sulphate and sodium hypochlorite) modifications of the current direct method. Assessments were based on standard AFB evaluation coupled with in house criteria; positivity (P), clarity and contrast (C) release of bacilli from specimen (R). Overall AFB positivity rate

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was 64% (409/640). Each protocol had 80 smears. The percentage positivity (P) for the conventional method was 58% (46/80) smears. The highest positivity rate of 57/80 (%) was by protocol 7 (5% phenol in 4% ammonium sulphate (PhAS) and concentrated by overnight gravitational sedimentation. The least positivity rate at 35% (28/80) was by protocol 1 (smears from direct application of swab tips). Differences in performance between the two chemical tested; 5% phenol in 4% ammonium sulphate (PhAS) and 3.5% NaHOCl was significant ( $P < 0.05$ ). The differences between the two physical methods were however not significant ( $P > 0.05$ ). This study concluded that BU samples treated with a solution of 5% phenol in 4% ammonium sulphate and concentrated by either centrifugation or overnight sedimentation are useful for maximizing AFB detection by bright field microscopy. This can be useful in rural health facilities with resource constraints.

DISCLOSURE Nothing to disclose.

## PSI.187

Improved methods for PCR-based identification of *Naegleria fowleri* from cultured sample and PAM-developed mouse

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Pathogenic *Naegleria fowleri* causes an acute and lethal primary amoebic meningoencephalitis (PAM) in animals and humans. Increasing PAM cases are becoming a serious issue in the sub-tropical and tropical countries as a Neglected Tropical Disease (NTD). To establish rapid and efficient diagnostic tools, in this study PCR-based detection was carried out by using the cultured trophozoites and experimentally PAM-developed mouse due to *N. fowleri* inoculation (PAM-mouse). In this study four kinds of primer pairs, Nfa1, Nae3, Nf-ITS and Naegl primer, were used. PCR cycling parameters were as follows: 5 min at 95°C and 40 cycles each of 3 sec at 95°C, 30 sec at 53 and 30 sec at 72°C. On the extraction methods of genomic DNA from *N. fowleri* trophozoites ( $1 \times 10^6$ ), a simple boiling with 10 µl of PBS (pH 7.4) at 100°C for 10 min, as which amplified  $2.5 \times 10^2$  of trophozoites using Nfa-1 and Nae3 primer, was the most rapid and efficient procedure among various extraction methods including commercial kits. For the species-specificity, Nfa1 and Nae3 primer amplified only the *N. fowleri* DNA, whereas ITS primer detected the *N. fowleri* and *N. gruberi* DNAs. On the other hand, all primers did not amplify the *Acanthamoeba castellanii* and *A. polyphaga* DNAs. Using the PAM-mouse brain tissue, Nfa1 primer amplified the *N. fowleri* DNA on 4 days post infection, and for the sensitivity 1 ng/µl of genomic DNA was detected with Nfa1 primer. Using the PAM-mouse CSF, Nae3 primer amplified the *N. fowleri* DNA from CSF on 4 days post infection was better than Nfa1 primer detected from 5 days. Finally, the simple boiling procedure at 100°C for 10 min was the best method for DNA extraction, and Nfa1 and Nae3 primer were more useful on the detection of *N. fowleri* DNA from the PAM-mouse brain tissue and CSF, respectively.

DISCLOSURE Parasitic protozoa.

## PSI.188

Re-purposing antimicrobial compounds as a promising approach for the identification of scaffolds with activity against *Mycobacterium ulcerans*

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*Mycobacterium ulcerans* is the causative agent of Buruli ulcer, a disfiguring neglected tropical disease characterized by the formation of chronic, necrotizing skin ulcers. According to WHO guidelines, Buruli ulcer is currently treated by daily administration of streptomycin and rifampicin over a period of 8 weeks. Since both antibiotics entail serious drawbacks, alternative drugs are of urgent need.

In order to search for scaffolds with activity against *M. ulcerans*, we tested pre-selected panels of compounds with known activity against *M. tuberculosis* (including advanced development compounds) or other microbes. By performing Resazurin-based whole cell-assays we determined the minimal inhibitory concentrations of these compounds. Several chemically diverse classes of compounds were identified that displayed activities in the micromolar range against *M. ulcerans*. Highly active compounds are being further evaluated in kinetic survival experiments. In a next step, it will be analysed whether selected compounds also show *in vivo* activity in an experimental mouse foot pad model of *M. ulcerans* infection.

In conclusion, the re-evaluation of compounds in combination with metabolic assays represents a straightforward approach to identify scaffolds with activity against *M. ulcerans*.

DISCLOSURE Nothing to disclose.

## PSI.189

## Chronic ulcers in Buruli ulcer patients following specific treatment in a district hospital in Ghana

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**BACKGROUND** Buruli Ulcer (BU) is a chronic necrotizing skin disease caused by *Mycobacterium ulcerans*. Late presentation of BU patients with large wounds is a major challenge for settings with limited resources. It demands great skills in general wound management including perfect hygiene, wound bed preparation and physiotherapy. Current practice in these settings need to be investigated and setting-adapted solutions developed and implemented.

**METHODS** A prospective observational study included all BU patients treated in the Buruli Ulcer Ward at the Municipal Hospital of Amasaman/Greater Accra Region/Ghana between October 2013 and January 2014. All patients had standard WHO chemotherapy. Study protocol and CRFs were cleared by the ERB of the Noguchi Memorial Institute and the Ghana Health Service. All patients had an entry examination. The wound area was measured and photo documented weekly. Secondary bacterial infections were investigated. The course of wound healing was reviewed at three levels (local attending clinician, plastic surgeon of Korle-Bu University Hospital and an international expert). **RESULTS** 21 patients, under hospital care since a mean of 32 (1–215) weeks, were enrolled into the study. Mean age 37



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(7–73) years. Mean wound area at enrollment 60 (1–297) cm<sup>2</sup>. In over one third of the patients wound healing made no progress or deteriorated over the 3 months observation period despite regular wound care. The wound area became larger with a mean increase of 29.7% (9.25–57.5%) in 6/21, remained unchanged in 6/21 and became smaller in 3/21 patients. In 6/21 patients skin grafting was performed. 5 patients had clinically significant wound infection. The expert panel identified hygiene and wound management deficiencies as major causes of delayed healing and deterioration of wounds in addition to impaired arterial and venous blood circulation, nutritional deficiencies, anaemia, and misdiagnoses (e.g. malignancies).

**CONCLUSIONS** Large chronic ulcers are difficult to treat in health facilities with limited resources. Delayed healing and deterioration of wounds have multiple causes: inappropriate wound management with lack of essential materials and training of staff or timely identification of factors causing impaired wound healing. Investment into this sector is urgently needed in face of the wide range of benefits from improved wound care.

**ACKNOWLEDGMENT** This work was supported by the Stop Buruli Initiative funded by the UBS-Optimus Foundation.

**DISCLOSURE** Nothing to disclose.

## PSI.190

## Diagnosis and management of Buruli ulcer patients at a health centre in Ghana

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**INTRODUCTION** Buruli ulcer (BU), a necrotising skin disease caused by *Mycobacterium ulcerans*, is typically associated with large chronic ulcers and physical, psychological and social sequelae. Management has focused mainly on microbiological cure and surgical wound closure, neglecting the role of patient factors (such as underlying comorbid conditions), wound care practices and secondary bacterial infections in the wound healing process.

**METHODS** Between October 2013 and March 2015, 27 newly diagnosed (IS2404 PCR positive) BU cases presenting at Obom Health Centre, Greater Accra, Ghana were enrolled into the study and prospectively followed up. After an initial medical work-up including full medical and wound history, physical examination and baseline laboratory investigations, patients' wounds were clinically assessed and documented weekly. In patients with non-healing wounds, additional clinical, laboratory and radiological examinations were done and therapeutic interventions performed were documented.

**RESULTS** All 27 laboratory confirmed cases of BU received WHO-recommended treatment (Rifampicin plus Streptomycin). 25 patients completed treatment. 12 patients (44.4%) had Category 1, 4 (14.8%) Category 2 and 11 (40.7%) Category 3 lesions. Out of 30 BU lesions assessed, 27 (90%) were ulcers. Of these, 20 (74%) healed completely, 15 (55.5%) within 1–12 and 5 (18.5%) within 13–24 weeks. Out of 7 ulcers (26%) that did not heal, 2 had underlying chronic osteomyelitis and 2 chronic lymphoedema. In 2 ulcers (6.7%) secondary bacterial infections were observed, in one at first presentation. 3 patients (6.7%) had other forms of systemic comorbidity (arterial hypertension, sickle cell disease and HIV infection) in whom all wounds healed with the exception of the HIV infected patient.

**CONCLUSION** The majority (74%) of BU lesions treated at health post level healed without the need of further surgical interventions. This provides a good perspective for successful wound management at the peripheral level of the health care system.

**ACKNOWLEDGMENT** This work was supported by the programme 'Knowledge for Tomorrow – Cooperative Research Projects in Sub-Saharan Africa' of the Volkswagen Foundation.

**DISCLOSURE** Nothing to disclose.

## PSI.191

## Treatment outcome of patients with Buruli ulcer disease – a clinical follow-up study from Togo

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Buruli ulcer disease (BUD), caused by *Mycobacterium ulcerans*, involves the skin and subcutaneous fatty tissue, and predominantly affects children under the age of 15 years. Treatment with rifampicin and streptomycin for 8 weeks is highly efficient with recurrence rates below 2%. However, especially if treated in advanced stages, severe functional limitation may occur. Studies from sub-Saharan Africa (SSA) revealed up to 25% of BUD patients with long-term sequelae. In the absence of comparable data from Togo, a pilot study was conducted to evaluate treatment outcome of Togolese BUD patients.

From October 2012 to May 2014, 20 field trips to 61 villages and 29 peripheral health posts (USP) in region 'Maritime' were undertaken by a study team from CHR, DAHW-T and DITM. Out of 199 PCR confirmed patients eligible for inclusion, 129 patients (64.8%) could be retrieved for clinical examination and questioning on their case history. Whereas lesions of 108/129 patients (83.7%) were completely healed, 22 patients (17.1%) had complications. 15 patients (11.6%) presented with various degrees of functional limitations (classified in °I,  $n = 8$ ; °II,  $n = 4$  and °III,  $n = 3$ ); among these, two patients developed secondary lesions (1.6%, °I; one of them with initial multiple lesions). Seven patients (5.4%) with multiple [ $n = 3$  (2.3%)] and secondary lesions [ $n = 4$  (3.1%)] had no functional limitations, but healing disorders with prolonged healing times up to 26 months. Microbiological analysis of clinical samples from 6 patients with secondary lesions did not reveal *M. ulcerans* DNA. *Staphylococcus aureus* was isolated from two patients (MRSA,  $n = 1$ ), in 4 cases the etiology of secondary lesions remained unclear. In this study cohort, main risk factors for complications were category III lesions (especially ulcers affecting joints), duration of disease before initiation of treatment of >7 months, delayed healing times of >8 months as well as distance from the reference treatment center CHR.

In conclusion, although the rate of healing disorders in Togo was significantly lower than reported from other countries, implementation of standardized post-treatment follow up programmes in Togo is envisaged. A list of criteria based on the risk factors determined in this study will allow for identification of patients at risk for complications and facilitate timely medical

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and physiotherapeutical interventions to efficiently prevent long-term sequelae.

DISCLOSURE Nothing to disclose.

## PSI.192

## Epidemiology of Buruli ulcer in the Mapé Dam region of Cameroon: a longitudinal study

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Buruli ulcer (BU) is a neglected tropical disease of the skin and subcutaneous tissues caused by *Mycobacterium ulcerans*; it can affect indiscriminately male and female of different ages and it is typically found in rural areas close to water bodies. Although risk factors for BU such as proximity to water, not wearing protective clothing and poor wound care have been identified, the mode of transmission and the natural reservoir of *M. ulcerans* remain under investigation. Following a district-wide survey for BU in the Bankim District of the Adamawa Region of Cameroon in early 2010, we locally established a disease surveillance system and continuously monitored the occurrence of new BU cases in the entire Mapé Dam region over 5 years. The collection of clinical information and details regarding the origin of all the patients notified, allowed us to longitudinally study the epidemiology of BU in the area. From March 2010 until the end of 2014, 142 laboratory re-confirmed cases of BU were registered in the area. As previously reported from this and other BU endemic areas, the incidence of BU was highest in young teenagers and in adults above the age of 50 while in children below 5 years the incidence is low. Male and female were equally represented among the cases and the majority of the reported patients had ulcerative lesions on the lower limbs. Analysis of the geographic distribution of the households and farms where the patients lived and worked prior to the onset of the BU symptoms, revealed an evolution of the spatial distribution of BU cases over time with a decrease of cases in the proximity of the Mapé Dam, while there was a continuous presence of BU cases along the Mbam river. The BU surveillance system we established in the Mapé Dam has allowed us to continuously monitor the population living in that area, resulting in a comprehensive epidemiological analysis of BU in the area over the last 5 years.

This study was supported and funded by MEDICOR Foundation.

DISCLOSURE Nothing to disclose.

## PSI.193

Evaluation of antifungal activities of *Bifidobacterium bifidum* and *Lactobacillus fermentum* against toxigenic *Aspergillus parasiticus*

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BACKGROUND Aflatoxins are one of the most important global concerns, especially in developing countries. They cause a wide

spectrum of serious medical problems in human and animals as well as economic losses.

AIMS This study evaluated the effect of *Bifidobacterium bifidum* PTCC 1644 and *Lactobacillus fermentum* PTCC 1744 isolates on the fungus growth rate and aflatoxin production in toxigenic *Aspergillus parasiticus*.

METHODS Mycelial growth inhibition of toxigenic *Aspergillus parasiticus* in the presence of *Bifidobacterium bifidum* and *Lactobacillus fermentum* was investigated by pour plate technique and weighting method of mycelial mass. Reduction of aflatoxin was evaluated in yeast extract sucrose broth (YESB) at 30°C after 7 days of incubation using HPLC method. Also, reduction of aflatoxin rate was observed in the presence of the metabolites of lactic acid bacteria by HPLC method. The data were analyzed by SPSS 21.

RESULTS Presence of *Bifidobacterium bifidum* and *Lactobacillus fermentum* significantly affected the growth rate of *Aspergillus parasiticus* in comparison with controls without lactic acid bacteria ( $P \leq 0.05$ ). Percentage of reductions in total aflatoxin and B1, B2, G1, G2 fractions by *Bifidobacterium bifidum* and *Lactobacillus fermentum* were more than 99%. Furthermore, the percentage of reduction of standard aflatoxin B1, B2, G1, G2 fractions by metabolites produced of lactic acid bacteria were approximately 88.8–99.8% ( $P \leq 0.05$ ).

CONCLUSION *Bifidobacterium bifidum* and *Lactobacillus fermentum* can be employed as good biocontrol agents against growth and aflatoxin production by aflatoxigenic *Aspergillus* species.

DISCLOSURE Nothing to disclose.

## PSI.194

## Improving wound care in Buruli ulcer at Ga west and Ga south municipality

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INTRODUCTION We previously identified secondary wound infection as one factor that could delay wound healing in Buruli ulcer. Some implicated factors were poor nursing practices and infection control. Using an architectural plan provided by an infection control specialist, an old dressing room was refurbished such that clean and dirty wounds would not be dressed in same room or beds as was previously being done to break the chain of cross infection.

MATERIALS AND METHODS A simple wound care manual and 2 posters were developed to guide proper management of wounds. Health workers involved in wound care were selected from all the sub districts in the Ga West and South Municipalities and then trained using the manual and posters; both theoretical and practical sections were held. A per-test and a post-test were conducted for participants on basic concept of wound care. Participants were taken through Prevention of Disability sessions using charts provided by the American Leprosy Mission.

RESULTS In the per-test prior to training, 40% scored between 50 and 60, 10% scored between 60 and 65 while 50% scored below 50. Adequate knowledge was gained after the training.

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This is evidenced by 80% of participants scoring between 70 and 75, 10% scoring between 65 and 70 and 10% scoring between 60 and 65 in the post test.

The evidence of the impact of knowledge gained in wound care at Ga West Municipal Hospital is ascertained in improvement in wound dressings skills, aseptic practice and POD activities. There is a reduction in the length of stay in the hospital with 50% of wounds healing without skin graft.

**CONCLUSION** To consolidate the improvement in a sepsis as is being observed now, periodic training and supervision of healthcare workers involved in management of BU would be done to ensure wounds heal at appropriate time.

**FUNDING** This work was supported by the stop Buruli initiative funded by the UBS- optimus Foundation.

**DISCLOSURE** Nothing to disclose.

## PSI.195

**In vivo study of antiparasitic activity of *Delphinium aquilegifolium* and *Artemisia sieberi* against acute toxoplasmosis in animal model**

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**INTRODUCTION** Iran was a pioneer in using plants for medical purpose for centuries because thousands of plants are growing in this country for its unique geographical and climate situation. *Toxoplasma gondii* infection causes acute toxoplasmosis in animals and human worldwide. For its treatment pyrimethamine and sulfadiazine have been used with success but undesirable side effects are often reported. Due to importance of folk medicine against parasitic diseases, two native Persian plants were evaluated in this study.

**METHODS AND MATERIALS** The aerial parts of plants were air dried in room temperature and then powdered by mixer. The powder was macerated in methanol and distilled water for 72 h away from light and high temperature then it filtrated. Following toxicity assay, the highest dose with the lowest toxicity of herbal extract was selected to apply for its anti- toxoplasmodic activity on male NMRI mice infected *Toxoplasma gondii*. Animals were divided into 4 groups ( $n = 10$  mice/group) including infected control, healthy control, infected treating with drug and infected treated with herbal solution.

The groups of mice were treated with *Delphinium aquilegifolium* and *Artemisia sieberi* extract at concentrations of 10 mg/ml for 7 days.

**RESULTS** The results of this assessment showed little toxicity in high concentration including a bit hepatomegaly and splenomegaly and diarrhea which conforms the medium dose for our investigations. Non significant reduction in percentage of toxoplasmosis was observed. No pathophysiological alterations were indicated in host hepatosplenomegaly or in body weight in comparison with infected untreated mice that shows a potential of anti – toxoplasmodic activity in *Artemisia sieberi* and even survival rate is more in the treated group. Whereas methanollic and aqueous extract of *Delphinium aquilegifolium* showed significant activity on *Toxoplasma gondii* and the animals survived after 12 days.

**CONCLUSIONS** These results showed the *Delphinium aquilegifolium* and *Artemisia sieberi* extract contain compounds with anti-toxoplasmodic activity. This could be the basis for more studies leading to the isolation of active component to explorer these plants as a source of natural medicine in Iran.

**DISCLOSURE** Nothing to disclose.

## PSI.196

**The globalization of Chagas disease: an emerging disease in Europe**

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**INTRODUCTION** In the last decades, Chagas disease (CD) has become a public health threat even outside Latin America, as a consequence of migration and travel. Around 8 million people are estimated to be affected around the world and Europe is the second continent after the Americas for CD burden. CD is considered ‘emerging’ because of the novelty of its recognition in non-endemic countries (NECs) where healthcare workers are generally unaware of it and also because it is a chronic disease, mainly a- or pauci-symptomatic, potentially life-threatening and diffusive. CD can be mainly transmitted in NECs through blood donation, transplants and vertically. Many efforts have been made in European countries to control CD. Our aim is to give a perspective of the current epidemiology of CD in Europe and to summarize the state-of-the-art of control strategies.

**METHODS AND MATERIALS** Published documents regarding CD control in European countries has been searched through the internet and PubMed. Experts of the NECs initiative of the World Health Organization (WHO) were interviewed.

**RESULTS** In Europe, the response to CD has been late and inappropriate. This contributed to the current scenario (between 14 000 and 180 000 cases are estimated with an incidence per 100 000 inhabitants of 20–30 for Italy, Portugal, the Netherlands, Sweden and Switzerland and 307 for Spain). In comparison with the past, some European countries have set up programs at different level to control CD. The WHO inspired this process through the ‘NEC initiative’. Only six European countries have produced specific official directives to increase safety of blood transfusion. Concerning transplantation, no governmental legislation exists but in some countries recommendations of the national transplant agencies. Regarding congenital transmission, only a few regions in Spain and one in Italy have adopted systematic screening. Diagnostic tools and trypanocidal drugs are not universally available in Europe.

**CONCLUSIONS** CD is a public health threat and is not being adequately tackled in Europe:

- 1 changes in European health policies for blood and organ safety should be urgently promoted (following the Council of Europe);
- 2 antenatal care programmes should include screening for *T. cruzi*;
- 3 other steps are urgently needed: working in coordination with WHO, implementing surveillance, enforcing networks, guaranteeing access to diagnosis/care.

**DISCLOSURE** Nothing to disclose.

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## PS1.197

**Childhood infectious diseases and vascular health in adolescence – results from the SAPALDIA youth study**

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**INTRODUCTION** The inflammatory pathway in the development of atherosclerosis is widely accepted. Inflammatory risk factors in childhood, such as obesity and tobacco exposure, impact on carotid intima media thickness (CIMT), an early indicator of atherosclerosis. Little is known on potential infectious origins in childhood. Using data of the SAPALDIA Youth study we investigated the association between the number of reported childhood infectious diseases and CIMT in adolescence.

**METHODS** 288 SAPALDIA offspring (born after 1991) underwent a clinical examination following standardized protocols in 2010–2011 (anthropometry, blood pressure, carotid ultrasound/CIMT) and a blood draw for cardiovascular biomarkers and serum cotinine. Offspring and parents gave information on individuals' and family health, child's vaccination status, early infectious diseases and other early life factors. Life-time prevalence of bronchitis, pneumonia, tonsillitis, otitis, mononucleosis, meningitis, appendicitis, and scarlet fever were investigated separately and as a cumulative infectious disease score. Multivariable linear regression analyses on the association between subjects' CIMT average and infectious diseases score was performed, adjusting for main confounders and stratifying by sex.

**RESULTS** The study sample's mean age was 14.8 years (8–21 years) and 53% were female. In average youth had experienced 1.3 of the listed infectious diseases (boys 1.36, girls 1.26,  $P = 0.401$ ; range 0–5). 21.7% of boys and 14.6% of girls reported  $\geq 3$  infectious diseases ( $P = 0.136$ ). Full vaccination status was stated by 59% (boys 56%, girls 61.5%,  $P = 0.567$ ). The interaction term between sex and infectious diseases was significant ( $P = 0.022$ ). Sex-stratified analyses yielded significantly increased CIMT in boys with  $\geq 3$  infectious diseases versus none (0.046 mm, 95% CI 0.024; 0.068). In girls, the effect estimates were of same direction but statistically non-significant (0.012 mm, 95% CI 0.017; 0.042).

**CONCLUSION** The SAPALDIA Youth study complements current evidence on infectious origins of atherosclerosis. The larger effects observed in boys may relate to a higher vulnerability of the vasculature in boys and/or to infectious pathogens. Further studies are needed to confirm this finding. Our data indicate that childhood infectious diseases may be strongly related to vascular health already at an early age and point to a potential population at risk.

**DISCLOSURE** The SAPALDIA Youth Study was funded by a Swiss National Science Foundation – MHV Stipend (grants no PMPDP3\_129021/1, PMPDP3\_141671/1).

## PS1.198

**Global health promotion in a local context: 'active ageing' in Dar es Salaam, Tanzania**

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Population ageing is described as a 'success story' of public health policies and social and economic development. In order to cope with the growing number of older people, the World Health Organisation (WHO) presently opts for a notion of 'active ageing' that is not anymore linked to decline and death but to being productively engaged in life – by promoting health, participation and security in old age (WHO 2002). While participation in these new notions of ageing is promoted on a global scale, medical anthropologists caution the lack of critical scrutiny when it comes to culture and ideology coining the discourses.

Yet multi-sited ethnographic research among people above 60 years in the city of Dar es Salaam, Tanzania and their children belonging to the Tanzanian diaspora in the United States has shown, that especially middle class older Tanzanians participated in the globally advocated health promotion in old age, while translating aspects of it into the social and cultural setting of Dar es Salaam. Being thus part of the global flows of ideas mediated through medical doctors, children abroad or information technologies, the older Tanzanians aspired to take good care of their own health so as to retain strength and independence in old age. They invested time and money in 'good' food and physical exercises in their private homes and went for medical check-ups – although these ageing practices were not promoted by national guidelines. The paper thus argues that local notions and circulating global ageing discourses as promoted by WHO can intersect to foster new visions of what it means to age well in middle-class Tanzania.

**DISCLOSURE** Nothing to disclose.

## PS1.199

**Usage of internet of things (IoT) for controlling of type I diabetes in adolescents**

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**INTRODUCTION** Compared to adults, adolescents with type 1 diabetes mellitus (T1DM) are considered at increased risk of experiencing hyper/hypoglycemia. Many studies have indicated that adolescent diabetes management is associated with better metabolic control. Little is known about adolescents with T1DM and their parents' views on the use of internet for controlling of their diabetes. The main purpose of this study was to explore adolescents with T1DM and their parents' views on their problems, which can be solving with internet of things (IoT), when a 'thing' connects to the Internet independently. A second aim was to identify implications for future development of IoT in this respect. **METHODS AND MATERIALS** This was a cross-sectional study conducted among 126 adolescents who had T1DM and their parents in Tehran. They completed a valid and reliable questionnaire that was about the participants' views on their problems in controlling of diabetes that can be solving with using of internet.

**RESULTS** 80% adolescents and/or their parents used internet. 69% of the adolescents have problem with recording their blood



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sugar (BS) and transfer those to their doctors. 78% of their parents were not satisfied from communication between their children and their doctors. 70% of the participants were very agreeing with quick BS transfer to their doctors by internet. **CONCLUSIONS** According to the participants' views, fast communication with their doctors, was one of the main advantages of the Internet usage in controlling of the diabetes. We suggest using of IoT for designing a glucometer which sends user's information (BS, last meal, time and date) automatically to a phone application after each test by Internet. Application receives information and sets it on a chart and shares it on a common page between patients and their doctors. They can have an online conversation or leaving offline message on their own page. **DISCLOSURE** Nothing to disclose.

**PSI.200****Clinical and etiological characteristics among patients having febrile respiratory illness with and without asthma**J. V. Pang<sup>1,2</sup>, X. Zhao<sup>2</sup>, J. Loh<sup>3</sup>, B. H. Tan<sup>3</sup> and V. Lee<sup>4,5</sup>

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**BRIEF INTRODUCTION** Asthma has been significantly associated with respiratory viral infections. However, there is still limited knowledge on the clinical and etiological characteristics among FRI patients with and without asthma in a semi-closing setting.

**METHODS AND MATERIALS** The Singapore Armed Forces (SAF) started a sentinel respiratory disease surveillance program in four major camps (including a recruit training camp) in May 2009 to track febrile respiratory illness (FRI) cases defined as patients with temperature  $\geq 37.5^{\circ}\text{C}$  with cough or sore throat. Informed consent, the baseline questionnaire, and clinical specimens were also obtained from these cases. A total of 20  $\mu\text{l}$  of DNA extract were tested with Resplex I and II (version 2.0, Qiagen, Inc., Valencia, CA, USA) for the presence of respiratory micro-organisms on the LiquiChip 200 Workstation, according to the manufacturer's instructions. All tests were conducted at the 5% level of significance. We report odds ratio (OR) and corresponding 95% confidence intervals (CI) where applicable, during univariate and multivariate logistic regression analyses. All statistical analyses were performed using an open source statistical software R 3.0.1 (R Core Development Team).

**RESULTS** Among the FRI asthma patients ( $N = 1597$ ), there were significantly higher percentage of Chinese, recruits, stay-in personnel, viral-bacterial co-infections, coronavirus infection, and flu vaccination compared with FRI non-asthma patients ( $N = 6136$ ;  $P < 0.05$ ). Cough with sputum, breathlessness, eye pain, joint pain, chest pain, nausea, and vomit were significantly more frequent among FRI patients with asthma than without asthma ( $P < 0.05$ ). From multivariate analyses, viral-bacterial coinfections, influenza A (H3N2), and coronavirus infections were independent characteristics of FRI patients with asthma. **CONCLUSION** FRI patients with asthma are likely to have more clinical manifestations and infected by viral-bacterial co-infections particularly with viruses such as influenza A (H3N2) and coronaviruses than FRI patients without asthma. Hence, FRI patients with asthma should be closely monitored during and after triage to minimize disease severity.

**DISCLOSURE** Nothing to disclose.

**PSI.201****Relationship between intestinal parasitic infection and age in the elderly population in Iran**E. Razmjou<sup>1</sup>, A. R. Meamar<sup>1</sup>, Z. Pirasteh<sup>1</sup>, R. Khalili<sup>1</sup>, L. Akhlaghi<sup>1</sup> and M. Moradi-Lakeh<sup>2</sup>

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**INTRODUCTION** Intestinal parasitic infections remain a major public health problem worldwide. Various prevalence of enteric parasites is reported in different geographic parts and social groups. Elderly people are a group with the high risk of infection especially in institutionalized populations. Lack of current data on the prevalence of enteric parasite infections in the elderly population in Iran encouraged us to determine the prevalence of intestinal parasites in elderly residents of a large nursing home in Tehran, Iran.

**MATERIAL AND METHODS** In this cross-sectional study, 300 triple faecal samples were collected from residents of Kahrizak nursing home, Tehran, Iran from September 2012 to February 2013. The specimens were investigated by formalin-ether concentration method, culture in xenic medium, and polymerase chain reaction (PCR) assay targeting the 5.8S rRNA gene of *Dientamoeba fragilis*. The relationship between prevalence of the intestinal parasites and demographics of the residents was examined. Participants were grouped in six age categories: 61–65, 66–70, 71–75, 76–80, 81–85, >85.

**RESULTS** The overall prevalence of intestinal parasites in the nursing home residents was 58.6% (95% CI: 52.3–64.7%). Formalin-ether and culture techniques showed infection with *Blastocystis* sp. (16.6%; 95% CI: 12.0–22.7%), *Entamoeba coli* (6.7%; 95% CI: 3.6–11.9%), *Chilomastix mesnili* (1.3%; 95% CI: 0.6–2.8%), *Giardia lamblia* (0.7%; 95% CI: 0.2–2.3%), *Iodamoeba butschlii* (0.4%; 95% CI: 0.1–1.8%), *Enterobius vermicularis* (0.2%; 95% CI: 0.0–1.2%) and *Strongyloides stercoralis* (0.2%; 95% CI: 0.0–1.5%). Amplification of 5.8S rRNA gene detected the high prevalence of *D. fragilis* infection (42.6%; 95% CI: 36.4–49.0%). There was no statistically significant relationship between sex and infection with intestinal parasites. However, age affected the prevalence of intestinal parasites. The highest prevalence of infection (71.8%; 95% CI: 58.0–82.5%) was detected in participants between 61 and 65 years of age.

**CONCLUSION** The high prevalence of intestinal parasites in our study indicates that better personal care and social health policies should be considered in facilities where elderly are cared for. Higher prevalence of infection in a specific age group warrants further investigation.

**DISCLOSURE** Nothing to disclose.

**PSI.202****Acute vascular effects of waterpipe smoking: importance of physical activity and fitness status**M. Alomari<sup>1</sup>, O. F. Khabour<sup>1</sup>, K. Alzoubi<sup>1</sup>, D. M. Shqair<sup>1</sup> and L. Stoner<sup>2</sup>

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**OBJECTIVE** While new forms of tobacco, including waterpipe (WP) smoking, continue to gain popularity, limited literature has examined the vascular health consequences. The purpose of the current study was to examine: (i) the acute WP-induced changes in vascular function; (ii) whether acute changes in vascular

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function are modified by lifestyle behaviors (habitual physical activity, physical fitness).

**METHODS** Fifty three (22.7 year, 36% F, 23.4 kg/m<sup>2</sup>) otherwise healthy WP smokers were recruited. Strain-gauge plethysmography was used to measure forearm blood flow, vascular resistance, venous capacitance, and venous outflow at rest and following occlusion. Habitual physical activity was determined using the Arabic version of short-form international physical activity questionnaire, while physical fitness was assessed using the 6 min walk test and handgrip strength. Partial correlations were used to examine the relationships between post-smoking vascular function and lifestyle behaviors, controlling for pre-smoking vascular measures.

**RESULTS** WP had a small effect on forearm post-occlusion blood flow ( $d = -0.19$ ), a moderate effect on venous outflow ( $d = 0.30$ ), and a moderate effect on post-occlusion vascular resistance ( $d = 0.32$ ).

Total habitual physical activity strongly correlated with resting blood flow ( $r = 0.50$ ) and moderately with vascular resistance ( $r = -0.40$ ). Handgrip strength moderately correlated with venous capacitance ( $r = 0.30$ ) and post-occlusion blood flow ( $r = 0.30$ ), while 6 min walked distance moderately correlated with resting venous capacitance ( $r = 0.30$ ).

**CONCLUSION** Waterpipe smoking is associated with immediate changes in vascular function, which are exacerbated in individuals with low habitual physical activity and physical fitness levels in young otherwise healthy individuals.

**DISCLOSURE** Nothing to disclose.

### PSI.203

#### Relationship between upper body strength and forearm vascular function in patients with rheumatoid arthritis

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**INTRODUCTION** Excess mortality in rheumatoid arthritis (RA) is attributable to cardiovascular (CV) diseases. Exercise is used in RA and CV rehabilitation. Despite the accumulating evidence confirming the importance of exercise, no study examined the relationship of large muscle group strength with VF in RA.

**PURPOSE** The present study compared shoulder press strength and VF in RA patients (Pt) to controls (Ct). Subsequently, the relationship between shoulder press strength and VF was examined.

**METHOD** A total of 21 Pts and 14 age-matched Ct were recruited to participate in the study. Shoulder press machine was used to examine upper body strength. Forearm blood flow at rest (RBF) and after 5 min of arterial occlusion (OcBF) was measured using strain strain-gauge plethysmography. Subsequently, vascular resistance at rest (RVr) and after occlusion (OcVr) was calculated as blood flow/mean arterial blood pressure.

**RESULTS** Shoulder press strength was lower ( $P < 0.05$ ) in the Pt ( $35.1 \pm 13.0$  kg) than in the Ct ( $49.0 \pm 13.9$  kg). Additionally, forearm RBF (Pt:  $3.0 \pm 1.1$  vs. Ct:  $3.8 \pm 0.7$  ml/100 ml/min;  $P = 0.05$ ), and OcBF (Pt:  $18.0 \pm 5.8$  vs. Ct:  $30.4 \pm 7.0$  ml/100 ml/min;  $P = 0.000$ ) were lower in the Pts, whereas RVR (Pt:  $31.8 \pm 11.3$  vs. Ct:  $23.1 \pm 4.0$  U;  $P = 0.007$ ), and OcVr (Pt:  $5.3 \pm 1.6$  vs. Ct:  $3.0 \pm 0.5$  U;  $P = 0.000$ ) were less in the CTs. Finally, shoulder press strength correlated positively with RBF ( $r = 0.7$ ;  $P = 0.001$ ), and OcBF ( $r = 0.7$ ;  $P = 0.000$ ) as well as negatively with RVR ( $r = -0.4$ ;  $P = 0.01$ ), and OcVr ( $r = -0.5$ ;  $P = 0.01$ ).

**DISCUSSION** The study confirms previous studies showing compromised muscular and vascular functions in the RA patients. Uniquely, the results revealed relationships between muscular and vascular function measures. This is the first study to demonstrate these relationships indicating that vascular function might be affected by strength in large muscle groups. Additionally, these results warrant for future studies examining the effect strengthening exercise on vascular function in RA patients.

**DISCLOSURE** Nothing to disclose.

### PSI.204

#### Development and validation of a protocol to assess multimorbidity in rural primary care settings: an Indian experience

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Multimorbidity is becoming increasingly common in India. Few studies highlighting the magnitude of NCD multimorbidity from secondary data sources have explored limited number of chronic diseases. We undertook a study to assess the prevalence, pattern, correlates and outcomes of multimorbidity in public and private primary care settings in India. The present abstract describes the process of development and validation of our data collection tool 'Multimorbidity Assessment Protocol (MAP)'. The MAP questionnaire included sections namely – socio-demographic information (age, sex, residence, ethnicity, religion, education, marital status, family income); multimorbidity assessment (information on whether the patient had ever been told by a physician or diagnosed with any of the listed chronic health problems; severity assessment comprising current use of treatment and functional limitation. For each of the reported chronic health problems patients were asked on how much the particular health problem gets in the way of daily activities (e.g.: not at all, a little, or a great deal), number of visits or outpatient consultations in last 1 year, past and current use of medication and inpatient admissions if any. Multimorbidity outcomes were assessed through self-rated physical and mental health and health related quality of life (using SF 12). We adopted iterative approach to prepare the contextualized list of chronic diseases. First, a free list of chronic diseases was prepared by extensive review of prevalence studies. This then further was revised with a chart review of both private and public hospitals. It was then shared with a panel of primary care physicians and refined. The translated instrument was then cognitively tested with 12 non-sampled patients for comprehensibility. Then the questionnaire was pretested with 80 non-study patients and test retest reliability coefficient was calculated. These patients were re-administered the questionnaire after 2 weeks. The validated questionnaire was administered to 1649 patients across 20 public and private primary care facilities.

**DISCLOSURE** None.

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## PSI.205

**Prevalence, pattern and correlates of multimorbidity among primary care patients in India**

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**INTRODUCTION** Multimorbidity, the coexistence of two or more chronic diseases in an individual, has been identified as a major challenge to primary care in developed countries and associated with poorer outcomes and increased healthcare costs. However, little is known about the prevalence of multimorbidity in developing countries. This study explored the prevalence, patterns and correlates of multimorbidity among patients attending primary care practices in India.

**METHODS** A total of 1649 adult patients attending 20 public and 20 private primary care facilities were interviewed during April–September 2013. A pre-designed validated questionnaire (multimorbidity assessment protocol) was used to elicit detailed information on 22 self-reported chronic conditions. Data were analysed for number of morbidities in relation to age, gender, education, socio-economic status and type of health care facility. Multimorbidity was defined as simultaneous occurrence of two or more morbidities.

**RESULTS** More than one-quarter of primary care patient attendees [26.5% (95% CI 24.3–28.6)] have multimorbidity. Patients in public facilities exhibit 1.35 times higher prevalence of multimorbidity than in private facilities. Multimorbidity is higher among females (adjusted odds ratio 1.5, 95% CI 1.1–2.0) than males. 40% of patients aged above 50 years and more than a quarter aged 30–50 years have multimorbidity. Education plays a protective role, while both financial deprivation and affluence are positively associated with multimorbidity prevalence. There is a steady increase in the number of morbidities with age. Acid-peptic disease (29.1%, 95% CI 26.9–31.3) followed by hypertension (15.7%, 95% CI 13.9–17.5), singularly or in combination with others, are the leading morbidity domains.

**CONCLUSION** This study is first to explore the extent of multimorbidity in primary care settings in India and demonstrates a high prevalence as shown in the West. This provides insightful information towards designing chronic disease control programmes in India.

**DISCLOSURE** Nothing to disclose.

## PSI.206

**The prevalence and determinants of chronic non-communicable disease risk factors among adults in Dikgale Health Demographic and Surveillance System (HDSS) site, Limpopo Province of South Africa**E. Maimela<sup>1</sup>, M. Alberts<sup>1</sup>, S. E. P. Modjadji<sup>1</sup>, S. Choma<sup>1</sup>, S. Dikotope<sup>1</sup>, S. Ntuli<sup>1</sup> and J. P. Van Geertruyden<sup>2</sup><sup>1</sup>Medical Sciences, Public Health and Health Promotion, University of Limpopo, Polokwane, South Africa; <sup>2</sup>International Health Unit, University of Antwerp, Antwerp, Belgium

**BACKGROUND** The aim of the study was to determine the prevalence and the determinants of chronic non-communicable diseases (NCDs) risk factors in a rural community Limpopo Province, South Africa.

**METHODS** This survey was conducted using the WHO 'STEPwise approach to surveillance of non-communicable diseases' (STEPS) methodology. Participants ( $n = 1409$ ) were

residents of the Dikgale HDSS site and standardized international protocols were used to measure behavioural risk factors (smoking, alcohol consumption, fruit and vegetable intake, physical activity), physical characteristics [weight, height, waist and hip circumferences, blood pressure (BP)]. Fasting blood glucose (BG), triglyceride and total cholesterol (TC) were determined in 816 participants. Data were analysed using STATA 12 for windows.

**RESULTS** The prevalence of current smokers was 13.7% with daily smokers contributing 81.3% and alcohol consumption was at 16.3%. Majority of participants (88.6%) had low daily intake of fruit and vegetables and low physical activity (66.5%). The prevalence of hypertension was 38.2%. Overweight; obesity and high waist circumference were prevalent in females. All the cardio-metabolic risk profile were not significantly different between men and women. People who are older than 40 years, overweight or obese people and those who consumed alcohol were more likely to be hypertensive. Smoking was associated significantly with older age, males, never married and divorced people. Alcohol consumption was associated with older age, males, low educational status and low income.

**CONCLUSION** High levels of risk factors for NCDs among adults in Dikgale HDSS suggest an urgent need for health interventions to control risk factors at the population level in order to reduce the prevalence of NCDs.

**KEYWORDS** Dikgale Health and Demographic Health Surveillance System, behavioural and biochemical risk factors, Non-communicable diseases, public health, Health System Performance.

**DISCLOSURE** Nothing to disclose.

## PSI.207

**Addressing non-communicable diseases through community health workers and traditional healers in Dikgale Health and Demographic Surveillance System site: a qualitative study**E. Maimela<sup>1</sup>, M. Alberts<sup>1</sup>, J. P. Van Geertruyden<sup>2</sup>, H. Meulemans<sup>3</sup>, J. Fraeyman<sup>4</sup> and H. Bastiaens<sup>5</sup><sup>1</sup>Medical Sciences, Health Promotion and Public Health, University of Limpopo, Polokwane, South Africa; <sup>2</sup>International Health Unit, Antwerp, Belgium; <sup>3</sup>Sociology and Research Centre for Longitudinal and Life Course Studies, Antwerp, Belgium; <sup>4</sup>Research Group Medical Sociology and Health Policy, Antwerp, Belgium; <sup>5</sup>Primary and Interdisciplinary Care, University of Antwerp, Antwerp, Belgium

**BACKGROUND** In many countries two health care systems exist which are a traditional health system and a health care system based on Western, sometimes so-called, modern medicine. Primary care systems with trained community health workers and well established guidelines can be effective in non-communicable disease prevention and management. The aim of this study was to determine how chronic disease management in a rural area can be strengthened by utilisation of community health workers and traditional health practitioners.

**METHODS** We used qualitative interviews in Dikgale Health and Demographic Surveillance System site. All data were recorded, transcribed verbatim and analysed using data-driven thematic analysis.

**RESULTS** Our study showed that chronic disease patients have a first contact with health care professionals at primary health care level in the study area. The mainly mentioned barriers by both the health care workers and chronic disease patients are lack of knowledge, shortage of medication and shortage of nurses in the clinics which causes patients to stay for a long

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period in a clinic. Health care workers are less trained on the management of chronic diseases. Lack of supervision together with poor dissemination of guidelines has been found to be a contributing factor to lack of knowledge by health care worker in clinics within the study area.

**CONCLUSIONS** Integrated approaches could create immediate synergies in service delivery by involving all health care providers in the rural area of Limpopo Province. Therefore, suitable trainings and capacity building should form part of the structural integration by making sure that these trainings reach all health care providers to deliver services that are appropriate to health system needs. Lastly there is a need to establish a link with traditional healers and integrate service in order to early detect and manage chronic diseases in the community with the support from traditional authority.

**KEYWORDS** Chronic disease management, Community Health Workers, Traditional health practitioners, Integration, Support.

**DISCLOSURE** Nothing to disclose.

**PSI.208****Is diabetes a risk factor for a severe clinical presentation of dengue?**

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**INTRODUCTION** With low- and middle-income countries (LMIC) struggling with an alarming rate of chronic non-communicable disease (NCD) and a continuously high communicable disease incidence rate, understanding the comorbidity between the two disease groups is crucial to control their prevalence, and to avoid complex clinical interactions, worst health outcomes and increased healthcare costs. Today, age-related comorbidity of dengue and diabetes mellitus (DM) become a public health concern to a large proportion of populations in tropical LMIC as dengue is not only affecting children and DM is prevalent in adults.

**METHODS AND MATERIALS** We conducted a systematic literature review using the MEDLINE database to access publications describing an association between dengue and DM and used the PRISMA criteria for the validity assessment of published articles. The random-effects models have been applied for meta-analyses of the association between DM and a severe clinical presentation of dengue.

**RESULTS** Our literature search resulted in 32 hits, and 10 articles were retained after excluding duplicates and non-relevant articles based on a full text analysis. Five case-control studies, with one study being population-based, which we included in the meta-analyses compared the prevalence of DM in persons with acute/past non severe dengue (controls) to an acute severe clinical presentation of dengue, and five articles (case series) represented DM-dengue patients with severe clinical manifestations, including fatal cases. The meta-analysis showed that a diagnosis of DM was associated with an increased risk for severe clinical manifestations of dengue by 75% (95% CI: 1.08–2.84,  $P = 0.022$ ) compared to non-DM patients.

**CONCLUSIONS** Acknowledging the factors that increase the chances of getting severe clinical symptoms in dengue patients would help physicians in making a timely decision for clinical management either under close observation, adequate treatment, or hospitalization. The DM patients with fever episodes and

living in a dengue endemic region should be confirmed for dengue as soon as possible. As the currently available epidemiological evidence of an interaction of dengue and diabetes is very limited and only suggestive, larger prospective studies are needed to address whether better control of glycemia level in dengue patients with DM can improve the outcome of the patient and reduce the risk of a severe clinical presentation.

**DISCLOSURE** Nothing to disclose.

**PSI.209****Community level behavioral intervention to reduce tobacco use: an experience from a project in rural Bangladesh**

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**INTRODUCTION** Tobacco use is a leading contributor to premature death, and causes about 9% of deaths worldwide. Nearly 6 million people die from tobacco-related causes every year. If present patterns of use persist, tobacco causes as many as 1 billion premature deaths globally during the 21st century. Bangladesh is on the verge of tobacco epidemic as 16% of total deaths in people aged 30 years and above are connected to tobacco. There are many difficulties to mitigate tobacco menace in Bangladesh despite government regulations. Community level effective behavioral strategy/techniques were largely absent. ICDDR,B has develop and tested a package of communication techniques to observe the reduction of tobacco use at the community level.

**METHOD AND MATERIALS** The project implemented in Chakaria a rural sub district of Cox's Bazar in Bangladesh where icddr,b is active in research-development activities since 1994. Fifteen villages from three unions were selected for the intervention and 15 were for comparison. We adopted various interventions in the form of *Othan Baithaks* or household courtyard meetings; peer group meetings; transmitting cell phone messages and counseling of tobacco users through mobile phone. The target audience is women and men aged 15 years and above. During the intervention, a female/male health worker showing/discussing the potential harmful effects of smoking and risky behavior towards their family members. A video on showing the harmful effects of tobacco was displayed to communicating the message to smokers and non-smokers. Data on follow-up, mobile counseling, video sessions and process documentations were used for analyzing and interpreting the results.

**RESULTS** Between January 2011 and June 2103, 9760 people aged 15 years and older from 1600 households participated in the *Othan Baithaks*, organized video sessions and mobile phone counseling. Among the targeted people 1173 (12%) quit tobacco, 728 (7.5%) committed to quit and 1482 (15%) persons reduced their use of tobacco. 43 persons (0.44%) declined to participate.

**CONCLUSION** Community level intervention can be an effective mechanism to reduce tobacco use along with governments' regulatory measures. The regulatory framework can be designed such a way that community can be engaged, informed and create a platform to use as the means of prevention strategies.

**DISCLOSURE** Nothing to disclose.



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## PS1.210

**Contribution to the rationalization and definition of an efficient policy for the prevention of cancer in DR Congo: entry point cervical cancer**

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Cervical cancer is the third most common cancer in women worldwide and leading cause of cancer death among African women. In the Democratic Republic of the Congo (DRC), cervical cancer is also the leading cause of cancer related deaths among women (27.8%). However, the data are fragmentary and actual disease burden might be more alarming. This is likely the result of lack of screening services for the prevention and early detection of the disease.

The objective of the study was to validate affordable, feasible diagnostic tools to propose a rational, evidence based screening strategy for the context of the DRC.

A cross-sectional study was carried out in women aged 30–50 years, living in the health zone of Mont-Ngafula, Kinshasa DRC. Each woman provided a urine sample and was screened using the pap smear, Visual Inspection with Acetic Acid (VIA) and Lugol (VILI). Colposcopic examination and biopsy sample was taken in all positive women to either test or 1/5 negative woman for confirmation of diagnosis.

875 women were included into the study and median age was 38 years old (IQR:). Positivity to VIA, VILI and pap smear was respectively 68 (7.8%); 109 (12.5%) and 40 (7.3%). Urine samples were used for the detection of Human Papilloma Virus (HPV) infection and 242 samples were examined of which 121 (50%) were found to be positive. Further genotyping demonstrated that 62% of the HPV belonged to the High Risk (HR) clade with 44% belonging to the HR-group 1 (with HPV 16 and 18) and 18% belonging to the HR-group 2.

These preliminary results show that carriage of oncogenic HPV was high among the studied women. Further analysis is needed to validate the visual inspection methods, however, lesions could be found and efforts need to be done to offer screening opportunities to the female population.

DISCLOSURE Nothing to disclose.

## PS1.211

**Characterization of daily weight, blood pressure and pulse rate using home telemonitoring in patients with heart failure**

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BACKGROUND Home telemonitoring (HTM) trials in heart failure (HF) lack consistent evidence in reducing mortality or

hospital readmission. Conceptually, HTM efficacy depends on unbiased knowledge of weight changes, and other parameters, if any, preceding severe cardiac events. The aim was to identify the features in the dynamics of the monitored parameters that are predictive in HF.

METHODS BELGIUM-HF study was a prospective multicentre registry of 171 HF outpatients (left ventricular ejection fraction <40%, New York Heart Association class II–IV, on diuretics). Patients completed 6-month blind daily weight, blood pressure and pulse measurements. Cardiac Composite Endpoint (CCE) included death or hospitalisation. The Meta-Analysis Global Group In Chronic HF (MAGGIC) risk score was used to establish a 6-month clinical risk score. Means and standard deviations of monitored parameters were computed on consecutive time windows up to 14 days and submitted to a logistic regression to build up the signal score. A score combining both scores was then computed.

RESULTS 146 patients completed the 6-month monitoring. The MAGGIC score was predictive of a first CCE (AUC = 0.663,  $P < 0.001$ ). The built-up signal score integrated the 3- and 7-day weight slopes, standard deviation of 3-day weight; it had a predictive power for a first CCE (AUC = 0.761,  $P < 0.001$ ). It was then tested on subsequent events (AUC = 0.814,  $P < 0.001$ ). Combined scores improved predictive power for a first CCE (AUC = 0.775) or a subsequent CCE (AUC = 0.882).

CONCLUSIONS As previously described, the absolute body weight change has a predictive value of cardiac events in HF. The inclusion in our study of body weight slopes and variations improves the predictive power of the signal score. A score combining both clinical and signal data has a greater predictive value than each of the clinical and signal scores taken separately.

Trial Registration: ISRCTN34357360.

DISCLOSURE Nothing to disclose.

## PS1.212

**The osteogenic effect of Andrographolide on osteoblastic cells**

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Osteoporosis is a major public health problem that reduces the quality of life especially old age. Currently, there is increasing interest in using the natural compounds for early prevention of osteoporosis. Thus, the natural compound that has beneficial effect to promote osteoblast formation and function is promising to be candidate using as an osteoporosis-preventing agent. Andrographolide, the major compound of *Andrographis paniculata* (Burm. f) Nees, exhibits various pharmacological properties including antioxidant, anti-inflammatory, and immunomodulator which has been used extensively for the treatment of many inflammatory disorders. According to these biological effects, we therefore aimed to investigate the osteogenic effect of Andrographolide in osteoblast cells using mouse preosteoblastic (MC3T3-E1) cells. In growth medium, Andrographolide increased MC3T3-E1 proliferation, and it accelerated osteoblast differentiation in the differentiation medium, as indicated by the increases in alkaline phosphatase (ALP) activity and osteoblast-specific (ALP) mRNA production at 7–21 days. Subsequently, Andrographolide accelerated production of bone structural genes, including collagen type I alpha I (COL1A1) and osteocalcin. It was supported by the increased bone mineralization of

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detected by alizarin red staining. In conclusion, Andrographolide effectively promotes osteoblast proliferation, differentiation and mineralization. In conclusion, the osteogenic effect of Andrographolide may have clinical relevance for prevention or treatment bone disease as well as osteoporosis.

DISCLOSURE Nothing to disclose.

## PSI.213

### Availability and choice of antineoplastic drugs in retail medicine outlets in Zaria, Nigeria

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**INTRODUCTION** Although availability of essential drugs is one of the most important objectives of national medicine policies, the unavailability of cancer drugs remains a major problem in Nigeria in relations to chaotic drug distribution channels and lack of established cancer centres in the country. These obstacles lead to inadequate treatment of rising cancer diseases in Nigeria. This study was carried out to examine the availability and choice of antineoplastic drugs in retail medicine outlets in Zaria. **METHODS AND MATERIALS** This was a cross-sectional descriptive study involving proprietors, pharmacists and vendors of medicine outlets in Zaria. The study was conducted between August and October 2014 and participants were selected randomly. The participants were interviewed using a structured questionnaire.

**RESULTS** Out of the 60 medicine outlets surveyed, 50 responded. The response rate was 83.3%. A relative minority (38%) of the medicine outlets stock antineoplastic drugs. The most available antineoplastic drugs include Tamoxifen (14.8%), Xeloda (12.7%), Paclitaxel (10.6%), Cyclophosphamide (10.6%) and Methotrexate (8.5%). The reasons for these outlets to stock antineoplastic drugs were mostly on doctors' request and patients' demand directly.

**CONCLUSION** Antineoplastic drugs were not widely available in Zaria. Generally, many problems of unavailability of antineoplastic medicines, including poor procurement, chaotic distribution and inadequate stocking remain. To improve this situation, medicines policies should be adopted to promote access to generic medicines, promote sustainable and reliable methods of procurement, financing, distribution and stocking of antineoplastic drugs in the supply chain.

DISCLOSURE Nothing to disclose.

## PSI.215

### The effects of vitamin B1 on ameliorating the mental symptoms of premenstrual syndrome

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**BACKGROUND AND OBJECTIVE** Premenstrual syndrome (PMS) is a series of physical, mental, and behavioral symptoms with various severities, that disturbs social and personal relationships. The syndrome appears during luteal phase of the menstrual cycle and is a common disorder of reproductive age.

Different treatments have been introduced for the syndrome due to its unknown complicated causes. Vitamin B1 (thiamin) may reduce mental symptoms of the syndrome through affecting the performance of coenzymes in the metabolism of carbohydrates and main branch of amino acid that plays an important role in appearance of mental symptoms of PMS. As it is effective in neural activity and muscle tone in different body activities, including hematopoiesis, metabolism of carbohydrates, activities of the central nervous system and neuromuscular system, etc., it can be effective in this dysmenorrhea that is a disorder resulting from uterine muscular contraction. This study was conducted to determine the effect of vitamin B1 on the mental symptoms of PMS in students residing at dormitories of Jahrom University of Medical Sciences in 2013.

**METHODS** In this double-blind placebo-controlled clinical trial, 80 students with PMS residing at dormitories of Jahrom University of Medical Sciences were divided randomly into two groups, vitamin B1 and placebo. The severity of the mental symptoms of PMS in two cycles, before the intervention and during the intervention, was recorded by the students. The data were collected using an information collection form, PMS provisional diagnosis form, daily status record form, and Beck Depression Inventory. The data were analyzed using descriptive and inferential statistics.

**RESULTS** There was no significant difference among the studied variables in terms of confounding variables. The comparison of vitamin B1 group before the intervention with that after the intervention showed that vitamin B1 reduced mean mental symptoms (35.08%) significantly ( $P < 0.0001$ ). Moreover, there was a significant difference between vitamin B1 and placebo groups in terms of mean mental symptoms, as mean symptoms in vitamin B1 group was significantly lower than that in the placebo group ( $P < 0.0001$ ).

**CONCLUSION** It seems that vitamin B1 is effective in recovery of mental symptoms of PMS. Therefore, this vitamin can be used to reach a major goal of midwifery, that is, reduction of mental symptom severity of PMS, without any side effects.

DISCLOSURE Nothing to disclose.

## PSI.216

### The effect of vitamin B1 on sleep disorders associated with premenstrual syndrome

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**BACKGROUND AND AIM** Premenstrual syndrome (PMS) is a cyclical disorder observed in late luteal phase and presenting with behavioral changes that can affect interpersonal relationships and normal daily activity. Sleep disturbances are also common.

The aim of this study is to investigate the determine effect of vitamin B1 on sleep disorders associated with PMS and subjective sleep quality with Pittsburg Sleep Quality Index (PSQI) in Academy students, who do not have in-depth information about menstruation.

**MATERIALS AND METHODS** In this double-blind placebo-controlled clinical trial, 80 students with sleep disorder associated with PMS residing at dormitories of Jahrom University were divided randomly into two groups, vitamin B1 and placebo. The severity of the symptoms of PMS in two cycles, before the intervention and during the intervention, was recorded by the students. PMS was detected with 'Premenstrual

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Syndrome Scale', and PSQI was used to evaluate subjective sleep quality.

The data were collected using an information collection form, PMS provisional diagnosis form, daily status record form, Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory. The data were analyzed using descriptive and inferential statistics.

**RESULTS** There was no significant difference among the studied variables in terms of confounding variables. The comparison of vitamin B1 group before the intervention with that after the intervention showed that vitamin B1 reduced sleep disorders (80.24%) significantly ( $P < 0.0001$ ). Moreover, there was a significant difference between vitamin B1 and placebo groups in terms of mean mental and physical PMS symptoms, as mean symptoms in vitamin B1 group were significantly lower than that in the placebo group ( $P < 0.0001$ ).

**CONCLUSION** It seems that vitamin B1 is effective in recovery of mental and physical symptoms of PMS such as sleep disorders. Therefore, this vitamin can be used to reach a major goal of midwifery, that is, reduction of symptom severity of PMS -specially sleep disorders- without any side effects.

**KEYWORDS** Premenstrual syndrome, sleep disorders, vitamin B1.

**DISCLOSURE** Nothing to disclose.

**PSI.217****The effect of vitamin B1 on fatigue associated with premenstrual syndrome**

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**BACKGROUND AND AIM** Premenstrual syndrome (PMS) is a cyclical disorder observed in late luteal phase and presenting with behavioral changes that can affect interpersonal relationships and normal daily activity. Fatigue is also common complaint. Fatigue can be manifested as difficulty or inability initiating activity (perception of generalized weakness); reduced capacity maintaining activity; and difficulty with concentration, memory, and emotional stability (mental fatigue). The aim of this study is to investigate the determine effect of vitamin B1 on Fatigue associated with PMS and severity Fatigue with Fatigue Severity Scale (FSS) in the Academy students, whom do not have considerable information about menstruation.

**MATERIALS AND METHODS** In this double-blind placebo-controlled clinical trial, 80 students with sleep disorder related to PMS residing at dormitories of Jahrom University were divided randomly into two groups, vitamin B1 and placebo. The severity of the symptoms of PMS in two cycles, before the intervention and during the intervention, was recorded by the students. PMS was detected with 'Premenstrual Syndrome Scale', and FSS was used to evaluate severity Fatigue. The 9-item Fatigue Severity Scale (FSS) is one of the most commonly used self-report questionnaires to measure fatigue.

The data were collected using an information collection form, PMS provisional diagnosis form, daily status record form, Fatigue Severity Scale (FSS), Beck Depression Inventory. The data were analyzed using descriptive and inferential statistics.

**RESULTS** There was no significant difference among the studied variables in terms of confounding variables. The comparison of vitamin B1 group before the intervention with that after the intervention showed that vitamin B1 reduced Fatigue (73.88%) significantly ( $P < 0.0001$ ). Moreover, there was a significant

difference between vitamin B1 and placebo groups in terms of mean mental and physical PMS symptoms, as mean symptoms in vitamin B1 group was significantly lower than that in the placebo group ( $P < 0.0001$ ).

**CONCLUSION** It seems that vitamin B1 is effective in recovery of mental and physical symptoms of PMS such as Fatigue. Therefore, this vitamin can be used to reach a major goal of midwifery, that is, reduction of symptom severity of PMS – specially fatigue – without any side effects.

**KEYWORDS** Premenstrual syndrome, Fatigue, vitamin B1.

**DISCLOSURE** Nothing to disclose.

**PSI.218****The association between sleep quality and incidence of preterm birth**

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**INTRODUCTION** Preterm birth is one of the most common adverse pregnancy outcomes and one of the major public health concerns also. Several risk factors have been identified, but understanding of the exact etiology has been remained unknown until now. Poor sleep quality is correlate with adverse pregnancy outcomes. Therefore, we evaluated whether sleep quality during pregnancy is a relevant risk factor with preterm birth.

**METHODS AND MATERIALS** This is a cohort study on 539 pregnant women in 20–29 weeks gestation. The method of sampling was continuum. Data was gathered by demographic questionnaire, Pittsburgh Sleep Quality Index (PSQI) and Perceived Stress Scale (PSS). After completing the questionnaires, the study subjects were divided in two groups; good and poor sleep quality. Two groups were followed until the end of 37 weeks gestation by telephone every 2 weeks. Risk factors those affected preterm birth were evaluate in two groups. Statistical analysis carried out with *t*-test, chi-square, Mann–Whitney *U* and Mantel–Haenszel.

**RESULTS** A total 309 pregnant women had poor sleep quality and 230 women had good sleep quality. The mean score of Pittsburgh questionnaire in term deliveries was  $6/30 \pm 3/03$  and in preterm deliveries were  $8/43 \pm 3/79$ . The rate of preterm birth in good sleep group was %5/6 and in poor sleep group was %13/7. There was significant difference in the rate of preterm birth in two groups ( $P = 0/003$ ). The entire risk factors associated with preterm birth except history of preterm birth, abortion, sever physical activity, stress and second hand smokers in two groups was consistence. But Mantel-Haenszel test eliminate the effect of them in two groups and showed that there was no dependent correlate between sleep quality and happening the preterm birth.

**CONCLUSION** There was an association between sleep quality and preterm birth.

**DISCLOSURE** Nothing to disclose.

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## PSI.219

**Studying the history of interventions in health systems for a better understanding of changes: the case of mental health care integration in Rwandese district hospitals**A. E. Fromont<sup>1</sup>, A. Ait Mohand<sup>2</sup>, C. N. Misago<sup>3</sup> and A. Casini<sup>1</sup><sup>1</sup>School of Public Health, Université Libre de Bruxelles, Bruxelles, Belgium; <sup>2</sup>Belgium Technical Cooperation, Kigali, Rwanda; <sup>3</sup>Mental Health Division, Rwanda Biomedical Center, Ministry of Health, Kigali, Rwanda

**INTRODUCTION** Health systems are very complex systems and need temporal perspective to apprehend their dynamic dimensions. We adopted this posture for studying the implementation of a new mental health (MH) policy in Rwanda. We assessed the psychosocial impacts of MH care units' integration in all district hospitals (DH) on the recently appointed mental health providers (MHPs).

**METHODS** 29 of the 85 MHPs participated in 4 focus groups (FC) based on the training and professional life narratives method. A particular attention was paid to the construction of their new professional identity and role inside the DH.

**RESULTS** As the MHP group was very homogenous, FC discussions allowed us to construct a chronological diagram that permitted to identify 4 dimensions of the MH integration policy: societal, organizational, social and individual. Following participants' narratives, the process of MH integration implied several mutations. General and specific awareness campaigns lead to significant changes of social representations for both population and DH professionals. The start of MHPs activities inside DH coincided with ever increasing demand for MH care. The development of these new practices for DH practitioners enhanced the recognition of the specific role of the MHPs. The joint training, the shared daily experiences and the regular meeting offered to the MHPs the basis to develop a strong professional identity as well as the feeling to belong to a same group with specific role and competences. This simultaneous evolution of representations, practices, and professional identities, which affect MHPs' values and capacities, contributes in turn to develop and strengthen their professional self-esteem. Despite these positive impacts, MHPs reported a high level of stress related to high responsibilities and workload.

**DISCUSSION** In a mere occupational health logic, observers might be tempted to take corrective measures against adverse effects of stress – e.g. by reducing MHPs' responsibilities. That would be to misread the whole process that concurrently generate high self-esteem and stress. Actually, the high sense of their values and capacities counterbalance the effects of stress for MHPs.

**CONCLUSION** The temporal perspective contributes to understanding processes inside systems. Many of the apparent problems spring from a two sided source. Resolving issues can be hazardous and generate new difficulties as long as we misinterpret their real implications and origins.

**DISCLOSURE** Nothing to disclose.

## PSI.220

**How many hours do people sleep in Bangladesh? – a country representative survey**F. M. Yunus<sup>1,2</sup>, M. S. Khan<sup>1</sup>, T. Akter<sup>1</sup>, F. T. Jhohura<sup>1</sup>, S. Reja<sup>1</sup> and M. Rahman<sup>1</sup><sup>1</sup>Research and Evaluation Division, BRAC, Kigali, Rwanda; <sup>2</sup>James P Grant School of Public Health, BRAC University, Kigali, Rwanda

**INTRODUCTION** Too little and too much sleep have an enormous effect on our health especially on non-communicable

diseases such as mental, cardiovascular, cerebrovascular and immune system. Hence the study aimed to explore the total sleep time of Bangladeshi population and to identify the proportion of people who are at high risk of developing chronic diseases.

**METHODS** In a cross-sectional survey, total sleeping time was captured and analyzed from the 3972 respondents ranging from 5 to 106 years old in 24 districts (of 64) in Bangladesh. Total Sleep Time (TST) was measured by the hours of total sleep in last 24 h. We regarded 9 h for children and 7 h for adults and older people as the recommended TST suggested by the US Department of Health and Human Services and recently being used in several published articles. We counted shorter and longer sleep time for those who sleeps below or more than the recommended total sleep time. Both linear and logistic regression models were used to determine the relationship between different variables of demographics and estimated risk of shorter and longer total sleep time.

**RESULTS** We found total sleeping time started decreasing with the increase of age and conversely, the risk of sleeping longer time found higher with the increasing of age. It revealed adult and old population of Bangladesh are at approximately 6 times higher ( $P < 0.01$ ) risk of sleeping longer time than the recommended TST. Alarming, 65.1% adults and 63.5% of the older population sleep longer than their recommended TST (7 h) and 59.6% children sleep less than their recommended TST (9 h). Population involved with agriculture tends to sleep shorter time than any other occupation. People in peripheral part of Bangladesh tend to sleep less and people in northern part of Bangladesh are approximately 11 ( $P < 0.01$ ) times higher risk due to sleep less than Dhaka division (center and capital of Bangladesh). Rural people are 2.43 ( $P < 0.01$ ) at times higher risk to sleep shorter times than the urban people.

**CONCLUSION** In Bangladesh, adults and the elderly sleep longer, and children sleep less than their respective recommended hours. Therefore both groups are vulnerable to various chronic diseases. Longer and lesser sleep may trigger chronic disease burden in Bangladesh and elsewhere.

**DISCLOSURE** Nothing to disclose.

## PSI.221

**'Class smoke-free' pledge impacts on nicotine dependence in male adolescents: a cluster randomized controlled trial**N. Al-Sheyab<sup>1</sup>, M. Alomari<sup>1</sup>, S. Shah<sup>2</sup> and R. Gallagher<sup>2</sup><sup>1</sup>Jordan University of Science and Technology, Irbid, Jordan; <sup>2</sup>University of Sydney, Sydney, NSW, Australia

**OBJECTIVE** To test the effectiveness of a school-based, peer-led smoking and asthma education program, known as the Triple A (Adolescent Asthma Action) in Jordan (TAJ), with an additional 'class smoke-free' pledge strategy (TAJ-Plus) as compared to the TAJ alone on smoking-related knowledge and perception, nicotine dependence, and asthma control in male high school students in Jordan 4 months post intervention.

**METHODS** In this cluster-randomized controlled trial, four public male high schools in Irbid, Jordan were randomly assigned to receive the TAJ-Plus ( $n = 215$ ) or the TAJ ( $n = 218$ ). TAJ educators were 3rd year male undergraduate nursing students ( $n = 9$ ) who received training in a 1-day workshop. These educators then trained senior students from the four schools to be Peer Leaders ( $n = 53$ ), who then taught peers in grades 7 and 8 ( $n = 433$ ). The Peer Leaders in the TAJ-Plus schools implemented the smoke-free pledge within the 7th and 8th graders, who voluntarily signed the pledge for 4 months.



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Data were collected from students in grades 7 and 8 using self-administered questionnaires at baseline and 4 months post intervention.

**RESULTS** Students from the TAJ-Plus group reported significant improvements in smoking-related knowledge and perception ( $P < 0.001$ ) and lower nicotine dependence ( $P < 0.001$ ) as compared to the TAJ group. Improvement in asthma control was greater ( $P = 0.03$ ) in nonsmokers versus smokers.

**CONCLUSIONS** Voluntary group commitment smoke-free through a pledge is feasible, beneficial, and an incentive to motivate adolescents to abstain from smoking. Using social influences approaches in schools is useful in countering current aggressive tobacco marketing campaigns in Arab youth.

**DISCLOSURE** Nothing to disclose.

**PS1.222****Prevalence of hypertension in Ethiopia: a systematic meta-analysis**

K. T. Kibret

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**INTRODUCTION** Hypertension has been rising in developing countries like Ethiopia. There is no population based national prevalence study on hypertension except pocket studies done here and there. These pocket studies reported the prevalence of hypertension from 9% to 31%. Our study is intended to estimate/pool the prevalence of hypertension at national level by using these pocket studies.

**METHODS** Relevant studies were identified through computer based and manual searches using MEDLINE/PubMed, Google scholar, EMBASE, HINARI and reference lists of prevalence studies. The description of original studies were made using frequency and forest plot. Heterogeneity across studies was checked using Cochrane Q test and  $I^2$  test statistic. Pooled estimate and Sub-group analysis of prevalence of hypertension was computed by random effect model.

**RESULTS** The electronic search using keywords identified 108 titles for prevalence of hypertension in Ethiopia, of which 99 were excluded. Nine studies were analyzed to determine the prevalence of hypertension in the Ethiopian population. Random effects meta-analysis of all the 9 studies showed that the prevalence of hypertension in Ethiopia population was estimated to be 19.6% (95% CI: 13.7%, 25.5%). In subgroup analyses, the prevalence of hypertension in the urban population was 23.5% and that of rural/urban population was 14.7%. It shows that the prevalence of hypertension is higher in the urban population of Ethiopia than the rural. But the prevalence of hypertension among male (20.6%) and female (19.2%) was the same.

**CONCLUSION** The prevalence of hypertension in Ethiopian population has been increasing. This evidence suggests that attention has to be given to primary prevention of hypertension in the Ethiopian adult population, especially the urban population.

**KEYWORDS** Prevalence of hypertension, Ethiopia, prevalence, blood pressure, systolic, diastolic.

**DISCLOSURE** Nothing to disclose.

**PS1.223****Determinant factors associated with occurrence of tuberculosis among adult people living with HIV after ART initiation in Addis Ababa, Ethiopia. A case control study**

K. T. Kibret

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**INTRODUCTION** Tuberculosis is the leading killer of people living with HIV and the first presenting sign in the majority of AIDS patients. Determinants of active TB among HIV patients on ART are not well described in resource limited settings. This study aimed to assess determinant factors for the occurrence of TB among people living with HIV after ART initiation in public health facilities in Addis Ababa, Ethiopia.

**METHODS** A case control study was conducted on 204 cases and 409 controls from December 2011 to February 2012 in selected 2 public hospitals and 13 health centers in Addis Ababa. Cases were adult people living with HIV who developed TB after ART initiation and controls were adult people living with HIV who did not develop TB after ART initiation. An interviewer administered structured questionnaire was used to collect information.

**RESULTS** After adjustment for potential confounders, presence of isoniazid prophylaxis [adjusted odd ratio (AOR) 0.35, 95% confidence interval (CI) 0.125, 0.69] and cotrimoxazole prophylaxis (AOR = 0.19; 95% CI: 0.06, 0.62) had an independent protective benefit against risk of tuberculosis. In contrast, being bedridden (AOR = 9.36; 95% CI: 3.39, 25.85), having WHO clinical stage III or IV (AOR = 3.40; 95% CI: 1.69, 6.87 and hemoglobin level  $<10$  mg/dl (AOR = 7.43; 95% CI: 3.04, 18.31) at enrollment to chronic ART care were independent predictors for increased risk of tuberculosis in people living with HIV after ART initiation.

**CONCLUSION** Increasing coverage of isoniazid and cotrimoxazole preventive therapy reduced the overall risk of TB among HIV patients who initiated treatment. All people living with HIV should be screened for TB, especially for patients who have advanced disease condition (WHO clinical stage III or IV disease, being bedridden and having hemoglobin level  $<10$  mg/dl) intensified screening is highly recommended during follow up of treatment.

**DISCLOSURE** Nothing to disclose.

**PS1.224****Is protease inhibitor-based antiretroviral therapy during pregnancy associated with increased risk of preterm birth? Systematic review and a meta-analysis**

K. T. Kibret

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**INTRODUCTION** The advent of antiretroviral treatment (ART) containing protease inhibitors (PI) has been reported in some of studies an increased risk of preterm birth while other studies have reported no increased risk. This meta-analysis of the studies published to date was conducted in order to derive a more reliable overall estimate of the association of the prenatal use of PI based ART with prematurity.

**METHODS** A systematic review and meta-analysis of published studies was conducted. Original papers were identified through a computerized search using Medline/Pubmed, Google Scholar and HINARI (Health Inter Network Access to Research Initiative). STATA was used for analysis and the studies were described by using forest plot. Publication bias was assessed using Funnel plot

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graphically and heterogeneity across studies was checked using Cochrane Q and  $I^2$  test statistic. Adjusted odd ratio with 95% confidence intervals (95% CI) of preterm birth comparing women exposed to PI and non PI-based antiretroviral regimens were pooled using random effects meta-analysis.

**RESULTS** The Cochrane Q test statistic (Q test  $P = 0.65$ ) and  $I^2$  test ( $I^2 = 0.001\%$ ) showed good homogeneity among studies. The traditional funnel plot and Begg's funnel plots become symmetrical distribution of effect estimate which showed no evidence of publication bias. The pooled analysis of all the 8 studies showed that PI based ART exposure during pregnancy was associated with an increased risk of preterm birth (pooled odds ratio 1.27; 95%, 1.11–1.43).

**CONCLUSIONS** This meta-analysis found that PI based ART exposure during pregnancy is significantly associated with an increased risk of preterm birth. There should be strong cautions in initiating ART during pregnancy and PI based ARV should be replaced by others. The proteinase inhibitor ARV drugs would not be included as part of first-line therapy during pregnancy.

**KEYWORDS** Risk factors, antiretroviral therapy, HIV, pregnancy, prematurity, protease inhibitors, preterm birth.

**DISCLOSURE** Nothing to disclose.

**PSI.225****Conventional harm and individual usefulness of unhealthy lifestyles in Belarus**

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**INTRODUCTION** In 2014, the Belarus Red Cross in cooperation with the Swiss Red Cross conducted research into healthy lifestyle among the population, aged 16–65 years in two regions in Belarus – the Grodno and Vitebsk regions. The objectives of the study are to investigate lifestyle characteristics of the target population and to identify behavioural risks (smoking, alcohol consumption, physical inactivity, unhealthy nutrition, stress) which influence lifestyle and health.

**METHODS** A sample of 796 individuals filled in the structured questionnaires with closed and opened questions related to healthy lifestyle perception, knowledge, behavior and practice. Data were analysed according to the main socio-demographic characteristics, such as gender, age and location.

**RESULTS** The main findings of this representative study showed that population have a high level of knowledge about factors that influence health. The perception of their lifestyles (as healthy or not) is not related to the level of knowledge, but to the satisfaction with the individual state of health: a high level of satisfaction with their health is correlated to an assessment of their lifestyle as healthy. Therefore, motivation to change behavior towards a healthy lifestyle, and giving up risky behaviour is linked to self-assessment of the current state of health. For example smoking cessation occurred when one's health deteriorated significantly, as the satisfaction with health declined. Otherwise smoking was not given up, although the harmful impact of smoking on health was understood. It means that a healthy lifestyle is not associated in the perception of people with future health. It was found that risky behaviour does not only cause well-known harm to health, but may also have positive aspects specific to each individual. 51.9% of smokers relieve stress by smoking and 27.9% of respondents who want to change their diet still enjoy eating 'tasty' and 'unhealthy' food.

**CONCLUSION** Understanding harmfulness of a certain behaviour on health does not necessarily lead to behavioural

change. A gap is observed between conventional harm and individual usefulness of a particular type of behaviour. The larger this gap, the less motivated people are to change their behaviour towards minimizing health risks. Therefore, effective promotion of a healthy lifestyle should include an individual component aimed at bridging this gap.

**DISCLOSURE** Nothing to disclose.

**PSI.226****Can we envisage menopausal transition as a risk factor for hypertension among middle-aged women in India?**

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**INTRODUCTION** Hypertension is a powerful risk factor for cardiovascular disease. Blood pressure (BP) rises more steeply in ageing women compared with men, and this may be related to the hormonal changes during menopause, though role of menopause in elevation of blood pressure has shown ambiguous results. This study attempts to find the potential risk factors for hypertension among middle-aged women in northern India.

**MATERIALS AND METHODS** Cross-sectional study among women aged 40–56 years ( $n = 503$ ) residing in Delhi, India. Information on socio-demographic, reproductive profile and lifestyle parameters were collected through structured questionnaire. Women were classified as pre-menopausal ( $n = 195$ ), peri-menopausal ( $n = 115$ ) and post-menopausal ( $n = 193$ ). Blood pressure was measured on each subject. Descriptive and multivariate logistic regression was used to explain and evaluate the present data. All statistical inferences were based on 95% confidence interval (CI) and 5%  $P$ -values. **RESULTS** Multivariate logistic regression analysis presented that Post-menopausal and peri-menopausal women were twice more likely to have systolic blood pressure (SBP)  $\geq 140$  mmHg than pre-menopausal women ( $P < 0.05$ ). Post-menopausal women present 2.0 times risk and peri-menopausal women 1.9 times risk of having diastolic blood pressure (DBP)  $\geq 90$  mmHg. Women who exercised  $< 3$  times a week had risk of having DBP  $> 90$  mmHg [OR: 1.7 (1.1–2.6),  $P < 0.05$ ]

**CONCLUSION** With menopausal transition, women are at higher risk of having hypertension, signifying a protective role of estradiol on BP. Preventive measures should be focused on cardiovascular diseases from the peri-menopausal stage. Regular exercise among women can promote a healthy menopausal transition among middle aged women.

**DISCLOSURE** Nothing to disclose.

**PSI.227****Improving chronic care in Cuba: assessment of hypertension control in the municipalities of Cárdenas and Santiago de Cuba**

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Hypertension is the leading cause of morbidity and mortality worldwide. Moreover, the risk of dying from hypertension at all

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ages is more than double in low and middle income countries compared to high income countries. Cuba is internationally recognized as having one of the best hypertension control figures in the world. Nevertheless, a series of problems remain with regard to the quality and the long-term continuity of the care provided for chronic patients.

To determine current hypertension control rates in Cuba a baseline cross-sectional study was carried out in two municipalities: Cárdenas and Santiago de Cuba. In each municipality two urban health areas of 30,000 inhabitants were selected. We interviewed and measured blood pressure in a sample of 1333 diagnosed hypertensive patients aged 18 years and older that had been previously diagnosed by family doctor/nurse practices. Hypertension control was defined as individuals with blood pressure lower than 140/90 mmHg.

A total of 1218 hypertensive patients [91.4% (95% CI, 89.9–92.9%)] were receiving pharmacological treatment and 773 [58% (95% CI, 55.3–60.6%)] had their blood pressure under control. Living in a given municipality had no influence [hypertension control in Cárdenas 59.1%, 57.0% in Santiago ( $\chi^2 = 0.61$ ,  $P = 0.4350$ )] but living in a specific health area within a municipality was found to be associated with hypertension control: 65.4% (95% CI, 59.9–70.9%) and 60.8% (95% CI, 55.6–65.9%) in the health areas of policlinics 'JAE' in Cárdenas and 'Grimau' in Santiago, respectively. In contrast, hypertension control rates in the health areas of policlinics 'Finlay' in Santiago and 'Moncada' in Cárdenas were 53.3% (95% CI, 48.1–58.5%) and 53.8% (95% CI, 48.5–59.0%) respectively. Other factors associated with hypertension control were being white (versus non-white) and being highly educated (versus lower educated): [61.4% (95% CI, 57.4–65.4%) vs. 55.4% (95% CI, 51.9–59.0%)] and [60.0% (95% CI, 57.1–62.8%) vs. 46.8% (95% CI, 40.0–53.7%) respectively]. Cuba, despite of being a resource-constraint setting ensures free and accessible care through family doctors and nurse practitioners. This family and community-based strategy contributes significantly to the Cuban health system's success in hypertension control. The results suggest that hypertension control can be impacted at community level by the way in which health care services are operationalized at micro level (i.e. in specific health areas).

**DISCLOSURE** We declare we have no conflicts of interest.

## PSI.228

### Risk perception regarding salt intake and implications for designing salt reduction strategies in coastal areas of rural Bangladesh

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**INTRODUCTION** Cardiovascular disease is the most important cause of death among adult Bangladeshis. Salt reduction was considered the most cost effective strategy for reduction of hypertension and heart diseases at population-level in the world. In coastal Bangladesh where rising level of salinity in ground water and unrefined salt are available, little is known about the source, patterns and belief of salt use which is essential for constructing future strategies.

**METHODS** Three villages from Chakaria, a rural area in Bangladesh, were selected for a mixed method study. A survey of randomly selected 400 people and qualitative data was collected by using 18 interviews and 6 focus group discussions with community members.

**RESULTS** In Chakaria people considered salt as the inseparable part of food. 91% of the respondents reported that salt added during cooking was their major source of dietary salt; 25% respondents reported that they add additional salt to their meals; and 78% reported that they add salt to seasonal fruits to enhance their taste. Qualitative exploration showed that salt was thought to be integral part of all foods and any food where salt was added to was considered salty. There was no perception about naturally occurring salt in any food source. There was a prevalent perception that unrefined salt was more harmful compared to refined salt. People did not link salt consumption to hypertension. Those who had hypertension were often advised to reduce salt consumption but they did not feel that amount of salt used in family foods can be reduced to cater to their health needs.

**CONCLUSIONS** It is important to raise awareness about consuming excessive salt and its link to health problems. Those who are at risk of hypertension and their families should be targeting for tailored messaged and strategies to reduce their consumption of salt.

**DISCLOSURE** Nothing to disclose.

## PSI.229

### Assessment of primary care interventions for improving hypertension control in Cuba

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Cuba is internationally recognized as having one of the best hypertension control figures in the world. Nevertheless, the country faces several challenges regarding to the quality of hypertension management.

Based on the results of a baseline study a 'health service' and 'community' intervention aiming at increasing hypertension control was implemented in two urban health areas in each of the municipalities of Cárdenas and Santiago de Cuba during 2014. In each health area an intervention zone and a control zone of roughly 15,000 inhabitants each, were defined. The health-service intervention consisted of training sessions for family doctors and nurses aiming at improving pharmacological prescription and hypertension management. For the community intervention we set-up 'hypertension schools' focused on increasing patients self-responsibility and their compliance with treatment. Before and after the intervention we interviewed and measured blood pressure in a random sample of 1333 and 1404 diagnosed hypertensive patients aged 18 years and older respectively. Hypertension control was defined as individuals with blood pressure lower than 140/90 mmHg.

Overall, in the intervened areas an average reduction was obtained of 1.69 mmHg and 1.76 mmHg in systolic and diastolic blood pressure respectively. In the control areas there was essentially no change: a value plus 0.06 mmHg and 0.23 mmHg in systolic and diastolic blood pressure respectively. Means of blood pressure numbers were significantly different in the intervention areas than in the control areas, being lower in the intervention areas [ $P = 0.000$  (IC95% -51 347 to -21 011) and  $P = 0.000$  (IC 95% -31 054 to -13 100)] for systolic and diastolic blood pressure respectively). After the intervention, hyper-

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tension control rates were significantly higher in the intervention areas than in the control areas [hypertension control 69.5% vs. 60.6%,  $\chi^2 = 12.2$ ,  $P = 0.0005$ , OR 1.48 (95% CI, 1.19–1.85)]. Moreover, the number of patients complying with their medication after the intervention was higher in the intervened areas than in the control [66.9% vs. 53.8%,  $\chi^2 = 23.9$ ,  $P < 0.0001$ , OR 1.73 (95% CI, 1.39–2.16)].

This study provided evidence on primary care strategies to address hypertension control. Major challenges remain to adapt essential interventions to different contexts and to sustain them in the long-term.

**DISCLOSURE** we declare that we have no conflicts of interests.

**PSI.230****Comparison of determinants associated with metabolic syndrome (MetS) in two Mexican rural communities**

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**BACKGROUND AND AIMS** The prevalence of overweight and obese adults in Mexico as of 2013 was 71.3% of the adult population (38.8% overweight and 32.4% obese). The objective of this study was to analyze and compare socio-demographic and health-related determinants associated with Metabolic Syndrome in previously diagnosed adults with Metabolic Syndrome from two Mexican rural communities.

**METHODS** Descriptive statistical analysis was used to compare the above mentioned determinants from two previous studies. The data of these two studies was collected from surveys of previously diagnosed adults with Metabolic Syndrome in the rural communities of Mirandillas (M) and El Chante (C), in 2012 and 2013 respectively; both communities form part of the state of Jalisco in North West Mexico near the coastline of the Pacific Ocean.

**RESULTS** The mean age (years) of subjects from M was 60.9 ( $\pm 11.6$ ), while in subjects from C it was 62.5 ( $\pm 11.5$ ). In M 52.4% of the total subjects were  $\geq 61$  years of age while in C, 52.95%. The proportion of females was 82.36% in C and 66% in M. SBP and DBP was higher in M with mean values of 140 mm Hg ( $\pm 19.2$ ) and 85.2 mm Hg ( $\pm 8.7$ ), respectively; while in C the mean values were 131.8 mm Hg ( $\pm 11.3$ ) and 77.6 mm Hg ( $\pm 5.6$ ). Mean BMI values revealed mild obesity in both communities but BMI was higher in C with 32.5 ( $\pm 1.7$ ) than in M with 30.4 ( $\pm 3.6$ ). The mean values of Fasting Blood Glucose (FBG) resulted abnormally high in both communities; in C it was 140.7 ( $\pm 54.3$ ) while in M it was 138.7 ( $\pm 52.4$ ). The mean levels of Serum Total Cholesterol (STC) and Triglycerides (STT) resulted normal in both communities; the mean level of STC in M was 233.9 mg/dL ( $\pm 36.4$ ) while in C it was 197.6 mg/dL ( $\pm 37.3$ ), this compared to the mean level of STT in M of 174.3 mg/dL ( $\pm 46.4$ ) and in C of 185.3 mg/dL ( $\pm 61.7$ ).

**CONCLUSIONS** In two Mexican rural communities Metabolic Syndrome is more prevalent in the elderly and female population. Many determinants associated with Metabolic Syndrome such as waist circumference, body mass index, fasting serum glucose and blood pressure, are not properly managed in either of these communities while others such as serum total cholesterol and serum total triglycerides are efficiently managed.

**DISCLOSURE** Nothing to disclose.

**PSI.231****Burden of *Cryptosporidium* spp. in children <5 years in a high HIV prevalent setting in Mozambique**

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**BACKGROUND** Diarrhoea remains one of the major causes of mortality among children <5 years of age. The recently conducted study in sub-Saharan Africa and south Asia aimed to quantify the burden of disease has shed a light on the major aetiology of moderate-to-severe diarrhoea, where *Cryptosporidium* was the second most common pathogen associated with moderate-to-severe diarrhoea, only after rotavirus in infants. Herein, we assessed the burden of *Cryptosporidium* in a high HIV prevalence setting of rural Mozambique.

**METHODOLOGY** A prospective matched case-control, age-stratified (0–11, 12–23 and 24–59 months) study was conducted by the Centro de Investigação em Saúde da Manhiça (CISM) in the Manhiça district as part of the Global Multicentre Study (GEMS) aimed to quantify the burden, microbiology aetiology and sequelae of moderate-to-severe diarrhoea (MSD) between Dec 2007 and Nov 2012. HIV sub-study was included from May 2010 to Nov 2012. *Cryptosporidium* antigen detection was detected using immunoassays test and species were determined by polymerase chain reaction (PCR). Conditional logistic regression with Firth's Penalized Likelihood was estimated to assess the association between *Cryptosporidium* and MSD within each age group and as overall for the full study period (5 years).

**RESULTS** In univariate analysis, *Cryptosporidium* spp. in infants (OR = 2.89, 95% CI: 2.07–4.06) and toddlers (OR = 2.63, 95% CI: 1.702–4.075) were associated with moderate-to-severe diarrhoea. In adjusted analysis by HIV status, *Cryptosporidium* was independently associated with MSD in infants (OR = 5.27, 95% CI: 2.10–14.97).

*Cryptosporidium hominis* (63%, 83/130) and *Cryptosporidium parvum* (21%, 27/130) were the most common species.

**CONCLUSIONS** Our data suggest that *Cryptosporidium* is an important pathogen associated with moderate-to-severe diarrhoea in infants regardless of HIV, and *C. hominis* is the most common circulating specie. This data has significant implication for defining public health policies in Mozambique such as the need to improve implementation of preventive strategies on a wider scale.

**DISCLOSURE** Nothing to disclose.

**PSI.232****Immune restitution in HIV-TB: a 5-year follow up study**

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**BACKGROUND** In an earlier study we found that 66% of 130 patients of HIV-TB showed suboptimal CD4 response at 1 year after starting anti-tubercular therapy and antiretroviral therapy



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(ATT-ART). A long-term follow up study was undertaken to validate this observation.

**METHODS** This was a prospective cohort study. HIV patients with TB (HIVTB+) being put on concurrent ATT- ART were enrolled as subjects. HIV patients not suffering from TB (HIVTB-) but starting ART were enrolled as controls. All patients were followed up for 5 years. Effect of age, baseline BMI and CD4 count, type of TB, ATT and ART regimens were studied on increase in body mass index (BMI), and CD4 count at 1 and 5 years. Univariate and multivariate analysis by was done using R 3.1.2 (R Development Core Team (2014-10-31). URL <http://www.R-project.org>).

**RESULTS** 65 HIVTB+ and 49 HIVTB- subjects with a mean age of 37.77 years were followed up for 5 years. Among HIVTB+ group 43% had disseminated TB and 23% sputum negative pulmonary TB. A zidovudine-based ART regimen was used in 81% of cases. CD4 count rose in both groups and was not influenced by the ART regimen, baseline CD4 count or TB status. There was no significant difference between the two groups in respect to number of patients achieving a 100% or 200% CD4 count rise from baseline or an absolute CD4 value of 500/ $\mu$ l at 5 years. An age of >35 years and higher baseline BMI were associated with more rapid increase in CD4 count in both groups. With each  $\text{kg}/\text{m}^2$  increase in BMI, CD4 count increased by 13.49 cells/ $\mu$ l (95% CI 8.04 18.935).

**CONCLUSION** Occurrence of TB did not influence long-term CD4 restitution with ART in HIV+ patients. Age >35 years and higher baseline BMI were predictors of more rapid increase in CD4 count.

**DISCLOSURE** Nothing to disclose.

## PSI.233

## Human immunodeficiency virus-Buruli ulcer: a comprehensive literature review

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**INTRODUCTION** Buruli ulcer (BU) has not been considered an opportunistic infection in Human Immunodeficiency Virus (HIV)-infected patients. This study aims to examine the existing literature relating HIV infection and its effects on BU clinical manifestations.

**METHODS AND MATERIALS** We searched Pubmed, Google Scholar and Google databases for published grey and peer-reviewed published articles using the key words: HIV, AIDS, BU, *Mycobacterium ulcerans*, VIH, SIDA and 'ulcère de Buruli'.

**RESULTS** Regarding HIV being a risk factor for BU; 8 longitudinal studies reporting HIV testing of BU patients and two case-control studies showed on pooled estimates a higher prevalence of HIV in BU cases [5%, inner quartile range (IQR): 3.3–10.6%] than in controls or in a reference population (2%, IQR: 0.5–3.2%).

5 studies and 9 case reports suggest HIV increases BU severity: a large cohort study conducted in Benin showed more severe BU lesions in HIV compared to non-HIV patients [OR 2.77, 95% confidence interval (CI) 1.32–6.33;  $P = 0.006$ ]; a comparative

study in Cameroon showed significantly more multifocal BU lesions in HIV positive patients (24% vs. 11%;  $P = 0.004$ ) and two studies of multifocal BU showed a particularly high HIV prevalence (25% and 36% respectively). One study showed lesion size was inversely associated with a CD4 cell count <500 cell/ $\text{mm}^3$  ( $\beta$ -coeff.,  $-0.50$ ;  $P = 0.015$ ; 95% CI  $-0.91$  to  $0.10$ ). In 9 case reports, severe BU lesions were associated with a low CD4 cell count or AIDS. In the 31 articles reviewed, mortality rates among co-infected patients in the absence of antiretroviral therapy appear elevated. In a BU cohort in Cameroon, the mortality in BU HIV co-infected patients was higher than in BU infected patients only (11% vs. 1%;  $P < 0.001$ ) with a median CD4 cell count of 228.5 cell/ $\text{mm}^3$  (IQR, 98–378), and a death at 41.5 days (IQR, 16.5–56.5) after enrolment, without ART. **CONCLUSIONS** HIV infection very likely increases the risk of developing BU and results in more severe clinical BU disease. Co-infected patients are particularly vulnerable. Further research on the best clinical management for these patients is warranted. **DISCLOSURE** Nothing to disclose.

## PSI.234

## Impact of human immunodeficiency virus on the severity of Buruli ulcer disease: results of a retrospective study in Cameroon

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**INTRODUCTION** Buruli ulcer is the third most common mycobacterial disease after tuberculosis and leprosy and is particularly frequent in rural West and Central Africa. However, the impact of HIV infection on BU severity and prevalence remains unclear.

**METHODS AND MATERIALS** This was a retrospective study of data collected at the Akonolinga District Hospital, Cameroon, from January 1, 2002 to March 27, 2013. Human immunodeficiency virus prevalence among BU patients was compared with regional HIV prevalence. Baseline characteristics of BU patients were compared between HIV-negative and HIV-positive patients and according to CD4 cell count strata in the latter group. Buruli ulcer time-to-healing was assessed in different CD4 count strata, and factors associated with BU main lesion size at baseline were identified.

**RESULTS** Human immunodeficiency virus prevalence among BU patients was significantly higher than the regional estimated prevalence in each group [children, 4.00% vs. 0.68% ( $P < 0.001$ ); men, 17.0% vs. 4.7% ( $P < 0.001$ ); women, 36.0% vs. 8.0% ( $P < 0.001$ )]. Individuals who were HIV positive had a more severe form of BU, with an increased severity in those with a higher level of immunosuppression. Low CD4 cell count was significantly associated with a larger main lesion size [ $\beta$ -coefficient,  $-0.50$ ;  $P = 0.015$ ; 95% confidence interval (CI),  $-0.91$  to  $0.10$ ]. Buruli ulcer time-to-healing was more than double in patients with a CD4 cell count below 500 cell/ $\text{mm}^3$  (hazard ratio, 2.39;  $P = 0.001$ ; 95% CI, 1.44–3.98).

**CONCLUSIONS** Patients who are HIV positive are at higher risk for BU. Human immunodeficiency virus induced immunosuppression seems to have an impact on BU clinical presentation and disease evolution.

**DISCLOSURE** Nothing to disclose.

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## PSI.235

**Prevalence and clinical implications of *Tropheryma whipplei* in stools of HIV-positive and HIV-negative individuals in Ghana**

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**INTRODUCTION** Recent studies have shown a high prevalence of *Tropheryma whipplei* (TW) in sub-Saharan Africa, the region most affected by HIV. TW is known to cause classic Whipple's disease, acute and chronic infections, or asymptomatic carriage. The objective of this study was to investigate the prevalence of TW in the stool of HIV positive patients and uninfected controls in Ghana, and the association with clinical, immunological and virologic parameters.

**METHODS AND MATERIALS** Consecutive adult HIV patients presenting to the HIV outpatient clinic, and blood donors of the Komfo Anokye Teaching Hospital in Kumasi, Ghana, were recruited between November 2011 and November 2012. Stool samples for TW testing were available from 853 HIV-positive and 103 HIV-negative individuals. Sociodemographic and clinical parameters, CD4 T cell count, as well as HIV-1 viral load were analysed. Markers for T-cell activation and regulation were quantified by flow cytometry.

Stool DNA was isolated by using the automated VERSANT kPCR Molecular System (Siemens Healthcare Diagnostics). The presence of TW was tested by using specific quantitative polymerase chain reaction (PCR), based on repetitive sequences, from freshly frozen stool samples.

**RESULTS** The prevalence of TW was higher in stool samples of 853 HIV-positive compared to 103 HIV-negative adults in Ghana (5.8% vs. 1.9%,  $P = 0.09$ ), and in HIV patients receiving antiretroviral therapy (ART) compared to ART naïve patients (10.2% vs. 1.9%,  $P < 0.001$ ). The intake of co-trimoxazole prophylaxis was associated to a lower TW prevalence (2.1% vs. 7.1%). In those HIV patients not taking co-trimoxazole, TW positivity was associated with a longer time period since HIV diagnosis (49.4 vs. 28.9 months,  $P < 0.001$ ), ART-intake (81.3% vs. 47.4%,  $P < 0.001$ ), a higher body mass index (25.2 vs. 23.4,  $P = 0.001$ ), higher CD4 T cell counts (507 vs. 403,  $P = 0.044$ ), and lower markers of immune activation (HLADR+/CD38+) on CD4 (12.3% vs. 18.9%,  $P = 0.019$ ) and CD8 (29.1% vs. 41.9%,  $P = 0.008$ ). TW positivity was not associated to abdominal pain, diarrhoea, fever, or cough.

**CONCLUSIONS** The overall prevalence of TW in our study population in Ghana was lower compared to other recent reports from sub-Saharan Africa. TW positivity was more common in HIV-positive compared to HIV-negative individuals. Among HIV-positive individuals, TW was not associated to low CD4 T cell counts or to clinical complications.

**DISCLOSURE** Nothing to disclose.

## PSI.237

**Lack of *Plasmodium* infection and antioxidant levels among patients with pulmonary tuberculosis (TB) and HIV co-infection**

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**BRIEF INTRODUCTION** Pulmonary tuberculosis (TB), malaria and HIV are infections of major public health concern in Africa. This study therefore aimed to assess malaria parasitaemia, HIV and oxidative stress among TB patients.

**METHODS AND MATERIALS** A total of 83 patients attending the chest clinic in Ibadan, Nigeria were recruited and classified into acid-fast bacilli negative (AFBN), acid-fast bacilli positive (AFBP) and multi-drug resistant TB (MDR-TB) groups using sputum smear microscopy and GeneXpert/Rif test. Venous blood was collected from each patient for HIV screening using recombinant ELISA kit. G6PD activity, PCV, hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), malondialdehyde, protein carbonyl (PC), myeloperoxidase, xanthine oxidase (XO), catalase, superoxide dismutase (SOD), reduced glutathione (GSH), glutathione S-transferase (GST), glutathione peroxidase (GPx),  $\alpha$ -tocopherol and ascorbic acid were estimated using standard methods. Malaria parasite was screened microscopically.

**RESULTS** Of the 83 patients screened, 29 (35%), 30 (36%) and 24 (29%) were AFBN, AFBP and MDR-TB infected respectively. None of the AFBN group (0%), 1 (3.3%) of the AFBP and 4 (16.7%) MDR-TB patients were positive for HIV infection ( $P > 0.05$ ). All the patients in the three groups were negative for *Plasmodium* infection. Significantly lower number of MDR-TB [6 (25%)] were anaemic compared with AFBN [16 (55.2%)] and AFBP [18 (60%)] patients ( $P > 0.05$ ). G6PD deficiency was significantly higher among AFBP [9 (30%)] relative to AFBN [4 (13.8%)] and MDR-TB [3 (12.5%)] patients ( $P > 0.05$ ). Plasma concentrations of H<sub>2</sub>O<sub>2</sub>, malondialdehyde and PC and also myeloperoxidase and XO activities were significantly higher among MDR-TB patients compared with AFB positive and AFB negative groups ( $P < 0.05$ ). Plasma concentration of GSH and the activities of SOD, GST and GPX were significantly reduced in MDR-TB patients compared with the 2 other groups ( $P < 0.05$ ). The plasma activity of catalase was similar between MDR-TB patients and AFB positive subjects but significantly lower when compared with AFB negative group. MDR-TB patients had significantly lower concentrations of  $\alpha$ -tocopherol and ascorbic acid compared with 2 other groups ( $P < 0.05$ ).

**CONCLUSIONS** HIV coinfection was associated with severity and multi-drug resistant TB. Lack of *Plasmodium* infection among TB patients may be due to the suspected antimalarial activity of anti-TB drugs and resistance of TB patients to rifampicin may be due to induction of oxidative stress.

**DISCLOSURE** Nothing to disclose.

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## PSI.238

**Outdoor air pollution and emergency department visits for respiratory illness in Greater Tunis district, between 2007 and 2014**H. Bellali<sup>1</sup>, A. Hechaichi<sup>1</sup>, C. Harizi<sup>1</sup>, R. Zaghouani<sup>1</sup>, N. Ben Alaya<sup>2</sup> and M. K. Chahed<sup>1</sup><sup>1</sup>Epidemiology and Statistics Department, A Mami Hospital, Ariana, Tunisia; <sup>2</sup>National Observatory of New and Emerging Diseases, Tunis, Tunisia

**BACKGROUND** Ambient air pollution contributes to the development and the exacerbation of respiratory illness. The aim of this work was to study the impact of the outdoor air pollution on the emergency department visits for asthma and chronic obstructive pulmonary disease (COPD) exacerbation. **METHODS** Morbidity data were collected from the emergency department register of the A Mami hospital, from January, 1st 2007 to December, 31st 2014. Information about age, sex and date of the emergency department visits were obtained for patients with the diagnosis of asthma or COPD. Concentration levels of NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, and particulate matter (PM<sub>10</sub>) were collected from the National Observatory of the air quality in Tunisia. The impact of outdoor air pollution on the daily emergency department visits was studied by a simple Pearson correlation and by a binomial negative regression using generalized linear models.

**RESULTS** We recorded 9814 visits to the emergency department for asthma (6499, 65.5%) or COPD exacerbation (3315, 34.5%) between 2007 and 2014. Overall mean age was 52 ± 21 years; it was respectively 47 ± 21 and 60 ± 18 years for asthma and COPD. 63% were male. Positive correlation was observed between number of visits for respiratory symptoms and NO<sub>2</sub> ambient air concentration (Spearman correlation coefficient = 0.204,  $P < 10^{-3}$ ), and O<sub>3</sub> level (Spearman correlation coefficient = 0.109,  $P < 10^{-3}$ ). Multivariate analysis showed significant positive association between the daily numbers of emergency department visits for asthma and COPD (Adjusted OR = 1.011, 95% CI: 1.006–1.015,  $P < 10^{-3}$ ).

**CONCLUSIONS** Exacerbation of respiratory illness in the Greater Tunis was correlated to the NO<sub>2</sub> outdoor air concentration level which can be related to the traffic density in the capital city of Tunisia and its provinces.

**DISCLOSURE** Nothing to disclose.

## PSI.239

**Allergic respiratory illness and environment of schoolchildren in Tunisia**H. Bellali<sup>1</sup>, C. Harizi<sup>1</sup>, A. Hechaichi<sup>1</sup>, S. Aissaoui<sup>1</sup>, C. Bouland<sup>2</sup> and M. K. Chahed<sup>1</sup><sup>1</sup>Epidemiology and Statistics Department, A Mami Hospital, Ariana, Tunisia; <sup>2</sup>Environmental and Occupational Health Department, Public Health School, Private University of Brussels, Brussels, Belgium

**BACKGROUND** There is increasing evidence that environmental conditions contribute to the development of allergic illness including asthma, the relationship between home and school environment and allergic respiratory illness was studied in schoolchildren in Tunisia.

**METHODS** A cross sectional study was carried out in an urban primary school and a rural one, in Ariana region. One classroom by level was randomly chosen in each school. Children aged from 9 to 12 years old and their parents responded to a standardized self-administered questionnaire. Information on

residential history, household characteristics, school air quality and medical history of children and parents was obtained. Relationship between home and school environment was checked out using a backward logistic regression approach.

**RESULTS** Asthma prevalence was 6.8% and allergic respiratory illness prevalence was 53.0%. Multivariate analysis showed that the risk of allergic respiratory illness was negatively associated with the school indoor air quality according to the score given by children to appreciate the air quality inside their schools. Household conditions were associated with a high risk of these diseases such as air conditioning, living in proximity of an agricultural area with a pesticide application, the presence of a gas water heater in the bathroom whether it connected to the outside or not and the leak or loss of water on the walls, the floor and the ceiling.

**CONCLUSIONS** This epidemiologic study showed that indoor conditions were harmful to the respiratory system. To confirm relationship between allergic respiratory illness and indoor air quality, concentration levels of NO<sub>2</sub>, CO<sub>2</sub>, O<sub>3</sub>, particulate matter (PM<sub>10/2.5</sub>), formaldehyde, VOC and dust mites in the classrooms and at home must be determined.

**DISCLOSURE** Nothing to disclose.

## PSI.240

**Non-carcinogenic risk from exposure to diethyl phthalate through bottled water consumption in children**M. Zare Jeddi<sup>1,2</sup>, M. Yunesian<sup>2,3</sup>, N. Rastkari<sup>4</sup> and R. Ahmadkhaniha<sup>5</sup><sup>1</sup>Institute for Environmental Research (IER), Tehran University of Medical Sciences, Tehran, Iran; <sup>2</sup>Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran; <sup>3</sup>Center for Water Qualities Research (CWQR), Tehran, Iran; <sup>4</sup>Center for Air Pollution Research (CAPR), Institute for Environmental Research (IER), Tehran University of Medical Sciences, Tehran, Iran; <sup>5</sup>Department of Human Ecology, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

The substances migrating from materials in contact with food have been recognized as important issues in human health and attracted increasing attention over the past decades. Throughout the world, Polyethylene terephthalate (PET) is the most popular material for packaging, accounting for >99% of all beverage bottles. Previous studies demonstrated that PET bottles can release harmful chemicals such as the diethyl ester of phthalic acid (DEP). This compound not used directly in the PET production, but as non-intentionally added substances during the manufacturing of PET, may come from a wide variety of sources. Adverse effects of exposure to DEP on fertility parameters and development are considered relevant to humans, especially within a critical window of development. Data from animal studies indicate that DEP is rapidly and almost completely absorbed following oral or inhalation exposure, with 100% bioavailability by these routes. This contaminated food event caused shock and panic among the general public and bottled water safety becomes a controversial issue. So, the purpose of this study was:

- 1 to evaluate the intake of DEP from drinking bottled water and health risk assessment; and
- 2 to assess the contribution of the bottled water to the DEP intake against on tolerable daily intake values.

DEP migration was investigated in six brands of PET-bottled water under different storage conditions at various time intervals using gas chromatography-mass spectroscopy. Eventually, a health risk assessment was conducted and the margin of exposure (MOE) was calculated. The results show that contact time with packaging material and storage temperatures causes release



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of DEP into water from PET bottles. But, when comparing the DEP concentration with the initial level, the results demonstrated that the release of phthalates were not substantial in all storage conditions especially at low temperatures (<25°C) and freezing conditions. The daily intake of DEP from bottled water was much lower than that reference value. However, the lowest MOE was estimated for high water consumers (children) but, the MOE was much higher than 1000, thus, low risk is implied. Consequently, PET-bottled water is not a major source of human exposure to DEP and from this perspective is safe for consumption.

**DISCLOSURE** Nothing to disclose.

**PSI.241****Carcinogens and bottled water: carcinogenic risk assessment of bis-(2-ethylhexyl) phthalate from daily exposure through bottled water consumption in pregnant and lactating women**

M. Zare Jeddi<sup>1,2</sup>, M. Yunesian<sup>2,3</sup>, N. Rastkari<sup>3</sup> and R. Ahmadvaniha<sup>4</sup>

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Substances that may migrate and affect the safety of food obviously depend on the nature of the packaging material. Consumers are worried about the exposure to bis-(2-ethylhexyl) phthalate (DEHP) as a carcinogen that can occur during consumer use of merchandises such as polyethylene terephthalate (PET) bottled water. PET has become the plastic packaging of choice for many food products, particularly beverages like bottled water and carbonated soft drinks. Moreover, many questions have been raised about possible migration of chemicals from the bottles and exposure to contaminants through bottled water consumption. Many studies reported the presence of hazardous substance such as DEHP in bottled water that may pose health risk to consumers. The International Agency for Research on Cancer (IARC) divides DEHP as a probable human carcinogen (Group 2B). The present study aims at assessing DEHP concentration in six brands of bottled water consumed in common storage conditions [40°C, room temperature, refrigerator temperature, freezing conditions (0 and –18°C) and outdoor]. Eventually, we associated potential carcinogenic health risks from PET-bottled water consumption in pregnant and lactating women. The analytical procedure was based on gas chromatography-mass spectrometry (GC-MS). The excess lifetime cancer risk (ELCR) due to water consumption was calculated in all storage conditions. We found that high temperatures are likely to increase the release of DEHP from PET-bottles into the water but the levels of these compounds in bottled water were found to be very low. The estimated intake to DEHP in the worse condition was 0.05 and 0.08 µg/kg/day in pregnant and lactating women, respectively. Finally, a negligible carcinogenic risk of  $1 \times 10^{-6}$  for DEHP was observed in lactating women due to consumption bottled water stored in worst condition (40°C). Our results prove that the estimated exposure to DEHP via consumption of PET-bottled water was very low. Finally, the levels of phthalates in bottled water are not a cause for fear for the pregnant and lactating women's health.

**DISCLOSURE** Nothing to disclose.

**PSI.242****The role of phthalates as environmental toxicants in development of autism in children: a systematic review**

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In recent years concern has risen about the increasing prevalence of Autism Spectrum Disorders (ASD). Although the involvement of genetic abnormalities in autism is well-accepted, recent studies point to an equal contribution by environmental factors, particularly environmental neurotoxic compounds. However, the identity of specific environmental chemicals such as phthalate esters that influence autism risk remains elusive. Phthalates are man-made chemicals used globally in production of commercial and industrial goods. Due to their widespread use, phthalates are ubiquitous in the environment. Exposure to phthalates can occur through ingestion, inhalation, intravenous, or dermal exposure over the life. This paper systematically reviews published evidence on associations between prenatal and/or childhood exposure to phthalate and autism. Studies were identified from a systematic literature search of Scopus, PubMed, PsycInfo and Web of Science prior to February 2015. This comprehensive bibliographic search among the total of 2342 articles identified four independent studies which were deemed relevant for further review. Among the four retrieved human studies, from different countries, two were case-control in design, while the other two studies were cohort studies, with using different valid measure of autism diagnosis. In included studies, exposure was mainly measured by determining phthalate exposure biomarkers in urine while the main instruments used to determination the urinary concentration of phthalate metabolites were somewhat different. Through the four studies investigated in this review, we deemed that only one study illustrated high quality using the criteria outlined. The other studies were of medium methodological quality. All of this research has a number of methodological limitations regarding outcome-exposure assessment and confounding factors analysis and control. The paucity of evidence different timing of urine collection, measurement instruments and health endpoints across studies may account for different results. This survey demonstrates that there is insufficient research on the possible association of prenatal and postnatal phthalates exposure and autism. Therefore, there is a need to carry out large, well-designed prospective cohort studies which both taken into account relevant pre-, peri- and neonatal confounders and characterization of exposure.

**DISCLOSURE** Nothing to disclose.

**PSI.243****Ambient air quality standards for particulate matter – an overview**

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**BACKGROUND** The air quality guideline values proposed by WHO are based on the available research and set at levels to protect public health. Governments are responsible for setting national or local air quality standards. Although available



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associations between air pollution and health outcomes are rather similar across all countries with no evidence for region specific health effects, air quality standards differ largely across the world. The objective of our investigation was to compile a list of all long-term standards set for particulate matter (PM). PM are an excellent marker of health relevant characteristics of air quality and scientific evidence for adverse effects of PM is very strong.

**METHODS** We have searched the web for official documents, asked WHO and international collaborators to contribute to the list of air quality standards with the respective reference.

**RESULTS** We have compiled air quality limit values from over 40 countries worldwide. 39 countries regulate particulate matter: 34 (87%) countries regulate PM<sub>10</sub>, 19 (49%) also or solely regulate PM<sub>2.5</sub>.

WHO proposes an annual air quality guideline value of 10  $\mu\text{g PM}_{2.5}/\text{m}^3$ , which has been adopted by only three countries to date: Australia with an even stricter value of 8  $\mu\text{g}/\text{m}^3$ , Canada and Iran, plus Switzerland currently discussing its adoption. The U.S. Environmental Protection Agency has set the limit value at 12  $\mu\text{g PM}_{2.5}/\text{m}^3$ . Other countries have set their limit value between 15 and 40  $\mu\text{g}/\text{m}^3$ . PM<sub>10</sub> limit values worldwide range from 20 (Switzerland) to 60  $\mu\text{g}/\text{m}^3$ . Most countries have set the limit value for PM<sub>10</sub> at 50  $\mu\text{g}/\text{m}^3$ .

**CONCLUSIONS** This is a first overview on ambient air quality standards worldwide for particulate matter. The broad spectrum of values reflects the countries' options to implement science based environmental regulations to protect public health. Studies have shown that the societal and health costs of air pollution are much larger than the costs of clean air regulations. In light of the globalized economy there is a clear need to also globalize air quality standards to protect peoples' health in all countries and to hinder the export of heavily polluting industries or technologies to countries with poor policies.

**DISCLOSURE** The author is working for the literature database LUDOK (Dokumentationsstelle Luft und Gesundheit) which selects, categorizes and summarizes relevant international research papers on the topic of air pollution and health outcomes on behalf of the Swiss Federal Office of the Environment (Bundesamt für Umwelt).

## PSI.244

## Short-term effects of ambient air pollution on asthma symptoms in children

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**INTRODUCTION** Asthma is the most frequent chronic disease among children worldwide. Reducing the level of air pollution is one prospective way of prevention of asthma. The aim of our project was to collect data on short-term effects of air pollution on asthmatic children in Ostrava, Czech Republic. Ostrava region is one of the worst air-polluted areas in Europe.

**METHODS** The study concerned 244 asthma patients diagnosed by doctors, severity of asthma classified as mild persistent or moderate persistent, age range of 6–18 years, residents of Ostrava city. The respondents (or their parents) filled an initial questionnaire. Then 232 participants daily completed one diary record, consisting of entries for the asthma symptoms and changes of the state of health. The study covered 4 months of the heating season November 2013–February 2014.

The concentrations of ambient air pollutants (particulate matter PM<sub>10</sub>, nitrogen dioxide NO<sub>2</sub> and sulphur dioxide SO<sub>2</sub>) were measured and provided as smoothed daily maps. GPS coordinates of two addresses of each respondent (the residence and the school) and time spent daily on those addresses were linked with the maps of concentrations of air pollutants. Thus the exposure of the respondents to each pollutant could be determined precisely.

The relationships between the cumulative exposures and the cumulative effects were established by locally estimated scatterplot smoothing (LOESS). After that, generalized additive models (GAM) with spline components were used. The models of increasing complexity permitted to take account of the pollutant concentrations, the apparent temperature and other factors in a single optimization process. The best fit was found using the Akaike information criterion (AIC).

**RESULTS** A substantial association between short-term air pollution changes and the complaints reported by the respondents was observed. It was significant for SO<sub>2</sub>, while non significant for NO<sub>2</sub> and PM<sub>10</sub>. In inverse question (incidence of 'no asthma symptoms') there was a significant association with lower PM<sub>10</sub> exposure and with lower SO<sub>2</sub> exposure.

**CONCLUSIONS** The study has demonstrated effects of short-term changes of the ambient air pollution on asthmatic children. A crucial point was the transformation of the rough input data into the set of individual exposures for each of the respondents.

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**DISCLOSURE** Nothing to disclose.

## PSI.245

Spatial models to estimate long-term exposure to NO, NO<sub>2</sub>, and NOx in the mega-city of Tehran, Iran

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**INTRODUCTION** Land use regression (LUR) models based on measurement campaigns are frequently used to assess long-term exposure to ambient air pollution. Our aim was to develop LUR models based on fixed-site monitoring station data for estimating annual and seasonal spatial variation in nitrogen oxide (NO), nitrogen dioxide (NO<sub>2</sub>) and nitrogen oxides (NOx) concentrations in the heavily polluted city of Tehran, Iran.

**METHODS AND MATERIALS** We used hourly 2010 data for NO, NO<sub>2</sub> and NOx from 23 fixed sites in the urban monitoring network. A total of 210 geographic variables were generated to potentially explain spatial patterns of air pollution concentrations. A standard approach was developed for LUR modeling given the specific situation of Tehran (Sci. Total Env., 2014, 488: 343–353), and LUR models were developed for annual, cool-season, and warm-season NO, NO<sub>2</sub>, and NOx.

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**RESULTS** The annual NO, NO<sub>2</sub>, and NO<sub>x</sub> concentrations were 88.1, 53.1, and 141.8 ppb, respectively. The correlation for the annual, cool-season, and warm-season averages, ranged from 0.96 to 0.99 for NO, 0.74 to 0.95 for NO<sub>2</sub>, and 0.94 to 0.99 for NO<sub>x</sub>. The correlation of NO and NO<sub>2</sub> ranged from 0.24 to 0.44. However, the correlation of NO and NO<sub>x</sub> ranged from 0.93 to 0.98. The correlation of NO<sub>2</sub> and NO<sub>x</sub> ranged from 0.35 to 0.58. The adjusted R<sup>2</sup> values ranged from 0.60 to 0.71 for NO models, 0.58 to 0.68 for NO<sub>2</sub> models, and 0.50 to 0.73 for NO<sub>x</sub> models. The most predictive variables were distance to traffic sources and high traffic areas, distance to primary schools, density of official areas, slope, and elevation.

**CONCLUSIONS** Our models indicate that spatial patterns did not much vary across the seasons. However, different pollutants, in particular NO and NO<sub>2</sub>, had independent spatial patterns. Overall, our models performed moderately well. In a next step, we will evaluate whether larger number of sites may lead to better models.

**DISCLOSURE** Nothing to disclose.

## PSI.246

## Impact of long- and shorter-term annoyance to transportation noise at home on physical inactivity

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**BACKGROUND** One pathway through which noise contributes to cardiovascular diseases could relate to noise annoyance, impaired sleep, and reduced physical activity. We investigated the association of long-term annoyance to residential transportation noise and its changes with physical activity.

**METHODS** We assessed 3842 participants (age 38–80) that attended the three visits of the population-based Swiss SAPALDIA cohort. The main outcome of physical activity was defined as being at least sufficiently active in moderate activities (i.e. >150 min/week, Yes/No). Participants reported general noise annoyance to daily transportation noise (all visits) and to specific sources at night (visit 3), i.e. road traffic, railway, and aircraft on an ICBEN-type 11-point scale. Long-term transportation noise annoyance was calculated as the average across visits 1 and 2. The change was derived as the continuous difference between transportation noise annoyance at visit 3 and visit 2. We used multivariate logistic regression adjusting for age, sex, socio-economic, lifestyles and environmental factors, and study area. We built models for each single noise annoyance, as well as a two-exposure model to study the independent association of long-term noise annoyance and its change with exercise. We evaluated effect modification by sex, sleep deprivation, and noise sensitivity.

**RESULTS** In total 16.4%, 7.4%, 3.1%, and 1.1% were annoyed (score ≥ 5) by general transportation, road, aircraft, and railway noise (visit 3), respectively. Models consistently indicated that annoyance to transportation noise, mainly related to road traffic and aircraft, was associated with reductions of 3–5% in being physically active at visit 3. The studied association was driven by long-term noise annoyance and not affected by changes in noise annoyance. Effect estimates with night-time

road traffic noise annoyance were greater among individuals reporting sleep deprivation.

**CONCLUSIONS** Longer-term transportation noise annoyance could contribute to cardiometabolic diseases through physical inactivity, particularly among individuals with impaired sleep.

**DISCLOSURE** Nothing to disclose.

## PSI.247

## Adoption of clean cooking technologies after improved stove promotion interventions, a case-study in three Peruvian Andean regions

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**INTRODUCTION** Clean cooking technologies are promoted in many low- and middle income settings to improve air quality and prevent health related problems. However, assessment of the effectiveness and sustainability of programmes promoting these technologies is scarce. Adoption of clean cooking technologies is a concept that is not well defined and currently there are different and heterogeneous definitions for adoption in the literature. The purpose of this study is to describe adoption of improved cookstoves (ICS) after stove promotion programmes in three geographically and culturally diverse rural Andean settings and thereby reflect on their effectiveness and sustainability.

**METHODS AND MATERIALS** An extensive socio-economic and livelihood questionnaire was administered to 1200 rural Peruvian families in Cajamarca, La Libertad and Cusco. A binary adoption variable will be created using answers on main and secondary cookstove in the home; amount of use of the respective technology (open fire, ICS, gas stoves); willingness to pay for a new ICS or replacement parts and fieldworker observations of the respective ICS. Subgroups of stove adoption will be defined according to different patterns of stove use. The concept of adoption will be informed with contextual information from focus group discussions that were conducted with selected households in the three areas.

**RESULTS** Results pending. Stove use and stove adoption will be described for 1200 families having participated in an ICS promotion programme. Results will be presented overall, by region and by the respective stove programme.

**CONCLUSIONS** We will discuss different definitions and categories of stove adoption and compare them to models currently described in the literature. Potential differences in adoption of clean cooking technologies between the three regions and between different stove programmes will be discussed and set into context with characteristics of these programmes.

**DISCLOSURE** Nothing to disclose.

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## PSI.248

**Environmental assessment, a tool to measure anthropogenic alteration in risk areas for Chagas disease transmission in the Brazilian Amazon**

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**INTRODUCTION** In assessing risk areas for Chagas Disease transmission in Pará state, in addition to entomological and serological surveys, an environmental assessment estimated the anthropization level and the spatial relationship between human Chagas cases and wild ecotopes. Reference was the percentage of existing acai fruit palm trees, the population of non-timber tree species and the extraction of commercial species.

**METHODS AND MATERIALS** On selected urban, rural and island areas of Abaetetuba municipality, Pará state, plant species were surveyed by using the Rapid Ecological Assessment (REA), a protocol developed by The Nature Conservancy for qualitative floristic inventory based on Observation Points (OPs). These OPs are selected areas with cross radius of 50 m where all plant species are recorded. Each species is assigned an occurrence or density and then can be categorized as Abundant, Common, Occasional or Rare. Abundant, if population species are very numerous and form spots or monospecific aggregates. Common, also numerous species, but do not form aggregates; Occasional, species whose occurrence pattern resembles that expected by chance. Rare if species occurs in low densities, with one individual by OP. Based on the exploration of non-timber species, in the extraction of commercial species such as the virola (*Virola surinamensis* (Rol.) Warb., pracuuba (*Mora paraensis* Ducke), macacaua (*Platymiscium duckei* Huber) and yellow sucupira (*Diploptropis martiusii* Benth.) and the percentage of acai planted area, it was assigned a score from 1 to 5, being 1 for the most anthropized area and 5 for the less disturbed.

**RESULTS** São Sebastião, an urban district, was the most anthropized area, with less risk of transmission, while Ajuaí Island was less anthropized and with increased risk for Chagas transmission.

**CONCLUSIONS** A correlation was observed between the least disturbed areas, presence of triatomine-infested palm trees and positive human cases.

**KEYWORDS** Environmental assessment, Amazon, Anthropization, Chagas Disease.

**DISCLOSURE** Nothing to disclose.

## PSI.249

**Urbanization and vector borne diseases in India**

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Urban populations are increasing at an unprecedented pace and unable to match the civic facilities leading to vector borne diseases. Other factors also contribute to the rise of Malaria, Dengue, Chikungunya, Japanese encephalitis and Filariasis.

Rural migration led to the establishment of 'urban slums' with poor housing and sanitary conditions. These areas have heavy

breeding potential of *A. stephensi*, *A. culicifacies* and *Culex quinquefasciatus* and have earned the reputation of peri-urban malaria paradigms. This is a difficult paradigm because of enormity of the diverse breeding sites. These slums are inhabited by 30–40% poor and marginalized people.

Urbanization is leading to the invasion by *Aedes aegypti*, the vector of Dengue and Chikungunya. The country reported 28 292 cases and 110 deaths due to dengue in 2010. An outbreak of Dengue haemorrhagic fever swept National Capital Territory, Delhi in 1996. More than 10 000 cases and 450 deaths due to DHF were recorded in various parts of Delhi. Again Delhi reported 1130 cases and 7 deaths in 2011.

Filariasis is endemic in different states of the country. Earlier this was a disease of urban areas but due to rapid environmental degradation and water stagnation the disease is now common in the rural areas. The vector *Culex quinquefasciatus* breeds in polluted water all over the country. In India 412 million people are at risk acquiring filariasis, of which 109 million population lives in urban areas.

Recently Japanese Encephalitis was also introduced in NCT-Delhi.

The different paradigms have variable receptivity and vulnerability and potential for VBD's outbreaks in urban areas. Control strategies therefore have to be paradigm specific and evidence based in an Integrated Vector Management (Mode). *A. stephensi* control will yield a collateral benefit of controlling *Aedes aegypti*, the vector of DF/DHF, because of shared breeding habitats with *A. stephensi*. Similarly *A. culicifacies* control will also yield control of *Culex quinquefasciatus*. Vector surveillance, vector control strategy, epidemiological trend and endemicity in different urban areas will be discussed in this paper.

**DISCLOSURE** Nothing to disclose.

## PSI.250

**Safe reuse of wastewater and sewage sludge in soils and crops**

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**INTRODUCTION** The reuse of both municipal wastewater for crop irrigation and sewage sludge for fertilization and improvement of soil productivity constitutes a practical method of disposal. In the immediate future, reuse is expected to contribute significantly in the minimization of environmental problems arising from the disposal of wastewater effluents on land and in aquatic recipients. The monitoring of a series of factors, related to the disposal of outflows on land, e.g. the detailed determination of meteorological, geological, soil, and microbiological parameters, will allow the safe reuse of municipal wastewater in agriculture, in urban centers, and the restoration of marginal areas. The data obtained so far, reveal the necessity of treated municipal wastewater (TMWW) reuse in the Mediterranean region, due to the dominant xerothermic conditions. Nevertheless, the long-term application of TMWW reuse enhances the possibility of the accumulation of heavy metals, toxic compounds, pesticides, and other xenobiotics in soil and plants, inducing adverse effects on human health and the environment. Consequently, the reuse practice should be applied in a controlled manner. In Greece, TMWW and sewage sludge are reused in agriculture and in reforestation.

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**MATERIALS AND METHODS** Although sewage sludge use positively affects soil and plants, its long-term application may result in toxic accumulation of heavy metals with unfavorable effects on plant growth. In this respect, to ensure safe sludge reuse and effective application, the monitoring of soil pollution is required. In order to estimate the soil pollution, indices such as Pollution Load Index (PLI), Elemental Pollution Index (EPI), and Total Concentration Factor (TCF) were determined. **RESULTS** A considerable number of heavy metal interactions are taking place in soil and plants, under the influence of both TMWW and sewage sludge. The quantification of the contribution of the above interactions, showed a significant acceleration of nutrients and minerals levels in soil and plants. **CONCLUSION** As TMWW are marginal waters, their utilization in agriculture, necessitates the acceptance of farmers and consumers. Additionally, the development of management plans, transport and implementation systems, is necessary, with regard to TMWW and sewage sludge reuse practices. Finally, further research is required to secure the highest safety and effectiveness of the reuse of TMWW and sewage sludge in agriculture and other sectors.

**DISCLOSURE** Nothing to disclose.

**PSI.251****Climate change and health: does it matter in Switzerland?**

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Amplified by global warming, there is a need to reduce the public health impacts of exposure to hot weather. The health risks of heatwaves may vary across the globe depending on climatic, demographic and socioeconomic profiles. In Switzerland, a heat-wave occurring during summer 2003 caused an estimated 7% increase in all-cause mortality. As a consequence, the Swiss Federal Office of Public Health provided recommendations on how to behave during hot weather periods.

Our project aims to

- 1 evaluate implemented preventive measures to reduce heat-related mortality,
- 2 to assess the effect of heatwaves on mortality in Switzerland, and
- 3 to identify meteorological parameters best describing the heat effect on mortality.

First, adopted and recommended measures aiming to reduce heat-related mortality in different counties in Switzerland will be collected and evaluated. Second, Swiss mortality data (1990–2012) and meteorological data from MeteoSwiss will be used to investigate heat-related excess mortality. The hypothesis will be tested whether the effect of heat episodes on mortality has been reduced since 2003. Finally, both the results of our project and of other identified relevant epidemiological studies on the topic will be made available to agencies and stakeholders in Switzerland by means of workshops and newsletters.

The project will generate evidence on the meteorological parameters of heatwaves most strongly related to increased mortality. It will indicate whether an increased sensitivity to health risks of heatwaves and adopted policies have reduced the extent of heat-related mortality in Switzerland. This information may contribute to limiting the public health impacts of heatwaves and climate change worldwide, and will generate evidence for new potential adaptation measures within health policy programs.

**DISCLOSURE** Nothing to disclose

**PSI.252****Long/short-term effects of air pollution in Tehran, Iran**

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A broad range of adverse health outcomes due to short- and long-term exposure to air pollutants, at levels usually experienced by urban populations throughout the world, are established. In the present work, we estimated the chronic and acute effects of air pollution on the health of inhabitants in Tehran city, the capital of Iran.

We applied the approach proposed by WHO using the AirQ 2.2.3 software. Concentrations of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub> in 2014 were used to assess exposure and long and short-term effects. The annual average of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub> were 78.8, 32.0, 49.9, 85.7 and 35.8 µg/m<sup>3</sup>, respectively. Considering long and short-term effects, PM had the highest health impact on the 9 000 000 inhabitants of Tehran city.

Our results showed that the magnitude of the health impact estimated for the city of Tehran highlights the need for urgent action to reduce the health burden of air pollution and the AirQ software seems an effective and easy tool, helpful in decision-making.

**DISCLOSURE** Nothing to disclose.

**PSI.253****Facility-based control of healthcare-associated infection in maternities of Kyrgyzstan**

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<sup>1</sup>Health Care Waste Management (HCWM) Project, Financed by the Swiss Agency for Development and Cooperation (SDC), implemented by the Swiss Red Cross (SRC), Bishkek, Kyrgyzstan; <sup>2</sup>International Cooperation, Swiss Red Cross, Bern, Switzerland; <sup>3</sup>Republican Centre for Infection Control (RCIC) under the Ministry of Health of the Kyrgyz Republic, Bishkek, Kyrgyzstan

**INTRODUCTION** Monitoring systems of Health Care-Associated Infections (HCAI), in most countries of the Commonwealth of Independent States often fail to achieve their objectives due to underreporting of HCAI. This is due to punitive actions from sanitary-epidemiological stations (SES) and healthcare authorities. In 2005, as part of the national strategy to update and reinforce management of HCAI, infection control specialists were introduced in all health facilities across the country. These professionals faced significant challenges to fulfill their duties due to insufficient technical knowledge and weak analytical skills. Six training modules were offered to the infection control specialists of referral-level facilities over a 1-year period. On-site supportive supervision by national experts followed after each training.

**METHODS** Two independent cross-sectional studies were conducted in 2013–2014 with a 1-year interval (study I – before, study II – after training on HCAI) in the same settings of 13 maternity wards with annual facility birth numbers from 404 to 7003 and overall coverage of 46 994 births annually (31.7% of all births in the country) to assess prevalence of HCAI in the context of changing practices. Study I covered 316 women after delivery, including 61 (19.3 ± 4.4%) with caesarean section



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(CS) and 342 newborns, including 68 ( $19.9 \pm 4.2\%$ ) with low birth weight (LBW or  $<2500$  g) and study II covered 302 women after delivery, including 75 ( $24.8 \pm 4.9\%$ ) with CS, and 307 newborns, including 60 ( $19.5 \pm 4.4\%$ ) with LBW. HCAI definitions were adapted from those of Centers of Disease Control. No microbiology testing was used because of very limited availability and reliability of microbial culturing.

**RESULTS** HCAI prevalence among women was higher in CS versus vaginal birth (VB) –  $6.6 \pm 6.2\%$  vs.  $2.4 \pm 1.9\%$  (OR 2.9, CI 0.8–10.7) in study I, and  $8.0 \pm 6.1\%$  vs.  $2.6 \pm 2.1\%$  (OR 3.2, CI 1.0–10.3) in study II. Among newborns HCAI rate was significantly higher in LBW versus normal birth weight (NBW) –  $16.2 \pm 8.7\%$  vs.  $4.0 \pm 2.7\%$  (OR 4.8, CI 2.0–11.7) in study I and  $8.3 \pm 7.0\%$  vs.  $2.4 \pm 1.9\%$  (OR 5.4, CI 1.6–10.2) in study II.

**CONCLUSIONS** HCAI was numerically lower among newborns in 2014 vs. 2013, particularly in LBW babies ( $16.2\%$  vs.  $8.3\%$ ,  $P > 0.05$ ) suggesting that changing practices may have had an impact on reduction of HCAI. Currently an updated model of facility-based infection control is being replicated in all hospitals all over the country.

**DISCLOSURE** Studies were conducted by RCIC and supported by HCWM project, funded by SDC.

## PS1.254

### Prevalence of constitutive and inducible resistance to clindamycin in staphylococcal isolates in Rafsanjan, southeast of Iran 2013

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**INTRODUCTION** Resistance to clindamycin (CL) in staphylococci is both constitutive and inducible. In this study we evaluated the prevalence of the constitutive and inducible resistance to CL among isolated staphylococci in Ali-Ebne Abitaleb hospital in Rafsanjan (southeast of Iran).

**MATERIAL AND METHODS** This descriptive analytical study was conducted on 100 non-duplicated staphylococci isolates. All collected isolates were identified based on conventional laboratory methods. Susceptibility to oxacillin, cefoxitin, erythromycin and clindamycin (CL) was performed by agar disk diffusion method according to the Clinical Laboratory Standards institute (CLSI) guidelines. D-test was carried out for all the isolates with resistance phenotype for erythromycin and susceptible phenotype for CL.

**RESULTS** Of the 100 staphylococci isolates, 66% were susceptible to CL, 27% had constitutive and 7% had inducible resistance to CL. The frequencies of constitutive and inducible resistance for CL in methicillin resistant *Staphylococcus aureus* (MRSA) were 51.2% and 12.82% respectively. Statistical analysis revealed the inducible resistance in MRSA isolates to be 3.92 times more frequent than that in methicillin sensitive *Staphylococcus aureus* (MSSA).

**CONCLUSIONS** The study results revealed that inducible clindamycin resistance should be determined in all MRSA isolates and also *Staphylococcus* strains resistant to erythromycin and susceptible to clindamycin by using D-test.

**KEYWORDS** *Staphylococcus aureus*, Clindamycin, Constitutive Resistance, Inducible resistance, Iran.

**DISCLOSURE** Nothing to disclose

## PS1.255

### Epidemiology and clinical presentation of MERSCoV in Saudi Arabia: a systematic review

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**BACKGROUND** Middle East Respiratory Syndrome is caused by a novel betacoronavirus. It was first reported in Saudi Arabia in September 2012. The disease resulted in severe respiratory illness and mortality rates ranging between 40% and 60%.

**AIM OF THE WORK** This systematic review analyses the clinical presentations of Middle East Respiratory Syndrome Coronavirus infection in Saudi Arabia.

**DATA SOURCES AND STUDY SELECTION** We searched for all relevant English language publications with the terms Middle East respiratory syndrome and Human Coronavirus Erasmus Medical Center individually and in combination with the terms epidemiology, transmission, clinical presentation, sequence. We searched MEDLINE conference abstracts, Saudi Ministry of Health data, World Health Organization data and Centers of Disease Control data and statistics from 2012 references until 2015.

**DATA EXTRACTION** Two reviewers extracted information on study design, population characteristics, clinical characteristics, disease outcomes and assessed risk of bias.

**DATA SYNTHESIS** We included 139 studies published in Medline, 218 Saudi Ministry of Health, World Health Organization and Centers for disease control and prevention notifications. As of 20 April, 2015, 981 cases of Middle East Respiratory Syndrome Coronavirus (67% of men and 33% women) were reported in Saudi Arabia. The mortality rate was 43.5% (428 patients). 548 patients was resolved. The majority of cases (72%) are older than 40 years, 25% are 20–40 years old, and 3% are  $<20$  years. Early cases were clustered in the Eastern region, however by mid-2013 cases emerged in central and Western Saudi Arabia. Interfamilial spread, occupational transmission for healthcare workers, exposure to camels were the identified modes of transmission. In 82% of cases, flu like symptoms and fever were initially observed. Positive cases showed progressive rise in fever, cough, and shortness of breath. Pneumonia, respiratory failure that requires mechanical ventilation and support in an intensive-care unit occurred in advanced cases. Gastrointestinal symptoms particularly diarrhoea, has been reported. Some patients developed renal failure and septic shock.

**CONCLUSION** More studies are required to elucidate the modes of transmission of Middle East Respiratory Syndrome Coronavirus. Interpersonnal transmission is an important risk factor particularly in familial and hospital settings. Severe upper respiratory infection is the prominent clinical presentation.

**DISCLOSURE** Nothing to disclose.

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## PSI.256

**Antibiotics usage in infants during the first 18 months of life in a cohort study in Benin: the role of mothers and children's characteristics at birth and infants' clinical findings at consultations**A. Brembilla<sup>1,2</sup>, F. Mauny<sup>1,2</sup>, A. Garcia<sup>3</sup>, G. K. Koura<sup>3</sup>, P. Deloron<sup>3</sup> and J.-F. Faucher<sup>3,4</sup><sup>1</sup>UMR 6249 Chrono-Environnement, Besançon, France; <sup>2</sup>Centre de Méthodologie Clinique CHRU Besançon, Besançon, France; <sup>3</sup>UMR 216 MERIT IRD, Paris, France; <sup>4</sup>Service des Maladies Infectieuses et Tropicales, CHRU Besançon, Besançon, France

From 2007 until 2009, a cohort study on infections in infants followed from birth until 18 months of age took place in a rural setting of Southern Benin. Since it appeared that the number of both malarial and non malarial infections were positively associated with placental malaria, our hypothesis is that placental malaria may also have an impact on antibiotic usage (AU) during follow-up. The aim of this study is to describe and analyse AU in this cohort.

Data on the mothers and children's characteristics at birth were available for the analysis. At each consultation, data on demographic characteristics, syndromic diagnostics and antibiotics (AB) prescriptions were recorded. When fever was stated or declared (<24 h before consultation), a rapid diagnostic test (RDT) was performed, and if positive, treated with the recommended antimalarials. A multilevel logistic regression was used.

A total of 538 children were followed, leading to 4451 consultations, 54.6% of which were related to fever. Malaria represented 37.3% of febrile episodes. AB were significantly less prescribed during the first semester of life, compared with the rest of follow-up. Overall, AB were prescribed in 44.4% of consultations, 41% of which were not related with fever. Among consultations related to fever, AB were not more frequently prescribed when fever was stated than not stated. AB were prescribed in 40% and 51% of malarial and non malarial fevers respectively. By increasing order, AU was positively associated with non malarial fevers, digestive symptoms, respiratory symptoms. None of mothers and children's characteristics at birth had an impact on AU. Odds ratios (95% confidence interval) were 1.00 (0.99–1.01), 1.08 (0.92–1.26), 1.03 (0.91–1.17), 1.09 (0.89–1.33) for mothers' age, parity anemia and placental malaria respectively. And odds ratio (95% confidence interval) were 1.06 (0.86–1.30), 0.90 (0.74–1.11) for children's birth weight and prematurity respectively.

Although placental malaria is a risk factor for malarial and non malarial infections in this cohort, it has no impact on AU in infants during follow-up. AB were frequently prescribed, but nearly half of these prescriptions occurred with consultations not related to fever. Therefore, the rationale use of antibiotics in this population should not focus strictly on the management of fevers. Clinical profiles associated with AU were identified.

**DISCLOSURE** Nothing to disclose.

## PSI.257

**Prevalence, aetiological agents and antimicrobial sensitivity pattern of bacterial meningitis among children receiving care at Kilimanjaro Christian Medical Centre, Moshi, Tanzania**M. S. Abdallah<sup>1,2,3</sup>, J. G. Gidabayda<sup>1,2</sup>, A. M. Saajan<sup>1,2</sup>, G. S. Kibiki<sup>1,3</sup>, B. T. Mmbaga<sup>1,2</sup> and R. N. Philemon<sup>1,2</sup><sup>1</sup>Kilimanjaro Christian Medical University College (KCMUCo), Moshi, Tanzania; <sup>2</sup>Paediatrics and Child Health, Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania; <sup>3</sup>Kilimanjaro Clinical Research Institute (KCRI), Moshi, Tanzania

**BACKGROUND** Bacterial meningitis is an inflammation of the meninges that occurs in response to bacteria causing a significant number of morbidity and mortality worldwide. Diagnosis of bacterial meningitis combines a high index of clinical suspicion and laboratory confirmation through cerebrospinal fluid (CSF) analysis. Despite antibiotic treatment, mortality remains high and many children end with neurological sequel. The aim of this study was to determine prevalence, etiological agents and antimicrobial sensitivity pattern among children aged <13 years with bacterial meningitis at Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania.

**METHODOLOGY** This was a hospital based cross sectional study carried out in KCMC Paediatric ward from December 2013 to May 2014. Eighty children <13 years of age were consecutively recruited. Lumbar puncture was done and CSF collected for microscopy, culture, sensitivity, and polymerase chain reaction (PCR) test. PCR was done in 48 randomly selected CSF samples. Data was collected by structured questionnaires and laboratory data sheet. Etiological agents were identified and antibiotic sensitivity was tested. Analyses were performed using SPSS version 20.0.

**RESULTS** Overall 19 children had acute bacterial meningitis as identified using both confirmation methods. Gram stain and Culture identified 2/80 (2.5%); whereas PCR confirmed infection in 18/48 (37.5%). *Escherichia coli* ( $n = 18$ ) was the commonest organism isolated followed by *Streptococcal pneumonia* ( $n = 1$ ). Both isolated organisms were sensitive to the common used antibiotics; ampicillin, chloramphenicol, gentamycin and cephalosporins.

**CONCLUSION** PCR yielded more organisms. *Escherichia coli* were the commonest organism and were sensitive to empirical used antibiotics for treatment of bacterial meningitis in our set up.

**DISCLOSURE** Nothing to disclose.

## PSI.258

**Prevalence, aetiological agents and antimicrobial sensitivity pattern of urinary tract infection among children admitted at Kilimanjaro Christian Medical Centre, Moshi, Tanzania**J. G. Gidabayda<sup>1,2</sup>, R. N. Philemon<sup>1,2</sup>, B. T. Mmbaga<sup>1,2</sup>, M. S. Abdallah<sup>1,2</sup>, A. M. A. Saajan<sup>1,2</sup> and L. J. Msuya<sup>1,2</sup><sup>1</sup>Paediatric and Child Health, Kilimanjaro Christian Medical University College (KCMUCo), Moshi, Tanzania; <sup>2</sup>Paediatric and Child Health, Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania

**BACKGROUND** Urinary tract infection (UTI) in children is recognized as one of the major causes of acute morbidity in outpatient and inpatient care. Although the drug treatment for UTIs is simple, the disease is still largely misdiagnosed and mismanaged. Worldwide, there is an increasing resistance to the conventional antimicrobial drugs among the organisms causing UTIs. There is a need to gain knowledge of pathogens causing

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UTIs and their effective antimicrobial sensitivity in our population. The aim of this study was to determine Prevalance, Aetiological agents and Antimicrobial sensitivity pattern of UTI among children admitted at Kilimanjaro Christian Medical Centre (KCMC).

**METHODOLOGY** This was a cross-sectional hospital based study conducted at KCMC Paediatrics and Child Health Department, where all children aged 2 months–14 years admitted between December 2013 and April 2014 were recruited. A structured questionnaire and laboratory data sheet was used for data collection. Urine samples were collected by trans-urethral catheterization or clean-catch midstream method. Dipstick was used to test for nitrate and leukocytes. Positive samples were sent for culture and antimicrobial sensitivity testing. Data analysis was carried out using SPSS version 20.0. **RESULT** UTIs were detected in 11.4% (39/343) of children. Common isolated bacteria were *Escherichia coli* 46.2% (18/39) and *Klebsiella pneumoniae* 30.8% (12/39), both were highly sensitive to Ciprofloxacin, Nalidixic acid and Ceftazidime and less sensitive to Ampicilin, Co-trimoxazole and Clindamycin. **CONCLUSION** Empirical used antibiotics in our set up; Ampicilin and Cotrimoxazole has shown to have low sensitivity, therefore there is a need to reconsider their use as a first-line drug of choice.

**ACKNOWLEDGEMENTS** We would like to thank Medical Education Partnership Initiative KCMC (MEPI-KCMC) for funding this project; we also extend our thanks to parents and guardians for allowing their children to participate in the study. **DISCLOSURE** The authors declare that there is no any conflict of interest associated with this article.

**PSI.259****Bacteriological findings in patients with ocular infection and antibiotic susceptibility patterns of isolated pathogens**

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**INTRODUCTION** Isolation of common pathogens involved in ocular infection, and their *in-vitro* susceptibility to commonly used ocular antibiotics, as well as the trends in antibiotic resistance developed by these pathogens, were investigated. **MATERIALS AND METHODS** Corneal scrapings were obtained from 318 hospitalized patients and inoculated directly onto enriched and differential culture media. Subcultures were performed on selective media. The necessary biochemical tests were conducted and the organisms identified using standard procedures. Susceptibility of isolated pathogens to commonly-used ocular antibiotics was examined using standard susceptibility testing.

**RESULTS** 70 organisms were isolated. Gram-positive cocci accounted for 47 (67.2%) and gram-negative bacilli for 23 (32.8%) bacterial isolates. Coagulase negative Staphylococci (33%) and *Pseudomonas* species (24%) were the most commonly-isolated organisms. In susceptibility testing, gentamicin had coverage against 35 (74.5%) of 47 gram-positive cocci and 19 (82.6%) of 23 gram-negative bacilli tested. The coverage of tetracycline, cephalotin and ceftriaxon against gram-positive cocci were 61.7%, 55% and 53%, respectively. All the tested gram-positive cocci showed resistance to cefotaxime and penicillin. Ceftriaxon and tobramycin had coverage against 17 (73.9%) and 14 (60.8%) of 23 gram-negative bacilli isolates,

respectively. The coverage of vancomycin against coagulase-negative Staphylococci was 100%.

**CONCLUSIONS** Susceptibility analysis revealed that antibiotic with the greatest coverage was gentamicin (77.1% of 54 isolates). Gentamicin also had good coverage against gram-positive cocci, which constituted the majority (67.1%) of ocular isolates.

**DISCLOSURE** Nothing to disclose.

**PSI.260****First report of bloodstream infections caused by extended-spectrum beta-lactamase producing bacteria in Zanzibar**

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**INTRODUCTION** Bloodstream infections (BSI) are common infections associated with high case-fatality rates. Urgent antibiotic treatment can save patients' lives, but antibiotic resistance can make antibiotic therapy useless. This study is the first to collect epidemiological data on BSI from Unguja, Zanzibar, and can help optimize local guidelines for empiric treatment.

**MATERIALS AND METHODS** Clinical data and blood for culturing and susceptibility testing were obtained from 469 consecutively enrolled neonates, children and adults presenting with signs of systemic infections at Mnazi Mmoja Hospital, Zanzibar.

**RESULTS** Pathogenic bacteria were recovered from the blood of 14% of the patients (66/469). The most frequently isolated microbes were *Klebsiella pneumoniae*, *Escherichia coli*, *Acinetobacter* spp. and *Staphylococcus aureus*. The infection was community-acquired in 56 patients (85%) and hospital-acquired in 8 (12%) (missing data in 2 patients). BSI caused by extended-spectrum beta-lactamase (ESBL) producing *Enterobacteriaceae* (*E. coli*, *K. pneumoniae*) was found in 5 cases, community-acquired in 3 and hospital-acquired in 2 infections. Three of these patients died. Six of 7 *Salmonella typhi* isolates were multidrug resistant. *Streptococcus pneumoniae* was found in one patient only.

**CONCLUSIONS** This is the first report of ESBL-producing bacteria causing BSI in Zanzibar. Our finding of community-acquired BSI caused by ESBL-producing bacteria is alarming, as it implies that these difficult-to-treat bacteria have already spread in the society. In the local setting these infections are virtually impossible to cure. The findings call for increased awareness of rational antibiotic use, infection control and surveillance to counteract the problem of emerging antimicrobial resistance. **DISCLOSURE** The project has not been granted any commercial support. It has been supported by the Centre for Tropical Infectious Diseases (CTID), Haukeland University Hospital, Bergen, Norway.

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## PSI.261

**Antibiotic resistance patterns among children at Kombewa District Hospital in Kenya**J. Oyieko<sup>1</sup>, J. K. Owuoth<sup>1</sup>, B. Andagalu<sup>1</sup>, A. Otieno<sup>1</sup>, J. Cowden<sup>2</sup>, S. Ondolo<sup>1</sup>, S. Gondi<sup>1</sup>, B. Ogutu<sup>1</sup>, L. Otieno<sup>1</sup> and W. Otieno<sup>1</sup><sup>1</sup>KEMRI-Walter Reed Project/USAMRU-K, Kisumu, Kenya; <sup>2</sup>US Army Medical Research Unit Kenya – Walter Reed Project, Kisumu, Kenya

**INTRODUCTION** Blood cultures are not frequently done in public hospitals in Kenya and treatment of suspected invasive bacterial infection is empirical. There is limited data on antibiotic susceptibility patterns of common pathogens that cause disease in our setting. We are reporting data obtained from a pilot hospital-based study and the phase III RTS, S malaria vaccine trial that followed.

**METHODS** This observational study was conducted at Kombewa District Hospital in the periods September 2008–March 2009, when all admitted acutely ill children aged 2 months–4 years were eligible for inclusion, and January 2010–October 2013 when all admitted children in the vaccine trial were eligible. Using a protocol defined algorithm, patients were clinically evaluated and routinely had blood cultures by the BACTEC<sup>®</sup> system and antibiotic susceptibility assays done.

**RESULTS** In 2008/2009, of the 75 positive blood cultures, 26 (34.67%) were positive for *Salmonella paratyphi* type B (*S. paratyphi* B); >95% were resistant to amoxicillin/clavulanate (amoxil/clav), chloramphenicol and cotrimoxazole (CTX), while all these isolates were susceptible to ceftriaxone. Of four (5.3%) *Streptococcus pneumoniae* (*S. pneumoniae*) isolates, 75% and 100% were susceptible to penicillin and chloramphenicol respectively but all were resistant to CTX. The 16 (17%) *Staphylococcus aureus* isolates were susceptible to Penicillin while resistant to CTX. In the period 2010–2013, of the 56 positive blood cultures, there were 24 (42.9%) *S. paratyphi* B isolates; 100% were resistant to amoxil/clav and CTX while 81.8% were resistant to chloramphenicol. All *S. paratyphi* B isolates were susceptible to ciprofloxacin while 70.8% were susceptible to ceftriaxone. There were 4 (5.3%) *S. pneumoniae* isolates; 100% were susceptible to penicillin, chloramphenicol and ceftriaxone but all were resistant to amoxil/clav, and CTX.

**CONCLUSIONS** *S. paratyphi* B remained the most common organism isolated in the two time periods. There was an increase in the number of ceftriaxone-resistant *S. paratyphi* B isolates in the second period. *S. pneumoniae* largely maintained susceptibility to commonly used antibiotics. Resistance to CTX and amoxil/clav remained high. Ciprofloxacin may be a potential alternative to ceftriaxone for the treatment of *S. paratyphi* B.

**DISCLOSURE** The Pilot and RTS, S studies were Funded by GlaxoSmithKline Biologicals and the PATH Malaria Vaccine Initiative.

## PSI.263

**Non-typhoidal salmonellosis, antimicrobial resistance and co-infection with parasites among patients with diarrhea and gastroenteritis in Addis Ababa, Ethiopia**

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Non-typhoidal *Salmonella* (NTS) is an important public health problem worldwide. Published information on NTS among human patients is very scarce in Ethiopia. This study investigated the prevalence, serotype distribution and antimicrobial suscepti-

bility of *Salmonella* among diarrheic patients and patients with gastrointestinal complaints. Stool samples were cultured for *Salmonella*. *Salmonella* serotyping was conducted using slide agglutination and microplate agglutination techniques. Antibiotic susceptibility testing was performed using the disk diffusion technique.

A total of 59 stool samples out of 957 (6.2%) were *Salmonella* culture positive. Fifty-five (7.2%) of 765 diarrheic patients from health centers and 4 (2.1%) of 192 patients from Tikur Anbessa Specialized Hospital (TASH) were culture positive for *Salmonella*. Having watery diarrhea was significantly associated with *Salmonella* culture positivity ( $\chi^2 = 7.9$ ;  $P = 0.02$ ). Consumption of raw vegetables was associated with *Salmonella* culture positivity OR = 1.9 (95% CI 1.1–3.3) whereas age, sex, consumption of raw meat and milk had no significant association with *Salmonella* positivity. Patients positive for *Entamoeba histolytica* had higher probability of being also *Salmonella* culture positive with OR = 1.99 (95% CI 1.1–3.67). Eleven serotypes were detected, and the most prominent were *S. typhimurium* (37.3%), *S. virchow* (34%), and *S. kottbus* (10.2%). Other serotypes were *S. miami*, *S. kentucky*, *S. newport*, *S. enteritidis*, *S. braenderup*, *S. saintpaul*, *S. concord* and V:ROUGH-O. Resistance to three or more antimicrobial agents was detected in 27 (40.3%) of the total isolates. Resistance to five or more antimicrobial agents was detected in 17 (25.4%) of the isolates. Resistance against individual antimicrobials was found at varying proportions: streptomycin (50; 74.6%), nitrofurantoin (27; 40.3%), sulfisoxazole (26; 38.8%), kanamycin (23; 34.3%), cephalothin (12; 17.9%), and ampicillin (11; 16.4%) respectively. Two *S. kentucky*, one *S. typhimurium* and one *S. concord* isolates were multi-drug resistant to more than 10 antimicrobial agents. The study demonstrated the dominance of *S. typhimurium*, and *S. virchow*. Overall, prevalence of MDR was low compared to previous studies. Continuous monitoring of circulating serotypes and antimicrobial resistance profile is essential for proper treatment of patients.

**DISCLOSURE** Nothing to disclose.

## PSI.264

**High rates of colonisation with ESBL producing Enterobacteriaceae among hospital patients and their caretakers in Rwanda**M. Kurz<sup>1</sup>, C. Bayingana<sup>2</sup>, J. Ndoli<sup>2</sup>, A. Sendegeya<sup>2</sup>, J. B. Gahutu<sup>2</sup> and F. P. Mockenhaupt<sup>1</sup><sup>1</sup>Institute of Tropical Medicine and International Health, Charité – Universitätsmedizin Berlin, Berlin, Germany; <sup>2</sup>University Teaching Hospital of Butare, University of Rwanda, Butare, Rwanda

**BACKGROUND** Extended spectrum beta-lactamase (ESBL) producing *Enterobacteriaceae* pose a serious threat to health and appear to emerge rapidly in sub-Saharan Africa. We assessed the rate of colonization with these bacteria among patients and caretakers attending a tertiary hospital in Butare, Rwanda. **METHODS** In October and November 2014, rectal swabs were collected from patients and their caretakers at hospital admission and discharge. ESBL producing *Enterobacteriaceae* were screened for using chromagar plates and confirmed through the Mast(R) D68C test. Species were identified by the API system, and susceptibility testing followed EUCAST guidelines. Medical history, socio-economic and behavioral data were collected. **RESULTS** Colonisation with ESBL producing *Enterobacteriaceae* was observed in 55% of 436 patients and 42% of 411 caretakers at hospital admission. These figures increased to 71% ( $n = 298$ ) and 52% ( $n = 268$ ), respectively, after a median



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hospital stay of 6 days. Only half of the isolated bacteria were *Escherichia coli*; resistance to commonly used antibiotics was frequent. Factors associated with colonization included, among others, referral from another health facility, previous medical procedures and treatment as well as several socio-demographic and behavioral factors. In a community-based control group of 1102 children, colonization with ESBL producing Enterobacteriaceae was observed in 6%.

**DISCUSSION** Colonization with ESBL producing Enterobacteriaceae at admission as well as further acquisition during hospital stay was substantial not only among patients but also among their accompanying caretakers. Low community prevalence suggests main acquisition of colonization at the levels of primary and secondary health care. Enforcement of hygiene procedures and antibiotic stewardship are urgently needed to prevent a spill-over to the community.

**DISCLOSURE** Nothing to disclose.

## PSI.266

### Overexpression of efflux pumps genes in azole resistant *Candida glabrata* isolated from oropharynx of immunocompromised patients

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**BRIEF INTRODUCTION** Azole resistance in opportunistic fungi causes severe clinical problems in immunosuppressed individuals. This study investigated the molecular mechanisms of azole resistance in clinical isolates of *Candida glabrata*.

**MATERIALS AND METHODS** Six unmatched strains were obtained from an epidemiological survey of oropharyngeal candidiasis in immunocompromised patients that included azole and amphotericin B susceptible and azole resistant clinical isolates. *Candida glabrata* CBS 138 was used as reference strain. Antifungal susceptibility testing of clinical isolates was evaluated using Clinical and Laboratory Standards Institute (CLSI) methods. Complementary DNA-Amplified Fragment Length Polymorphism (cDNA-AFLP) technology, semi-quantitative RT-PCR and sequencing were employed for identification of potential genes involved in azole resistance.

**RESULTS** *Candida glabrata* *Candida* drug resistance 1 (CgCDR1) and *Candida glabrata* *Candida* drug resistance 2 (CgCDR2) genes, which encode for multidrug transporters, were found to be upregulated in azole-resistant isolates ( $\geq 2$ -fold).

**CONCLUSIONS** This study revealed overexpression of the CgCDR1 and CgCDR2, genes affecting biological pathways, small hydrophobic compounds transport in the resistant clinical *C. glabrata* isolates.

**DISCLOSURE** Nothing to disclose.

## PSI.267

### Assessment of the frequency of *Staphylococcus aureus* carriers and its antibiotic susceptibility in nursing, midwifery and paramedical students

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**INTRODUCTION** Nasal colonization with community-acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA) is being increasingly reported, especially in places where people are in close contact. In this study we investigated the frequency of MRSA colonization and their antibiotic susceptibility in nursing, midwifery and paramedical students at Rafsanjan University of Medical Sciences, South-East of Iran.

**MATERIAL AND METHOD** Two hundred nasal swabs were collected from nursing, midwifery and paramedical students that had no risk factors for colonization by *S. aureus*. The specimens were cultured for isolation of *S. aureus* by standard methods. Antimicrobial susceptibility testing was performed by disk diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) Guidelines. For evaluation of the frequency of erythromycin-induced clindamycin resistance, the disk approximation test (D test) was applied.

**RESULTS** Among the 200 cases studied, the frequency of 5% nasal carriers for *S. aureus* was determined. Six (60%) of the 10 *S. aureus* isolates were MRSA strains. 50% of MRSA and 25% of methicillin-susceptible *S. aureus* (MSSA) were resistant to clindamycin. Four of the 6 strains of MRSA and 1 of the MSSA strains were resistant to erythromycin and the D test was positive in 50% of cases.

**CONCLUSIONS** Students that are nasal carriers of the resistant variants of *S. aureus* are pose a serious risk to themselves and others. We conclude that the rate of colonization by MRSA is high in studied cases and regarding the frequency of induced resistance to clindamycin in MRSA cases, screening *S. aureus* isolates in this regard, seems to be essential.

**DISCLOSURE** Nothing to disclose.

## PSI.268

### Malaria prophylaxis of travellers visiting sub-Saharan Africa

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**INTRODUCTION** An increasing number of travellers from Greece visit malaria endemic areas. The aim of the study was to identify patterns of malaria prophylaxis in travellers visiting sub-Saharan Africa.

**MATERIALS AND METHODS** A prospective study was conducted from 1 January 2011 to 31 December 2014 in all (57) departments of public health (official travel health providers). Data were collected through a standardized form per traveller including travellers' and travel characteristics and information about pre-travel medical advice.

**RESULTS** During the study period 1768 travellers visiting sub-Saharan Africa were identified; 69.2% were male with mean age of 39.2 years; 58.5% travelled for work, 29% for vacation, and

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5.8% for visiting friends and relatives (VFRs). The commonest destination was Nigeria (15.7%). Regarding duration of travel, 57.9% stayed for <1 month, and 35.5% ≥1 month. Malaria prophylaxis was administered to 41.5% of all travellers; 26.8%, 14.1%, 0.4% and 0.1% received atovaquone/proguanil, mefloquine, doxycycline and chloroquine, respectively. Only 52.6% of those who stayed at local residences, 50% of VFRs and 36% of those travelling for work were offered chemoprophylaxis. Chemoprophylaxis was administered to 49% and 30.5% of short-term (<1 month) and long-term travellers (≥1 month), respectively; short-term travellers were more likely to receive chemoprophylaxis ( $P < 0.001$ ). Atovaquone/proguanil and mefloquine were more likely to be prescribed to short-term and long-term travellers, respectively ( $P < 0.001$ ).

**CONCLUSIONS** There is a need for improvement regarding recommendation of malaria prophylaxis for travellers to sub-Saharan Africa. This indicates the necessity for individualized and more selective approaches for travellers seeking pre-travel advice.

**DISCLOSURE** Nothing to disclose.

**PSI.269****Evaluation of Hemocult cards as a tool for the detection of travel-associated gastrointestinal pathogens by multiplex PCR**

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**INTRODUCTION** Up to 60% of international travelers experience traveler's diarrhea (TD). Reliable data on the etiology of TD during travel is lacking, as means for laboratory testing are often missing in the destination countries. Important pathogens concerning the etiology of TD include *Campylobacter* spp., norovirus and in countries with low hygienic standards *Entamoeba (E.) histolytica*. Stool samples can be easily acquired during travel by use of Hemocult cards (Beckman Coulter) and tested in the home country. Multiplex PCRs (e.g. Gastrointestinal Pathogen Panel, GPP, Luminex), offer the simultaneous detection of several causative viral, bacterial and protozoal TD pathogens. This study evaluated stool sampling by Hemocult cards combined with the detection of model gastrointestinal pathogens by GPP simulating a travel duration of up to 6 weeks.

**MATERIALS AND METHODS** Three negative stool samples were spiked with gastrointestinal pathogens to achieve a defined concentration of *Campylobacter* spp. and *E. histolytica* in the samples. Three norovirus G I- and three G II-stool samples were obtained from a reference laboratory (CT values: 11–23). Each sample was spread out on both detection fields of a Hemocult card. From each sample seven cards were prepared to allow for duplicate testing at baseline and weekly up to week 6. Cards were stored at room temperature. Stepwise serial dilutions were prepared and limits of detection were established comparing card samples with conventional stool samples. DNA/RNA was extracted by NucliSENS miniMag DNA/RNA extraction system. Gastrointestinal pathogens were detected by GPP on a Luminex MAGPIX system.

**RESULTS** After extraction of the stool samples on Hemocult cards the detection rate for *Campylobacter* spp. was 97.6%, for *E. histolytica* 100%, and for norovirus G I and G II 97.6% and 100%, respectively. Gastrointestinal pathogens could be reliably

detected at weekly intervals up to 6 weeks. The limits of detection were similar between card and conventional stool samples.

**CONCLUSION** Hemocult cards are a reliable tool for stool sampling and testing for gastrointestinal pathogens in combination with a commercially available multiplex PCR. DNA and RNA were stable on the test cards and pathogens could be reliably detected for up to 42 days. Sampling on stool cards is a powerful tool for studies on the etiology of TD or for evaluating vaccines or antibiotic prophylaxis.

**DISCLOSURE** Nothing to disclose.

**PSI.270****Imported giardiasis in Czech travellers resistant to treatment with metronidazole**

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**INTRODUCTION** Giardiasis represents one of the most common enteric infections imported by travellers from tropical regions to the developed countries. The vast majority of infections are mild or asymptomatic. Resistance to metronidazole (MTZ) which is a drug of choice for giardiasis is frequent in the tropics.

**METHODS** Retrospective study evaluated epidemiological and clinical characteristics of giardiasis in the patients investigated at the Department of Infectious Diseases of Hospital Na Bulovce in Prague during 1/2004 and 12/2014. All cases were diagnosed by parasitological investigation of stool at the National Reference Laboratory for Tropical Parasitic Infections in Prague. The resistance to MTZ was evaluated. Refractory infections were identified and treated with an alternative regimen.

**RESULTS** Giardiasis was diagnosed in 213 persons (129 men, average age 30.4 years, and 84 female, average age 30.0 years) including 5 children (1–4 years) since January 2004–December 2014 at our Department. The majority of infections were imported from the Indian Subcontinent (146; 68.5%), followed by Sub-Saharan Africa (21), Latin America (15), Southeast Asia (14), Middle East (7), North Africa (5) and Southern Europe (5). Health problems referred about 66% of patients during the stay in tropics (diarrhea) and about 90% after returning (diarrhea, bloating). The response to treatment with MTZ was evaluated in 160 patients. Out of 127 patients treated with high dose of MTZ (≥500 mg tid for ≥10 days) 45 (35%) were treated successfully, 37 (29%) failed and 45 did not come for the follow up stool investigation. Out of 33 patients treated with the lower dose of MTZ 4 (12%) responded, 15 (45%) failed and 14 did not come for the follow up. The vast majority of patient, in whom MTZ monotherapy failed, were cured with combination of tinidazole or ornidazole (500 mg bid) plus albendazole (200–400 mg bid) for 14–16 days.

**CONCLUSION** Giardiasis is common infection in travellers and immigrants in the Czech Republic (CZ). There were diagnosed 100–150 cases of this infection each year in the CZ during last 5 years. Out of all reported giardiasis cases in the CZ, there are around 55% autochthonous, around 40% imported by Czech travellers, and around 5% imported by immigrants. The

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resistance to MTZ is common and longer treatment with drug combination is needed.

The study was partially supported by the Charles University in Prague (PRVOUK No. P25/LF1/2).

DISCLOSURE Nothing to disclose.

**PSI.271****Activity in 2014 in a reference travelers advice outclinic in Madrid, Spain**

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**BACKGROUND** The rising number of EU travelers to tropical countries for personal or professional reasons requires expert medical advice before departure to prevent posterior medical complications.

**METHODS** Medical records of all adults ( $\geq 18$  years-old) visiting the Travelers Advice Outclinic in 2014 prior to a trip were reviewed. Main demographics, destinations, vaccines administered and antimalarial recommendation are always registered in a single electronic record.

**RESULTS** A total of 8229 travelers (mean age  $34 \pm 6$  years-old, 57% women) were evaluated in 1 year, with peak activity in the months of July, September and June (1595, 954 and 952 travelers, respectively); duration of the trip was shorter than a month in 76% of the instances, and tourism and business (55% and 23%, respectively) were the main reasons to travel. Africa (37%) was the preferred continent, followed by Asia (35%) and Central and South America (22%); among countries, India (20%), Kenya (14%) and Thailand (11%) were the most visited among top ten choices. Overall 55% of patients were considered for antimalaria intervention, 79% chemoprophylaxis (atovaquone-proguanil 78%, mefloquine 11%, doxycycline 9%) and 21% self-treatment with atovaquone-proguanil. Most commonly administered vaccines were hepatitis A (57%), typhoid (49%) and yellow (34%) fever, hepatitis B (24%), tetanus-diphtheria (22%), meningitis-ACWY (20%), poliomyelitis (14%) cholera (13%) and rabies (12%).

**CONCLUSIONS** Medical advice before traveling to tropical countries is currently in high demand. Africa and Asia, prior to America, are the preferred destinations in Spain. Most travelers required vaccination and more than half antimalaria intervention.

DISCLOSURE Nothing to disclose.

**PSI.272****Maternal carriage of group B streptococcus and Escherichia coli in a rural Mozambican hospital**

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**INTRODUCTION** Group B streptococcus (GBS) and *Escherichia coli* (*E. coli*) are leading causes of neonatal sepsis in many

industrialized countries, but reports from the developing world infrequently identify those pathogens among newborns with sepsis. We aimed to assess the GBS and *E. coli* prevalence among near term pregnant mothers and the antimicrobial susceptibility pattern of the isolates in a rural Mozambican hospital.

**MATERIALS AND METHODS** A cross sectional descriptive study was conducted on pregnant mothers attending the Manhiça District Hospital at two time-points during their pregnancy (Group 1: during routine antenatal clinics (AC) at gestational age up to 35 weeks; Group 2: at delivery, regardless of gestational age).

Samples from lower genital tract and rectum for GBS and a vaginal sample and urine for *E. coli* determination were collected and cultured.

**RESULTS** Thirty-six of the 200 pregnant mothers recruited at the AC (18%) studied were GBS carriers. Twenty-five of them (12.5%) had positive *E. coli* culture in their vaginal samples and 5/200 (2.5%) had positive urine cultures for *E. coli*. One hundred and twenty mothers were recruited at delivery.

Prevalence of GBS colonization among this group was 26.7% (32/120) and 20.8% (25/120) had positive *E. coli* culture in vaginal samples and 5% (6/120) in urine. 9.6% of the GBS isolates were resistant to penicillin (5.8% with intermediate resistance and 3.8% fully resistant), the usual antibiotic utilized in the developed world for GBS vertical transmission prophylaxis, whereas the remaining 89.4% were fully sensitive. All GBS isolates except three (2.9%) were sensitive to ampicillin, two of which were highly resistant to both ampicillin and penicillin.

**CONCLUSION** The study showed recto-vaginal GBS colonization among near term pregnant mothers is reasonably high in our community calling for the need to screen mothers near term and provide appropriate antimicrobial prophylaxis to prevent potential adverse maternal and neonatal outcomes.

**DISCLOSURE** Quique Bassat has a fellowship from the program Miguel Servet of the ISCIII (Plan Nacional de I + D + I 2008–2011, grant number: CP11/00269) for the Project ‘Determining the epidemiology and risk factors for Group B streptococcus infections among pregnant women and newborns in Mozambique and Morocco’. Lola Madrid has a fellowship from the program Río Hortega of the ISCIII (CM13/00260).

**PSI.273****Description of baseline characteristics and determinants for maternal morbidity in pregnant women attending first antenatal visit in Southern Mozambique**

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**INTRODUCTION** In low-income countries a high proportion of maternal deaths are due to preventable causes. For many of the essential interventions in antenatal care (ANC) it is crucial to have early identification of underlying conditions. Identification of determinants for adverse health outcomes at first ANC visit can guide preventive strategies needed to ensure safe motherhood, particularly in HIV-infected pregnant women, who represent an especially vulnerable population group.

**MATERIALS AND METHODS** This is a descriptive study of data obtained prospectively as part of a clinical trial performed at the ANC clinic in Manhiça District Hospital (MDH), in



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southern Mozambique. Clinical characteristics were collected from all pregnant women attending the first ANC visit. For a sub-sample of 561 HIV-infected women hospital admissions and outpatient visits during pregnancy were also recorded. Baseline factors associated with these morbidity outcomes were analyzed using multivariate logistic regression models.

**RESULTS** A total of 3586 pregnant women attended the first ANC visit at MDH between March 2010 and January 2012. Out of 2664, 622 (23%) were adolescents ( $\leq 19$  years) and 62% had anemia (Hb  $< 11$  g/dl). Prevalence of HIV was 28% and 37% were in their third trimester of pregnancy. Among HIV-infected women, 3% had malnutrition (middle upper arm circumference  $< 23$  cm), 5% had severe anemia (Hb  $\leq 7$  g/dl), 36% had a CD4 count  $< 350$  cells/mm<sup>3</sup>, 56% had HIV-1 RNA  $> 1000$  copies/ml and incidence of hospital admissions and outpatient visits during pregnancy were 66/241.65 and 174/241.65 episodes/person year respectively. Factors associated with hospital admissions in these women were: adolescence [RR 3.23 (95% CI 1.48; 7.08)  $P = 0.03$ ], severe anemia [RR 4.14 (95% CI 2.05; 8.40)  $P < 0.001$ ], CD4 count  $< 350$  cells/mm<sup>3</sup> [RR 1.65 (95% CI 1.00; 2.71)  $P = 0.05$ ] and malnutrition [RR 4.19 (95% CI 1.64; 10.67)  $P = 0.03$ ]. Being in the third trimester [RR 0.60 (95% CI 0.39; 0.95)  $P = 0.028$ ], adolescence [RR 2.38 (95% CI 1.38; 4.11)  $P = 0.02$ ] and severe anemia [RR 2.62 (95% CI 1.57; 4.39)  $P < 0.001$ ] were associated with outpatient visits during pregnancy.

**CONCLUSIONS** A high proportion of pregnant women attend late in pregnancy and present treatable underlying conditions at first ANC visit in this area of southern Mozambique.

Adolescence, anemia, immune-suppression and malnutrition are important drivers of maternal morbidity in HIV-infected pregnant women and should be targeted by ANC preventive strategies.

**DISCLOSURE** Nothing to disclose.

## PSI.274

**Seroprevalence of TORCH infections and their perinatal outcome in pregnant women receiving care at Kilimanjaro Christian Medical Centre, Moshi, Tanzania**

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**INTRODUCTION** Toxoplasmosis, Rubella, Cytomegalovirus and Herpes Simplex Virus-2 (TORCH) are infections affecting both mother and her fetus with adverse outcomes to the fetus. Majority of infected mothers are asymptomatic and this leaves only speculation as to the probable cause of many congenital anomalies, still births, prematurity and death seen in neonates. The aim of this study was to investigate the seroprevalence of TORCH infections and their Perinatal Outcomes in pregnant women receiving care at Kilimanjaro Christian Medical Centre (KCMC).

**METHODS** This was a cross-sectional hospital based study carried out at KCMC from December 2013 to April 2014. We recruited and tested 347 pregnant women attending antenatal clinic and who opted to deliver at KCMC. We tested 308 newborns born to these mothers. TORCH infections were identified by ELISA testing for IgG and IgM for mothers and IgM only for neonates. Newborns of mothers found to have any of the TORCH infections were followed up for first 7 days of

life. A structured questionnaire was used to collect data of mothers and their newborns.

**RESULTS** The seroprevalence of TORCH IgG antibodies among pregnant women were 44.4% for *T. gondii*, 89.6% for Rubella, 98.6% for Cytomegalovirus (CMV) and 99.7% for Herpes simplex virus (HSV) type 1 and 2. For the IgM antibodies, HSV 1 and 2 was the most prevalent infection found in 137 (39.5%) of the 347 pregnant women included in this study. A total of 11 newborns (3.6%) were infected with HSV 1 and 2. Prevalence of Rubella was 0.3%. None of the newborn had IgM antibodies to Toxoplasmosis and CMV.

**CONCLUSIONS** Immunity to TORCH was high among pregnant women in our population. Prevalence of HSV infection was high in newborns. The higher IgM seropositivity for HSV1 and 2 amongst mothers may disturb maternal, fetal, and neonatal health hence antenatal screening is reasonable.

**DISCLOSURE** This project was supported by the Mentorship Education Partnership Initiative (MEPI) from the Kilimanjaro Christian Medical University College with HRSA award No. T84HA21123.

## PSI.275

**Puerperal sepsis, the leading cause of maternal deaths at a tertiary university teaching hospital in Uganda**

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**BACKGROUND** Maternal mortality is highest in sub-Saharan Africa. In Uganda, the WHO- MDG 5 (aimed at reducing maternal mortality by 75% between 1990 and 2015) has not been attained. The current maternal mortality ratio (MMR) in Uganda is 438 per 100 000 live births and there has been a slow decline between 1990 and 2012 from 550 to 438. This study sets out to find causes and predictors of maternal deaths in a tertiary university teaching hospital in Uganda.

**METHODS** The study was a retrospective unmatched case control study which was carried out at the maternity unit of Mbarara Regional Referral Hospital (MRRH). The sample included pregnant women aged 15–49 years admitted to the maternity unit between January 2011 and November 2014. Data from patient charts of 139 maternal deaths (cases) and 417 controls were collected using a standard audit/data extraction form. Multivariable logistic regression analysis was used to assess for the factors associated with maternal mortality.

**RESULTS** Direct causes of mortality accounted for 77.7% while indirect causes contributed 22.3%. The most frequent cause of maternal mortality was puerperal sepsis (30.9%), followed by obstetrical hemorrhage (21.6%), hypertensive disorders in pregnancy (14.4%), abortion complications (10.8%). Malaria constituted the commonest indirect cause of mortality at 40[yj1]%. On multivariable logistic regression analysis, the factors associated with maternal mortality were: primary or no education (OR 1.9; 95% CI, 1.0–3.3); HIV positive sero-status (OR, 3.6; 95% CI, 1.9–7.0); no antenatal care attendance (OR 3.6; 95% CI, 1.8–7.0); rural dwellers (OR, 4.5; 95% CI, 2.5–8.3); having been referred from another health facility (OR 5.0; 95% CI, 2.9–10.0); delay to seek health care (delay-1) (OR 36.9; 95% CI, 16.2–84.4).

**CONCLUSIONS** Most maternal deaths occur among mothers from rural areas, uneducated, HIV positive, unbooked mothers (lack of antenatal care), referred mothers in critical conditions



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and mothers delaying to seek health care. Sepsis, obstetrical hemorrhage and severe pre-eclampsia/eclampsia are the leading causes of maternal deaths. Therefore improvement in primary health care in rural areas and strengthened implementation of maternal health programs such as PMTC+ can contribute towards eliminating of mother to child[yl2] transmission of HIV and curtail the number of maternal deaths.

DISCLOSURE Nothing to disclose.

## PSI.276

### Exposure to artemether-lumefantrine (Coartem®) in first trimester pregnancy: an observational study in Zambia

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**INTRODUCTION** Safety data following exposure to drugs in the first trimester of pregnancy are scarce. More specifically, data on the safety of artemisinin-based combination therapy (ACT) in pregnancy still remain limited. Therefore, pregnant women from Choma, Zambia, who were exposed to artemether-lumefantrine (AL) for the treatment of uncomplicated malaria were followed up and evaluated in a prospective cohort study. This report assessed the longitudinal safety outcomes of the pregnant women inadvertently exposed during the first trimester.

**METHODS** Participants were classified based on the drug used to treat their most recent malaria episode: artemether-lumefantrine (AL) versus sulphadoxine-pyrimethamine (SP) and/or quinine. All enrolled women were followed up until 6 weeks post-delivery and the live births for 12 months.

**RESULTS** There were 294 first trimester exposures in the observational cohort (pregnant women: AL = 150, AL and SP = 9 and SP and/or quinine = 135). Similar rates of perinatal mortality (stillbirths and neonatal deaths) were observed for each treatment arm (AL 4.4%, SP and/or quinine 3.9%). At delivery (newborns: AL = 135, AL and SP = 7 and SP and/or quinine = 129), the gestational age (measured using the Dubowitz total scores), length and head circumference of the newborns were similar between the two arms. Low birth weights were reported in 10.2% (95% CI 6.0, 16.6) and 6.7% (95% CI 3.4, 12.6) of newborns in the AL and SP and/or quinine arms, respectively. Overall development (including neurodevelopmental parameters) was similar between the two arms, both at 14 weeks and 12 months of age.

**CONCLUSION** Exposure to AL and SP in the first trimester was not associated with particular safety risks such as perinatal mortality, preterm deliveries or low birth weights. These outcomes as well as infant neurodevelopmental parameters up to 12 months were similar between the two arms. These findings add to the body of data suggesting that randomized clinical trials could now be the way forward to assess safety and efficacy of ACT in the first trimester of pregnancy.

DISCLOSURE Nothing to disclose.

## PSI.277

### Maternal nutrition and birth weight in Northern Ghana

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Birth weight is a crucial determinant of the development potential of the newborn. Low birth weight is associated with negative effects on the health and survival of the newly born baby. High birth weight may lead to obstetric complications for both mother and baby such as prolonged labor, increased need for surgical delivery, postpartum hemorrhage and neonatal morbidity. This study assesses determinants for abnormal birth weight in Northern Ghana with special emphasis on maternal nutrition.

The study was a facility-based cross-sectional survey conducted in two districts in the Northern region of Ghana. Tamale Metropolis and Savelugu-Nanton District were purposely sampled to represent a mixed of urban, Peri-urban and rural populations. In all 578 mothers were interviewed. Mother's height and pre-pregnancy weight were generated from antenatal attendance book. Multinomial logistic regression was used to determine the association between dependent and independent variables. Birth weight was classified in to three categories; that is normal (birth weight  $\geq 2.5$  kg < 4.0 kg), too light (low birth weight (birth weight < 2.5 kg) or too heavy (macrosomia) (birth weight  $\geq 4.0$  kg). Dietary diversity scores and dietary patterns were also determined. The association between low birth weight and dietary patterns was determined using logistic regression.

The results show that mothers were generally well nourished before pregnancy as 57.79% had normal pre-pregnancy body mass index (BMI), 25.43% overweight, 13.32% obese while 3.46% were underweight. The mean birth weight of the study population was  $2.9 \pm 0.68$  kg and the prevalence of low birth weight infants was 28.03% while macrosomic births was 10.38%. Underweight ( $P < 0.038$ ) and location-rural ( $P < 0.005$ ) were associated with increased risk of low birth weight while overweight ( $P < 0.001$ ) and obesity ( $P < 0.001$ ) were associated with increased risk of macrosomia. Also dietary diversity score ( $< 0.001$ ) and health conscious dietary pattern ( $P < 0.001$ ) were associated with decreased odds for low birth weight.

The study shows that preconception nutrition and dietary habits during pregnancy are important risk factors that could modify birth weight. Therefore, it is important that prospective and pregnant women should be counseled and assisted to practice optimal nutrition as this would ensure desirable birth outcomes.

DISCLOSURE Nothing to disclose.

## PSI.278

### The definition and counting of maternal deaths: an ethnographic review of a pregnancy-related death by suicide in Ladakh, India

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This paper investigates how a review of a single maternal death in the Ladakh region of India can illuminate the relationships and discontinuities between local practices and global policies that aim to reduce maternal mortality. It considers how global, national, district-level policies and practices that promote mater-

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nal death reviews (MDR), as well as improved counting and definitions of maternal deaths, can still leave a maternal suicide uncounted and unrecognized, thereby undermining the very agenda they promote. In analyzing these policies in light of social determinants that have shaped 30 years of maternal outcomes including the prevalence of live births, maternal deaths, sterilizations, IUDs, and abortions at single district hospital in Ladakh. It considers why this hospital has witnessed both a steady increase in deliveries and abortions, as well as a more recent and precipitous decline in abortions in response to a climate of pronatalism among Buddhist and Muslim communities that perpetuates fear and intimidation around abortion in particular. It concludes that a broader definition of pregnancy-related death that includes maternal suicide and recognizes the role of access to abortion and family planning is critical to the analysis of maternal mortality in India today.

**DISCLOSURE** Nothing to disclose.

**PSI.279****Maternal and perinatal post-caesarean morbidity and mortality in Benin in 2013**

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**INTRODUCTION** Caesarean delivery is an obstetric intervention recognized as effective way to reduce maternal and perinatal mortality. In Benin, the caesarean is free of charge since 2009 in order to increase financial accessibility by the population. The current study aims to access maternal and perinatal post-caesarean morbidity and mortality in Benin in 2013.

**MATERIALS AND METHODS** Cross-sectional study, included all women who delivered by caesarean section from 18th December 2013 to 8th February 2014 in 12 Benin's hospitals selected by simple random selection (one in each of the 12 departments). The data were collected from existing obstetric records, and analyzed using Epi Info version 3.5.1.

**RESULTS** Among the 579 caesareanized, 80.7% had an emergency caesarean section and 48.0%, for an absolute maternal indication with 124 (5; 918) minutes as median time of intervention. Maternal morbidity was 15.4% ( $n = 89$ ) with 17 cases of suppuration of the wound (19.1%), 21 cases (23.6%) of hemorrhage, 7 cases (7.9%) of puerperal infection, 1 case (1.1%) of anesthetic complication and 43 cases (48.3%) of other complications. It was significantly higher among referred women ( $P = 0.0337$ ). Maternal mortality was 0.2% (1 death) and the perinatal one, 7.4% ( $n = 43$ ), with 38 (88.4%) stillbirths and 5 (11.6%) early neonatal deaths. Perinatal mortality did not differ depending on the status of the hospital but was higher for emergency caesarean sections ( $P = 0.019$ ) for women referred ( $P = 0.001$ ) and transported by ambulance ( $P = 0.006$ ) and for premature infants ( $P = 0.003$ ).

**CONCLUSION** Apart from the response time twice longer than the national standard (1 h), maternal morbidity and perinatal mortality are influenced by external factors to the hospitals that cannot be eliminated by the sole free caesarean.

**KEYWORDS** Caesarean section; maternal; perinatal; morbidity; mortality.

**DISCLOSURE** Nothing to disclose.

**PSI.280****Effect of malaria, HIV and helminth infections on cytokine levels in pregnant women in Ibadan, southwestern Nigeria**

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**BACKGROUND** Malaria parasites, helminths and HIV are common infections in the tropics. These infections are known to modulate immune responses. Pregnant women are particularly highly vulnerable to these pathogens. Little is however understood about their interaction when they coexist. We therefore investigated the effect of single and co-infections of the infective agents on cytokine levels in pregnant women.

**METHOD** One hundred and fifteen pregnant women aged 18–45 years were recruited from antenatal and PEPFAR HIV clinics of a secondary health care facility in Ibadan, Nigeria. Personal details of the patients were documented. 5 ml of blood and stool samples were collected. They were screened microscopically for malaria parasitaemia using Giemsa stained thick blood films. Intestinal helminths were screened in stool using Kato-Katz method. Serum was assayed for TNF- $\alpha$ , IFN- $\gamma$ , IL-10, IL-6 and IL-1 $\alpha$  using ELISA kits. Significant differences in median values were set at  $P < 0.05$ .

**RESULT** Fifty-seven (49.6%) participants had single infections comprising of *Plasmodium* (15.7%), helminth (14.8%) and HIV (19.1%) while 31 (27%) were not infected. Twenty-seven had co-infection of *Plasmodium* and helminth (2.6%), *Plasmodium* and HIV (17.4%) and helminths and HIV (3.5%). *Ascaris lumbricoides* (20.9%) and *Trichuris trichiura* (1.7%) were the most prevalent helminths. Helminths caused significant reduction in IFN- $\gamma$  levels when co-infected with *Plasmodium* ( $P = 0.002$ ) relative to *Plasmodium* infection only. However, the levels of TNF- $\alpha$ , IL-10, IL-6 and IL-1 $\alpha$  werenon-significantly elevated in *Plasmodium*-helminth co-infection compared with *Plasmodium* only. Co-infection of helminths with HIV caused significant increase in the concentrations of IL-10 ( $P = 0.002$ ) and IFN- $\gamma$  ( $P = 0.026$ ) relative to those infected with HIV only. TNF- $\alpha$  and IL-6 were elevated among those infected with HIV only relative to those co-infected with helminths.

**CONCLUSION** Helminth infection modulated cytokine profile in malaria and HIV co-infections. Helminth infection induced reduction of IFN- $\gamma$  when co-infected with malaria and so may reduce the risk of negative pregnancy outcome. Helminth infection was associated with increased IL10 and IFN- $\gamma$  in HIV infected women.

**DISCLOSURE** Nothing to disclose.

**PSI.281****Appraisal of dietary assortment and nutritional condition of pregnant females in Tirana, Albania**

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**INTRODUCTION** One of the main significant sources of maternal morbidity and mortality, mostly in the developing nations is maternal under-nutrition, which is linked to fetal under-nutrition. This survey intended to recognize nutritional

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variety and establish any affiliation of nutritional assortment with dietary condition of pregnant females linked to diverse socioeconomic situations in the Tirana area.

**METHODS** It was a cross sectional study with 290 pregnant women in their second and third trimesters, performed in the Obstetrics and Gynecology Hospital in Tirana, Albania. A qualitative questionnaire was applied that included prearranged questions concerning socio-demographic aspects, socioeconomic position, dietary type, and 4 day nutritional remind. A succeeding sector involving of questions regarding nutritional observations was also accomplished.

**RESULTS** 44% of the pregnant women had a normal pre-gestational BMI; 28% were overweight, 21% obese, and only 7% of pregnant females were malnourished. Likewise 25% were anemic. Average nutritional variety was examined in 82% of pregnant females, whereas merely 8% demonstrated low, and elevated nutritional variety. Nutritional variety was not connected with socio-demographic, or socio-economic position of pregnant females. Although weight achievement through second ( $P = 0.1$ ) and third trimesters ( $P = 0.023$ ) was positively associated with nutritional variety; over 68% of pregnant women achieved under-suggested stage of weight increase. No connection could be confirmed among hemoglobin and nutritional variety ( $P = 0.34$ ).

**CONCLUSION** Nutritional variety is a fine substitute sign for micronutrient sufficiency in pregnant females, and if the amount of provisions used is known it can provide enhanced suggestion of indicators of dietary grade of pregnant females.

**DISCLOSURE** Nothing to disclose.

## PSI.282

**Polymerase chain reaction and histology in diagnosis of placental malaria in an area of unstable malaria transmission in Central Sudan**

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**INTRODUCTION** Prevalence of placental malaria has been widely used as a standard indicator to characterize malaria infection in epidemiologic surveys. Placental malaria poses a greater diagnostic challenge, accurate and sensitive diagnostic tool for malaria infections in pregnancy is needed.

**METHODS** A cross sectional study was conducted at Medani Hospital, which serves catchment area which is characterized by unstable malaria transmission. One hundred and seven placentae were investigated for malaria infection using polymerase chain reaction (PCR) and histology.

**RESULTS** Out of 107 investigated placentae, 33 (30.8%) and 34 (31.8%) were positive for malaria by histology [2 (2%) and 31 (29.0%) were acute and past infections, respectively] and PCR, respectively. Of 33 positive by histology, 15 were positive by PCR while 18 were negative. The sensitivity of PCR was 45.5% (95% CI: 29.2–62.5%). Of 74 who were negative by histology, 19 were positive by PCR. This translates to a specificity of 74.3% (95% CI: 63.5–83.3%). Of those tested positive by PCR, 15 were positive by histology, while 19 were negative. This translates to a positive predictive value of 44.1% (95% CI: 28.3–61.0%). Of those 73 tested negative by the PCR, 55 were negative according to histology while 23 were positive. This

translates to a negative predictive value of 75.3% (95% CI: 64.5–84.2%).

**CONCLUSION** PCR had low sensitivity and specificity in comparison to placental histology, perhaps because the vast majority of the placental infections were past infections. Further research is needed.

**DISCLOSURE** Nothing to disclose.

## PSI.283

**Vaccination in pregnancy: tetanus diphtheria and acellular pertussis (Tdap) immunization strategy at Hospital General de Niños Dr Pedro de Elizalde 2013**

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The objective of this investigation is to describe the coverage with acellular pertussis vaccine (Tdap) in mothers of children born after June 1, 2012, assisted in the Hospital General de Niños Dr. Pedro de Elizalde and the perception of these mothers about whooping cough and this vaccine during pregnancy.

This research took place in the context of the recommendation of the Ministry of Health in response to the outbreak of whooping cough that caused the death of 76 children under 12 months of age in Argentina in 2011.

**METHOD** An exploratory, descriptive, non-experimental, cross-sectional study was performed. Women who were 20 weeks gestational age pregnant or more at the time of implementation of the strategy were surveyed. Variables such as maternal age, number of children and highest level of education achieved in relation to timely immunization were analysed. Mothers were also asked about the 2 other vaccines received during pregnancy. **RESULTS** 82% of the mothers had received this vaccine during pregnancy. No significant statistical association was found regarding to the variables education, maternal age and number of children with timely vaccination.

Only 33.81% of the mothers showed knowledge about vaccines received during pregnancy but when asked about each vaccine, significant statistical differences existed between reported vaccines and vaccines they actually had.

In the 27 mothers who did not have the vaccine in 77% this was due to lack of medical prescription and in 22.22% due to lack of vaccine availability. There were no reports of mothers refusing a vaccine or of having limited access to the vaccination centre.

**DISCLOSURE** Nothing to disclose.

## PSI.284

**Diarrhoea prevalence, care and risk factors among poor children under five in Mesoamerica**

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**INTRODUCTION** The burden of diarrheal disease among children under five in Mesoamerica decreased by more than 80% between 1990 and 2010. However, little information is available regarding the burden, correlates, and treatment of

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diarrhoea among the poorest and most remote segments of this population.

**METHODS** We analysed baseline data collected between March 2011 and August 2013 for the Salud Mesoamérica 2015 (SM2015) initiative, a results based financing scheme that seeks to improve maternal and child health among poor, indigenous, and rural populations through implementation of evidence-based interventions. To calculate the prevalence of diarrhoea, we analysed survey data from 14 500 children under five in a sample of poor areas in El Salvador, Guatemala, Mexico (Chiapas State), Nicaragua, and Panama. We used multivariable Poisson regression models to calculate adjusted risk ratios (aRR) and 95% confidence intervals (CI) for potential correlates of diarrhoea, including sociodemographic and water and sanitation variables.

**RESULTS** Approximately 13% of children had diarrhoea within the 2 weeks preceding the survey, with variation between countries and sub-national areas of Guatemala and Panama ( $P < 0.05$ ). Among children with diarrhoea, nearly 56% were given either less to drink than usual, much less to drink than usual, or nothing to drink at all, again with significant variation by country and sub-national areas in Guatemala and Panama ( $P < 0.05$ ). Approximately one third of children with diarrhoea were given oral rehydration therapy (ORT), one third were given antibiotics, and <3% were given zinc, for treatment. In a multivariate regression model, compared to children 0–5 months, those 6–23 months had a 49% increased risk for diarrhoea [adjusted risk ratio (aRR) = 1.49, 95% confidence interval (CI): 1.15–1.95]. Treatment of water, by a method other than boiling, filtration, and chlorination, was associated with a 38% increase in diarrhoea risk (aRR = 1.38, 95% CI: 1.07–1.76). Male children also experienced increased risk for diarrhoea (aRR = 1.15, 95% CI: 1.02–1.29).

**CONCLUSIONS** The prevalence of diarrhoea remains substantial among poor children in each of the assessed countries, with notable variation within poor areas of some countries. While ORT use among children with diarrhoea was high, the frequency of zinc supplementation and the number of children receiving less fluids than usual is disconcerting and should be addressed through interventions.

**DISCLOSURE** Nothing to disclose.

## PSI.285

### Characteristics, etiology and nutritional consequences of moderate-to-severe diarrhea associated with convulsion among rural under-5 children

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**BACKGROUND** Information on children presenting with moderate-to-severe diarrheal disease (MSD) along with history of recent convulsive disorders are grossly lacking.

**OBJECTIVE** To assess the etiology of MSD with convulsion and their characteristics and nutritional consequences among under 5 years old children in rural Bangladesh.

**METHODS** A total of 65 MSD children presented with convulsion from 2nd December 2007 to 1st December 2010, in Kumudini Hospital, Mirzapur, and rural Bangladesh under

GEMS. Their concomitant age-sex-community matched healthy controls ( $n = 114$ ) were enrolled. Another comparison group comprised of randomly selected children with MSD but without convulsion in a ratio of 1:2 ( $n = 130$ ).

**RESULTS** No significant differences regarding socio-demographic characteristics among three groups were noted. Ninety eight percent of the MSD children with convulsion presented with fever, 60% reported straining and 49% had visible blood mixed with stool; moreover, 11% of the children had history of unconsciousness. *Shigella* was the leading pathogen accounting for 82% of the MSD children with convulsion. The major sub-types were *S. flexneri* (51%), and *S. sonnei* (27%). Most (52%) of the children with convulsion were infected with multiple pathogens. *Aeromonas* spp. (23%), norovirus (14%), *Entamoeba histolytica* (9%), rotavirus (8%), and EPEC (6%) were other commonly associated pathogens. Children with convulsion were more underweight (37% vs. 22%,  $P < 0.001$ ), and wasted (39% vs. 12%,  $P < 0.001$ ) than their corresponding controls during enrollment. However, at the time of household follow-up visits, higher proportion of children with convulsion remained wasted (24% vs. 10%,  $P < 0.001$ ). These children were even more wasted than non-convulsive MSD children (18%,  $P > 0.001$ ; 12%,  $P > 0.001$ ) during enrollment as well as follow up respectively.

**CONCLUSION** MSD children infected with *Shigella*, norovirus, *Aeromonas* spp., EPEC, *Entamoeba histolytica* and rotavirus are more likely to develop convulsion.

**KEYWORDS** Convulsion, diarrhea, etiology, nutrition, rural, under-5 children.

**DISCLOSURE** Nothing to disclose.

## PSI.286

### Determinants of diarrhea in children aged under five at the Bengo General Hospital, Angola

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**INTRODUCTION** Diarrhea is an important cause of morbidity and mortality in children aged under five, especially in low income countries. It is often associated to gastrointestinal infections due to pathogenic agents as bacteria, viruses and parasites. The aim of this study was to investigate the most frequent etiological agents of diarrhea in children aged under five attending Bengo General Hospital, Angola.

**MATERIALS AND METHODS** From September 2012 through December 2013, 344 children with diarrhea attending the hospital were included in the study. A questionnaire was filled in and weight and length/height were measured. Stool samples were collected in a sterilized container. Rotavirus and adenovirus were detected using rapid qualitative immunochromatographic assay, astrovirus was detected by a commercial ELISA assay. Microscopic detection of intestinal parasites was performed through direct examination with saline iodine and a concentration method using the Kit Parasitrap®-System. Immunochromatographic rapid tests were used to detect *Entamoeba* spp. *Giardia lamblia* and *Cryptosporidium* spp. Bacterial agents were studied by applying a conventional solid



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selective culture for *Salmonella* spp. and *Shigella* spp., *Campylobacter jejuni*, and *Escherichia coli*.

**RESULTS** 61% of the children were underweight, 54.6% were stunted and 51.0% were wasted. There were more cases of diarrhea in the wet than the dry season (54.7% vs. 45.3%). An enteric pathogen was detected in 66.6% of stool samples. We found *Cryptosporidium* spp. (30.0%), rotavirus (25.1%), *Giardia lamblia* (21.6%), diarrhoeagenic *Escherichia coli* (6.3%), *Ascaris lumbricoides* (4.1%), adenovirus (3.8%), *Strongyloides stercoralis* (3.5%), astrovirus (2.6%), *Hymenolepis nana* (1.7%), *Entamoeba histolytica*/dispar (0.9%), *Taenia* spp. (0.6%), *Trichuris trichiura* (0.3%) and *Entamoeba histolytica* (0.3%). Infection by rotavirus and by *Cryptosporidium* spp. was more frequent in children aged under 12 months. No statistical association was observed between infectious agents and water sources, water treatment or latrine usage.

**CONCLUSIONS** This study demonstrates high rates of infection, particularly in children aged under 12 months, enhancing the importance of taking action targeting this age group. Since the rotavirus vaccine was only recently introduced, further studies are needed to evaluate its impact on diarrheal disease.

**DISCLOSURE** Nothing to disclose

## PS1.287

## Determinants of malnutrition among under-fives in Bengo province, Angola

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**INTRODUCTION** Nutrition is capable of maximize health and minimize morbidity and mortality in early childhood. In fact, some nutritional disturbances, if not detected nor treated in the first 1000 days of a child's life, can have irreversible consequences impairing an individual for his entire life. New interventions to reduce undernutrition should be designed taking into account their determinants. This study aims to identify factors associated with undernutrition (wasting, stunting and underweight) among children under 5 years in Bengo province, Angola.

**MATERIALS AND METHODS** Logistic regression analysis was used to examine undernutrition against a set of variables associated with health, water and parental caregiver factors. Children nutritional status was classified as underweight, stunted and wasted if their Z-scores for weight-for-age (WAZ), height-for-age (HAZ) and weight-for-height (WHZ) were less than -2.0 SD of the WHO (2006) standards.

**RESULTS** The present study comprised 803 children, of whom 50.8% were males and 43% aged 0–23 months. Concerning to parental practices, 36% of the under-tuos were currently breastfeeding, and 89% were breastfed for more than 12 months. 84% started complementary feeding within <6 months of birth. The caregivers reported that 34% of the children had diarrhea in the last 2 weeks and 53.4% of the mothers did not treat drinking water. The prevalence of wasting was 5.6%, of stunting 30.7% and of underweight 29.0%. The most significant factors for wasting were age of the child (OR 4.5, 2.1–9.3 risk for 0–23 age), being breastfed (OR 4.0, 2.0–7.7) and diarrhea episodes (OR 2.0, 1.0–3.7). The most significant factors for stunting were mother's education (OR 0.5, 0.2–0.9 for mother with secondary or higher education), age of the child (OR 0.5, 0.4–0.8 risk for 0–23 age), being breastfed (OR 0.4, 0.3–0.6). The most significant factors for underweight

were age of the child (OR 1.7, 1.1–2.6 risk for 0–23 age class), being breastfed (OR 1.7, 1.1–2.7) and diarrhea episodes (OR 1.9, 1.3–3.1).

**CONCLUSIONS** The study suggests the necessity of different approaches in interventions depending on the age group. Community-based education interventions are needed to reduce preventable morbidity and mortality triggered by undernutrition.

**DISCLOSURE** Nothing to disclose

## PS1.288

## Dermatological problems in an under-five clinics at a district hospital in a rural area in southern Ethiopia

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**INTRODUCTION** Under-five clinics (U5C) consist of a specialized facility which overall goal is to provide comprehensive health care to children below the age of five. Their activity includes the assessment of growth; monitoring, preventive care health, education and family planning as well as the integrated management of childhood illness. This approach to children health focuses on the well being of the child as a whole. Dermatological diseases account for a high percentage of the consults at an U5C. The aim of this study to analyse dermatological diseases attended in an U5C in Gambo General Rural Hospital (GRH) in south-eastern Ethiopia.

**MATERIAL AND METHODS** The study population were the children that attended one of the three under five consults at GRH. This is a 135-bed rural general hospital located 250 km south of Addis Ababa. A cross-sectional study was performed. Consecutive children under 5 years attending a U5C in GRH from January 26 to February 20 of 2015 were included.

**RESULTS** A total of 324 children under 5 year were included (59.6% male and 40.4% female) and the mean age was 16.4 months. The main complaint was a cutaneous problem in 33%, the rest of the children consulted for general medical conditions. A dermatologic disease was diagnosed as an associated condition in 21%. Overall, 46.3% had a dermatologic condition, however, only 32% of those came for that reason, the other 14% consulted for a general health problem and the dermatologic condition was a finding during the physical exploration. The most common dermatologic disease was scabies (16.7%), either as a primary consult or as an associated diagnosis. Followed by impetiginized scabies (10.1%), eczema (4.7%), impetiginized eczema (3.3%), oral thrush (3.3%), burns (3.3%), tinea capitis (3.3%), cradle cap (2%) oedemas (2%) and scars (2%).

**CONCLUSIONS** Dermatologic diseases are very frequent in young children in rural southern Ethiopia, and therefore, account for a significant number of consults to the UFC. Furthermore, up to 21% of the children that present with other diseases have an associated skin condition. We recommend that all children that attend an UFC should be examined to rule out skin diseases, mainly scabies. Paediatricians, nurses and assistants of a children's clinic should be trained in diagnosis and treatment of the main dermatological problems.

**DISCLOSURE** Nothing to disclose.

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## PSI.289

**Antenatal care program including screening of syphilis, hepatitis B virus infection and HIV in pregnant women attending in a rural hospital southern Ethiopia**C. Deme<sup>1</sup>, B. Edao<sup>1</sup>, G. Jaya<sup>1</sup>, F. Reyes<sup>1</sup>, I. Alegria<sup>1</sup>, P. Barreiro<sup>2</sup>, M. Gorgolas<sup>1,3</sup> and J. M. Ramos<sup>1,4,5</sup><sup>1</sup>Gambo Rural General Hospital, Kore, Ethiopia; <sup>2</sup>Unit of Infectious Diseases, Hospital Carlos III, Madrid, Spain; <sup>3</sup>Division of Infectious Diseases, Fundación Jiménez Díaz and Universidad Autónoma de Madrid, Madrid, Spain; <sup>4</sup>Department of Internal Medicine, Hospital General Universitario de Alicante, Alicante, Spain; <sup>5</sup>Department of Medicine, Miguel Hernández University of Elche, Alicante, Spain

**BACKGROUND** The government of Ethiopia is committed to achieving millennium development goals 5, to improve maternal health, with a target of reducing the maternal mortality rate by three-quarters over the period 1990–2015. Ethiopia has fully embraced and implemented the focused antenatal care (ANC) model.

**OBJECTIVE** The aims of the study were to analyze the prevalence of hypertension, protein and nitrites in urine, leukocyturia, and anemia, as well as determine the seroprevalence of syphilis, HVB, and HIV into the ANC program.

**MATERIAL AND METHODS** The study population was pregnant mothers attending ANC at Gambo Rural Hospital (GRH). The GRH is a 135-bed rural general hospital located in West-Arsi Zone, 250 km south of Addis Ababa. A cross-sectional study was performed. Consecutive pregnant women attending a ANC in GRH from July 1 to February 28 of 2012 were included.

**RESULTS** A total of 574 pregnant women were included. The mean age of study population was 25.7 (SD: 4.8); 88.2% were living in urban area; and 11.8% in rural area. Most patients attended in the second trimester of pregnancy (67.2%). Prevalence of hypertension was 1.2% [95% confidence interval (CI): (0.06–2.6%)]; it was higher in the third trimester (3.2%) than in the second (0.5%) and first (0%) ( $P = 0.01$ ). The prevalence of  $>2+$  of protein in urine was 2.9% (95 CI: 1.8–4.7%), 12.7% of pregnant women had  $\geq 10$  WBC/HPC in urine [95% CI: (10.0–15.5%)], but only 1.2% [95% CI: (0.05–2.5%)] had nitrites positive in urine. Severe anaemia (haemoglobin  $<10$  g/dl) was in 1.9% (CI 95%: 1.1–3.4%) and mild anaemia (10–10.9 g/dl) in 40 patients (prevalence: 7.0%; CI 95%: 5.2–9.4). Rapid plasma reagin was positive in two patients (prevalence: 0.3%; 95%: 0.1–1.3%). 13 were positive for HBsAg (prevalence: 2.3%; 95 CI: 1.3–3.8%). One patient was positive for HIV-1 [prevalence: 0.2%; 95% (CI: 0.03–0.9%)].

**CONCLUSION** The ANC program is useful in the care of pregnant women in rural areas in Ethiopia, because it detects cases of hypertension in the third trimester, anaemia and urine tract infection by urine test strip. Moreover the prevalence of syphilis and HIV-1 was very low, but the prevalence of HBsAg was relevant.

**DISCLOSURE** Nothing to disclose.

## PSI.290

**Screening of pathogens in vaginal samples of women in Posadas, Argentina**G. B. Jordá<sup>1</sup>, M. L. López<sup>2</sup>, N. Quintana<sup>3</sup> and J. M. Ramos<sup>4</sup><sup>1</sup>Laboratorio del Instituto de Previsión Social Misiones (IPSM) y Facultad de Ciencias Exactas, Química y Naturales, Universidad Nacional de Misiones (UNaM), Posadas Argentina, Posadas, Argentina; <sup>2</sup>Laboratorio del Instituto de Previsión Social Misiones (IPSM), Posadas Argentina, Posadas, Argentina; <sup>3</sup>Facultad de Ciencias Exactas, Química y Naturales, Universidad Nacional de Misiones (UNaM), Posadas Argentina, Posadas, Argentina; <sup>4</sup>Department of Internal Medicine, Hospital General Universitario de Alicante y Universidad Miguel Hernández de Elche, Alicante, Spain

Vaginal infection may due to different microorganisms as *Candida* sp., *Trichomonas vaginalis*, *Chlamydia* sp, *Neisseria gonorrhoea*, etc. Some of these microorganisms can colonise of mucosa vaginal with produce infection.

The aim of this study was to analyse the prevalence of candidiasis, trichomoniasis, *Chlamydia* infection, Herpes simplex infection and human papilloma virus infection in vaginal samples of symptomatic and asymptomatic women

**MATERIAL AND METHODS** This is a cross-sectional study of presence of vaginal pathogen responsible of vaginal infection in women how when to Laboratorio del Instituto de Previsión Social Misiones (IPSM), Posadas, Argentina from October 2011 to April 2013. Candidiasis, trichomoniasis was performed by microscopy (400 $\times$ ). Gonococcal infection was diagnosis by culture, seeing the presence of protozoa and culture in Thayer Martin medium. And Chlamydia infection, Herpes simplex infection and HPV infection by the presence of DNA by polymerase chain reaction.

**RESULTS** 505 women were included in the study, with a median age of 28.3 (range 15–49). 265 women were symptomatic and 240 asymptomatic. Trichomoniasis was present in 14 women: 12 (2.4%) of women with symptoms and 2 (0.4%) asymptomatic ones ( $P = 0.012$ ). Candidiasis was found in 44 (8.7%) women, 33 (12.5%) were symptomatic and 11 (4.6%) asymptomatic ( $P = 0.002$ ). *Chlamydia* infection was diagnosed in 43 (8.5%), 30 (11.3%) in symptomatic and 13 (5.45) in asymptomatic ( $P = 0.018$ ) women. HPV infection was detected in 115 vaginal samples (30.7%), especially serotype 16 ( $n = 26$ ; 35.6%). The prevalence of HPV infection was similar in symptomatic and asymptomatic women [ $n = 78$ ; 29.4% vs.  $n = 77$  (32.1%) ( $P = 0.05$ )]. The presence of herpes infection was shown in 32 (6.3%) women, similar in symptomatic ( $n = 17$ ; 6.4%) and asymptomatic women ( $n = 15$ , 6.2%) ( $P = 0.92$ ).

**CONCLUSION** The presence of vaginal symptoms was associated with the presence of vaginal candidiasis, trichomoniasis and *Chlamydia* infection, but not with HPV and Herpes infection.

**DISCLOSURE** Nothing to disclose.

## PSI.291

**Plasmodiasis and anemia among children between 0 and 6 months in health center in Igbesa in Ado Odo Local Government Ogun State, South West Nigeria**

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Anemia during childhood remains a major public health challenge especially in Africa with malaria being a major risk factor.

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Malaria also accounts for most hospital visits especially in children. This study aimed to determine malaria as a major cause of anemia among 0–6 months-old children in a state health center in Igbesa, Ogun State, Lagos State, Nigeria. 284 children between the ages of zero to 6 months, 144 males and 140 females, were admitted with packed cell volume (PCV) of <30% over a 6-month period from July to December, 2014. Malaria parasite was detected through simple chromatographic test (rapid diagnostic test). Anemia was defined as Packed Cell Volume <45%. At presentation, anemia occurred in 284 [100%] of the patients admitted, 144 [51%] were males and 140 [49%] females, all tested positive for malaria parasite. Children aged 6 months had the highest prevalence of anemia at 70 [25%]; the lowest prevalence of 32 [0.1%] was in the 1–2 months age group. Males have significant higher risk for both malaria and anemia. Several factors contribute to anemia in children in Africa, but malaria remains the number one risk factor. Effective control measures against malaria are needed. Prompt treatment of malaria can reduce the malaria burden.

DISCLOSURE Nothing to disclose.

**PSI.292****Sexual behaviour among sub-Saharan African migrant women with HIV/AIDS in Belgium: a qualitative study**

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**OBJECTIVE** HIV/AIDS among migrants from resource-limited countries remains a public health challenge in the European Union. In Belgium there are about 13 941 people with HIV/AIDS receiving treatment, of whom about 4550 are sub-Saharan African (SSA) migrant women. Yet research on the sexual behaviour of these women remains patchy. We examined the sexual behaviour of SSA migrant women infected with HIV in Belgium and reasons for (not) changing sexual behaviour after a positive HIV diagnosis.

**METHODS** We conducted a qualitative study consisting of semi-structured face-to-face interviews and observations with SSA migrant women with HIV/AIDS in Belgium between April 2013 and December 2014. Participants were recruited through purposive and snowball sampling if they were 18 years and older, speaking French or English and receiving healthcare in Belgium. Thematic analysis was conducted to identify emerging themes and NVivo 8 was used to support data analysis.

**RESULTS** 41 participants aged 20–67 years were interviewed. 8 participant observations were also conducted. A majority of the interviewees remain sexually active and reported inconsistent condom use with intimate partners. Strong childbearing and fertility desires embedded in the African culture were reported as a barrier to safe-sex and main reason for not changing sexual behaviour. A few cases of temporal or complete abstinence were also reported.

**CONCLUSIONS** SSA migrant women remain at high risk of HIV. Considering the diverse socio-demographic characteristics and risky sexual behaviour of most HIV-infected SSA women, tailored interventions are needed to control the spread of HIV/AIDS within the migrant as well as the general population. Continuous awareness campaigns about safe sex are needed to educate the general public. Policy makers should revamp existing HIV prevention interventions that will enable HIV caregivers and others involved in HIV prevention to help women

reformulate their life goals as the challenge to HIV prevention is more social and behavioural than medical.

**KEYWORDS** HIV/AIDS, sexual behaviour, sub-Saharan African migrant women, Belgium.

DISCLOSURE Nothing to disclose.

**PSI.294****Small investment – large impact: improving the quality of reproductive, maternal and child health services in a rural district (Dadu) of Pakistan**

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**INTRODUCTION** The recent population based data from Pakistan depicts a dismal state of maternal, neonatal and child health (MNCH) both in terms of morbidity and mortality. It is recognized that a significant proportion of these illnesses and deaths occur in community settings, frequently with home births and are preventable through community and facility based intervention strategies. An integrated intervention package comprised of strengthening of public health infra-structure, capacity building of public sector health care providers and provision of first level health care staff at community level is being delivered in a rural district in Pakistan with the aim to improve RMNCH indicators.

**METHODS** A pre intervention ( $n = 15\ 617$ ) and post intervention ( $n = 3346$ ) evaluation design with a control group has been undertaken to evaluate the impact of intervention. Household questionnaire surveys were administered and data from the health information system used. Data were entered into SPSS version 16 and analyzed by the Agha Khan University data management center. Data present two cross sectional evaluations that were done as baseline and midline surveys about 15 months apart. A final end line survey is yet to follow for mortality related indicators.

**RESULTS** On comparing the midline and baseline data we found that in the intervention group there have been an increase of 37% for antenatal care attendance, a 28.7% reduction in unskilled births, an improvement of 7% for the initiation of breast feeding in the first hour and an increase of 15.2% for post natal Care attendance. On the contrary no significant change was observed in the control areas over time.

**CONCLUSION** Minimal investments in public RMNCH services can bring about rapid change in health seeking behavior and health outcomes. This fostered interest and pride of the staff and public authorities to invest more in the public health structure to provide quality care as for example investment in infrastructure, utilities and drug supply.

DISCLOSURE Nothing to disclose.

**PSI.295****Perceptions, attitudes and use of family planning services in post conflict Gulu district, Northern Uganda**

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**BACKGROUND** Northern Uganda was severely affected by two decades of civil war that led to the displacement and

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encampment of an estimated 1.6 million inhabitants. The objective of this study was to assess community perspectives, attitudes and factors that influence use of family planning services in post conflict Gulu district.

**METHODS** We conducted a cross sectional study using multistage sampling technique. We purposely selected all three counties in the district. Two sub-counties per county and two parishes per sub-county were randomly selected. A total of 24 parishes (clusters) and 21 adult heads of households per cluster were randomly selected and interviewed. In total, 500 adults 117 males (23.4%) and 383 (76.6%) females were interviewed. We conducted 8 focus group discussions and 15 key informant interviews with district, community and health facilities personnel. Quantitative data were captured using EPI data and analyzed using STATA version 12. Qualitative data were analyzed manually.

**RESULTS** Contraceptive prevalence rate was 46.2%. Communities perceive FP as acceptable, beneficial and geographically, temporally and financially accessible. Factors associated with FP use include age 26–35 years (AOR 2.27, 95% CI 1.18–3.10,  $P = 0.008$ ), and 36–45 years AOR 2.27, 95% CI 1.21–4.25,  $P = 0.010$ ), rural residence (AOR = 0.41, 95% CI 0.24–0.71,  $P = 0.001$ ), cohabitation (AOR = 2.77, 95% CI 1.15–6.65,  $P = 0.02$ ), and being a farmer (AOR 0.59, 95% CI 0.35–0.97,  $P = 0.04$ ). The main reason for non-use of family planning was fear of side effects 88.2%. The main source of family planning services was government health facilities 94.2%.

**CONCLUSION** Use of family planning is relatively high and communities view family planning as acceptable, beneficial and accessible. Family planning use is mainly determined by age, residence, occupation and marital status. Fear of side effects is the main impediment to family planning use. There is need to increase awareness and effectively manage side effects of family planning in the settings.

**DISCLOSURE** Nothing to disclose.

## PSI.296

### Self-reported competencies of nurses in providing sexual and reproductive health services to young people (15–24 years): a comparative survey in DRC, Burundi and Rwanda

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**INTRODUCTION** Health care professionals equipped with the knowledge and the skills to address young people's reproductive and sexual health (SRH) are important to improving their health worldwide. Yet, the attention to youth-friendly SRH-related training throughout the nursing curricula remains weak in many countries.

**METHODS** In the framework of the Dutch-funded adolescent and youth SRH program named 'Next Generation' implemented in South Kivu Province (Democratic Republic of the Congo (DRC)), Burundi and Rwanda, nurses were asked to self-rate their SRH-related knowledge, clinical and communication skills. Between February and May 2014, a tablet-based questionnaire, using Open Data Kit software, was administered to nurses in randomly selected health facilities providing SRH services. The survey instrument was largely based on the WHO youth-friendly health facility assessment tool and adapted to local context. The data were analysed by descriptive statistics.

**RESULTS** In South Kivu, Burundi and Rwanda, 135, 131 and 99 nurses were interviewed, respectively. A minority of nurses working in South Kivu reported to have more than 2 years of experience in delivering SRH services (33.4%), compared to their counterparts in Burundi (63.8%) and Rwanda (66.6%). Self-rated confidence in communicating about contraception to young people varied across countries and level of experience. In South Kivu, nurses with <2 years of experience reported more often being extremely confident compared to nurses with more experience (29.7% vs. 7.3%;  $P = 0.008$ ), which was different in Burundi (10.2% vs. 28.5%;  $P = 0.333$ ) and Rwanda (25.0% vs. 25.4%;  $P = 0.75$ ). Similarly, nurses in South Kivu with less experience also reported more often to be extremely confident in testing and counselling on HIV (27.4% vs. 7.1%;  $P = 0.003$ ), compared to Burundi (8.9% vs. 29.3%;  $P = 0.009$ ) and Rwanda (10% vs. 23.4%;  $P = 0.181$ ).

**CONCLUSION** Results from all three countries show that more years of SRH experience does not necessarily translate in feeling more competent in providing health services for youth. Most nurses reported not to be adequately equipped with knowledge, clinical and communication skills to provide youth-friendly health services. More attention should be given to comprehensive training with regards to delivering youth-friendly health services.

**DISCLOSURE** Nothing to disclose.

## PSI.297

### 'Shadows and Light' project: improving the access to health services and fostering increased and accelerated action on sexual and reproductive health and HIV linkages for key populations

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**BACKGROUND** 'Shadows and Light' is a 3-year project implemented by four International Planned Parenthood Federation (IPPF) Member Associations and funded by the German BACKUP Initiative. It addresses the linked sexual and reproductive health (SRH) and HIV needs of four key populations: transgender people (India); sex workers (Uganda); people who use drugs (Kenya); and men who have sex with men (Cameroon). The project recognizes that a comprehensive response to HIV has to include initiatives that respond to the needs of those who are socially excluded. Thus, addressing SRH within HIV programmes and services funded by the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) is a key opportunity for the sustainability of providing services to key population groups.

**METHODS** The initial activities focused on identifying and preparing clinic sites, including training of service providers to provide stigma-free services to key population groups. This has involved consultations with key population networks and peer educators to inform the development of services and to raise awareness of the developing service capacity to ensure the availability of a full continuum of HIV services as part of SRH services provided, tailored towards key populations.

**RESULTS** The project contributed to the identification of gaps in GFATM financed health services for key populations to address specific needs in designing stigma-free and safe access to services. One of the lessons learned is the importance of



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empathic counselling services, e.g. from community health workers, which have been rated positively by the target groups. The project also identified specific issues related to addressing needs of young people from one or more key population groups, as they are made especially vulnerable to HIV by endemic discrimination, stigma and violence in society, combined with the particular vulnerabilities of youth, power imbalances in relationships.

**CONCLUSIONS** Reducing HIV stigma and discrimination is key to increasing access to the use of HIV testing, treatment, care and support programmes, and ensuring that key populations have equal access to SRHR that meet their specific needs. Using the project's lessons to inform policies and craft programmes that address stigma and discrimination is a challenge. The development of a framework for operationalizing stigma-free services at three levels: policy, service-delivery and individual empowerment is crucial.

**DISCLOSURE** Nothing to disclose.

**PSI.298****Sperm viral infection and male infertility: focus on herpes viruses**

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**BACKGROUND AND AIM** Infertility in a couple is defined as the inability to achieve conception despite 1 year of frequent unprotected intercourse. The male factor is responsible for 23% of couple infertility. The aim of this study was to determine the relationship between the herpes viral infections and male reproductive health is of importance to both theoretical and practical medicine.

**MATERIALS AND METHODS** This review analysed more than 32 published papers in valid sites such as Pubmed, Google Scholar, Proquest, SID, Science Direct and etc., during 2005–2015.

**RESULTS** The review contains the data on the frequency of herpes virus identification in sperm, the effect of the viruses on structure and function of male germ cells, potential vertical transmission of the herpes viruses with male gametes, and experimental models of study the effects of herpes viruses on spermatogenesis. From the analysis of these data it can be concluded that: (i) identification of herpes virus in sperm is associated with reduced fertility; (ii) herpes simplex virus has a negative effect on spermatogenesis, which manifests itself in a decreased proliferative activity of spermatogonia, meiosis block and enhanced apoptosis of germ cells; (iii) herpes viruses can be found intra cellularly in male gametes; and (iv) the analysis of the markers of widespread herpes viruses (HSV, CMV) should be included in examination of men attending infertility clinics. **CONCLUSION** Chronic viral infections can infect sperm and are considered a risk factor in male infertility. Recent studies have shown that the presence of HIV, HBV or HCV in semen impairs sperm parameters, DNA integrity, and in particular reduces forward motility.

In light of this evidence, we suggest performing targeted sperm washing procedures for each sperm infection and to strongly consider screening male patients seeking fertility for HPV, HSV, and HCMV, both to avoid viral transmission and to improve assisted or even spontaneous fertility outcome.

**KEYWORDS** Herpes Simplex Viruses, Infertility, Men.

**DISCLOSURE** Nothing to disclose.

**PSI.299****Human papilloma viruses infection and male infertility**

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**BACKGROUND AND AIM** Infertility in a couple is defined as the inability to achieve conception despite one year of frequent unprotected intercourse. The male factor is responsible for 23% of couple infertility. A relationship between the human papilloma viral infections and male reproductive health is of importance to both theoretical and practical medicine. Human papillomaviruses (HPV) are the most frequently sexually transmitted viruses and etiological agents of several human cancers. This infection in men is also a problem for partners. Controversial results of the role of HPV in infertile population on sperm parameters have been published. The aim of this study was to determine the role of HPV infection on sperm function and male infertility.

**MATERIALS AND METHODS** This review article analysed more than 25 published papers in valid sites such as Pubmed, Google Scholar, Proquest, SID, Science Direct and etc., during 2008–2015.

**RESULTS** HPVs are agents of the most common sexually transmitted disease and can lead to warts and cancers both in men and women. A high incidence of HPV infection has been demonstrated in sperm from sexually active men with and without risk factors for HPV and from infertile patients. Semen infection is associated to an impairment of sperm parameters suggesting a possible role in male infertility. Interestingly, it has been demonstrated that when HPV is present in semen only a percentage of total cells are infected and the virus can be localized in sperm or in exfoliated cells with different impact on sperm motility. Moreover, infected sperm are able to penetrate the oocyte, to deliver HPV genome in the oocyte and HPV genes can be actively transcribed by the fertilized oocyte. Recently an increased risk of pregnancy loss has been demonstrated in couples undergoing in-vitro fertilization and particularly when HPV DNA was present in semen samples of male partners.

Co-infection with HPV has a significant role in decreasing male fertility, in particular with regard to sperm motility and morphology. Growing evidence suggests that semen infection may cause infertility and early miscarriage; more attention should be paid to male HPV infection. It is recommended for couples with male infertility done screening HPV tests on the first visit and, if necessary, appropriate treatment should be initiated for male HPV infection.

**KEYWORDS** Human Papilloma Virus, Male Infertility, Infection.

**DISCLOSURE** Nothing to disclose.

**PSI.300****Prevalence of *Trichomonas vaginalis* infection among Iranian women using P270 gene**

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**INTRODUCTION** Pregnant women infected with *Trichomonas vaginalis*, may associated with preterm child delivery, low birth weight infants and increased risk of infection by HIV following exposure. Trichomoniasis is one of the most common sexually transmitted disease in the world and a marker for other urogenital infections. Millions of males and females in childbearing

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age group have to visit the STD clinics due to infection with this parasite every year. An important issue about this protozoan is diagnosis and treatment of the patients and their sexual partners. Different methods are available to detect this parasite but due to high sensitivity of PCR method, the present study aimed to investigate the prevalence of trichomoniasis in women who referred to gynecology clinics in Tehran province, Iran.

**METHODS** In this cross-sectional study, two vaginal swabs and urine sample was collected from each patient who referred to the clinic with their due consents. One swab used for cultivation in TYI-S-33 media and the second sample kept in saline and transferred to the laboratory. The DNA of the parasite extracted by using DNG<sup>+</sup> kit and then conducting PCR method by specific primers of P270 gene, that present in all isolates.

**RESULTS** From 210 patients who participated in this study, 52 cases reported as suspected to infection with *T. vaginalis*, during per speculum examination by gynecologist. By PCR method, 19 (9.4%) samples, and by culture media 8 (3.8%) samples were diagnosed infected with *T. vaginalis* in presence of positive control. Other suspected cases (33) may suffer from vaginal infections by other microorganisms.

**CONCLUSIONS** The results of this study indicated that, there is significant difference between the clinical diagnosis and molecular techniques. Therefore, clinical symptoms, such as vaginitis, alone cannot be used for diagnosis of trichomoniasis. Complementary methods such as direct microscopy examination, although with low sensitivity, can help the physicians in proper diagnosis. Inappropriate use of drugs due to incorrect diagnosis brings drug resistance and economic loss that is one of the most important problems in our country.

**DISCLOSURE** This study has supported by Pasteur Institute of Iran, Tehran, I.R. Iran.

## PSI.301

### Predictors of HIV-related knowledge and risk behavior among school-attending teenagers in Esmeraldas, Ecuador

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**BACKGROUND** Recent studies (2008) show that HIV/AIDS cases have steadily increased in Ecuador, especially among the young. The province of Esmeraldas, where 45% of people are African-descendants, disproportionately holds the third highest incidence rate in the country. This study aims at elucidating the factors affecting knowledge and risk-taking behavior among school-attending teenagers in Esmeraldas, Ecuador.

**METHODS** A cross-sectional survey on HIV/AIDS and its determinants among school-attending youth studying in the Province of Esmeraldas was conducted. Information on 55 variables were clustered to represent four spheres based on which analysis was carried out:

- 1 Socio-demographic context (predictors),
- 2 General knowledge of STIs (outcome 1),
- 3 comprehensive knowledge of HIV/AIDS (outcome 2); and,
- 4 Risk behaviors (outcome 3).

Each outcome was measured as a composite variable condensing information from 5, 15, and 10 questions, respectively. Student's *T* test and chi-square statistics were used in bivariate

analysis whereas three logistic regression models were run independently.

**RESULTS** The proportion of single young people was higher in low and medium risk behavior when compared to those in high risk. In fact, after controlling for confounders, age was found to be significantly associated with both Comprehensive Knowledge of HIV/STIs (CHK) and Risk Behaviors (RB) ( $P = 0.01$  and  $0.02$ , respectively) whereas marital status showed a borderline association with both General Knowledge of STIs and (GKS) and RB ( $P = 0.07$ , both).

**CONCLUSIONS** Age was an important predictor of both CKH and RB among school-attending teenagers. Further research in this subject is needed to dissect the effect of age and marital status on GKS as well as CKH and RB using a larger sample size. A study of the correlation between different levels of GKS, CKH and RB with HIV transmission rate could also help inform and improve existing HIV prevention programs.

**DISCLOSURE** Nothing to disclose.

## PSI.302

### Prevalence of STI/HIV and factors associated with STI among female sex workers in Ecuador

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**BACKGROUND** Female sex workers (FSWs) constitute a high risk population for STIs in many countries and should be an important target population for a public health response to the STIs and the HIV epidemic.

**OBJECTIVE** To estimate the prevalence of HIV and STIs, and identify the risk factors for STIs among FSWs in Ecuador.

**METHODS** Data from 270 FSWs in Ecuador recruited by respondent driven sampling were analyzed. Through face-to-face interviews, structured questionnaires were administered and blood samples were obtained and tested for HIV and syphilis. Univariate and bivariate analyses were done. Multivariable binomial regression analyses were conducted to estimate adjusted prevalence ratios (APRs) of self-reported STI in the last 3 months.

**RESULTS** The prevalence of HIV infection, syphilis and self-reported STIs were 0.7%, 3.3% and 26.4% respectively. The age of the respondents ranged from 18 to 54 years, and 248 (91.9%) reported always using condom with their clients. FSWs who did not know of any infection transmitted by sex were twice as likely to report STI (APR = 2.18, 95% CI = 1.06, 4.46). STI was also more prevalent among 'single/divorced/widowed' FSWs than among 'married/cohabiting' FSWs, and among those without a stable partner in comparison to those with a stable partner ( $P$ -value < 0.05).

**CONCLUSIONS** The prevalence of HIV and syphilis was low among participating FSWs in Ecuador. However, the prevalence of self-reported STIs was high and associated with knowledge of STI transmission, stable partner and marital status. There is need for increased awareness on STI transmission and STIs prevention interventions among FSWs in Ecuador.

**DISCLOSURE** Nothing to disclose.

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## PS1.303

**The association between female urogenital schistosomiasis and infertility in coastal Kenya: differential impact of childhood versus adult drug treatment**S. C. Miller-Fellows<sup>1</sup>, V. Hildebrand<sup>1</sup>, J. Furin<sup>2</sup> and C. H. King<sup>3</sup><sup>1</sup>Anthropology, Case Western Reserve University, Cleveland, OH, USA;<sup>2</sup>Medicine, Case Western Reserve University, Cleveland, OH, USA;<sup>3</sup>Center for Global Health and Diseases, Case Western Reserve University, Cleveland, OH, USA

**INTRODUCTION** Previous research has documented an increased risk of subfertility in areas of sub-Saharan Africa due to high rates of pelvic infection, as well as an ecological association between urogenital schistosomiasis prevalence and decreased fertility. We examined reproductive patterns, cultural practices surrounding reproduction, and the potential effects of childhood urogenital *Schistosoma haematobium* infection (and the timing of its treatment) on adult subfertility among women in an endemic area of Kwale County on the coast of Kenya.

**MATERIALS AND METHODS** This project analysed findings from 162 interviews with women of childbearing age in a rural, coastal community, linking them to their individual treatment records from a previous 27 year longitudinal study of schistosomiasis control. Both quantitative and qualitative findings were included.

**RESULTS** Reproductive histories suggested a much higher local rate of subfertility (43.8%) than worldwide averages (8–12%). Qualitative analysis regarding reproductive practices demonstrated a high saturation of public health messages regarding proper pregnancy care co-existing with continuing ethnomedical beliefs. Although no significant relationship was demonstrated between *Schistosoma* infection history (*per se*) with adult subfertility, due to the high local prevalence of urogenital schistosomiasis (>90% lifetime risk), significant associations were found between age at first anti-schistosomal drug treatment and later fertility in adulthood, with those women who were treated one or more times after age 11 and before age 21 significantly less likely to have experienced subfertility ( $P = 0.001$ ).

**CONCLUSIONS** The high subfertility rate documented in this study suggests the importance of public health programs to prevent and treat pelvic infections in their early stages in order to limit reproductive tract damage. The qualitative study findings suggest the successful saturation of some public health messages regarding pregnancy care, such as the importance of sleeping under bed nets for malaria prevention. However, other messages, such as the importance of seeking prenatal care, were less frequently mentioned. Finally, the findings strongly suggest the importance of early anti-schistosomal treatment to prevent the fertility-damaging effects of urogenital schistosomiasis, and lend further support for programs providing universal treatment of children in *Schistosoma*-endemic regions.

**DISCLOSURE** Nothing to disclose.

## PS1.304

**Diverxualitat: a model of comprehensive intervention to improve access to affective sexual and reproductive health in a multicultural context**J. Gómez i Prat<sup>1</sup>, G. Garreta<sup>1</sup>, H. Ouabarab<sup>1</sup>, K. Ghali<sup>1</sup>, I. Claveria<sup>1</sup>, M. Torrecillas<sup>2</sup> and F. Interarts<sup>3</sup><sup>1</sup>Unidad de Salud Internacional Drassanes-Hospital Universitario Vall d'Hebron, PROSICS, Barcelona, Spain; <sup>2</sup>Pequeños Dibujos Animados (PDA), Barcelona, Spain; <sup>3</sup>Interarts Foundation, Barcelona, Spain

**INTRODUCTION** DIVERXUALITAT is a model of comprehensive intervention that aims to improve access to Affective Sexual and Reproductive Health (ASRH) of the immigrant population in Catalonia (Spain), through the provision of knowledge and practical tools to health professionals.

**METHOD** It is the result of a research process based on a qualitative descriptive pilot study: Assessment of the health care approach to access to Sexual and Reproductive Health Rights SRHR for women in reproductive age of migrant origins in Spain. An empirical approach to social determinants that affect access to health.

**RESULTS** The *Assessment* results point out the professionals' lack of knowledge about clinical tools as well as the lack of a basic ethnographic framework to address cultural diversity. Consequently, cultural prejudices and barriers to communication and interpretation of messages in the relationship between the professional and the user do exist.

Proposed model of intervention (workshops) in order to meet the identified needs. Two tools have been developed:

Web ([www.diverxualitat.com](http://www.diverxualitat.com)): a resource platform that provides a fast and convenient access to clinical guidelines, protocols and official plans related to ASRH (Chagas disease, Sexually Transmitted Infections, Malaria, etc.)

Two educational videos: its content reflects the barriers and difficulties existing in the relationship between the professionals and the immigrant users when accessing the SASR through two specific situations: the first one deals with the intercultural competences issue through the story of a pregnant woman with Chagas disease who visits the doctor; the second one deals with the issue of sexually transmitted diseases through a teenage couple visiting a family planning center due to a broken condom.

**CONCLUSIONS** Considering cultural diversity and inequality means avoiding bias in health care and improves the understanding of the fact that many of the situations faced by immigrant women and men, which affect their health, are the result of the intervention of social determinants.

The provision of knowledge and practical tools related to ASRH to health professionals will generate a more comprehensive treatment to the user and an attitude change towards cultural diversity, thus improving access to health and fostering their direct participation in the transformation for a more equitable society.

**DISCLOSURE** Nothing to disclose.

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## PSI.305

**Low prevalence of *Neisseria gonorrhoeae* infections and no evidence of resistance against third generation cephalosporins in a cohort of HIV positive patients from a tertiary hospital in Tanzania**S. Deutschmann<sup>1</sup>, W. Bohne<sup>2</sup>, F. Mujuni<sup>3</sup>, S. Kalluvya<sup>3</sup>, S. Mshana<sup>3</sup>, U. Gross<sup>2</sup> and A. Mueller<sup>1</sup><sup>1</sup>Tropical Medicine, Medical Mission Hospital, Wuerzburg, Germany;<sup>2</sup>Medical Microbiology, University of Goettingen, Goettingen, Germany;<sup>3</sup>Catholic University of Health and Allied Sciences (CUHAS), Mwanza, Tanzania

**INTRODUCTION** Gonorrhoea is one of the most common sexually transmitted infections (STI) worldwide. Resistances against each first-line antimicrobial, including third-generation Cephalosporins have emerged. Surveillance for antimicrobial resistance (AMR) in *Neisseria gonorrhoeae* (NG) is mandatory therefore to ensure an appropriate reaction to this emerging pathogen. Due to limited resources there is lack of surveillance for NG and monitoring of AMR in most of the African countries including Tanzania.

**MATERIALS AND METHODS** During August and September 2014 we conducted a cross-sectional study on the prevalence of NG infection among male and female adult HIV-positive patients attending a continuous treatment and care (CTC) clinic in Mwanza, Tanzania, for a regular check. First stream urine samples of 15 ml each were centrifuged and the sediment stored in a lysis buffer at  $-20^{\circ}\text{C}$  until analysis. For DNA extraction the Roche MagNA Pure<sup>TM</sup> system was used. A protocol on a light-cycler targeting the *porA*-gene was used to detect gonococcal DNA. Detection of cephalosporin resistance was done by amplification of the *penA* gene on a light cycler followed by sequencing of the PCR products. Cephalosporine resistance was defined as detection of the *penA mosaic* gene.

**RESULTS** 512 patients were included, 261 males and 251 females. The age ranged from 19 to 82 years with a mean age of 42.5 years and a median age of 42 years. The overall prevalence of *Neisseria gonorrhoeae* was 2.15% ( $N = 512$ ; positives = 11) in our study cohort. The *penA mosaic* gene was not detected in any of the isolated strains.

**CONCLUSIONS** The prevalence of NG infection among HIV positive patients attending a specialized HIV clinic in Mwanza, North-western Tanzania, for a regular check was relatively low. In this recent study there was no evidence of resistance to third generation cephalosporines using molecular antibiotic resistance testing. Further surveillance for NG and AMR testing needs to be implemented. Molecular diagnostic techniques based on urine samples as diagnostic material for the detection of NG have substantial advantages for screening purposes.

**DISCLOSURE** Nothing to disclose.

## PSI.307

**Hepatitis-B virus infection and vaccination status among the young students of Dhaka city**

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**INTRODUCTION** Hepatitis B is caused by infection with the hepatitis B virus, which is predominantly blood- and sexually transmitted. Hepatitis B vaccine, developed for the prevention of HBV infection, offers complete protection. It is the most common serious liver infection in the world. Worldwide, 2 billion people (1 out of 3 people) have been infected with

hepatitis B and 400 million people have become chronically infected and estimated 1 million people worldwide die each year from hepatitis B virus infection and its complications.

**METHODOLOGY** The study was conducted in the capital city of Bangladesh among 300 university going students. It was a cross-sectional study conducted over 9 months. Convenience sampling technique was used. Data were collected by direct interview of the respondent using structured questionnaires. The surveyed data was converted into frequencies, percentage tabulations and cross-tabulations using SPSS 20.

**RESULTS** 71% of the 300 respondents were male. Only 26% had been vaccinated against hepatitis B virus, but all had received other important vaccines. 36.33% had a previous history of jaundice and 30.33% had a family history. Chi square results shows that both have a significant relationship with respondents' perception about their own risk of hepatitis-B infection.

**CONCLUSION** Hepatitis B vaccine is the mainstay of hepatitis B prevention. WHO recommends that all infants should receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 h. All children and adolescents younger than 18 years old and not previously vaccinated should receive the vaccine if they live in countries where there is low or intermediate endemicity.

**DISCLOSURE** Nothing to disclose.

## PSI.308

**Excretory/secretory proteins from the intestinal nematodes *Strongyloides* and *Trichuris* interfere with the intestinal mucosal defense system of the host**D. Ditgen<sup>1,2</sup>, E. M. Anandarajah<sup>1,2</sup>, E. Janecsek<sup>3</sup>, H. Soblik<sup>1</sup>, A. E. Younis<sup>1,4</sup>, M. G. Hernández<sup>1,5</sup>, J. Hansmann<sup>6</sup>, C. Strube<sup>3</sup>, K. D. Erttmann<sup>1</sup>, E. Liebau<sup>2</sup> and N. W. Brattig<sup>1</sup><sup>1</sup>Molekulare Medizin, Bernhard Nocht Institute for Tropical Medicine, Hamburg; <sup>2</sup>Westphalian Wilhelms-University, Münster; <sup>3</sup>Institute for Parasitology, University of Veterinary Medicine Hannover, Hannover, Germany; <sup>4</sup>Aswan University, Aswan, Egypt; <sup>5</sup>Universidad Autónoma de Nuevo León, Monterrey, Mexico; <sup>6</sup>University Hospital Wuerzburg, Würzburg, Germany

According to the *Old Friends Hypothesis* extending the former *Hygiene Hypothesis* of David Strachan from the *London School of Hygiene and Tropical Medicine*, numerous harmless intestinal organisms within the gut microbiota sustain the immunological homeostasis. Thus, intestinal nematodes represent multicellular organisms which colonize their habitat for years. They can restrain their expulsion by sustaining tolerance mechanisms and containing inflammatory host responses. Excretory/secretory (E/S) helminth products represent first-line molecules affecting the mucosal immunological regulatory network. By proteomic analysis of E/S products from developmental stages of *Strongyloides ratti* (Sr), *Trichuris suis* and *Ascaris suis*, we had e.g. identified 586 secreted proteins (Soblik et al., Mol Cell Proteomics 2011). We had isolated, cloned and partially characterized proteins like a prolyl serine carboxypeptidase, several small heat shock proteins, multiple galectins, the *secreted-protein-acidic-and-rich-in-cysteine* (SPARC), thioredoxin family protein, calumenin and non-assigned proteins. We here report the interaction of some E/S proteins with mucosa-associated immune cells investigating (i) the differential binding capacity of the various nematode proteins to mucosa-associated immune cells applying flow cytometry, (ii) the effects of the parasite proteins on host cells using a novel *in vitro* 3D mucosal model that mimics the *in vivo* natural microenvironment and comprise human intestinal epithelial cells and dendritic cells on collagen scaffold and



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(iii) effects on cell migration and epithelial wound healing.

Differential responses occurred in cell binding capacity, the generation of inflammatory or anti-inflammatory cytokines and wound healing of intestinal epithelium. The presented results indicate that distinct of our E/S proteins from the studied gut-dwelling nematodes may belong to the actually strongly investigated helminth-derived potentially therapeutic proteins of the treatment of autoimmune inflammatory diseases.

D. Ditzgen and E. M. Anandarajah contributed equally to this work.

DISCLOSURE Nothing to disclose.

## PS1.310

### Association between malaria and invasive non-typhoid *Salmonella* infection in a hospital-study – accounting for Berkson's bias

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**INTRODUCTION** There is growing evidence on the association between malaria and invasive non-typhoid *Salmonella* (iNTS) infection. However, case-control studies conducted within health care facilities also report inverse associations. This may be due to a collider-stratification bias, also called Berkson's bias, which acts if both exposure and outcome are associated with hospital attendance and study participants are selected among attendees only. A way to account for this bias is choosing controls that have the same likelihood to visit the hospital as cases. We established two case-control studies with different control selection procedures to show the effect of Berkson's bias and to give a less biased estimate of the malaria-iNTS association.

**METHODS** Data collected from children (<15 years) in two Ghanaian hospitals was used to establish the studies. In both studies children with iNTS were cases; in the first study children without bloodstream infections were controls while in the second, children with a bloodstream infection other than iNTS served as controls. Malaria defined the exposure status. Malaria was diagnosed via microscopy and bloodstream infections via automated blood culture. Age-adjusted odds ratios (OR) were calculated using logistic regression.

**RESULTS** Data from 6,746 children was eligible for the analyses. iNTS infection was diagnosed in 160 children. 6,301 children were blood-culture negative and served as conventional controls. Other febrile bloodstream infections (i.e., control-infection) were detected in 285 children. Using the conventional case-control study an OR of 0.4 (95% confidence interval [CI]: 0.3–0.7) and in the alternative sampling approach, utilizing a control-disease, an OR of 1.9 (95% CI: 1.1–3.3) was calculated.

**CONCLUSIONS** The study highlights how a selection bias may reverse results when an unsuitable control group is used. As the alternative control-selection approach is also prone to biases, it limits the ability to quantify the malaria-iNTS association. However the study adds further evidence on the association between both infections based on individual data, which is informative since current research is mainly grounded on ecological study designs.

DISCLOSURE Nothing to disclose.

## PS1.311

### Monitoring of rotavirus genotypes in indigenous children of Brazilian Midwest in the vaccine era: footprints of animal genome

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**INTRODUCTION** World group A rotavirus (RVA) surveillance data provides useful estimates of the disease burden, however, indigenous population might require special consideration. The aim of this study was to describe the results of G- and P-types from Brazilian native children  $\leq 3$  years after vaccine introduction. Selected strains have been analyzed for the VP7, VP6, VP4 and NSP4 encoding genes in order to gain insight into genetic variability of Brazilian strains.

**METHODS** A total of 149 samples, collected during 2008–2012, were tested for RVA using ELISA, following by RT-PCR and sequencing.

**RESULTS** RVA infection was detected in 8.7% of samples (13/149). Genotype distribution showed a different profile for each year: G2P[4] in 2008 and 2010, G8P[6] in 2009, and G3P[8] in 2011. A significant reduction in the detection rate of RVA from 25% (4/16) in 2008 to 0% (0/5) in 2012 was observed. The phylogenetic analysis of the VP7 and VP4 genes grouped the Brazilian G2P[4] and G3P[8] strains within the lineages currently circulating in humans worldwide. However, the phylogenetic analysis of the VP6 and NSP4 from the Brazilian G2P[4] strains, and the VP7 and NSP4 from the Brazilian G3P[8] strains suggest a distant common ancestor with different animal strains.

Brazilian G2P[4] strains shared moderately high nucleotide identities with bovine and caprine VP6 genes (90.3–94.9% nt; 98.4–99.2% aa), and with the caprine GO34 NSP4 gene (90.5–91% nt; 78.8–80.2% aa). Modest nucleotide identity was observed between Brazilian G3P[8] strain and the porcine NSP4 gene A34 (90.1% nt; 72% aa), and feline VP7 genes (90.2% nt; 71.3–71.7% aa). The G8P[6] samples were analyzed in a previous study, and were documented to be closely related to bovine (VP7 and VP6) and bat (VP4) RVA strains.

**CONCLUSION** This is a pioneer study in Brazil focusing to monitor the RVA genotypes and to conduct genetic analyzes among indigenous children after the introduction of Rotarix<sup>TM</sup> in 2006. The epidemiological and genetic information obtained is expected to provide an updated understanding of RVA genotypes circulating in the native infant population, and to formulate policies for the use of RVA vaccines in indigenous Brazilian people. Moreover, these results highlight the great diversity of human RVA strains circulating in Brazil, and an in-depth surveillance of human and animal RVA will lead to a better understanding of the complex dynamics of RVA evolution.

DISCLOSURE Nothing to disclose.

## PS1.312

### Cross-sectional study of *E. coli*, *Salmonella* and its antibiotic resistant in drinking water, cloacal swab and feces in poultry farm in Thailand

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**INTRODUCTION** Poultry production industry is a main business firm in Thailand since poultry meat market and its products can

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yield a major income for Thai business annually. This study aims to evaluate *E. coli* and *Salmonella* contamination in drinking water and antibiotic resistant in poultry farm in Thailand.

**MATERIALS AND METHODS** Water samples collected in tank-water (after treated with chlorine) and water from nipple inside housing (housing-water) from 11 poultry farms. Bacterial contamination in feces and cloacal swab samples were isolated and the positive samples were further evaluated for antibiotic resistance by VITEK II machine. All water quality parameters have also been examined.

**RESULTS** *E. coli* contamination was found 27.27% (3/11 farms) and 54.54% (5/11 farms) in tank-water and housing-water, respectively. *Salmonella* serogroup E was found in housing-water of 9.09% (1/11 farms), serogroup C was found from feces samples of 9.09% (1/11 farms) and serogroup C of 18.18% (2/11 farms) and serogroup D of 9.09% (1/11 farms) in cloacal swab samples. The isolated *E. coli* was found to be sensitive towards amoxy-clavulenic acid, amikacin, gentamycin, enrofloxacin, marbofloxacin and nitrofurantoin but resistance to amoxicillin, ampicillin and piperacin. On the other hand, *Salmonella* was having sensitive to enrofloxacin, marbofloxacin and tetracyclin in cloacal swab samples but the sensitivity pattern was not similar for *Salmonella* isolated from water and feces samples. However, there showed no significant different for chemical parameters in water samples from both sources.

**CONCLUSION** *E. coli* and *Salmonella* could be found even after treatment with chlorine even in housing-water. Understanding of antibiotic resistance patterns of *E. coli* and *Salmonella* in poultry farms was important in order to help selecting the appropriate antibiotic uses in farms and make sure of not possess any impacts of antibiotic resistance in human and animal in long term.

**DISCLOSURE** Nothing to disclose.

## PSI.313

## Cross-sectional survey of dietary diversity among children aged 6–24 months in KwaZulu-Natal, South Africa

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**INTRODUCTION** Reducing the number of people suffering from hunger and nutritional problems is one of the aims of the Millennium Development Goals since malnutrition contributes to one third of all child deaths worldwide. This survey investigated infant feeding patterns and dietary diversity for children 6–24 months of age.

**METHODS** In a cross sectional nutrition study, a randomized community survey in iLembe district, KwaZulu-Natal, South Africa, stratified households by sub-districts (4), ward ( $n = 30$ ), enumerator areas (120) and households (1200). In each household the principal caregiver of one child between 6 and 24 months provided a 24 h recall of food consumption by the child in the household.

**RESULTS** Dietary Diversity: Amongst the 172 children aged 6–23 months, grains, roots and tubers were the staple food (93.0%) (95%CI: 88.1, 96.3), 53.4% of children (95%CI: 45.7, 61.1) had consumed dairy products, 48.2% (95%CI: 40.6, 56.0) had received meat, and 41.9% (95%CI: 34.4, 49.6) of the children had eaten eggs. Of the children 26.7% (95% CI: 20.3, 34.0) had eaten legumes. Children (54.1%) (95% CI: 46.3, 61.7)

received pumpkin or similar Vitamin A rich fruits and vegetables. Of the households 26.7% (95% CI: 20.3, 34.0) had provided the child with other fruit or vegetables and nearly a fifth of the children had consumed fat or oil in their diet. The children's mean dietary diversity score was 3.44 (SD 1.91) instead of the minimum 4 of the 7 food groups. Although the number of food groups increased for children aged from 12 to <18 months, from 18 to <24 months there was less variety in the children's diet with a decrease in the number of food groups in the 25%, 50% and 75% percentiles.

**CONCLUSIONS** Many South African children live in households which are food insecure and where the diet is limited. As reported in this study children may receive adequate macronutrients but lack the essential micronutrients and this 'hidden hunger' can be addressed by a more diversified diet, that can protect against under-nutrition and infection.

**DISCLOSURE** Nothing to disclose.

## PSI.314

## IgE cross-reactivity between house dust mite and Chinese liver fluke antigens

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**INTRODUCTION** Identification of common allergens between parasites and house dust mites (HDMs) is important to understand modulation of allergic diseases. Clonorchiasis caused by infection of Chinese liver fluke *Clonorchis sinensis* is the most prevalent parasitic disease in South Korea. IgE cross-reactivity between HDM allergens and *C. sinensis* antigens was investigated in this study.

**MATERIALS AND METHODS** Human clonorchiasis ( $n = 31$ ), opisthorchiasis ( $n = 37$ ), HDM-sensitized allergic ( $n = 88$ ) and normal ( $n = 23$ ) sera prepared. To eliminate possible *C. sinensis* infection among the HDM-sensitized allergic subjects, IgG ELISA against *C. sinensis* crude lysate was primarily performed. IgE ELISA against *C. sinensis* crude lysate or two HDM (*Dermatophagoides farinae* and *D. pteronyssinus*) extracts was performed to investigate the cross-reactivity. Cross-reactive allergen was confirmed by IgE immunoblot.

**RESULTS** HDM-sensitized allergic subject exhibited 0.6% of reactivity to *C. sinensis* antigens. Among the HDM-sensitized allergic subjects, 83.3% exhibited reactivity with *C. sinensis* antigens by IgE ELISA. Clonorchiasis and opisthorchiasis subjects exhibited 58% and 18.9% of IgE cross-reactivity with *D. farinae* extract, respectively. Similar cross-reactivity was observed when *D. pteronyssinus* extract was used. IgE immunoblot showed multiple cross-reacting bands. Most of the bands appeared to have over 100 kDa of molecular masses.

**CONCLUSIONS** The present study demonstrated the presence of multiple IgE cross-reacting allergens between *C. sinensis* and HDM. Individual identification of the allergens from *C. sinensis* may provide some clues to understand the modulation of allergic diseases by parasitic infections.

**DISCLOSURE** Nothing to disclose.

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## PS1.315

**Spatial distribution of anemia in children under five in Burkina Faso**S. Samadoulougou<sup>1,2</sup>, F. Kirakoya-Samadoulougou<sup>2</sup> and A. Robert<sup>1,2</sup><sup>1</sup>IREC – EPID, Bruxelles, Belgium; <sup>2</sup>Université Catholique de Louvain, Bruxelles, Belgium

**INTRODUCTION** Anemia remains one of the biggest public health problems in Burkina Faso (BF), a malaria-endemic country, with children under five being the most affected. Despite the magnitude of anemia in BF, geographic variability of anemia prevalence and identification of risk factors within this country remain poor. To date there are no studies that have spatially reported the burden of anemia at the district level. Identifying geographical disparities at the small area level is useful to inform where greatest scaling-up efforts should be concentrated and to provide baseline data against which these future scaling-up interventions can be compared.

**MATERIALS AND METHODS** This study applied spatial methods using the 2010 BF Demographic and Health Survey (DHS) to generate maps at the district level to serve such purposes.

**RESULTS** Anemia prevalence in Burkina Faso's districts ranged between 64% (95% CI: 50–77%) to 98% (95% CI: 86–100%), with more than three-quarters of districts near 86%; severe anemia prevalence was <7% in 16 of 63 districts, but reached 31% (95% CI: 21–41%) in the district of Gourcy. Children had a lower hemoglobin level if they were young (<24 months), if they had stunted growth or were underweight, if their mothers had a low level of education, or if they lived in rural and poorest households.

**CONCLUSIONS** We noted large geographical inequalities in terms of anemia prevalence in Burkina Faso, masked by national and provincial averages. Planning, implementation, and evaluation of programs for anemia should be based on district-level needs and outcomes.

**DISCLOSURE** Nothing to disclose.

## PS1.316

**Immunological characterization of antibodies and antigens of *Plasmodium falciparum* in plasma samples obtained from individuals who previously stayed in malaria-endemic areas**

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**INTRODUCTION** The development of protective immunity against *Plasmodium* spp. requires several exposures to the parasite. However, when the immune system is no longer stimulated by the contact with the parasite, the period of time in which the parasite antibodies persist in the bloodstream is not clear. Previous studies verified *Plasmodium* spp. antibodies in the bloodstream of individuals with their last exposure time 10 or more years before the studies execution. Thus, the principal aims of this work are to characterize the immunoglobulins regarding its subclasses and their persistence time in the bloodstream, and to identify parasitic proteins responsible for the serological reactivity, in individuals with previous stays in endemic areas of malaria.

**MATERIALS AND METHODS** Individuals with previous stays in an endemic area of malaria were included in this study. Plasma samples were analysed by an ELISA technique to detect antibodies against *Plasmodium* sp. (Malaria EIA Test Kit

Biorad-USA). Subsequently, the reactive samples were analysed regarding to the immunoglobulins subclasses with specificity for *Plasmodium falciparum*, through an 'in house' ELISA technique. The reactive samples were used to study the antigenic reactivity through Western Blot.

**RESULTS** From 321 samples collected, 76 were serological reactive to total antibodies against *Plasmodium* spp., from which 11 were reactive to IgM and 51 to total IgG against *P. falciparum*. Those 51 samples were used to study the antigenic reactivity to *P. falciparum*: the proteins with more frequent reactivity had molecular weight between 40–50 and 80–120 kDa. From the 76 reactive samples to total antibodies against *Plasmodium*, 61.3% are individuals with their last return from an endemic area 6 months before the study execution, 6.7% return 6 months–1 year before the study, 6.7% 2–9 years and 25.3% 10 or more years before the study execution.

**CONCLUSION** Antibodies against *Plasmodium* spp. may remain detectable in the bloodstream several years after the return of the individual from an endemic area. Thus, it is essential identify the parasitic proteins responsible for the serological reactivity, to understand why those antibodies remain in the bloodstream so many years after the last exposure time, as well as the role of those parasitic proteins in the malaria immunity. This knowledge could be an important factor in the development of new markers for serological diagnosis or vaccines.

**DISCLOSURE** Nothing to disclose.

## PS1.317

**Species-specific associations between helminths and micronutrients in Vietnamese schoolchildren**B. de Gier<sup>1</sup>, T. Thuy Nga<sup>2</sup>, P. Winichagoon<sup>3</sup>, M. Dijkhuizen<sup>4</sup>, N. Cong Khan<sup>5</sup>, M. Campos Ponce<sup>6</sup>, K. Polman<sup>7</sup> and F. Wieringa<sup>8</sup><sup>1</sup>Health and Life Sciences, VU University Amsterdam, Amsterdam, The Netherlands; <sup>2</sup>National Institute of Nutrition, Hanoi, Vietnam; <sup>3</sup>Institute of Nutrition, Mahidol University, Bangkok, Thailand; <sup>4</sup>Copenhagen University, Copenhagen, Denmark; <sup>5</sup>Ministry of Health, Hanoi, Vietnam; <sup>6</sup>Health Sciences, VU University Amsterdam, Amsterdam, The Netherlands; <sup>7</sup>Institute of Tropical Medicine, Antwerp, Belgium; <sup>8</sup>Institut de Recherche pour le Développement, Montpellier, France

Several different associations between helminth infections and micronutrient status in children have been reported. We aimed to study associations between specific STH species and micronutrients in schoolchildren. Vietnamese children ( $n = 510$ ) aged 6–9 years were recruited from two primary schools. STH infections were determined in stool samples. In blood samples, hemoglobin, ferritin, retinol and zinc were measured, as well as CRP to control for inflammation. Iodine excretion was measured in urine. Associations of single and multiple *Ascaris lumbricoides*, *Trichuris trichiura*, or hookworm infections and micronutrients were estimated by regression techniques. *Ascaris* infections showed a specific and dose-dependent relationship with vitamin A. *Trichuris* and hookworm infections were associated with lower hemoglobin concentration, but not with plasma ferritin. *Trichuris*-infected children had zinc deficiency less often than uninfected children. The different life cycles of STH species might have specific effects on the absorption or loss of specific micronutrients.

**DISCLOSURE** Nothing to disclose.

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## PSI.321

**Quantitating the burden of anaemia in acute and convalescent uncomplicated falciparum malaria treated with artemisinin combination therapy (ACT) in sub-Saharan Africa**J. ZWANG<sup>1</sup>, G. DORSEY<sup>2</sup>, A. DJIMDE<sup>3</sup>, J.-L. NDIAYE<sup>4</sup>, C. KAREMA<sup>5</sup>, A. MÄRTENSSON<sup>6</sup> and P. OLLIARO<sup>7,8</sup><sup>1</sup>Independent Researcher, Bangkok, Thailand; <sup>2</sup>Department of Medicine, University of California San Francisco, San Francisco, CA, USA; <sup>3</sup>University of Bamako, Bamako, Mali; <sup>4</sup>Department of Parasitology, Cheikh Anta Diop University, Dakar, Senegal; <sup>5</sup>National Malaria Control Programme, Kigali, Rwanda; <sup>6</sup>Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden; <sup>7</sup>UNICEF/UNDP/WB/WHO Special Programme for Research & Training in Tropical Diseases (TDR), Geneva, Switzerland; <sup>8</sup>Centre for Tropical Medicine and Global Health, University of Oxford, Oxford, UK

Anaemia is a common feature of malaria, but also a potential adverse event following artemisinin combination therapy (ACT). It is important to quantitate the risk of anaemia and distinguish between changes in haemoglobin (Hb) that are part of the natural history of disease and those potentially caused by drug toxicity.

Individual-patient data analysis based on a database of 8 randomized controlled trials conducted in sub-Saharan Africa using ACT or monotherapy for treating uncomplicated falciparum malaria, with at least two Hb assessments (baseline and end of follow-up). Hb values were analysed as either continuous or categorical: anaemia defined as Hb <10 g/dl and further classed by severity grade 1–4.

5189 patients (64% <6 years-old), from 12 sites in 8 countries with up to 42 days follow-up were treated with AS-AQ (46%) or a comparator (other ACTs = 36%, other combination = 10%, single-agent therapy = 8%). On presentation, 30% of subjects were anaemic.

Daily monitoring shows that Hb starts dropping soon after the first dose of treatment to reach its nadir at ~33 h. The loss is ~5% and is greater for subjects with normal baseline Hb than for those who were anaemic. Customary day 3 measurements are a good proxy. Thereafter there was a significant linear increase in Hb throughout day 28 ( $y = 0.065x + 9.1$ ,  $P = 0.001$ ), corresponding to a steady rate of ~0.6% per day.

Using a multivariate logistic regression model with mixed effect, the risk of drop in Hb levels resulting in being anaemic on Day 3 was significantly higher in case of higher baseline parasitaemia, lower baseline Hb, and parasitological failure; no significant association was found with age and treatment.

In patients treated with ACT, the burden of anaemia in person-day (PAD) was 259/1000 (17 234/66 450) PAD corresponding to 7.3 days with anaemia; moderate (grade 2) anaemia was prevalent for 1.7 days corresponding to 23% of the total anaemia burden.

Less than one-third of patients were anaemic on presentation. Hb dropped within 2 days of starting treatment, then the risk of anaemia decreased with follow-up time and there was no case of delayed anaemia. There was no obvious, systematic difference between treatments.

**ACKNOWLEDGEMENTS** JZ received a grant from DNDi (Drugs for Neglected Diseases initiative) to do this analysis.

**DISCLOSURE** Nothing to disclose.

## PSI.322

**Seasonal dynamics of human retinol status in mobile pastoralists in Chad**L. CRUMP<sup>1,2</sup>, M. BÉCHIR<sup>3</sup>, B. N. R. NGANDOLO<sup>4</sup>, D. M. DAUGLA<sup>3</sup>, J. HATTENDORF<sup>1,2</sup> and J. ZINSSTAG<sup>1,2</sup><sup>1</sup>Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>Centre de Support en Santé Internationale, N'Djaména, Chad; <sup>4</sup>Institut de Recherche en Elevage pour le Développement, N'Djaména, Chad

**BACKGROUND** The Swiss Tropical and Public Health Institute have investigated health in mobile pastoralists in Chad for more than 20 years. Our work has demonstrated the added value of a One Health approach in populations highly interdependent with livestock. Vitamin A deficiency is a central health issue in developing countries, and livestock milk is the primary source of vitamin A in mobile populations. This study investigated seasonal dynamics of retinol status in Chadian mobile pastoralists.

**METHODS** A repeated cross-sectional study assessed human blood and cattle milk over three seasons (2012–2013) in 327 Fulani, Gorane and Arab mobile pastoralists in southeastern Lake Chad. Portable fluorometry (iCheck™) was used to rapidly measure retinol levels in blood and milk. Linear regression models analyzed human retinol level as the outcome. **RESULTS** Human seasonal means were 606 µg/l (95% CI 77–1786 µg/l) in rainy, 282 µg/l (95% CI 105–530 µg/l) in cold and 501 µg/l (95% CI 0–1126 µg/l) in dry seasons. Retinol level and deficiency varied according to season and ethnic group. Average values were highest in Gorane during rainy season and in Fulani in the cold and the dry season. Arabs had the lowest average values in all seasons. Retinol deficiency (<200 µg/l) was found in 15% of the study participants in the dry, 25% in the rainy and 32% in the cold season. Retinol levels varied according to age, sex, level of milk consumption and pooled cattle milk retinol level. Effect sizes varied and not all were statistically significantly different. Pooled cattle milk retinol levels varied seasonally and were positively associated to human retinol levels.

**CONCLUSIONS** This study establishes seasonal variation in human blood and pooled cattle milk retinol levels in Chad, demonstrating a linkage from animals to humans through milk. Future work should investigate the apparent interethnic differences and consider dynamics of pastoralist migration patterns. Retinol deficiency is a prevalent, important public health problem near Lake Chad.

**ACKNOWLEDGEMENTS** This work was funded by a grant from Sight and Life.

**DISCLOSURE** Nothing to disclose.

## PSI.323

**Stakeholder perceptions of research options to improve nutritional status in Uganda**

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**INTRODUCTION** Malnutrition is a major public health problem in sub-Saharan African countries including Uganda. The objective of this study was to evaluate the relevance of the current research options towards improving nutrition status in Uganda.

**MATERIALS AND METHODS** In a cross sectional study conducted between June 2011 and November 2011, we used the Multi Criteria Mapping (MCM) technique for data collection.



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Both qualitative and quantitative data were collected. We interviewed 16 high level representatives of 6 different stakeholder groups including health professionals, food industry, government, civil society, academics and research funders. Each stakeholder appraised 6 types of research options including; ecological nutrition, community nutrition interventions, nutritional epidemiology, behavioural nutrition, clinical/therapeutic nutrition and molecular nutrition on how they could best address malnutrition in Uganda. The criteria used to appraise the research options comprised cost effectiveness, practical feasibility, impact, socially acceptability and research efficacy. Data were captured using the 'Multi Criteria Mapper' software, and analysed using the 'MCM Analyst' software. **RESULTS** The study revealed that the most appraised nutrition research options towards improving nutrition status were applied community nutrition, behavioral nutrition and ecological research. Applied community nutrition was regarded as low cost and responsive to community problems, while behavioural nutrition was considered to be highly acceptable to communities and the country has the necessary expertise for its implementation. Ecological research was considered to be in line with the countries' development priorities in agriculture and environment and there is available scientific technologies in the country for its implementation. Molecular nutrition research was regarded as very costly to implement, had ethical dilemmas and was therefore the least appraised.

**CONCLUSIONS** The research options considered most appropriate towards improving nutrition status in Uganda were community nutrition intervention and behavioural nutrition. Molecular nutrition was considered the least appropriate research option owing to costs and ethical dilemma. Stakeholders should consider supporting community and behavioural nutrition research interventions in the setting.

**DISCLOSURE** This study was conducted in the context of the 'Sustainable Nutrition Research for Africa in the Years to come (SUNRAY project), a SP 1-Cooperation, Support action research project, financed by the 7th Frame work Programme of the European Commission (Grant Agreement Number 266080) [KBBE.2010.2.2-03-Identifying research needs on Malnutrition in Africa].

**PSI.325****Effect of malaria infection on lipid profile and oxidative stress in children**

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Malaria is a common disease among pregnant women and children. The pathological effect of malaria has been attributed to changes in the lipid profile and oxidative stress during the infection. This work studied the role of malaria infection on the lipid profile and oxidative stress in children. 240 children within the age range 0–5 years were enrolled for this study; 170 were malaria positive while 70 were malaria negative (Control). Those who were malaria positive were grouped into two based on the level of parasitaemia. Those who had more than 100 000 parasitaemia were grouped as severe infection, while those who had <100 000 parasitaemia were grouped under mild infection. Level of high density lipoprotein (HDL) was significantly higher ( $P < 0.05$ ) in the control than in the severe and mild groups, while the HDL level was not significantly higher in the mild group than in the severe group. There was a significant increase

( $P < 0.05$ ) in the total protein in the control and mild group compared to the severe group. The low density lipoprotein, total cholesterol and triglyceride levels were not significantly reduced in the control and mild group when compared with the severe group. The significant increase ( $P < 0.05$ ) in MDA and decrease in SOD and GSPX levels were recorded in the severe and mild groups when compared with the control group. This study shows that children who belong to severe group may likely to have serious complication and cardiovascular problem during malaria infection.

**DISCLOSURE** Nothing to disclose.

**PSI.326****Management's evaluation of acute malnutrition in the area of Segue in Mali**

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**BACKGROUND** Acute malnutrition is a major public health problem in developing countries. In Mali, the prevalence of acute malnutrition has stagnated at around 13%. In Segue health area, several preventive and curative activities are currently being reorganized in order to fight against this scourge. The main objective of the study is to make a normative assessment of program management of acute malnutrition among children 6–59 months in this region. More specifically, the implementation of the activities, program coverage, the results for participants and populational prevalence of acute malnutrition have been documented and compared to national guidelines.

**METHOD** A participatory approach was used in all stages of the project. Several sources of quantitative and qualitative data were triangulated: local register the program, interviews with villagers ( $n = 35$ ) and health workers ( $n = 20$ ), direct observation at the health center and in the villages. Three screenings of acute malnutrition have also been made in the Segue region in 2006, 2008 and 2011.

**RESULTS** Overall, the implementation of program activities is suboptimal. The main issues identified relate to shortages, lack of training and recognition of the various stakeholders, and a lack of coordination between the villages and the health center. Program coverage is alarming, with a rate of just 7.0% of participation and dropout rate of 71%. Outcomes for program participants are satisfactory, with a 73.9% cure rate excluding dropouts. The study showed a clear trend decline in the prevalence of acute malnutrition in the area segue from 26.9% in 2006 to 11.4% in 2011 ( $P < 0.001$ ).

**CONCLUSION** Despite significant problems in the implementation of certain program activities and despite the very low coverage of it, acute malnutrition has been halved in the area of Segue. Several hypotheses are discussed to explain this trend and recommendations are made to improve preventive interventions for malnutrition in this region of Mali.

**DISCLOSURE** Nothing to disclose.

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## PSI.327

**Immunogenicity and safety of tetanus/diphtheria booster vaccine and hepatitis A vaccine in patients with rheumatoid arthritis, spondyloarthritis and vasculitis – a cohort study in 6 Swiss rheumatology centres and 4 travel clinics**

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**INTRODUCTION** The morbidity and mortality due to vaccine-preventable infections is high among patients with autoimmune inflammatory rheumatic diseases. Vaccination is thus indicated in this patient group. However, the immunogenicity of vaccines may be reduced (i) due to an immunologic impairment secondary to the underlying disease and (ii) due to the immunosuppressive treatment. The variety of immunosuppressive drugs and of biological therapies in particular is increasing. So far, data on basic and travel-related vaccinations in these disease groups are scarce.

**MATERIALS AND METHODS** We are currently conducting a multi-centre prospective cohort study (NCT ID: NCT01947465) in Switzerland enrolling patients with rheumatoid arthritis (target  $n = 142$ ), spondyloarthritis and psoriatic arthritis (target  $n = 142$ ), patients with vasculitis (Behçet's disease and ANCA-associated vasculitis, target  $n = 142$ ) and healthy controls (target  $n = 319$ ). Vaccinations against tetanus/diphtheria and/or hepatitis A are administered according to vaccination recommendations of the Swiss Federal Office of Public Health.

Blood samples are taken immediately before vaccination, and 1 and 3 months after vaccination. Antibody concentrations against vaccine antigens (tetanus/diphtheria and hepatitis A) are measured by enzyme-linked immunosorbent assay. Solicited and unsolicited symptoms and serious adverse events are recorded.

**RESULTS** Half of the intended participants have been recruited. Interim results on the immunogenicity of hepatitis A and tetanus/diphtheria booster vaccination will be presented in patients with rheumatic diseases under various immunosuppressive therapies in comparison to healthy controls. Geometric mean concentrations (GMCs) and the percentage of individuals with protective antibody titers will be compared between each disease group and healthy controls. It will be evaluated whether vaccination is associated with worsening of the rheumatic disease or reactivation. Local and systemic adverse vaccine reactions will be compared between patients and healthy controls.

**CONCLUSIONS** The results of this study will provide data that will guide vaccination recommendations in patients with autoimmune inflammatory rheumatic diseases under various immunosuppressive medications.

**DISCLOSURE** Nothing to disclose.

## PSI.328

**Can local flour recipes made of locally available and cheap ingredients be used for adequate complementary feeding of infants in rural and poor settings in Burkina Faso?**

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**INTRODUCTION** Malnutrition of infants is a recurring health problem in Burkina Faso. The distribution of imported flour has limitations in terms of access, sustainability and knowledge transfer. Our study aimed at identifying local flour recipes produced by households, and evaluated their potential to meet the nutritional needs of breastfed children aged 6 months–2 years.

**MATERIAL AND METHODS** First, a survey of local flour recipes for infants was carried through in a sample of 10 villages. Based on the food composition table of Burkina Faso, 5 recipes were selected and analyzed for their nutritional content. The acceptability of the porridge made from the flour recipes was evaluated as well.

**RESULTS** The 5 flour recipes consisted in pearl millet, beans, peanuts, local ingredients like soumbala (fermented seed of *Parkia biglobosa*), monkey bread, fish powder or tamarind and iodized salt in different combinations. Regarding energy and nutritional contents, 100 g of flour contained 430–454 kcal, 11.5–14 g of proteins, and 9–13 g of lipids. 20 g of flour were used to prepare a cup of 200 ml of porridge, and two cups of porridge/day were sufficient to cover the energy requirements of a breastfed child aged 6–8 months and a part of the following micronutrient requirements: iron (38–81%), zinc (31–38%).

Flours were well accepted by children aged 6–24 months. Taking into account the availability of products and their cost, the following two flour recipes were selected as the best:

Flour recipe 1: Pearl millet (48%), beans (7%), peanuts (23%), soumbala (7%), monkey bread (15%).

Flour recipe 2: Pearl millet (48%), beans (7%), peanuts (26%), fish powder (4%), monkey bread (15%).

**DISCUSSION** Local flour recipes fully covered the energy needs of breastfed children and a part of micronutrient requirements. The use of local recipes has the advantage of good cultural acceptability, availability, and low cost. It could reduce household dependence on imported flour.

**DISCLOSURE** Any conflict of interest.

## PSI.329

**A comparative survey of stratum corneum free amino acids in patients with dermatophytosis and normal subjects**

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**BACKGROUND** Dermatophytes are a group of fungi that cause infections in keratinized human and animal tissues. Physical and chemical agents can be effective in reveals of dermatophytosis pathogenesis in human which some people are sensitive and some other are resistance to it. Amino acid changes may be a risk factor for infection with dermatophytes in mammals.

**METHODS** In the framework of a survey on the comparative changes of free amino acids in stratum corneum in 60 patient

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with dermatophytosis in two site, one, near skin lesion and two, sole area and 60 healthy volunteers (normal subjects), at sole area were done. Amino acid in stratum corneum analyzed by HPLC method and the identification of dermatophytosis was based on direct examination and culture. The results of research statistically were analyzed by software and comparison of mean by using the *t*-test.

**RESULTS** Achieved results between case and control in sole area showed that cases were significantly increased in: Aspartate – Tyrosine – Tryptophane – Phenylalanine and were significantly decreased in: Citrulline – Ornithine. Similarly, in male and female. In also people with dermatophytosis in two site near skin lesion and sole area distribution in associated were significantly increased in Glutamates – Asparagine – Histidine – Glutamine – Arginine – Citrulline – Threonine – Methionine – Leucine – Ornithine and were significantly decreased only in Glycine.

**CONCLUSION** Our research shows that due to the concentration, amino acids can effect stimulation or inhibition of dermatophytes growth in stratum corneum.

**DISCLOSURE** Nothing to disclose.

## PS1.330

**Malnutrition and malaria infection in children 6–59 months: a cohort study in Adami Tulu District, Ethiopia**

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**INTRODUCTION** Malnutrition and malaria are the major causes of sickness and death among children <5 years of age in Africa. There are contradictory data on the interaction between malnutrition and malaria. Therefore, the aim of this study was to assess the effect of malaria infection on malnutrition in children between 6 and 59 months old.

**METHODS** A retrospective cohort study was conducted in Adami Tulu District, Ethiopia. From August to December 2014 we registered episodes of malaria (exposure factor), and in January 2015 nutritional status and haemoglobin (outcome) were measured. This information was obtained from community randomized controlled trial of malaria prevention measures. Malaria infection was assessed using rapid diagnostic test, and standard anthropometric criteria were used to classify malnutrition as: wasting [weight-for-height < -2], stunting [height-for-age < -2] and being underweight [weight-for-age < -2 Z-score]. Anaemia was defined as haemoglobin level <11 g/dl.

**RESULT** In total, 3003 children (36 with malaria infection and 2967 without malaria infection) were included. The prevalence of stunting, being underweight and wasting was 43.1%, 19.3% and 6.2% respectively. 822 of 2981 (27.4%) children were anaemic (2% severe, 11.3% moderate and 14.4% mild anaemia). The malaria incidence was 6.7 episodes per 10 000 person weeks of observation. Malaria incidence was 2.5 times higher among stunted compared to non stunted children, [hazard ratio (HR) = 2.5, (95% CI: 1.4–5.1)]. There was no association between malaria infection and being underweight, wasting and anaemia.

**CONCLUSION** High prevalence of stunting was identified among children with malaria infection. The result should be

interpreted with caution for casual inference, given lack of nutritional data at baseline and inability to link temporal relationship between malnutrition and malaria episode. This study will however be followed up with repeated measurements of nutritional status and haemoglobin.

**ACKNOWLEDGEMENTS** We acknowledge the Research Council of Norway for funding this project.

**DISCLOSURE** Nothing to disclose.

## PS1.331

**Schistosoma mansoni infection and its association with nutrition and health outcomes: a household survey in school-aged children living in Kasansa, Democratic Republic of the Congo**

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**BACKGROUND** Schistosomiasis (SCH) is an important public health problem in developing countries and school-aged children are the most affected. The aim of this study was to explore the consequences of SCH on health and nutritional outcomes in the population of 6–15 years old children living in the area of Kasansa in the Democratic Republic of Congo.

**METHODS** A cross-sectional study was carried out in Kasansa health area in February 2011, involving school children attending third to sixth grades primary schools. Socio-demographic characteristics, information on morbidity history and risk factors were collected using a semi-structured questionnaire. *S. mansoni* and malaria infection were assessed using the Kato-Katz technique and Rapid Diagnostic Test, respectively. Hemoglobin concentration was also performed using a portable HemoControl device. Bivariate and multiple logistic regressions were used to assess risk factors for *S. mansoni*.

**RESULTS** A total of 197 children were enrolled in the study with a median age of 12 years old and 53.8% of them were boys. The overall health status of the children was poor with very high prevalence of *S. mansoni* infection (89.3%), malaria infection (65.1%), anemia (61.4%) and stunting (61.0%). Regular contact with river water ( $P = <0.001$ ) and anemia ( $P = 0.003$ ) were the most important risk factors related to schistosomiasis infection. Chronic malnutrition and anemia may have been potentially aggravated by SCH. Low school performance was strongly associated with low income (<1 USD).

**CONCLUSION** A high prevalence of *Schistosoma mansoni* and malaria infection was observed in the population of 6–15 years old children living in Kasansa area. Moreover, they presented a high burden of anemia, chronic malnutrition and low school performance. These alarming results suggested the implementation of an integrated strategy to reduce morbidity and to improve the health status of these children.

**DISCLOSURE** Nothing to disclose.

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## PSI.332

**A case of *Saccharomyces cerevisiae* fungemia associated with probiotic intake**

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A 75-year-old female patient was admitted via ER, because of RUQ pain and fever, which was diagnosed as SMA thrombosis. After 90 days of surgical observation, *Saccharomyces cerevisiae* were isolated from 4 out of 4 blood cultures during newly developed febrile episode. During her admission *Saccharomyces boulardii* was prescribed as a probiotic to improve her GI symptoms.

DISCLOSURE Nothing to disclose.

## Late Breakers

## PSI.333.LB

**Ecohealth research to regionally address agriculture intensification impacts on health and the environment in Southeast Asia and China**H. Nguyen-Viet<sup>1,2</sup>, T. Dinh Xuan<sup>3</sup>, P. Pham-Duc<sup>2</sup>, P. Kittayapong<sup>4</sup>, W. Adismito<sup>5</sup> and J. Fang<sup>6</sup>

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Ecohealth Field Building Leadership Initiative is a regional operational research network in Southeast Asia and China that focuses on solving human health problems associated with agricultural intensification. FBIL has 3 focus areas, namely research, capacity building and knowledge translation. FBIL gathers researchers, policy makers, community members and other stakeholders from 4 focused countries (China, Indonesia, Thailand and Vietnam). Here we describe the operational research component that focuses on aspects of agriculture intensification on health and the environment including animal waste from pig production (Vietnam), dairy production (Indonesia), pesticide use in vegetable production (China), and health risks in rubber plantation (Thailand). Integrated approaches to the research component including survey, participatory and cross-cutting methods are discussed.

The research results from Vietnam and Indonesia showed health and environmental impacts of manure management options, in particular the biogas system and turning waste to value. In Hanam of Vietnam, the health risks from biogas effluent reuse include *E. coli* infection (19–22% of population exposed) and *G. lamblia* infection (45–55% of population exposed). In Pangalengan, Indonesia, the Ecohealth approach was used to promote the production of medicinal worm and casting biofertilizer from cow manure as an environmentally friendly fertilizer alternative. In Chachoengsao Province of Thailand, key findings include evidences for higher risk of vector-borne diseases (dengue and chikungunya) in rubber plantation areas as well as higher microbial and heavy metal contamination of water and soil. In six villages of three townships in a County of Yunnan Province, China, issues identified were lack of farmer knowledge of pesticides, pesticide abuse, and ineffective policy to reduce pesticide abuse. Pesticide contamination was recorded from 6.1% to 12.7% of vegetables depending on sampling location in the field or market. The findings from 4 countries illustrate how Ecohealth research has been applied in health and

agriculture and serve as basis for interventions for reduce health and environmental risks.

DISCLOSURE Nothing to disclose.

## PSI.334.LB

**Characterization co-existence of AmpC, MBLs, TEM and SHV type of  $\beta$ -lactamases in clinical strains of *Escherichia coli* and *Klebsiella pneumoniae* isolated from hospitals of Khorramabad, Iran**F. Rezaei<sup>1</sup>, D. Kalantar<sup>2</sup>, S. Delfani<sup>1</sup>, M. M. Feizabadi<sup>3</sup> and M. Moatamedi<sup>4</sup>

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**INTRODUCTION**  $\beta$ -lactamases enzyme, particularly in Enterobacteriaceae such as *Escherichia coli* and *Klebsiella pneumoniae*, are a major mechanism of resistance to  $\beta$ -lactam antibiotics. Prevalence of co-existence of ESBLs, MBLs with AmpC- $\beta$ -lactamases in bacteria is serious threat in the treatment of bacterial infections. The aim of this study was to determine the presence of AmpC- $\beta$ -lactamases, VIM, TEM and SHV type of  $\beta$ -lactamases in clinical isolates of *Escherichia coli* and *Klebsiella pneumoniae* isolated from hospitals of Khorramabad, Iran.

**MATERIALS AND METHODS** Resistance to different antibiotics was determined by using standard disk diffusion method. ESBLs, MBLs and AmpC- $\beta$ -lactamases were detected by combined disk method. Polymerase chain reaction (PCR) was used to determine *bla*<sub>TEM</sub>, *bla*<sub>SHV</sub> and *bla*<sub>VIM</sub> genes.

**RESULTS** Out of the 130 isolates, 41 (31.5%) and 37 (28.4%) isolates of producing ESBLs and AmpC- $\beta$ -lactamases, respectively. The obtained results by PCR revealed that *bla*<sub>TEM</sub> and *bla*<sub>SHV</sub> among isolates were 24 (18.4) and 23 (17.6%) respectively.

**CONCLUSIONS**  $\beta$ -lactam therapy can be failed when  $\beta$ -lactamases- hyper-producing organisms appear in an infection. Outbreak of isolates co-expressing AmpC- $\beta$ -lactamases, MBLs and ESBLs can cause serious problems in future regarding the treatment of infections caused by these common enteric pathogens.

DISCLOSURE Nothing to disclose.

## PSI.336.LB

**Patterns and distribution of drug dependence and associated risk factors among male youth in upper Egypt**R. Afifi<sup>1,2</sup>

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**INTRODUCTION** Drug dependence is a challenging problem, worldwide, with different etiologies and motives.<sup>(1,2,3)</sup> The global rate of drug dependents ranges between 9 per 1000 and 13 per 1000.<sup>(4)</sup> Young people are at greatest risk. In Egypt, preliminary estimates show that 'experimentation' with drugs account 10–12% among 15–25 years old youth; cannabis products mostly consumed.<sup>(14)</sup> There is not enough research to identify drug dependence in Egypt by geographical distribution.



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**AIM** This study aims to determine the patterns of drug dependence in young male population in Upper Egypt, and a associated risks.

**METHODS** One-thousand Egyptian male 18–28 years old were seen in Quena University Outpatient clinics between March 2013 and March 2014; prevalence and risk factors for drug abuse were analyzed.

**RESULTS** Drug dependence was reported by 28 (2.8%) subjects; hashish (cannabis product) was the commonest drug used (71.4%). Most abusers (78.6%) took the drug in the form of smoking alone or combined with sniffing (14.3%). Most abusers (92.9%) were occasional users. Likewise, 64.3% of abusers had this habit for  $\leq 5$  years. High social class was a significant risk for drug abuse (Fisher's exact,  $P < 0.001$ ); living in rural areas was protective [ $X^2(df = 1) = 8.39$ ,  $P = 0.004$ ]. Smokers tended to be either drug abusers (Fisher's exact,  $P < 0.001$ ) or alcohol consumers (Fisher's exact,  $P = 0.013$ ). The presence of extra-marital sexual activity has also been risk for drug abuse (Fisher's exact,  $P < 0.0001$ ).

**CONCLUSION** Drug dependence is influenced by certain socio-demographic factors, the control of which helps minimize burden of such social level.

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Disclosure

Nothing to disclose.

## PSI.337.LB

**Clostridium difficile from the hypervirulent clade II isolated from Costa Rica with a variant toxin B**

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*Clostridium difficile* NAP1 strains are responsible for nosocomial outbreaks worldwide. The increased pathogenic potential of these strains has been attributed to overproduction of toxins and fluoroquinolone resistance. During a *C. difficile* nosocomial outbreak in Costa Rica, a strain was found to induce a distinct cytopathic effect (CPE), different from the canonical arborizing CPE. The strain was further identified as a NAP1 isolate (NAP1<sub>V</sub>) of the hypervirulent clade II that harbored a silent mutation in the *gyrA* gene. After toxin purification, cells treated

with TcdB of the NAP1<sub>V</sub> strain (TcdB<sub>V</sub>), displayed a rounded and surface detached phenotype, resembling that induced by *C. difficile* TcdB toxin A-negative strains. The effect mediated by the TcdB<sub>V</sub> was due to differences in substrate preferences that resulted in different glucosylation patterns of the various GTPases. Whereas TcdB from classical NAP1/027 strains glucosylated RhoA, Rac and Cdc42, TcdB<sub>V</sub> did not used RhoA as substrate and displayed less affinity for Cdc42. Sequence comparison of the functional domains of TcdB<sub>V</sub> with other *C. difficile* strains along with comparative genomic analysis revealed that TcdB<sub>V</sub> is a NAP1 toxin but with modifications within the enzymatic domain. The enzymatic domain is identical to that of a NAP9/017 strains (A-B+). We also provide evidence that the NAP1 strains glucosylate a broader spectrum of GTPases *in vitro* as both toxins glucosylated Rap and R-Ras. These findings provide insight into the role of the glucosyltransferase activity in the pathogenesis of *C. difficile* variant TcdB strains and the hypervirulent NAP1 strains.

**DISCLOSURE** Nothing to disclose.

## PSI.338.LB

**Nitric oxide in Giardiasis**

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**INTRODUCTION** Nitric oxide (NO) is a free radical synthesized from L-arginine by different isoforms NO-synthases. NO possesses multiple and complex biological functions. *Giardia lamblia* is one of the important intestinal parasites that cause both acute and chronic diarrheal diseases in human is still important a worldwide public health problem in specific geographical areas and among people with specific socio-economic status. Knowing the importance of NO as inflammatory mediator in diverse infectious diseases, nitric oxide levels was measured in patients infected with *Giardia lamblia*. **MATERIALS AND METHODS** This study was carried out at the Health Center Clinics of Tehran University of Medical Sciences among 49 *Giardia* positive and 39 age and sex matched healthy volunteers.

Examination of stool samples was done by direct wet smear and formol-ether concentration method. Serum samples were obtained for further laboratory examination.

The presence of of nitric oxide was detected by Griess reagent. **RESULTS** The mean value of nitric oxide in *Giardia* positive patients and control group was  $32.19 \pm 2.15$  and  $17.1 \pm 1.33$  micro moles respectively.

There was a significant difference between nitric oxide in *Giardia* positive patients and control group ( $P = 0.001$ ).

**CONCLUSION** NO naturally occurs in body immune system and plays an important role in bacterial and microbial infections. NO is able to affect the biology of *Giardia*, either by direct toxicity or by enhancing the immune response against the parasite. Therefore the level of NO production in patients infected with *Giardia lamblia* could contribute to the variability of the duration and severity of infections by this parasite and also to new tools for research and treatment of *Giardia lamblia*. **DISCLOSURE** Nothing to disclose.

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**PSI.340.LB****Women's perceptions of the quality of emergency obstetric care in a referral hospital in rural Tanzania**K. Stal*VU Medical Centre, Amsterdam, The Netherlands*

**OBJECTIVES** To assess perceptions of the quality of obstetric care of women who delivered in a Tanzanian rural hospital.

**METHODS** A descriptive-exploratory qualitative study, using semi-structured in-depth interviews and participatory observation. Nineteen recently delivered women and three health workers were interviewed.

**RESULTS** Although most women held positive views about the care they received in the hospital, several participants expressed major concerns about negative attitudes of care members. Lack of medical communication given by care providers constituted a major complaint.

**CONCLUSIONS** A more positive attitude by health workers and the provision of adequate medical information may promote a more positive hospital experience of women in need of obstetric care and enhance attendance.

**DISCLOSURE** Nothing to disclose.

**PSI.342.LB****Environment-related factors influencing morbidity among economically active household members in urban and rural Nigeria**A. Oyekale*North-West University, Mafikeng, South Africa*

**INTRODUCTION** Environmental quality is among the factors influencing people's health. This paper analyzed environment-related factors influencing reported morbidity in rural and urban Nigeria.

**METHODS** The data were the 2013 Demographic and Health Survey (DHS) collected from 38 522 households. Negative Binomial regression was used to analyze the data.

**RESULTS** The results showed that 6.10% and 5.63% of the rural and urban households reported that some household members were smoking inside the house. Also, 28.47% of the households were sharing toilet with other households. Water was boiled before being used by 2.62% of the respondents. Modern cooking fuel was used by 26.55% of the households. Separate rooms for cooking were reported by 26.68% of the households. However, 1.97% and 1.54% of the households in rural and urban areas reported that one person was sick in the previous one month to the survey. Also, 1.17% and 1.05% of rural and urban households reported that household members had been very sick for three months. Also, in the previous one year, 6.98% and 3.37% of rural and urban households reported that at least an household members had died in the past 1 year. Out of the included variables in the Negative Binomial regression, years of education, smoke inside the house, access to electricity, age of household heads, use of clean cooking fuel, having place for hand washing, and number of rooms per person showed statistical significance ( $P < 0.05$ ).

**CONCLUSION** There is the need to create more environmental awareness on the impacts of environmental quality on health of household members.

**DISCLOSURE** Nothing to disclose.

**PSI.343.LB****Factors influencing malaria morbidity among children under five in Cameroon**A. S. Oyekale*North-West University, Mafikeng, South Africa*

**OBJECTIVES** This study analyzed the effect of number of mosquito nets that are owned by households, dwelling characteristics and maternal demographic characteristics on malaria infection.

**MATERIAL AND METHODS** The 2011 Demographic and Health Survey (DHS) data for under-5 children were used. The children were subjected to haemoglobin test and rapid diagnostic test (RDT) to ascertain presence of malaria parasites. Data were analyzed using probit regression method.

**RESULTS** It was found that 2.43% and 8.68% of the children were living in houses that were prone to landslide and flooding, respectively. Also, 19.93%, 17.08% and 16.26% of the children lived in houses without windows, with broken windows, and with hole in the roof, respectively. Only 5.59% and 23.96% of the children lived in houses with window and door nets, respectively. Mosquito nets were owned by 64.03% of the households although Adamawa Region had the lowest coverage (52.23%). Reasons for not owning mosquito nets by all the households included lack of financial means (25.17%), used something else (1.80%) and not having many mosquitoes in the vicinity (5.53%). In the probit regression, variables that significantly reduced malaria infection among children ( $P < 0.05$ ) are number of mosquito nets, urban residence, improved toilet, ownership of radio, residence in flood-prone area, mother's secondary education, mother's tertiary education and residence in areas with not many mosquitoes, while infection increased with household size, residence in areas prone to landslide, severe anaemia, moderate anaemia, mild anaemia and age of children.

**CONCLUSIONS** Ownership of mosquito nets and dwelling characteristics are critical factors influencing infection with malaria. There is the need to ensure compliance with its use since there are disparities between access and actual usage. Also, addressing malaria problem in Cameroon should consider regional disparity in malaria incidences and more engagement of the media for appropriate sensitization, among others.

**DISCLOSURE** Nothing to disclose.

**PSI.344.LB****Assessment of maternal education, fertility and survival of children under five in Comoros**A. S. Oyekale*North-West University, Mafikeng, South Africa*

**INTRODUCTION** The pace of educational development in Comoros is slow due to several socioeconomic constraints. Similarly, fertility of women and associated child mortality are issues of concern. This paper analyzed the role of maternal education in explaining fertility and child survival in Comoros.

**METHODOLOGY** The data were the 2011 Demographic and Health Survey (DHS) which were collected from women 15–49 years old. Data were analyzed with two-stage Probit least square and ordinary least square (OLS) regression.

**RESULTS** The results showed that 59.07% and 83.85% of the children under age of one (infants) and under five years respectively were alive and average years of education was 2.04. Among others, maternal fertility reduced significantly ( $P < 0.05$ )

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with education. Fertility was instrumented with years of education, age of household heads, age at birth and uptake of health insurance. The Probit results showed that infant survival reduced significantly ( $P < 0.05$ ) with maternal fertility and male children, while it increased with vaccination, residence in Ndzouani region, breastfed immediately and birth order. Under five survival reduced significantly ( $P < 0.05$ ) with fertility and smoking while it increased with vaccination, urban residence, Moheli and Ndzouani regions, breastfed immediately and birth order.

**CONCLUSION** It was recommended that among other promotion of maternal education would reduce fertility and increase child survival.

**DISCLOSURE** Nothing to disclose.

**PSI.345.LB****The gendered impact of Buruli ulcer on the household production of health: why decentralization favours women**

I. Agbo

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A recent article in *Lancet*, 'Gender and global health: evidence, policy, and inconvenient truths' (Hawkes and Buse 2013), has brought renewed focus on the need for studies in global health to attend to gender dimensions of health care decision-making, treatment adherence, and the impact of illness on the household. In this gender-focused study of the neglected tropical disease Buruli Ulcer (BU) in Benin, West Africa, we highlight the many ways gender relations impact decisions to seek care, both from hospitals and from decentralized systems. We demonstrate that decentralized care is significantly less threatening to the integrity of households with Buruli ulcer, and places fewer and less onerous demands on women.

A female social scientist conducted semi-structured interviews and case studies in two BU-endemic zones of households having a family member diagnosed or treated for BU. In the first zone, decentralized care is well established; in the second, centralized care was the only option until an intervention introduced this year. Gender-sensitive case studies focused on factors enabling or delaying care-seeking in different seasons, and on the ramifications of displacing individuals from a household.

In Benin, illnesses incur gendered responsibilities. Women and girls shoulder a disproportionate share of the burdens incurred by a household illness, most notably in childcare. In the case of BU, a disease that infects many children, households must negotiate childcare in hospital as well as substitute labor for children remaining in the household. These negotiations are often time-consuming and constitute a significant factor in treatment delay for hospital care. The gendered indirect costs of BU hospital treatment may be severe and long-lasting, and include marital stress, economic vulnerability, permanent school dropout, and loss of income-generating activities. Because decentralized care does not usually require long-term displacement of individuals, these indirect costs are not incurred.

The case study of BU clearly demonstrates the necessity of recognizing the household, and not just the patient, as a unit of analysis in public health.

Decentralized BU care places far less burden on households even when hospital care is subsidized. Decentralized care is more socially acceptable and removes critical factors in treatment-seeking delay.

**DISCLOSURE** Nothing to disclose.

**PSI.346.LB****Plan to eliminate leprosy – involvement of public health staff in leprosy control in Puttalam, Sri Lanka: success story in a limited resource setting**

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<sup>1</sup>*Fairmed Foundation, Colombo, Sri Lanka;* <sup>2</sup>*Office of the Regional Director of Health Services, Madampe, Sri Lanka*

**INTRODUCTION** Leprosy is a chronic disease, caused by a bacillus, *Mycobacterium lepre*. The causative agent multiplies slowly and the incubation period of the disease is around 5–20 years. The history of leprosy control in Sri Lanka dates back to Dutch colonial era in 18th century. The Anti Leprosy Campaign (ALC) was established in 1954. Sri Lanka introduced the multidrug Therapy (MDT) regime in 1983 and the Public Health Inspectors attached to ALC distributed MDT. Sri Lanka reached the Leprosy Elimination Target of the World Health Organization of less than one case per 10 000 population in the year 1995. In 2001, control activities were integrated with the general health services.

Confirmation of diagnosis, treatment and contact tracing are done at the dermatology clinics by Dermatologists. However, due to lack of resources and logistical issues the expected benefit of integration is not reflected in the statistics. There has been persistent high new case detection, disability and child rates in certain geographical areas in Puttalam district of the North-Western Province due to the vulnerable populations (slum dwellers, fishing communities, and former displaced communities from the North).

Screening, defaulter tracing and contact tracing could not be expected from the overburdened curative health staff of three major hospitals with Dermatologists. The well established public health system with trained health workers at grass root level could be utilized effectively in control and prevention activities. **MATERIALS AND METHODS** Public health staff including Medical Officers, Public Health Inspectors (PHII) and Public Health Midwives (PHMM) were trained in leprosy control and to conduct community screening programmes such as household surveys, mobile skin clinics and school screenings to improve early detection. PHII were trained to follow up patients on treatment to reduce defaulters and to trace contacts. PHII and PHMM were trained to counsel and to guide patients for rehabilitation services.

**RESULTS** In 2012, 54 leprosy patients were detected in household surveys conducted by public health staff. In 2014, Mobile clinics conducted in high risk areas detected 17 patients. In 2014, two children were diagnosed during screening in schools.

**CONCLUSIONS** In limited resource settings, utilizing the public health infrastructure and staff could improve leprosy control activities.

**DISCLOSURE** Nothing to disclose.

**PSI.347.LB****Treg/T helper imbalance with emphasis on Treg factors during implantation window in unexplained recurrent spontaneous miscarriage**

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**OBJECTIVE** The embryo is the only natural allograft which may reject by mothers immune responses. Inappropriate immunological responses of mother are probably the main cause

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of unexplained recurrent spontaneous miscarriage (URSM), particularly Th1 (Th2, Treg/Th17 and cytokines balances. In this cross sectional study with control group, the balance of T regulatory (Treg)/T helper 17 (Th17) cells with an emphasis on Treg, as the main player of immunomodulation were evaluated during luteal phase in the window of implantation.

**MATERIALS AND METHODS** Flow cytometry analysis was used to measure the frequencies of Th17 and Treg cells. Quantitative real-time PCR (qRT-PCR) was performed for expressions of glucocorticoid-induced tumour necrosis factor receptor (GITR), Forkhead boxP3 (FoxP3), IL-10, Cytotoxic T-Lymphocyte Antigen 4 (CTLA-4) and transforming growth factor-beta (TGF- $\beta$ ) cytokines and markers.

**RESULTS** There were  $5.66 \pm 0.85\%$  Treg cells in the URSM subjects which was lower than in the NNP ( $9.5 \pm 1.48\%$ ;  $P = 0.001$ ). The frequency of Th17 cells in the URSM group ( $2.8 \pm 0.51\%$ ) was higher than in the NNP group ( $1.82 \pm 0.41\%$ ;  $P = 0.018$ ). Expressions of CTLA-4, FoxP3, TGF- $\beta$  and GITR cytokines and factors in URSM subjects were significantly lower than those in NNP group. However, expression of IL-10 in the URSM subjects was non-significantly higher than in the NNP. Significant correlations were found between TGF- $\beta$  to FoxP3 and GITR. FoxP3 showed significant correlations with CTLA-4 and GITR. CTLA-4 showed a significant correlation with GITR.

**CONCLUSION** Evaluation of cytokines and markers related to Treg cells and balance between Treg and Th17 cells in peripheral blood lymphocytes could be used as prognostic factors of patients with URSM.

**KEYWORDS** TGF- $\beta$ , GITR, CTLA-4, IL-10, Unexplained recurrent spontaneous miscarriage.

**DISCLOSURE** Nothing to disclose.

**PSI.350.LB**

**The link between Toxoplasmosis and diabetes: modifications of pancreatic  $\beta$  cells TC-6 infected by *Toxoplasma gondii* tachyzoites**

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**INTRODUCTION** The intracellular parasite *Toxoplasma gondii* chronically infects approximately 20–50% of the global population and it is commonly accepted that the parasite is able to invade all kind of nucleated cells, however there is not data about the invasion and proliferation in pancreatic  $\beta$  cells. In this study the mean goal was to determine the morphological and functional changes of pancreatic  $\beta$  cells TC-6 infected by *Toxoplasma*.

**METHODS** Pancreatic  $\beta$  cells TC-6 were incubated with *Toxoplasma gondii* tachyzoites and then fixed in order to measure the proliferation capability of the parasite inside the cells. TC-6 cells infected with *Toxoplasma gondii* tachyzoites were also stimulated with glucose and then the insulin secretion was determined by ELISA in order to observe the variation of the levels of insulin according to the time of proliferation of *T. gondii*. Regarding of the morphology cells, immunofluorescence was used to determine the changes in the structure at cytoskeleton level.

**RESULTS** *Toxoplasma gondii* was able to invade and proliferate in TC-6 cells and the insulin secretion determined by ELISA was affected significantly compared with the control cells without tachyzoites. By immunofluorescence microscopy we can see some

changes in the distribution of the actin cytoskeleton, while the cellular morphology of TC-6 was apparently unaffected.

**CONCLUSIONS** *Toxoplasma gondii* tachyzoites are able to invade and proliferate in pancreatic  $\beta$  cells TC-6, leading a normal dynamic cells proliferation. In addition *Toxoplasma gondii* affects insulin secretion from pancreatic  $\beta$  cells which may lead to chronic conditions such as diabetes.

**ACKNOWLEDGEMENTS** This work was funded by the research grants no. 165282 (to MGC) by CONACyT (Mexico).

**DISCLOSURE** Nothing to disclose.

**PSI.351.LB**

**Structural and functional changes in osteoblasts invaded with *Toxoplasma gondii* tachyzoites**

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**INTRODUCTION** The protozoan *Toxoplasma gondii* is an intracellular parasite that infects humans and a broad variety of animals. In immunocompromised individuals it causes a severe disease and death. *T. gondii* is able to invade all the cells in the organism through dynamic mechanisms such as gliding motility, conoid extrusion and secretion from different organelles. To date there are no data to suggest the parasite's ability to cause damage in bone remodeling due to the invasion of osteoblasts.

**METHODS** Osteoblast cell culture were incubated with *Toxoplasma gondii* tachyzoites and then fixed in order to measure the number of parasites inside the parasitophorous vacuole. Osteoblast infected with *Toxoplasma gondii* tachyzoites were analyzed with immunofluorescence microscopy in order to determine the distribution of the actin cytoskeleton, the glucose transporter GLUT4 and the protein mTOR (mammalian Target of rapamycin).

**RESULTS** *Toxoplasma gondii* was able to invade and proliferate in osteoblast cell culture. Various modifications were observed in the actin cytoskeleton observed a thickening of the filaments in the invaded cells. mTOR protein which plays a fundamental role in regulating various cellular processes, apparently recruited in the periphery of the parasitophorous vacuole which also is associated with translocation of glucose transporters GLUT 4 to the membrane of the invaded cells.

**CONCLUSIONS** *Toxoplasma gondii* tachyzoites are able to invade and proliferate in osteoblasts, leading a normal dynamic cells proliferation. Further the infection with *Toxoplasma gondii* affects various aspects of metabolism of osteoblasts, such as the distribution of actin filaments (structural damage) as well as activation of protein kinases involved in the regulation of cell metabolism and glucose entry the cell which could affect the functionality of osteoblasts and the bone remodeling.

**DISCLOSURE** This work was funded by the research grants no. 165282 (to MGC) by CONACyT (Mexico).



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**PS1.352.LB****Effectiveness of topical vitamin E against bicarbonate mouthwash in prevention of oral mucositis in children with chemotherapy**

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**INTRODUCTION** Mucositis is one of the most common oral complications in cancertherapy treatment is controversial. The effectiveness of some agents depends on the stage at which treatment is started.

**MATERIALS AND METHODS** Randomized controlled clinical trial from period June to September 2013 in 39 patients with leukemia in the pediatric oncology department of Rio Blanco Regional Hospital SESVAR. Two groups were formed; experimental group received vitamin E topical application 20 mg/kg/day and control bicarbonate mouthwash; oral mucositis was recorded in degrees according to the world health organization (WHO) index. Descriptive and inferential statistical analysis,  $\chi^2$  for differences, 5% error, 95% reliance.

**RESULTS** Oral Mucositis with vitamin E after 5 (25%) and bicarbonate 15 (75%); was obtained  $P$  of 0.013. Poor oral hygiene study's beginning 26 (66.7%), poor oral hygiene at the end no one. caries index and presence of mucositis: 1–3 caries/mucositis 4 (20%), 4–6 caries/mucositis 8 (40%), 7–9 caries/mucositis 5 (25.0%), 10–12 caries/mucositis none, 13–15 caries/mucositis 3 (15%); was obtained  $P$  of 0.022.

**CONCLUSIONS** There is statistical significance in the use of vitamin E. Therefore it may be an effective therapy for preventing oral mucositis in children with cancer receiving chemotherapy.

**DISCLOSURE** Nothing to disclose.

**PS1.353.LB****Health economic evaluation of wound debridement and moist wound care in chronic cutaneous leishmaniasis ulcers in Afghanistan**

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**BACKGROUND AND METHODS** A decision analytical model based on pre-defined health states was used to analyse the comparative cost-effectiveness of two wound care regimens versus intra-dermal Sodium Stibogluconate investigated within a randomized controlled clinical trial in cutaneous Leishmaniasis patients in Afghanistan. Costs were collected from a societal perspective. Effectiveness was measured in wound free days. The decision tree was calibrated, e.g. baseline parameters, sensitivity ranges and parameter distributions, on the basis of the patient level data collected during the trial. Final outcomes were the efficiency of the regimens and a budget impact analysis in the context of Afghanistan.

**RESULTS** Average baseline costs per patients were 11 US\$ for intra-dermal antimony (Group I), 16 US\$ for wound

debridement and subsequent moist wound care (Group II) and 25 US\$ for moist wound care alone (Group III) in patients with a single chronic CL ulcer elicited by *L. tropica* or *L. major*. The incremental societal budget impact analysis estimated additional costs of 0.765 million US\$ and 2.3 million US\$ for Group II and Group III regimens compared to Group I, respectively. The budget impact of the DAC N-055 basic crème preparation in Group II and III would save 0.353 million US\$ in regimen II and 0.036 million US\$ in regimen III compared to the intra-lesional sodium Stibogluconate WHO EMRO IL SSG case management protocol. The incremental baseline cost-effectiveness ratio of Group II versus Group I was 0.09 US\$ and Group III versus Group I 0.77 US\$, Group III versus Group II and very cost-effective according to WHO CHOICE criteria. Within a Monte-Carlo probabilistic sensitivity analysis Group II was cost-effective in 80% of the cases starting at a willingness-to-pay of 80 cent per wound free day.

**CONCLUSION** Group II is the most cost-effective treatment alternative compared to Group I. The comparative cost-effectiveness of Group III depends on the re-ulceration rate, the number of dressings necessary to avoid super-infections. A future multi-centre implementation research study to account for subgroup analysis and for the heterogeneity of patients should supplement the results obtained in Group III.

**REGISTRATION** Ethical clearance was also obtained by the International Review Board at the Ministry of Public Health in Kabul, Afghanistan. The trial was registered online at Clinicaltrials.gov (ID: NCT00996463, 15th October 2009).

**DISCLOSURE** Nothing to disclose.

**PS1.355.LB****Antimicrobial resistance and genetic virulence profile of vaginal *Escherichia coli* isolated from pregnant women in Manhica, Mozambique**

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**BRIEF INTRODUCTION** *Escherichia coli* have been reported to be one of the most common organisms found in the genital tract among pregnant women. Vaginal *E. coli* (VEC) strains are considered to be a reservoir for vaginal and/or endocervical colonization in pregnant women, being an important step in the development of urinary tract, intra-amniotic and puerperal infections. The aim of the study was to characterize 51 *E. coli* isolates from vaginal samples from pregnant women in terms of antimicrobial resistance, phylotype and virulence profile in Manhica (Mozambique) to know their virulence potential.

**MATERIALS AND METHODS** We studied 51 VEC isolates collected from pregnant women at the Hospital de Manhica from June to December 2014. Samples were collected from 2 groups of pregnant women (i) during routine antenatal consultations ( $\geq 34$  weeks) and (ii) delivery. The antibiotic resistance levels were studied using disk diffusion methods. Phylogenetic group was performed by a new multiplex-PCR. The virulence profile was determined by PCR of 13 virulence factor genes (VFGs) typically associated with extraintestinal infections. **RESULTS** Sixty-one percent of all the strains were resistant to trimethoprim-sulfamethoxazol (SXT), following by ampicillin and tetracycline (31%). One of the strains harboured an

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extended-spectrum  $\beta$ -lactamase (ESBL) which was CTX-M-15. The most prevalent VFGs were those related to the iron uptake systems *fyuA* (49%), followed by *iucC* (41%) and *iutA* (37%). Surprisingly, most of strains belonged to the E phylogroup (29%) or were unknown (24%) whereas only 16% belonged to the most virulent B2 group.

**CONCLUSIONS** This is the first study that provides information about vaginal carriage of *E. coli* among pregnant women in Mozambique. The high rate of SXT resistance is due to the extensive use of SXT in the study area and as prophylaxis for opportunistic infections in HIV patients. Apart from this and the presence of one ESBL, the lower percentages of antimicrobial resistance and virulence factors compared with the rates in Spain suggest lower antibiotic pressure and virulence potential. Knowledge of antimicrobial resistance may be useful for guiding treatment recommendations.

**ACKNOWLEDGEMENTS** ESL was a recipient of a 'MAEC-AECID' grant from the Spain's government. LM has a fellowship from the program Río Ortega of the ISCIII (CM13/00260). QB has a fellowship from the program Miguel Servet of the ISCIII (P.N. de I + D + I2008–2011, grant No: CP11/00269).

**DISCLOSURE** Nothing to disclose.

**PSI.356.LB**

**Persistent bacteremia from *Pseudomonas aeruginosa* resistant to the novel antibiotics ceftolozane-tazobactam and ceftazidime-avibactam**

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**INTRODUCTION** Sepsis from *Pseudomonas aeruginosa* bacteremia is fatal and necessitates prompt antimicrobial therapy. The prevalence of multidrug-resistant (MDR) *P. aeruginosa* is increasing. Newer antimicrobials, including ceftazidime-avibactam and ceftolozane-tazobactam, have been developed to address the rise of MDR organisms.

**MATERIALS AND METHODS** Serial blood cultures were performed on a 67-year-old man with newly-diagnosed follicular lymphoma who was admitted to the hospital for sepsis and right lower extremity cellulitis. *P. aeruginosa* was identified using Vitek 2 (Biomerieux, Lenexa, KS). Antimicrobial susceptibility for ceftazidime-avibactam and ceftolozane-tazobactam were performed by measuring minimum inhibitory concentration by E-test (Biomerieux, Lenexa, KS). Resistance determinants were identified using the Verigene Blood Culture-Gram Negative (BC-GN) microarray-based assay (Nanosphere, Inc., Northbrook, IL).

**RESULTS** This is the first case of persistent *P. aeruginosa* bacteremia resistant to the novel antimicrobials ceftazidime-avibactam and ceftolozane-tazobactam. Blood cultures from Day 1 of hospitalization were susceptible to piperacillin-tazobactam and cefepime, but repeat blood cultures grew *P. aeruginosa* resistant to all cephalosporins and penicillins by Day 6, and to meropenem by Day 10. Blood cultures from Day 6 and Day 10 were resistant to ceftazidime-avibactam and ceftolozane-tazobactam. The Verigene BC-GN did not detect CTX-M, KPC, NDM, VIM, IMP or OXA gene.

Antimicrobial coverage was adjusted appropriately based on blood culture susceptibility reports. Work-up to find the source of *P. aeruginosa* bacteremia were performed. Trans-esophageal echocardiogram did not show endocarditis. Non-contrast CT

scan of the chest, abdomen and pelvis revealed bilateral pleural effusions but no abscess. Urine cultures did not grow bacteria. The patient died on Day 16 of hospitalization.

**CONCLUSION** Antimicrobial resistance in *P. aeruginosa* may develop even during the course of appropriate antimicrobial therapy. Resistance mechanisms to ceftazidime-avibactam and ceftolozane-tazobactam need to be further investigated.

Continued antimicrobial susceptibility surveillance and studies on treatment strategies for persistent *P. aeruginosa* bacteremia are warranted.

**DISCLOSURE** Nothing to disclose.

**PSI.357.LB**

**Prevalence of intestinal parasites in African community on the example of Pygmy and non-Pygmy population in Central African Republic**

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**BACKGROUND** The Central African Republic (CAR) community, living in poor socioeconomic conditions is estimated to be a population with a high rate of intestinal parasitic infections. One of the ethnic groups living in CAR are Aka Pygmies, in whom the prevalence of infections with intestinal helminths and protozoa remains unknown. Similarly, non-Pygmy population residing in south-western CAR, in the same region as the Pygmy tribes, is treated on the basis of clinical symptoms rather than parasitological diagnostics. The aim of the study was to present the prevalence of intestinal parasites in the population of Pygmies and non-Pygmies inhabiting the Central African Republic.

**MATERIAL AND METHODS** In total, 3159 Pygmies and non-Pygmies (children 0–17 years 70.9%, females 55.6%) from the region of Bagandou (prefecture Lobaye) and Monassao (prefecture Sangha) were examined in the period December 2014–April 2015: 415 Aka Pygmies from Monassao, 537 Aka Pygmies and 2207 non-Pygmies from Bagandou. Single stool samples were collected from each patient, fixed in 10% formalin, and transported to the Military Institute of Medicine in Poland, where they were examined using one basic diagnostic method in light microscopy (direct smear in Lugol's solution).

**RESULTS** Pathogenic intestinal parasite infections were detected in 76.6% of Pygmies from Monassao, 84.7% of Pygmies and 48.0% of non-Pygmies from Bagandou. The most common pathogens detected in the studied individuals were *Ascaris lubricoides*, *Ancylostoma duodenale*/*Necator americanus*, and *Giardia intestinalis* which were detected in 952 Pygmies from Monassao and Bagandou (57.0%, 39.7%, and 15.3% of infections respectively); *Giardia intestinalis* (21.0%), *Ascaris lubricoides* (17.0%), and *Ancylostoma duodenale*/*Necator americanus* (13.7%) detected in 2207 non-Pygmies from Bagandou.

**CONCLUSIONS** The parasitological examination focused on the prevalence of intestinal parasites and revealed high rates of infections both in Pygmies and non-Pygmies in Central African Republic, which suggests a necessity of periodic deworming according to the results obtained in the local population.

**DISCLOSURE** Nothing to disclose.

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## PS1.358.LB

**A geographically heterogeneous context and spatially varying risk factors for malaria at Lake Victoria**T. Homan<sup>1</sup>, A. Hiscox<sup>1</sup>, T. Smith<sup>2</sup> and W. Takken<sup>1</sup><sup>1</sup>Department of Entomology, Wageningen University Research Centre, Wageningen, The Netherlands; <sup>2</sup>Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland

**BACKGROUND** Great decreases in malaria transmission and malaria attributable mortality have been realized over the last years, and this has mainly been because to the scale-up of long-lasting insecticidal bed nets and indoor residual spraying with insecticides. Notwithstanding these gains, considerable residual, spatially heterogeneous, malaria transmission remains. To shrink malaria in these foci of residual transmission scientists need to consider the local demographical, environmental and social context, and propose an appropriate set of interventions. Exploring spatially varying risk factors for malaria can give understanding into which human and environmental characteristics play important roles in nourishing malaria transmission.

**METHODS** On Rusinga Island, western Kenya, malaria infection was tested by rapid diagnostic tests during two cross sectional surveys conducted three months apart in 3632 individuals from 790 households. Demographic data was collected for all households using questionnaires. Geographical variables were derived using Quickbird satellite images. Analyses were performed on 81 clusters. A global regression model was constructed to define how much of the spatial variation in malaria prevalence could be explained by the demographic and environmental data. Successively a geographically weighted regression (GWR) was performed assuming non-stationarity of risk factors. Special attention was taken to investigate the effect of residual spatial autocorrelation and local multicollinearity.

**RESULTS** Combining the data from both surveys, overall malaria prevalence was 24%. Scan statistics revealed two clusters which had significantly elevated numbers of malaria cases compared to the background prevalence across the rest of the study area. A multivariable linear model including environmental and household factors revealed that higher socioeconomic status, outdoor occupation and population density were associated with increased malaria risk. The local GWR model improved the model fit considerably and the relationship of malaria with risk factors was found to vary spatially over the island; in different areas of the island socioeconomic status, outdoor occupation and population density were found to be positively or negatively associated with malaria prevalence.

**DISCUSSION** Investigation of risk factors for malaria that vary geographically can provide comprehension into the local epidemiology of malaria. Exploring spatially variable relationships can be a helpful tool in exploring which set of targeted interventions could locally be implemented. Additional malaria control may be focussed at areas which are identified as at risk. For instance, areas with many people that work outdoors at night may need more emphasis in terms of vector control.

**DISCLOSURE** Nothing to disclose.

## PS2 Poster Session II

## PS2.002

**HERACLES collaborative project on cystic echinococcosis funded by the European Commission**

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**INTRODUCTION** Cystic Echinococcosis (CE) is one of the most important zoonotic diseases and was recently assigned to the WHO list of neglected tropical diseases (NTDs). Clinical decision making on CE is difficult because the evidence base is low as no funding to support randomized clinical trials is available. Human cystic Echinococcosis ReseArch in Central and Eastern Societies (HERACLES) is a EU funded collaborative project that offers for the first time a reasonable amount of funding and a real chance to break this vicious circle and finally put CE on the radar.

**MATERIALS AND METHODS** The main goals of the HERACLES cooperative project are to: Identify the population affected by CE in Bulgaria, Romania and Turkey by ultrasound screening; create the European Register of CE (ERCE); establish the Echino-Bio-Bank from animal and human CE patients; set-up and validate new molecular-based POC-LOC (Point Of Care - Lab On a Chip) kits based on recombinant antigens; identify cyst stage-specific biomarkers associated with CE response to therapy or lack thereof, through 'omic' studies; increase drug bioavailability of benzimidazoles; train experts working in Eastern European countries, as they are crucial to fight this disease.

**RESULTS** Heracles Consortium is made up of nine partners, of which seven are academic institutions, one is a small-medium enterprise (SME) and one is a service provider company. In December 2015 we built ERCE (<http://www.heracles-fp7.eu/erce.html>) with 533 patients enrolled as of this writing, and under the umbrella of the Heracles project an ultrasound screening of 12 050 people was carried out in the summer of 2014 in Bulgaria, Romania and Turkey. A total of 25 000 people are expected to be screened by the end of 2015.

**CONCLUSIONS** The results from HERACLES will support governments, organizations (WHO), European Commission, related European agencies (ECDC, EFSA) and the Global Burden of Disease study (IHME) to harmonize data collection, monitoring and reporting of CE. We see this as breakthrough in the current scenario of CE and we want to seize the opportunity by adding multipliers to the already broad field of action of HERACLES and by involving more partners and adding activities under the umbrella of HERACLES 'Extended Family' ([http://www.heracles-fp7.eu/interactive\\_map.html](http://www.heracles-fp7.eu/interactive_map.html)).

**ACKNOWLEDGEMENTS** The research was funded from the European Community's FP7 under the grant agreement 602051 (Project HERACLES; <http://www.Heracles-fp7.eu/>).

**DISCLOSURE** Nothing to disclose.

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## PS2.003

**Extended ultrasound surveys in Eastern Europe: preliminary results from HERACLES collaborative project on cystic echinococcosis**A. Casulli<sup>1</sup>, O. Akhan<sup>2</sup>, C. M. Cretu<sup>3</sup>, K. Vutova<sup>4</sup>, P. Pezzotti<sup>1</sup>, E. Brunetti<sup>5</sup> and F. Tamarozzi<sup>5</sup><sup>1</sup>Istituto Superiore di Sanità, Rome, Italy; <sup>2</sup>Hacettepe University, Ankara, Turkey; <sup>3</sup>Spitalul Clinic Colentina Bucuresti, Bucharest, Romania;<sup>4</sup>Specialized Hospital for Active Treatment of Infectious and Parasitic Diseases 'Prof. I. Kirov', Sofia, Bulgaria; <sup>5</sup>University of Pavia, Pavia, Italy

**INTRODUCTION** Cystic echinococcosis (CE) global prevalence is estimated at 2–3 million human cases and a burden of 1 million DALYs accounting for underreporting. However, clinically diagnosed cases represent only a small proportion of the total number of real infected people. For these reasons, extended ultrasound (US) surveys on human populations are needed to quantify asymptomatic carriers and permit a global and a real estimation of the burden due to CE. Such efforts are crucial to assess, compare and prioritize interventions in limited resource settings.

**MATERIALS AND METHODS** A study of prevalence of abdominal CE was undertaken in 3 Eastern European countries. US surveys were conducted in association with resident partners and public health centres: Hospital of Infectious and Parasitic Diseases 'Prof. J. Kirov' (Sofia, Bulgaria), Colentina Clinical Hospital (Bucharest, Romania), Hacettepe University Hospital (Ankara, Turkey). Ethical approvals were given by Ethical Committees from the centres involved in the project. Informed consent was obtained from participants and a questionnaire reporting demographic and epidemiological information was distributed. Each suspected case was examined independently by 2 clinicians and patients were assigned to treatment according to WHO-Infomal Working Group on Echinococcosis (WHO-IWGE) Expert Consensus.

**RESULTS** 12 050 people (5667 in Bulgaria, 2902 in Romania and 3481 in Turkey) were screened during the summer of 2014, with 138 individuals with probable CE. Among these patients, 89 were confirmed to have CE, while 49 were identified as suspected CE with inactive and CL cyst stages. Blood samples were collected for serology and proteomic studies. Patients identified as positives were allocated to available treatments. A total of 25 000 people are expected to be screened by the end of 2015.

**CONCLUSIONS** Collection of accurate epidemiological and clinical data will give a reliable picture of the burden of this disease in Eastern Europe, providing a statistically supported case series for future evaluation of efficacy and effectiveness of interventions. This will be the largest US survey on CE from a single community-based study.

**ACKNOWLEDGEMENTS** The research was funded from the European Community's FP7 under the grant agreement 602051 (Project HERACLES; www.Heracles-fp7.eu/).

**DISCLOSURE** Nothing to disclose.

## PS2.004

**Population pharmacokinetics of the novel anthelmintic tribendimidine in *Opisthorchis viverrini* infected patients in Lao PDR**I. Meister<sup>1</sup>, F. Vanobberghen<sup>1</sup>, M. A. Penny<sup>1</sup>, S. Sayasone<sup>2</sup>, K. Phongluxa<sup>2</sup>, P. Odermatt<sup>1</sup>, U. Duthaler<sup>1</sup>, A. Leonidova<sup>1</sup>, J. Huwyler<sup>3</sup> and J. Keiser<sup>1</sup><sup>1</sup>Swiss Tropical & Public Health Institute, University of Basel, Basel, Switzerland; <sup>2</sup>National Institute of Public Health, Vientiane, Lao People's Democratic Republic; <sup>3</sup>Pharmaceutical Sciences, University of Basel, Basel, Switzerland

Opisthorchiasis is caused by the food-borne trematode *Opisthorchis viverrini* and affects more than 8 million people in Cambodia, Lao PDR, Thailand and Vietnam. The disease causes hepatomegaly, cholangitis and cholangiocarcinoma. Praziquantel is the sole drug available to treat the disease. Tribendimidine is a novel anthelmintic, approved for human use by Chinese authorities since 2004. It displays an efficacy against *O. viverrini* comparable to praziquantel. The aim of this study is to elucidate the pharmacokinetic parameters of tribendimidine and its metabolites, dADT and adADT, in a large population of *O. viverrini* infected patients.

Tribendimidine was delivered to 300 patients at a single oral dose of 400 mg. The sampling time points were optimized by modelling data from previous phase IIa studies. According to this sampling scheme, 5 blood drop samples were collected from patient fingertips of 125 patients at 20 min, 2, 7.75, 8 and 30 h after treatment and deposited on filter cards. The dried blood samples were analysed by a validated liquid chromatography coupled to tandem mass spectrometry method. Pharmacokinetic parameters, as mean maximal concentration ( $C_{max}$ ), time to maximal concentration ( $T_{max}$ ), elimination half life ( $t_{1/2}$ ) and area under the curve (AUC) of both tribendimidine metabolites were evaluated using non-compartmental analysis with WinNonlin<sup>®</sup> software.

Tribendimidine was quickly metabolised to dADT and adADT: after 20 min post-treatment, no parent molecule was detectable. dADT reached higher concentrations than adADT ( $C_{max}$  of 2.7 and 0.8  $\mu\text{g/ml}$ , respectively). Mean  $T_{max}$  values were 6.4 h for dADT and 6.3 h for adADT. The corresponding mean  $t_{1/2}$  values were 5.8 and 7.6 h. Mean dADT AUC was 28.0  $\mu\text{g/ml}\cdot\text{h}$ , while adADT AUC was much smaller (7.7  $\mu\text{g/ml}\cdot\text{h}$ ). Our data will be further evaluated by population PK-PD analysis to identify important covariates and relate PK parameters with treatment efficacy.

To our knowledge, we have for the first time presented the disposition of tribendimidine in a large population. By collecting PK information in the representative population to be treated and by aiming to identify factors driving PK variability, our data will be helpful in the development of tribendimidine as an alternative opisthorchicidal drug.

**DISCLOSURE** Nothing to disclose.



## Abstracts of the 9th European Congress on Tropical Medicine and International Health

## PS2.005

**Prevalence and risk factors for *Strongyloides stercoralis* infection in Bolivia among patients at high risk of complications**

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**INTRODUCTION** Strongyloidiasis can be fatal in immunocompromised patients. The prevalence of this neglected tropical disease has never been evaluated in Bolivia using sensitive tests. The aim of the study was to estimate the prevalence and risk factors for strongyloidiasis among patients at high risk of complications.

**MATERIALS AND METHODS** We conducted a multicenter study in Santa Cruz (400 m, tropical climate) and Cochabamba (high inter-Andean valleys, 2550 m, temperate climate) among patients with cancer, HIV, rheumatic or hematologic disease. Strongyloides IgG antibody titers were measured by enzyme-linked immunosorbent assay (Bordier Affinity Products) and two fresh stool samples were analyzed using four parasitological techniques (direct smear, Ritchie, Baermann and agar plate culture). A structured socio-demographic characteristics questionnaire was administered. Categorical variables were compared by chi-square test and  $P < 0.05$  was considered statistically significant. Multivariable logistic regression model was used to evaluate adjusted OR for positive stool test. **RESULTS** 1151 patients participated. The serological and coproparasitological prevalences were 23% (265/1151) and 7.6% (88/1151), respectively.

In both the unadjusted and adjusted analyses, factors associated with positive coproparasitology ( $P < 0.05$ ) were younger age, living in rural area and low education level. There was no difference in prevalence between Cochabamba and Santa Cruz as defined by coproparasitology (6.4% vs. 8.9%;  $P = 0.11$ ) or serology (24% vs. 22%;  $P = 0.40$ ). Among 64 patients in Cochabamba who had never traveled to the tropical lowlands, 5 (7.8%) had a positive coproparasitology.

**CONCLUSIONS** The study demonstrates that strongyloidiasis is widely present in Bolivia and that many vulnerable patients are at risk of complications. Given the known performance of the serological test, the actual prevalence of strongyloidiasis is estimated at 20%.

The transmission of this parasitosis is highest in tropical and subtropical areas, but also occurs at altitudes over 2500 m in regions with a temperate climate, as evidenced in Cochabamba. Bolivia should reinforce control strategies to prevent complications from this serious parasitic disease.

**DISCLOSURE** Nothing to disclose.

## PS2.006

**How to measure responses to anthelmintic treatments? Centile distribution of individual versus group mean egg reduction rates**

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**BACKGROUND** Anthelmintics are given to millions of people under preventive chemotherapy programmes for schistosomiasis and soil-transmitted nematodes (STN). To assess treatment response, group means are used (egg reduction rate, ERR: the difference in mean egg counts in a group of treated individuals from before treatment to after treatment), aiming for ERR  $\geq 90\%$  for schistosomiasis and most STNs. However ERRs are not apt to describe the broad range of individual responses and identify suboptimal responses. We propose a different approach consisting in the distribution of individual ERR (iERR).

**METHODS** We compiled databases of 4375 subjects with *Schistosoma* spp infection (*S. mansoni* (Sm) = 1708, *S. japonicum* (Sj) = 300, *S. haematobium* (Sh) = 2367) treated with praziquantel (PZQ: 15 trials in Asia, Africa and Latin America); and 1832 school age children with *Ascaris* (AL) *Trichuris* (TT) and hookworms (HW) treated with 400 mg albendazole (ALB,  $n = 613$ ) and 500 mg mebendazole (MBL,  $n = 1219$ ) (5 trials in Africa, Asia and Central America).

We analysed the centile distribution of iERR and compared it to arithmetic mean ERR (ERRam). No change or increase in egg counts post-treatment count as no reduction (ERR = 0).

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## FINDINGS

Schistosoma. 6.3%, 1.7% and 4.3% of the subjects treated for *Sh*, *Sj* and *Sm*, respectively, had ERR = 0. The 5th, 10th, and 25th centiles of the subjects treated for *Sh* had iERRs of 0%, 49.3%, and 96.5%; values for *Sj* were 75%, 99%, and 99%; and for *Sm* 18.2%, 65.3%, and 99.8%. For comparison: ERRam was 86.6%, 96.7% and 86.7% for *Sh*, *Sj* and *Sm*. STNs. Of the 613 subjects treated with ALB, 31.8%, 48.5% and 19.7% were infected with AL, TT and HW, respectively; corresponding values for MBL ( $n = 1219$ ) were 43.6%, 42.1% and 14.3%.

5%, 36% and 8% of subjects treated with ABL for AL, TT and HW respectively had ERR = 0; figures with MBL for AL, TT and HW were 1%, 19% and 34%. The 5th, 10th, and 25th centiles of the subjects treated with ALB for AL had iERRs of 53.1%, 100% and 100%, respectively; for TT all 0%; and for HW: 0%, 44% and 89.3%. Corresponding values with MBL for AL were 96.4%, 100% and 100%; TT: 0%, 0% and 27.6%; HW: all 0%. For comparison, ERRam with ABL for AL, TT and HW were 95.4%, 38.4% and 91.3%; and for MBL 93.7%, 55.7% and 40.6%, respectively.

CONCLUSIONS The centile distribution of iERR is a useful complement to group mean estimates and better suited to detect suboptimal responses to anthelmintics.

DISCLOSURE Nothing to disclose.

## PS2.007

***Strongyloides stercoralis* larvae excretion patterns before and after treatment**

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INTRODUCTION The variability of larvae excretion impedes the parasitological diagnosis of the soil-transmitted helminth *Strongyloides stercoralis* in infected individuals. In particular, low-intensity chronic infections may be missed because of the low number of larvae excreted. The objective was to determine possible differences in larvae excreted by infected individuals and to assess the effect of treatment with ivermectin.

MATERIALS AND METHODS Using a modified Baermann diagnostic method, we assessed the number of larvae excreted per gram (LPG) stool in 219 samples from 38 infected individuals over seven consecutive days before and in 470 samples from 44 persons for 21 consecutive days after ivermectin treatment (200 µg/kg BW). We assessed for a possible cyclic excretion pattern by using local maxima calculation. We compared the observed local maxima in the larvae excretion counts within individuals with the number of local maxima in randomly generated numbers. A local maximum was identified when the LPG on a certain day was higher than the counts of the previous day and the following day.

RESULTS The diagnostic sensitivity of a single stool sample was 75% for individuals with low-intensity infections (<1 LPG) and increased to 95% for those with high-intensity infections (>10 LPG). Doubling the number of samples examined per person increased the sensitivity to more than 95%, even for low-intensity infections. There was no indication of a cyclic excretion of larvae. After treatment, all individuals stopped excreting larvae within 3 days. Larvae were not detected during

any of the following 18 days (total 388 Baermann and 388 Koga Agar tests).

CONCLUSIONS The sensitivity of the Baermann technique increased with the infection intensity and the number of analysed stool samples. At least two stool samples, collected on consecutive days, are recommended to examine for a satisfactory sensitivity. Three days post-ivermectin treatment *S. stercoralis* larvae were no longer detectable.

DISCLOSURE Nothing to disclose.

## PS2.008

**Occurrence of and risk factors for *Strongyloides stercoralis* infection globally and in South-East Asia**

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INTRODUCTION The soil-transmitted helminth *Strongyloides stercoralis* is one of the most neglected helminth infections. It is present world-wide, but more prevalent in hot and humid climates and resource poor countries where inadequate sanitary conditions prevail. The difficult diagnosis and irregular excretion of larvae lead to an underreporting of infection rates. We reviewed studies of the last 25 years on *S. stercoralis*'s global prevalence in general populations and risk groups.

MATERIALS AND METHODS A literature search was performed. A Bayesian meta-analysis was carried out to obtain country-specific prevalence estimates. Including the sensitivity of diagnostic methods applied, we modeled and mapped country-wide prevalence estimates. The modeling was divided into studies reporting infection rates in the general population, in hospitals and on refugees and immigrants, respectively. We further summarized possible risk factors for *S. stercoralis* infection using meta-analysis.

RESULTS A total of 354 studies from 78 countries were included for the prevalence calculation, 194 (62.4%) were community-based studies, 121 (34.2%) were hospital-based studies and 39 (11.0%) were studies on refugees and immigrants. World maps with country data are provided. In numerous African, Asian and South-American resource-poor countries information on *S. stercoralis* is lacking. The meta-analysis showed an association between HIV-infection/alcoholism with *S. stercoralis* infection (OR: 2.17 BCI: 1.18–4.01; OR: 6.69; BCI: 1.47–33.8), respectively. Our results show high prevalence estimates in many resource poor tropical and subtropical countries and in particular in South-East Asia. Whereas data is very limited in most South-East Asian countries, Thailand is a notable exception with more than 40 studies reporting data on the prevalence of *S. stercoralis*.

CONCLUSIONS Adequate information on the prevalence of *S. stercoralis* is still lacking from many countries. Further assessments in different socio-economic and ecological settings are needed and integration into global helminth control is warranted. *S. stercoralis* should not be neglected and adequate interventions assuring access to adequate treatment are warranted.

DISCLOSURE Nothing to disclose.

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## PS2.009

**Clinical and epidemiological characteristics of adult and pediatric patients with neurocysticercosis observed in five European centers**

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**INTRODUCTION** In Europe the management of neurocysticercosis is challenging because health care providers are often unaware of this condition leading to diagnostic delay and mismanagement.

**MATERIALS AND METHODS** The aim of this retrospective study was to review the cases of neurocysticercosis observed in five infectious diseases centers located in Florence (Italy), Verona (Italy) and Barcelona (Spain).

**RESULTS** A total of 81 subjects with neurocysticercosis were evaluated in the period 1980–2013. Of them 20 were younger than 15 years. By applying the Del Brutto criteria to the 78 cases for which the information was available, 38 cases (48.7%) were classified as definitive cases and 31 (39.7%) as probable cases, while 9 (11.5%) were deemed to be cases even if the diagnostic criteria were not satisfied. Continent of origin was known in 80 subjects. Latin America and Asia were the most frequent continent of origin ( $n = 37$ ; 46.3% and  $n = 22$ ; 27.5%, respectively) followed by Europe ( $n = 14$ ; 17.5%) and Africa ( $n = 7$ ; 8.8%). Among the 14 European subjects, 7 patients had a history of travels abroad (Latin America in 3 cases, sub-Saharan Africa in 2 cases, East European countries in 1 case, unknown country in 1 case), while 7 cases without history of travel could be considered autochthonous infections acquired in Spain ( $n = 6$ ) and Italy ( $n = 1$ ). Subjects with autochthonous infection originated from Catalonia (4 cases), Cantabria (1 case) and Sicily (1 case), while this information was not available in one case.

If compared with adults, paediatric patients (aged <15 years) were more likely to have eosinophilia, other parasitic infections, to be asymptomatic, not treated with antiepileptic drugs or analgesic and not clinically improved after treatment.

**CONCLUSIONS** The study shows that there are some hurdles in the management of neurocysticercosis in Europe. A not negligible portion of patients do not satisfy the Del Brutto diagnostic criteria. The higher portion of asymptomatic subjects among the paediatric group is probably related to the ongoing serological screening of adopted children from endemic regions in Italy. The value of this serological screening should be better assessed by a cost/benefit analysis.

**DISCLOSURE** Nothing to disclose.

## PS2.010

**Prevalence of six neglected tropical diseases among immigrants in five Italian reference centres: a cross-sectional study**

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**INTRODUCTION** Neglected Tropical Diseases (NTDs) are a motley group of infections mainly endemic in low and middle-income countries and usually associated with poverty. Due to international movements, NTDs are present in Europe where they can be confused with ubiquitous diseases; some of them can be transmitted via blood or organ donation, from mother to child or reactivate during immunosuppression.

In Italy, despite a rapid increase in migration, little is known about the NTDs burden. The objective of this study, funded by the National Centre for Disease Prevention and Control, was to estimate the prevalence of 6 infections among immigrants in 5 Italian centres (Bologna, Brescia, Florence, Rome, Negrar-Verona).

**METHODS** People who attended outpatient services or were admitted to Infectious Diseases wards and met the inclusion criteria ( $\geq 18$  years, coming from an endemic country, sufficient level of Italian/availability of a linguistic mediator) were eligible.

After signing an informed consent form, they underwent different sets of serological test according to: country of origin (strongyloidiasis, schistosomiasis, Chagas disease) or country of origin plus presence of eosinophilia (toxocariasis, filariasis) or presence of specific symptoms (leishmaniasis). Socio-economic data were collected through a questionnaire. Seropositive individuals were offered the treatment and followed up.

**RESULTS** 1083 individuals were enrolled (51.6% men, 46.9% women, 1.5% transgender; mean age: 38.8 years). 11.2% of them were diagnosed with at least one NTD; among the 130 diagnosed infections, the most common was strongyloidiasis (43.1%), followed by schistosomiasis (26.9%), toxocariasis (15.4%), filariasis (6.9%), Chagas disease (6.2%), leishmaniasis (1.5%). The prevalence of each infection varied across the centres, presumably as a result of diverse migration patterns. Seropositive subjects were more likely to be male, aged  $\geq 40$  years, with low educational level. Proportions of screened people with at least one NTD according to region of origin (Geosentinel classification) were: 15.3% from South America, 15.2% from Sub-Saharan Africa, 8.8–10.3% from Asian regions, 5.3% from East Europe, 3.2% from Northern Africa.

**CONCLUSIONS** Despite its limitations, in particular the selection bias, the study showed that the burden of NTDs among immigrants is not negligible and underlined the need for control strategies and education programmes, particularly in the field of transplant medicine.

**DISCLOSURE** Nothing to disclose.



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## PS2.011

**Antagonistic effects on anaemia and splenomegaly in *Plasmodium*-helminth co-infected children in Côte d'Ivoire**E. Hürlimann<sup>1,2</sup>, C. A. Hounbedji<sup>3,4</sup>, R. B. Yapi<sup>3,5</sup>, P. B. N'Dri<sup>3,4</sup>, M. Ouattara<sup>3,5</sup>, K. D. Silué<sup>3,5</sup>, E. K. N'Goran<sup>3,5</sup>, J. Utzinger<sup>1,2</sup> and G. Raso<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland;<sup>2</sup>Universität Basel, Basel, Switzerland; <sup>3</sup>Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire; <sup>4</sup>Université Nangui Abrogoua, Abidjan, Côte d'Ivoire; <sup>5</sup>Université Félix Houphouët-Boigny, Abidjan, Côte d'Ivoire

**INTRODUCTION** Co-infection with *Plasmodium* and parasitic worms such as soil-transmitted helminths and *Schistosoma* spp. is common in endemic areas of the tropics. Anaemia and splenomegaly are typical clinical manifestations due to malaria but may also be caused by helminth infections. Little is known on potential interaction on these morbidities from *Plasmodium*-helminth co-infections, which may be of antagonistic or synergistic nature.

**METHODOLOGY** Between 2011 and 2013 four cross-sectional parasitological and clinical community-based surveys in rural southern Côte d'Ivoire and a national school-based study were conducted. Each child was asked to provide a finger-prick blood sample for haemoglobin measurement and detection of *Plasmodium*. Kato-Katz thick smears from stool samples were examined under a microscope for eggs of *Schistosoma mansoni* and soil-transmitted helminths, respectively. *S. haematobium* infection was detected by a filtration method or by using microhaematuria from reagent strip testing as a proxy for infection. Splenomegaly was defined as a palpable spleen of grade 1 or higher using a Hackett's scale. Logistic regression analysis was used to determine odds ratios (ORs) for anaemia and splenomegaly by infection category and subsequent calculation of interaction measures performed to assess direction and magnitude of interactions.

**PRINCIPAL FINDINGS** 601 school-aged children from the communities and 4938 children from the national school-based study had complete information on parasitological and clinical status and were considered for analysis. All infection categories (i.e. single- and co-infections) showed increased ORs for anaemia in both study types (i.e. communities and schools). Interaction measures showed a tendency for antagonistic effects on anaemia from co-infection. Co-infection of *S. mansoni* and *Plasmodium* in schoolchildren and *Plasmodium*-hookworm co-infection in community children showed a significant negative interaction on splenomegaly.

**CONCLUSIONS AND SIGNIFICANCE** Our findings contribute to a better understanding of interactions between parasite species on clinical morbidity and highlight the need for combined control strategies against these diseases.

**DISCLOSURE** Nothing to disclose.

## PS2.012

**Transmission of *Echinococcus multilocularis* to humans in Basel is possible**B. Frauchiger<sup>1,2</sup>, P. Deplazes<sup>3</sup> and P. Odermatt<sup>1,2</sup><sup>1</sup>Swiss Tropical and Public Health Institute (Swiss TPH), Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>Institute of Parasitology, University of Zürich, Zürich, Switzerland

**INTRODUCTION** The zoonotic cestode *Echinococcus multilocularis* (fox tape worm) causes alveolar echinococcosis responsible for about 700 000 disability adjusted life years (DALYs) globally per year. Its life-cycle includes foxes and dogs

as definitive hosts, which can contaminate their respective environment with parasite eggs shed in their faeces. Human infection may occur upon accidental ingestion of viable eggs. Switzerland is considered highly endemic. The situation in Basel and surrounding was largely unknown. This study assessed the presence of suitable hosts and the environmental contamination with eggs from fox faeces in Basel.

**MATERIALS AND METHODS** We identified five transects in the conurbation of Basel and searched monthly for fox faecal samples from May to November 2014. Each sampling session lasted 3 h. Before analysis each fox faecal sample was stored at –80°C for at least three days. The samples were then subjected to a flotation and sieving technique in ZnCl<sub>2</sub> to isolate *Taeniid* eggs in the faeces. The samples were then scanned for eggs under the microscope. The species of the eggs was then determined with polymerase chain reaction (PCR).

**RESULTS** Fox faecal samples in the transects were searched for 105 h. A total of 30 samples were found. Most samples were collected in the month of July (27%) and in the transect in Riehen (43%). Eight (27%) samples were found positive for *E. multilocularis* by PCR. All positive fox faecal samples were found on the premises of a farm in Riehen within an area of approximately 1000 m<sup>2</sup>.

**CONCLUSIONS** The faecal contamination of the environment was low overall indicating a small fox population in and around Basel. The population has been decimated during an outbreak of mange disease in the past several years. Frequent heavy rains during the summer months may have also washed away fox faeces. In addition, the search for faecal samples could not be extended to private gardens where foxes are likely to roam and defecate. The finding of fox faecal samples infected with *E. multilocularis* on the farm in Riehen demonstrates the presence of suitable hosts and a wildlife transmission cycle of the parasite in Basel. Therefore, adequate precautionary measures such as regular deworming of dogs are warranted.

**DISCLOSURE** Nothing to disclose.

## PS2.013

**Can increasing ivermectin coverage decrease the incidence of Nodding Syndrome and other forms of epilepsy in onchocerciasis endemic regions?**R. Colebunders<sup>1</sup>, M. Mandro<sup>2</sup>, F. Tepage<sup>3</sup>, G. Mambandu<sup>4</sup>, G. Musinya<sup>5</sup>, J. Mokili<sup>6</sup>, E. Rood<sup>7</sup>, J. F. Wamala<sup>8</sup>, L. Kur<sup>9</sup> and A. Laudisoit<sup>1,10</sup><sup>1</sup>University of Antwerp, Antwerp, Belgium; <sup>2</sup>Division Provinciale de Santé de l'Ituri, Bunja, The Democratic Republic of the Congo; <sup>3</sup>National Onchocerciasis Control Program, Kisangani, The Democratic Republic of the Congo; <sup>4</sup>Ministry of Health, Orientale Province, Kisangani, The Democratic Republic of the Congo; <sup>5</sup>Médecin Sans Frontières Switzerland, Bunja, The Democratic Republic of the Congo; <sup>6</sup>San Diego State University, San Diego, CA, USA; <sup>7</sup>Royal Tropical Institute, Amsterdam, The Netherlands; <sup>8</sup>Ministry of Health, Kampala, Uganda; <sup>9</sup>Ministry of Health, Juba, South Sudan; <sup>10</sup>University of Liverpool, Liverpool, UK

**INTRODUCTION** A high prevalence of epilepsy has been described in many onchocerciasis endemic areas. Moreover case control studies have repeatedly shown an association between Nodding Syndrome (NS), a severe form of epilepsy, and *Onchocerca volvulus* infection.

**METHODS** We compared the epilepsy situation in 3 onchocerciasis endemic regions in 3 countries: South Sudan, Uganda and the Democratic Republic of the Congo (DRC). In South Sudan we visited NS-affected villages and interviewed affected families, and patients. In Uganda we only interviewed



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health officials, colleague researchers and health care workers. In the DRC a prevalence and a case control study were performed in the village of Titule, Bas Uélé in the Oriental Province.

**RESULTS** In the Western Equatoria State in South Sudan, NS is a major public health problem in villages along rapid flowing rivers. In the village of Mvolo 1 in 6 children presented with epilepsy and 1 in 2 families had at least one child with epilepsy. The NS epidemic in South Sudan started around 1990 and is ongoing. NS and other forms of epilepsy were frequently observed in the same families. Ivermectin coverage in South Sudan has always been very low. In northern Uganda the NS epidemic started around 2000. Before 2009 there was no access to ivermectin but in contrast with South Sudan today the NS epidemic has stopped. Since 2012 there has been a sharp decrease in the number of new NS cases following the biannual distribution of ivermectin and larviciding the main rivers in the affected area. In the DRC, a house to house survey conducted in Titule revealed 67 (2.3%) epilepsy cases among 2908 people interviewed. Epilepsy cases were clustered in families, persons with epilepsy were more likely to live close to a river and a history of ivermectin use protected against epilepsy. A case control study including 59 cases with epilepsy and 61 healthy controls showed that, daily bathing in local rivers was an important risk factor for epilepsy (OR 3.07, 95% CI 1.19–7.93).

**CONCLUSIONS** NS seems to be part of a spectrum of different types of seizures in onchocerciasis endemic areas. Low ivermectin coverage appears to be associated with high prevalence of NS and other forms of epilepsy in these regions. A clinical trial to evaluate whether increasing the coverage of ivermectin with or without larviciding rivers is able to decrease the incidence of epilepsy in onchocerciasis endemic regions needs to be done.

**DISCLOSURE** Nothing to disclose.

## PS2.014

### Analysis of risk factors for soil-transmitted helminth infections and impact on child development in Timor-Leste

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**INTRODUCTION** Soil-transmitted helminths (STH) are parasitic infections causing a high disease burden in communities with inadequate water, sanitation and hygiene (WASH). STH control programmes are now a major global health priority. Effective control programmes require accurate baseline STH infection estimates in order to determine type of intervention strategy and communities to target, and thereby optimise resource allocation for STH control.

**MATERIALS AND METHODS** The 'WASH for Worms' cluster randomised controlled trial integrates community WASH with mass albendazole to reduce STH in Manufahi District, Timor-Leste. Using multivariable mixed-effects regression models, we report on a broad range of STH risk factors at trial baseline, by parasite species and age group (preschool; school-aged and adult). Timor-Leste reports extremely high child stunting (58%

of <5 year olds); therefore we also present analyses of the impact of STH infection on child development z-scores and haemoglobin levels in our study population.

**RESULTS** There were some differences in risk factors across age groups. For adults, males had higher risk than females [adjusted odds ratio (AOR) 3.4; 95% Confidence Interval (CI): 2.4–5.0]. Household appliance ownership (AOR 0.52; 95%CI: 0.35–0.77), and households having one child under five (AOR 0.60; 95%CI: 0.38–0.96) were protective factors. For school-aged children, risk factors were male gender (AOR 4.5; 95%CI: 2.4–8.7), washing hands without soap (AOR 2.3; 95%CI: 1.0–5.0), discarding household waste in the bushes only (AOR 3.3; 95% CIs: 1.4–8.2), or burning it only (AOR 3.4; 95%CI: 1.2–9.3) compared to other disposal methods, and increasing number of household goats owned (AOR 1.4; 95%CI: 1.0–2.0). Protective factors included household water sourced from a tubewell or borehole compared to an unprotected spring or well (AOR 0.02; 95%CI: 0.00–0.41), and interestingly, reported use of unimproved (versus improved) school pit latrine (AOR 0.28; 95%CI: 0.10–0.81). For preschool children age was the main risk factor (AOR 1.7 per increasing year; 95%CI: 1.3–2.1). We will discuss implications for control.

**CONCLUSION** This is the first STH risk factor analysis presented for Timor-Leste, using contemporary molecular methods for diagnosis. It is an important, novel addition to the global picture of STH burden from an impoverished and understudied region of the world.

**DISCLOSURE** Nothing to disclose.

## PS2.015

### Kitchen waste as pig feed sustains transmission of *Taenia solium* cysticercosis in Mbeya, Tanzania

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Attempts to control the neglected tropical disease *Taenia solium* taeniosis/cysticercosis in low-income countries have been unsuccessful or unsustainable. This could indicate a knowledge gap in our understanding of the transmission dynamics including the importance of environmental contamination with *T. solium* eggs. We aimed to identify risk factors associated with porcine cysticercosis using a case-control study design, utilising known information on persistent or multiple infections of porcine cysticercosis. Questionnaire interviews and observational surveys were conducted in July 2014 in the two districts Mbeya and Mbozi, Tanzania. Study households were identified based on participation in a previous study investigating porcine cysticercosis prevalence at multiple time points, and allocated into cases or controls based on porcine cysticercosis presence or absence, respectively. This resulted in 43 farmers in the case group and 50 farmers in the control group from 20 villages. Potato peels were said to be given to pigs either raw or boiled by 46% of the farmers. Based on logistic regression porcine cysticercosis could be associated with absence or a completely open latrine ( $P = 0.035$ , OR 5.98, CI: 1.33–43.02) compared to an enclosed latrine, and feeding potato peels to pigs ( $P = 0.007$ , OR 3.45, CI: 1.43–8.79). Logistic analysis including management indicated pigs kept in elevated pens ( $P = 0.049$ , OR 5.33, CI: 1.08–32.27) and on earthen floors ( $P = 0.041$ , OR 9.87, CI: 1.29–114.55) compared to cemented floors, were more likely to be infected. Whether potato peels are contaminated with *Taenia* eggs, or whether the contamination is from the water used, or from dirty

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hands, in the process of peeling the potatoes, need to be confirmed. The results obtained in this study are strengthened by the case-control design, which is unique for porcine cysticercosis related surveys, and suggests that blocking transmission to pigs will require management and feeding addressed in greater detail. DISCLOSURE Nothing to disclose.

## PS2.016

**A high prevalence of *Strongyloides stercoralis* found in a rural area of Amhara region, North-Western Ethiopia, by using a combination of three different diagnosis techniques**

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**INTRODUCTION** Soil-transmitted helminths are among the most common infections worldwide, mostly in tropical/subtropical poverty areas, with lack of sanitation, affecting mainly children under 15. The morbidity is directly related to impairment of the nutritional status and of the school performance. Efforts to control their impact in endemic areas are based on public health interventions, as periodic mass drug administration, being the level of endemicity a key point to launch preventive chemotherapy interventions. Attention has been focused on *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus* and *Ancylostoma duodenale*. However *Strongyloides stercoralis* is excluded, even though good reasons for its inclusion: his ability to cause long-lasting infections and hyper-infections in immune-suppressed individuals, with high fatality rate. Non-standard approaches for its diagnosis, different drugs for treatment needed, and the scarcity of data about its epidemiology are explanations for this exclusion.

**MATERIALS AND METHODS** In October 2013, we performed a study in a rural area, where the prevalence of *S. stercoralis* in 2012 was 5.1%, by using the formol ether concentration method. Our aim was to know if the prevalence of *S. stercoralis* was underestimated. The area is located in North-western Ethiopia, Bahirdar, in the shoreline of Lake Tana and the source of the Blue Nile. We collected 396 stool samples from children randomly selected in 8 primary schools, to be processed in the day of collection by three techniques: in the laboratory of Bahirdar a concentration with formol ether (FEC), by using a filtration-concentration device (Boparaprep MINI<sup>®</sup>, Leti Diagnósticos, Barcelona, Spain), a Baermann method, after an incubation of 18 h with charcoal, and a deoxyribonucleic acid extraction (QIAamp<sup>®</sup> DNA stool mini kit, Qiagen, Hilden, Germany) were carried out. A real time Polymerase Chain Reaction (PCR) targeting the 18S ribosomal subunit of the *S. stercoralis* was done in Spain.

**RESULTS** Prevalence of *S. stercoralis* was 4% by FEC, 12.4% by the Baermann method and 13.4% by PCR, being the latest the most sensitive ( $P < 0.001$ ). Prevalence by the three techniques was 21%, ranging from 13% up to 36%.

**CONCLUSIONS** This is a good illustration of the underestimation of *S. stercoralis* with classical diagnosis approaches. In order to establish the appropriate control

measures in endemic sites, more efforts must be done to know the real burden of the disease.

DISCLOSURE Nothing to disclose.

## PS2.017

**From Italian to European register of cystic echinococcosis: implementation and evaluation after 2.5 years**

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**INTRODUCTION** Cystic Echinococcosis (CE) is highly endemic in some areas of Europe, but its true burden is unknown due to the lack of efficient and specific reporting systems. As a result, CE is perceived as unimportant, making measurement of disease burden even more difficult. Neglect hampers the collection of good quality data to inform evidence-based diagnostic and therapeutic strategies, adding to the lack of prospective randomized trials and resulting in suboptimal, when not wrong, management of cases outside referral centres and ineffective allocation of public resources. The Italian prospective register of CE patients, RIEC (Italian Register of CE; [www.iss.it/riec](http://www.iss.it/riec)) was launched in September 2012 to address this problem, by the WHO Collaborating Centre on CE of Pavia (Italy) and the Italian National Health Institute (Rome, Italy). In October 2014 RIEC expanded into ERCE (European Register of CE; [www.heracles-fp7.eu/erce](http://www.heracles-fp7.eu/erce)) in the context of FP7 project HERACLES.

**METHODS** Nearly 2.5 years after its launch, we evaluated the use of the Register by voluntarily adhering Italian Centres and the completeness of fundamental data: record of CE patients visited and evolution over time of cysts in relation to management. Data from the 5 non-Italian Centres that recently adhered to ERCE were not included in the analysis.

**RESULTS** As of March 2015, 484 CE patients were enrolled in ERCE by 14 Centres, 284 (59.1%) in Pavia Centre, while 7 Centres, 57% of which located in the most endemic regions, did not enrol any patient. In adjunction of basic enrolment as a CE case, 96.6% patients had also other data recorded. Only 5 Centres recorded data after ERCE launch (10/2014).

Completeness of the data recorded ranged from the 99.03% ('date of visit') to 51.89% ('cysts characteristics'), but these values decreased dramatically when excluding data from Pavia.

**CONCLUSIONS** ERCE responds to a long standing need for a CE Register with online data entry, and recorded data largely outnumber the total of National cases reported by most European endemic countries. This confirms the need for a better report system of CE at European level. However, more efforts are needed to encourage new centres to join and to ensure regular data entry, through improvement in the structure and usability of the database and implementation of 'benefits' for the participating Centres.

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DISCLOSURE Nothing to disclose.

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## PS2.018

**Application of LC-MS/MS in identifying potential biomarker of *Opisthorchis viverrini* related cholangiocarcinoma from plasma**

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Identification of potential novel biomarker is crucial need for cancer diagnosis. LC-MS/MS is commonly used to investigate the different expression and identification of plasma protein. Either individual or pooled plasma has been used to investigate for differential protein expression (potential biomarker). There was still no conclusion whether individual or pooled should be selected. Therefore, this study was aimed to compare an individual and pooled plasma based on the number of differential expressed plasma protein (potential biomarkers), cost effectiveness, and time consuming by using LC-MS/MS. The cholangiocarcinoma (CCA) plasma (20 *Opisthorchis viverrini* related cholangiocarcinoma) and non-CCA plasma (10 *O. viverrini* infected patients and 10 healthy volunteer) were analyzed by gel based LC-MS/MS (GelC-MS/MS). The pooled non-cholangiocarcinoma plasma (pNCCA) was prepared by mixing 1 µg of each 10 OV and 10 HV while the pooled cholangiocarcinoma plasma (pCCA) was prepared by mixing 1 µg of each 20 CCA. Either individual or pooled plasma was size separated by SDS-PAGE, sliced into 29 gel pieces. Among these, 20 of 29 gel pieces (9 pieces of albumin were removed) were subjected to GelC-MS/MS (800 gel pieces of individual and 40 gel pieces for pooled analysis). The results showed 4173 plasma proteins were identified from individual analysis (average 5.22 proteins/gel piece) and 1587 plasma proteins from pooled analysis (39.7 proteins/gel piece). Among these identified plasma proteins based on three fold differential expression, 74 and 59 proteins were identified from individual and pool, respectively. For individual analysis, 6 and 21 proteins were specifically presented only in non-CCA and CCA, respectively while 21 and 33 proteins were specifically presented only in pNCCA and pCCA, respectively. The estimate cost/identified potential biomarker was 203 US dollar for individual plasma and 12 US dollar for pooled plasma. Pooled plasma was less time consuming than individual plasma by 190 h or nearly 8 days continuously analyzed by LC-MS/MS (15 min/shot or gel slice). In conclusion, pooled plasma is recommended for identifying a novel *O. viverrini* related CCA biomarker. According to this result, identification of other cancer biomarker from pooled plasma might also be recommended due to the cost effectiveness, shorter time and higher number of identified potential biomarker aspects.

DISCLOSURE Nothing to disclose.

## PS2.019

**Subtle to severe hepatobiliary morbidity in *Opisthorchis viverrini* endemic district in Lao PDR**

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**INTRODUCTION** Evidence on severe hepatobiliary morbidity associated with *Opisthorchis viverrini* liver fluke infection including cholangiocarcinoma (CCA) is scarce in Lao People's Democratic Republic (Lao PDR) although *O. viverrini* infection is highly prevalent. We assessed hepatobiliary morbidity using abdominal ultrasonography (US) in Saravan province, Southern Lao PDR.

**MATERIALS AND METHODS** We performed a cross-sectional study from January to April 2011 in parasitological *O. viverrini*-confirmed adults (aged ≥20 years) in ten endemic villages in Saravan district, Saravan province, Southern Lao PDR, including an in-depth questionnaire and an abdominal US examination.

**RESULTS** A random sample of 431 *O. viverrini* patients from 10 villages underwent abdominal US. Mild, moderate and markedly advanced periductal fibrosis was diagnosed in 7.0%, 66.5%, and 17.0%, respectively. Normal liver parenchyma was seen only in 9.5% of patients. Presence of gall stones (13.2%), sludge (1.4%), gall wall thickening (1.2%), bile duct dilatation (1.6%), fatty liver (12.0%), and kidney stones (8.6%) and cysts (7.9%) were diagnosed in considerable frequencies. In five patients (1.2%) hepatobiliary lesions suggesting CCA were diagnosed. Tumour markers, i.e., Interleukin-6, plasminogen activator inhibitor, and carbohydrate antigen 19-9 were within normal range.

**CONCLUSION** The number of CCA suspected liver masses and hepatobiliary morbidity diagnosed among clinically asymptomatic adult patients in *O. viverrini* endemic areas presents a major public health concern in Lao PDR. Definite diagnosis with regard to opisthorchiasis-related severe sequelae including a liver fatal cancer, cholangiocarcinoma is urgently needed to gauge the burden of the fatal disease in Lao PDR.

DISCLOSURE Nothing to disclose.

## PS2.020

**Highest prevalence of *Strongyloides stercoralis* in Cambodia**

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**INTRODUCTION** *Strongyloides stercoralis*, endemic in tropical and temperate climates, is a most neglected tropical disease. Its



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diagnosis requires specific methods. Accurate information on its geographic distribution and global burden are lacking. We determined infection prevalence and risk factors in two socioeconomic and ecological distinctly different provinces in Cambodia, and predicted infection prevalence in unsurveyed locations, using Bayesian geostatistical modelling in a northern province.

**MATERIALS AND METHODS** Two cross-sectional community-based studies were conducted in 2010 and 2011 to assess the infection prevalence and risk factors of *S. stercoralis* in Preah Vihear province and Takeo province in the North and South of Cambodia, respectively. Stool samples were examined using Koga agar plate culture and the Baermann method for detecting *S. stercoralis* infection. Bayesian kriging was used to predict risk at non-surveyed locations in Preah Vihear.

**RESULTS** *S. stercoralis* infection prevalence among the general population was 44.7% and 21.0% in Preah Vihear and Takeo province, respectively. In both provinces male participants were significantly more frequently infected than females ( $P < 0.001$ ) in all age classes. Participants who reported having a latrine at home were significantly less frequently infected than those who did not. Strongyloidiasis cases would be reduced by 39% if latrines would be systematically available for defecation. In Preah Vihear province, *S. stercoralis* infection statistically increased with age, starting at 31.4% in children <6 years to a peak of at 51.2% in participants older than 50 years. In Takeo province, *S. stercoralis* infection prevalence reached 14.5% in children under or equal to 5 years and 28.0% in participants aged between 56 and 60 years. Muscle pain and urticaria were significantly associated with *S. stercoralis* infection.

**CONCLUSIONS** *S. stercoralis* infection is highly prevalent in rural communities of Cambodia, in places where appropriate diagnosis and treatment do not exist. Personal hygiene and sanitation, including utilization of latrines, are significant predictors of *S. stercoralis* infection. Thus, *S. stercoralis* infection should no longer be neglected in Cambodia and access to treatment should be guaranteed.

**DISCLOSURE** Nothing to disclose.

## PS2.021

## Risks of helminth transmission from urban wastewater reuse systems in Kampala, Uganda and Hanoi, Vietnam

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**BACKGROUND** Unsafe wastewater management and reuse practices are common in densely populated and fast growing cities in Africa and Asia, thus contributing to the risk of transmission of infectious diseases, such as soil-transmitted helminthiasis, schistosomiasis and intestinal protozoa infections. We determined the prevalence and risks factors for intestinal parasitic infections in different population groups with various levels of exposure to wastewater management and reuse in Kampala, Uganda and Hanoi, Vietnam.

**METHODS** In both study settings, cross-sectional surveys were carried out in five exposure groups, namely

- 1 workers maintaining wastewater treatment facilities;
- 2 workers collecting faecal sludge;

3 urban farmers;

4 city residents with contact to wastewater; and

5 city residents without contact to wastewater.

We collected a single stool sample that was subjected to the Kato-Katz and formalin-ether concentration methods for the diagnosis of helminth and intestinal protozoa infections. We employed a questionnaire survey to assess risk factors and self-reported signs and symptoms.

**RESULTS** A total of 915 and 665 individuals were enrolled in Kampala and Hanoi, respectively. In both setting, highest prevalence of helminth infections were found in urban farmers. In Kampala, hookworm was the predominate species (27.8%), followed by *Trichuris trichiura* (26.1%), *Schistosoma mansoni*, *Ascaris lumbricoides* (18.7%). In Hanoi, hookworm was as well the most prevalent helminth (15.5%),

*T. trichiura* was found in 4.0% and *A. lumbricoides* was only detected in workers (1.6%).

*E. histolytica/dispar* and *Giardia intestinalis* were detected in 15% and 0.8%, respectively, in Kampala while no *E. histolytica/dispar* and 1.1% *Giardia intestinalis* were detected in Hanoi. Multivariate regression models revealed significant higher odds of an infection with intestinal parasite for urban farmers compared to the other groups.

**CONCLUSION AND SIGNIFICANCE** Urban farmers' high level of infection can play an important role in the transmission of helminth infection via contamination of their environment.

Hence, sanitation safety planning, mass deworming and awareness programmes that target vulnerable population groups along wastewater management and reuse chains are required to support the control and elimination efforts of intestinal parasitic diseases in African and Asian cities.

**DISCLOSURE** Nothing to disclose.

## PS2.022

Detachment of *Ascaris* eggs from solid surfaces

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Helminthiasis is an important public health problem worldwide, especially in low and middle-income countries. Helminth eggs adhere to different surfaces, e.g. soil particles, hands, particles in water, but also laboratory utensils. Despite these characteristics which have direct implications on egg transmission, little is known about the adhesion properties of helminth eggs. The aim of this study was to estimate the detachment of adhered *Ascaris suum* eggs from PVC plastic and glass surfaces by flushing the surfaces with different solutions. The experiments were performed with perfusion chambers mounted on a surface with adhering *A. suum* eggs (1000 eggs deposited with 10 µl of water), and then flushed with ddH<sub>2</sub>O at a flow velocity of 10 ml/min (shear stress of 0.67 Pa). Each experiment ran for 30 min, and the number of eggs removed was enumerated every 5 min. Different factors of importance to egg detachment was tested, such as drying time of eggs to the surface (0 and 1.5 h) and subsequent soaking time (0.5 and 1 h) of the eggs dried for 1 h inside the chamber with different solutions (ddH<sub>2</sub>O, Benzethonium chloride 1%, 0.5 M NaOH, and 5 M NaOH) before flushing. The preliminary results showed that all freshly deposited eggs (drying time 0) were detached from both PVC and glass



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surfaces already after 5 min of flushing. For eggs dried on a surface for 1.5 h (where all the water containing the eggs had just evaporated), only soaking in NaOH resulted in detachment of eggs after 30 min. After soaking in 5 M NaOH for 0.5 h the detachment of eggs from plastic was 76% and from glass 63%, whereas after soaking for 1 h the detachment of eggs from plastic was 100% and from glass 83%. In conclusion, *A. suum* eggs showed a very strong adherence towards the surfaces tested, and only freshly deposited eggs or eggs soaked in a strong NaOH solution resulted in complete detachment of eggs from surfaces after flushing for 30 min.

DISCLOSURE Nothing to disclose.

## PS2.023

### Treatment of human and animal helminth infections at Lake Chad: awareness, access, common practice and content of active ingredient in drugs

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**INTRODUCTION** In the Lake Chad region in Chad, human and animal health services only cover very basic services and can hardly attend to the needs of the population. The Swiss Tropical and Public Health Institute together with its Chadian partners engage to improve human and animal health systems by applying a One Health approach. This project was initiated by mobile pastoralists' concerns about unsatisfying outcomes in the treatment of human and animal helminth infections. Laboratory diagnostics for helminth infections are not available at health centres in the study area and diagnosis is based on symptoms. Suspected human and animal helminth infections are treated with albendazole available from health centres, pharmacies, local markets or veterinary health posts. The unsatisfying treatment outcome is believed to originate from the low quality of drugs.

**METHODS** Stool samples from randomly selected people ( $n = 228$ ) and cattle ( $n = 375$ ) were analysed for helminth infections performing Kato-Katz technique, SAF concentration and sedimentation method. Reported health seeking behaviour, treatment strategies and outcomes for humans and animals were assessed during interviews and focus group discussions.

Albendazole tablets purchased at health centres, pharmacies and local markets were tested for their albendazole content using a high pressure liquid chromatography-UV method.

**RESULTS** Overall prevalence of human helminth infections was low (<3%). Infection with intestinal protozoa was found at high prevalence (>36%). Trematodes (*Fasciola gigantica*, *Schistosoma bovis*) were the most prevalent helminth infections in cattle. Disease awareness among pastoralists was high and self-mediated therapy for humans and animals is the common practice. Albendazole content of all tablets tested lay between 77% and 150% of the labelled amount.

**CONCLUSIONS** We show that access to helminth treatment exists and albendazole tablets from different sources contain sufficient amount of active ingredient. Most parasitic diseases in humans were caused by protozoa whereas most parasitic cattle diseases were caused by trematodes which are not sensitive to albendazole. This indicates that the reported unsatisfactory treatment outcome is most likely due to the use of inappropriate substances for the treatment of the identified diseases. Together

with our Chadian partners we will now develop recommendations to contribute to improve treatment of human and animal health services in Chad.

DISCLOSURE Nothing to disclose.

## PS2.024

### Effectiveness of a community-directed intervention against liver fluke and soil-transmitted helminths in Southern Lao PDR

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**BACKGROUND** Food-borne trematodiasis (FBT) and soil-transmitted helminthiasis (STH) are a major public health concern in Southeast Asia and particularly in Lao People's Democratic Republic (Lao PDR). Preventive chemotherapy along with health education are the mainstay of control. We developed and evaluated a community-directed intervention (CDI) approach against FBT and STH in southern Lao PDR.

**METHODS** We piloted the CDI in 30 villages of Saravane district, Southern Lao PDR. Trained health volunteer and village leaders distributed deworming medicine and delivered health education on worm infections in the community in close collaboration with trained health centre staff. In 2010, 2011 and 2012 we conducted cross-sectional surveys in ten randomly selected villages. Two stool samples obtained from individuals aged  $\geq 2$  years of selected households were examined using Kato Katz method. Household heads and individuals were interviewed. Focus group discussions (FGD) and direct observation were performed. Baseline data was compared with after intervention data. A textual content analysis was performed for qualitative data.

**RESULTS** The prevalence of *Opisthorchis viverrini*, hookworm, *Ascaris lumbricoides*, and *Trichuris trichiura* infection was reduced by 26.4%, 38.1%, 45.9%, and 30.3%, respectively. A reduction of multiple helminth infections was achieved.

Household heads had better knowledge on liver fluke and STH in relation to liver fluke prevention and they were aware of risk factors for hookworm and whipworm infections. Misleading conceptions on acquiring roundworm infection through eating any raw food could be corrected. A decrease in eating raw fish was observed which was consistent with statements of FGD participants that after treatment they did not want to eat raw fish anymore and some were afraid of a re-infection with the liver fluke. Participants understood that the community activity aimed at treating worm infections and preventing ill-health.

**CONCLUSIONS** CDI reduced liver fluke and STH infections and improved local knowledge, attitudes, and practices regarding worm infection, and its risk factors as well as the awareness on the importance of worm control. The CDI approach has a high potential to control liver fluke in endemic areas by empowering village leaders. Therefore, an evaluation of a scaling up of the intervention is warranted.

DISCLOSURE Nothing to disclose.

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## PS2.025

**Understanding raw fish food consumption in Southern Lao PDR where liver fluke infection is highly endemic**K. Phongluxa<sup>1,2,3</sup>, V. Xayaseng<sup>1,2,3</sup>, K. Akkhavong<sup>1</sup>, P. van Eeuwijk<sup>2,3,4</sup> and P. Odermatt<sup>2,3</sup><sup>1</sup>National Institute of Public Health, Ministry of Health, Vientiane, Lao People's Democratic Republic; <sup>2</sup>Swiss Tropical & Public Health Institute, Basel, Switzerland; <sup>3</sup>University of Basel, Basel, Switzerland; <sup>4</sup>Institute of Social Anthropology, Basel, Switzerland

**BACKGROUND** Consumption of raw or insufficiently cooked fish is a major public health concern in Southeast Asia, and in Lao People's Democratic Republic (Lao PDR), in particular. In southern Laos about 79.7% reported to eat raw fish dish. We aimed to assess the knowledge, attitudes, perceptions and practices of villagers in liver fluke endemic areas related to raw fish preparation, consumption and its health consequences. **METHODS** In February 2010, eight focus group discussions (FGDs, 35 men and 37 women total) and direct observations were conducted in four randomly selected liver fluke endemic villages in Saravane District, Saravane Province. FGDs distilled the knowledge, attitudes, perceptions and practices of adult community members on raw fish preparation, consumption and its consequences for health. Conversations were transcribed from notes and tape-recorders. MAXQDA software was used for content analysis.

**RESULTS** Knowledge regarding the health effects of raw fish consumption was heterogeneous. Some participants did not associate liver fluke infection with any ill health, while others linked it to digestive problems. Participants also associated vegetables and tree leave consumption with liver fluke infection. The majority of FGD participants considered fish flesh that had been prepared with weaver ant extract to be safe for consumption. Visual appearance, taste, smell and personal preference were given as reasons for consuming raw fish dishes. Moreover, participants considered it a traditional way of food preparation, practiced for generations in Laos. Ten different fish dishes that use raw or fermented fish were identified. All FGD participants reported consuming dishes with raw fish. Men consumed more frequently raw fish dishes than women. Children were allowed to eat raw fish dishes with other family members after the age of about 14 years.

**CONCLUSIONS** This study reveals a low degree of biomedical knowledge among local people on the health risks related to frequent consumption of raw or insufficiently cooked fish. Fish dishes were considered to be 'well-prepared' (that is 'cooked') even though the fish had not been heated. Health education campaigns will have to address the specific knowledge, attitudes, perceptions and practices of the concerned population.

**DISCLOSURE** Nothing to disclose.

## PS2.026

**Novel DNA marker for population genetic study of lung fluke, *Paragonimus* spp. in Japan**W. Saijuntha<sup>1</sup>, C. Tantrawatpan<sup>2</sup> and T. Agatsuma<sup>3</sup><sup>1</sup>Walai Rukhawej Botanical Research Institute (WRBRI), Mahasarakham University, Mahasarakham, Thailand; <sup>2</sup>Preclinical Sciences, Faculty of Medicine, Thammasat University, Prathumthani, Thailand; <sup>3</sup>Division of Environmental Health Sciences, Kochi Medical School, Kochi University, Nankoku, Japan

Paragonimiasis is a food-borne parasitic infection caused by the lung fluke, *Paragonimus* spp. It infects an estimated 22 million people yearly worldwide. Several *Paragonimus* species are end-

emic in Japan, e.g. *P. westermani*, *P. miyazaki* and *P. ohirai*. Intron sequence is proven to be the potential molecular marker for population genetics study in many organisms. Then this current study aims to characterize the third intron sequence in domain 1 (D1int3) of phosphagen kinase (PK) gene of *Paragonimus* spp. in Japan for implication of genetic diversity investigation. Ten individual adult worms of each three species of *Paragonimus*, i.e. *P. westermani*, *P. miyazaki* and *P. ohirai* were examined herein. Several intron domains of PK gene of *Paragonimus* were amplified and screened for the nucleotide variations. Of these, intron domain 3 (Intron 3) is successfully amplified in all three species. It showed high variations within *P. westermani* with 62 variable nucleotide sites, whereas low level of variation was observed within *P. miyazaki* and *P. ohirai* at 4 and 10 variable sites, respectively. Moreover, heterozygous locus was observed in *P. westermani* and *P. ohirai*. Haplotype analysis found that 15, 6, and 5 haplotypes were detected in *P. westermani*, *P. miyazaki* and *P. ohirai*, in total, respectively. However, the haplotype network and phylogenetic tree constructed by using the intron 3 sequences demonstrated that *P. westermani* was separated into two distinct lineages and closely clustered with a monophyletic group of *P. miyazaki*. The finding in this study suggested that the intron 3 sequence of PK gene is suitable for the population genetic study in *P. westermani* and *P. ohirai* and it would also be a potential marker for phylogenetic study of the *Paragonimus* spp. in endemic areas including Japan.

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**DISCLOSURE** Nothing to disclose.

## PS2.027

**Molecular diagnosis of Taeniasis/Cysticercosis complex by real time PCR based on HDP2 and Ptsol9 repetitive sequences**

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**INTRODUCTION** Taeniasis/Cysticercosis complex is endemic in many low- and middle-income countries of the world. Due to increased travels and immigration, cysticercosis may be diagnosed also in non-endemic areas as in Spain. In taeniasis, eggs identification allows the diagnosis of *Taenia* tapeworm carriers, and proglottids morphological analysis, if they are well preserved, permits the taeniid species-specific determination. For treatment of taeniasis, it is relevant to detect unambiguously the *Taenia solium* patients. Since, PCR is a good alternative to ascertain between *T. solium* and *T. saginata*, we evaluated the limit of detection and usefulness of the two repetitive DNA sequences, HDP2 and pTsol9, using conventional and real time PCRs.

**MATERIAL AND METHODS** Cerebrospinal fluid (CSF), tissue biopsies, proglottids and stool samples from patients attended in Spanish hospitals were included. DNA was extracted using QIAamp DNA/Stool Mini Kit. Analytical sensitivity and specificity of the two molecular targets were determined and compared for both *T. saginata* and *T. solium* DNAs. In real time PCR, temperature of melting (Tm) analysis was used to distinguish between *T. solium* and *T. saginata*. pTsol9-PCR was performed in a single run, whereas HDP2-PCR was carried out in both a single run and seminested PCR.

**RESULTS** The HDP2-seminested PCR had an analytical sensitivity of 100 fg for both *T. solium* and *T. saginata* gDNAs;

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although in feces samples, this limit of detection was 10 fold lower for *T. solium*. In contrast, pTsol9-PCR allowed the detection of 10 fg and 10 ng from *T. solium* and *T. saginata*, respectively. Using these PCRs, we confirmed 9 neurocysticercosis and 15 taeniasis cases (one by *T. solium*). **CONCLUSION** Both conventional and real-time PCR protocols presented similar detection limits for the two molecular targets. pTsol9 showed excellent sensitivity to detect *T. solium* DNA, and significantly lower for *T. saginata*. Although, HDP2 did not reach the same sensitivity that pTsol9 did, a single run of HDP2-PCR was able to distinguish between *T. solium* and *T. saginata* by Tm analysis. In the copro-DNA diagnosis, the seminested-PCR was the best protocol to increase the limit of detection and distinguish between *T. solium* and *T. saginata*. **DISCLOSURE** Nothing to disclose.

## PS2.028

**The impact of bi-annual ivermectin mass drug administration on the level of endemicity and intensity of *Onchocerca volvulus* infection in Adansi South District of Ghana**

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**INTRODUCTION** *Onchocerca volvulus* infection leads to severe dermatitis, visual impairment, and blindness. Ivermectin remains the operational drug for its control. Reports indicate sub-optimal response in Ghana posing a challenge to the control efforts. In this study, the impact of bi-annual ivermectin mass drug administration on the level of endemicity and intensity of this infection was assessed.

**MATERIALS AND METHODS** In all, 1223 volunteers from 19 hyperendemic communities in two sub-districts who had received 3–5 rounds of bi-annual ivermectin were examined for onchocercal nodules, out of whom 444 were assessed for microfilarial loads and community microfilarial load (CMFL). Level of endemicity was measured using onchocercal nodule and microfilarial prevalence while the intensity of infection was measured by CMFL, a reference index used by the OCP. **RESULTS** The result indicated that 41.8% volunteers were nodule positive. A significant difference was observed in the nodule prevalence between New-Edubiase and Akrofuom sub-districts. The microfilaria prevalence and CMFL in the study communities ranged from 13.3% to 88.9% and 1.4–5.2 mf/mg respectively.

**CONCLUSION** This study showed a drop in the intensity of infection from hyper- to meso-endemicity after 3–5 ivermectin treatment rounds.

**KEYWORDS** *Onchocerca volvulus*, ivermectin, microfilariae, endemicity, mesoendemic, hyperendemic.

**DISCLOSURE** Nothing to disclose.

## PS2.029

**The study of praziquantel effects *in vivo* and *in vitro* on European liver fluke *Opisthorchis felineus***

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**INTRODUCTION** The European liver fluke *Opisthorchis felineus* (Rivolta, 1884) is an epidemiologically important parasite

infecting mammals, including humans. *Opisthorchis felineus* is widespread in Russia, Kazakhstan and Eastern European countries. *O. felineus* invasion can result in severe complications, such as cholangitis, cholecystitis, in some cases associated with the development of cholangiocarcinoma.

Praziquantel (PZQ) is the drug of choice for the treatment of opisthorchiasis, but the effects of this drug on *O. felineus* are poorly studied. The aims of this work were (i) to perform a study of PZQ effects *in vitro*, (ii) to identify morphological markers of PZQ action on *O. felineus*, (iii) to analyse damage to the worm surface and (iv) to assess the efficacy of PZQ *in vivo* in a hamster model.

**MATERIALS AND METHODS** Light microscopy, optical sectioning and fluorescence microscopy were used to study morphological changes.

**RESULTS** *In vivo*, PZQ at a dose of 400 mg/kg reduced the rate of infection in experimental acute and chronic opisthorchiasis in hamsters by 70% and 79%, respectively. *In vitro*, the drug caused destruction and vacuolisation of the tegument of *O. felineus*, contractions of the worm musculature, paralysis, and irreversible changes in morphology (IC<sub>50</sub> = 0.14 mg/ml). Differences in susceptibility to the drug between adult and newly excysted metacercariae were also observed.

**CONCLUSIONS** Qualitative effects of PZQ *in vivo* and *in vitro* were similar to the drug's effects on other trematodes, including epidemiologically important liver flukes. Nevertheless, high heterogeneity of *O. felineus* specimens in terms of susceptibility to the drug was observed. In addition, we describe for the first time the high rate of recovery of *O. felineus* following the destructive action of PZQ.

**DISCLOSURE** Financial support for this study was provided in part by the Russian Foundation for Basic Research (# 13-04-00662a) and by the State Project of ICG SB RAS VI.60.1.1.

## PS2.030

**Xenobiotic metabolizing system of the carcinogenic liver fluke, *Opisthorchis felineus***

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**INTRODUCTION** The basic metabolic system cytochrome P450 (CYP450) is essential for biotransformation of sterols and xenobiotics, for synthesis and degradation of signaling molecules in all living organisms. Most eukaryotes including free-living flatworms evolved numerous paralogues of the CYP450 gene. Notably, by contrast, parasitic flatworms have only one gene. The flukes and tapeworms are the etiologic agents of major neglected tropical diseases of humanity. Three helminth infections (*Opisthorchis viverrini*, *Clonorchis sinensis* and *Schistosoma haematobium*) are considered by the International Agency for Research on Cancer (IARC) as definite causes of cancer. CYP450 enzymes of helminths may be linked to the synthesis of unique sterol-like metabolites, oxysterols, and catechol-estrogens found in some species of trematodes that may possess pro-oxidative and proinflammatory properties and promote carcinogenesis. However, the role of CYP450 in physiology and biochemistry of helminths is not known.

We focused our research on the human liver fluke *Opisthorchis felineus*, an emerging source of biliary tract disease including bile duct cancer in Russia and central Europe.

The aim of this study was to determine the functional significance of the monooxygenase of *O. felineus*, to assess its ability to metabolize xenobiotics, to identify the possible spectrum of



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substrate specificity of this CYP, and to determine the necessity of expression of this gene on the phenotype of the fluke.

**MATERIALS AND METHODS** CDD search, MS-MASCOT, HPLC, Microscopy, Droplet digital PCR, RNA interference. **RESULTS** We observed constitutive expression of CYP450. The CYP of the pathogen can metabolize exogenous selective substrates for mammalian CYP2E1, CYP2B, CYP3A, but not CYP1A. Tissue localization studies revealed the CYP activity in excretory channels, while suppression of CYP mRNA by RNA interference was accompanied by morphological changes of the excretory system.

**CONCLUSIONS** It appears that the function of this CYP is linked to metabolism and detoxification. The findings suggest that this liver fluke evolved a highly expressed functional monooxygenase system with broad substrate specificity that plays an important role in parasite metabolism and is a potential drug target.

**DISCLOSURE** Financial support for this study was provided in part by the Russian Foundation for Basic Research (# 13-04-00662a, 15-04-03551a) and by the State Project of ICG SB RAS VI.60.1.1.

**PS2.031****Strongyloides stercoralis is highly prevalent on Mekong Islands in Southern Lao PDR**

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**BACKGROUND** *Strongyloides stercoralis* is a most neglected helminth infection leading potentially to a systemic infection in immunocompromised individuals. In Lao People's Democratic Republic (Lao PDR) information on *S. stercoralis* infection is scarce. Most data on *S. stercoralis* stem from studies examining other intestinal helminths infections using diagnostic tests with a low sensitivity for *S. stercoralis* diagnosis. We assessed *S. stercoralis* infection by using a high sensitivity diagnostic test and examined associated risk factors and symptoms on the Mekong islands, Southern Lao PDR.

**METHODS** Baermann and Kato-Katz techniques were performed on two stool samples from each individual to detect *S. stercoralis* larvae and concomitant helminth infections. Exposure to potential risk factors was assessed with a questionnaire.

**RESULTS** Among 729 individuals, 41.0% were infected with *S. stercoralis*. Men were at higher risk than women (OR 1.97, 95% CI 1.45–2.67). Urticaria and body itching was associated with *S. stercoralis* infection (OR 2.4, 95% CI 1.42–4.05). Infection with *Opisthorchis viverrini* (72.2%), *Schistosoma mekongi* (12.8%), and hookworm (56.1%) were very common. Few infections with *Trichuris trichiura* (3.3%), *Ascaris lumbricoides* (0.3%) and *Taenia* spp. (0.3%) were detected. The majority of helminth infections were of light intensity, with infection rates of 80.4%, 92.9%, 64.5%, 100% and 100%, for *O. viverrini*, hookworm, *S. mekongi*, *T. trichiura* and *A. lumbricoides*, respectively. Nevertheless, heavy infection intensities were observed for *O. viverrini* (1.0%), *S. mekongi* (14.0%) and hookworm (2.9%).

**CONCLUSIONS** *S. stercoralis* is highly endemic on the Mekong islands of Khong district, Champasack Province, Southern Lao PDR. Access to adequate diagnosis and treatment services are urgently required.

**DISCLOSURE** Nothing to disclose.

**PS2.032****Identification of surface and secreted proteins from the Chinese liver fluke *Clonorchis sinensis* by signal sequence trap**

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**INTRODUCTION** Biological roles of excretory secretory products (ESP) of the Chinese liver fluke *Clonorchis sinensis* are under the investigation. Proteins in ESP may have multiple biological roles in host-parasite interaction and even the genesis of cholangiocarcinoma. In this study, surface-located or secreted proteins of *C. sinensis* were identified *in vitro*.

**MATERIALS AND METHODS** Signal sequence trap using PST plasmid vector was used to identify cellular surface-located or secreted proteins of *C. sinensis*. cDNA library was constructed with PST vector. The library was transfected into COS-7 cells. Following substrate staining, positive clones containing signal sequence were selected by repeated sib-screening. Nucleotide sequence of the final clones was determined. BLAST search was performed to identify the clones.

**RESULTS** Signal sequence trap identified vitelline B precursor protein (Egg protein) ( $n = 12$ ), NADH dehydrogenase subunits ( $n = 4$ ), cysteine proteinases ( $n = 4$ ), tetraspanin superfamily ( $n = 4$ ), DNA damage-responsive protein 48 ( $n = 3$ ), vesicle membrane protein ( $n = 3$ ), glucose transport protein ( $n = 3$ ), innexin ( $n = 2$ ), adenylate cyclase ( $n = 1$ ), glutathione S transferase ( $n = 1$ ), secreted protein acidic, cysteine-rich ( $n = 1$ ), antigen Cs44 ( $n = 1$ ), granulin ( $n = 1$ ) from *C. sinensis* cDNA library as cellular surface-located or secreted proteins. Granulin which has no known signal sequence can translocate to cellular surface. Each expression of the clones in adult worms was confirmed by real-time PCR.

**CONCLUSIONS** The present results provide basic information of the secreted *C. sinensis* proteins involved immune modification and even progression of cholangiocarcinoma.

**DISCLOSURE** Nothing to disclose.

**PS2.033****The identification of antigenic peptides through immuno-bioinformatics approaches in *Clonorchis sinensis***

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**INTRODUCTION** *Clonorchis sinensis* is an important liver fluke in Asia containing Vietnam, China and Korea. Chronic infections of *C. sinensis* affect negatively the liver function and induce cholangiocarcinoma. To effective management clonorchiasis, it is needed to simple and high sensitive diagnosis instead of microscopic analysis. In this study, we have identified



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more sensitive serodiagnostic novel antigens from *C. sinensis*. And we introduce that the peptides derived from some proteins having tandem repeat sequences (TRS) have a strong antigenicity for clonorchiasis.

**MATERIALS AND METHODS** 276 contigs having TRS were identified from *C. sinensis* unigene database containing 131 868 contigs via T-REKS program to sort out TRS. Subsequently, contigs of those, which more than 50% of whole be constructed with TRS, were collected as latent antigenic proteins through B-cell epitope prediction with BepiPred. We designated micro-array which is loaded synthetic peptides having 15-mer TRS from predicted proteins and analyzed antigenicity of those against clonorchiasis patients' sera.

**RESULTS** Proteins which have TRS predicted high antigenicity from ORF library of *C. sinensis* were found 61 contigs such as egg shell protein, proline-rich antigen, CS1 antigen and antigen Cs44 etc. To ascertain antigenicity of TRS, we designed peptide micro-array containing 115 synthetic peptides which have 15-mer peptide size. 12 of 115 synthetic peptides have an antigenicity against from clonorchiasis patients' sera. Finally, we identified that 6 synthetic peptides of those have more than 80% sensitivity.

**CONCLUSIONS** This approach which has occupied to collect proteins having TRS, predict epitopes and synthesis peptides is one of available tools to identify a new antigen. Interestingly, this result shows that proteins having specific sequence such as TRS could be as good targets to identify antigenic materials from parasite containing *C. sinensis*. These new antigenic peptides will be applied to develop high sensitive serodiagnostics.

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**DISCLOSURE** Nothing to disclose.

## PS2.034

### Complex morbidity patterns in different parts of Lao People's Democratic Republic where *Opisthorchis viverrini*, *Schistosoma mekongi* and other helminths co-exist

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**BACKGROUND** Multiple helminth infections are widespread in resource-constrained settings. Yet, resulting morbidity patterns due to multi-helminth infections are poorly understood. In Lao People's Democratic Republic (Lao PDR), *Opisthorchis viverrini*, *Schistosoma mekongi* and soil-transmitted helminth (STH) infections are co-endemic and multiple-species helminth infections are common. We present findings from cross-sectional surveys examining the association of single and multiple species helminth infections of different intensities with hepatobiliary and intestinal morbidity, nutritional status and anemia.

**METHODS** The studies were carried out in Vientiane, Savannakhet and Champasack province where *O. viverrini* and STHs are endemic. *S. mekongi* is co-endemic in Champasack. Morbidity was assessed by questionnaire asking for self-reported signs and symptoms, coupled with clinical examination and assessment of nutritional status [i.e. body mass index (BMI)] and

anemia (using a hemoglobinometer). Ultrasound examination was performed to assess liver morbidity. Stool samples were subjected to the Kato-Katz and formalin-ether concentration technique (FECT) for the diagnosis of helminth infections. Logistic regression analysis was employed to associate infection status with morbidity indicators and anemia.

**RESULTS** Considerable morbidity was associated with helminth infections. In adults, hepatobiliary pathology was associated with *O. viverrini* infection intensity. The strongest association was found in patients with intra-hepatic bile duct dilatation [intensity rate ratio (IRR), 12.9; 95% confidence interval (CI), 5.2–20.2]. Co-infection with *S. mekongi* showed strong associations but distinctly different patterns. In children, morbidity was associated with specific helminth infections [e.g. *S. mekongi* with hepatomegaly; adjusted odds ratio (OR) 9.5, 95% CI 2.1–43.5] and multiparasitism (e.g. >2 helminth species with abdominal pain; OR 2.4, 95% CI 1.5–3.9). Anemia was associated with hookworm infection (OR 1.6, 95% CI 1.2–2.3) and multiparasitism (OR 1.6, 95% CI 1.2–2.3). Low BMI was associated with *O. viverrini* infection (OR 1.7, 95% CI 1.1–2.5) and multiparasitism (OR 1.4, 95% CI 1.0–2.0).

**CONCLUSION** *O. viverrini*, *S. mekongi* and hookworm infections were strongly associated with hepatobiliary morbidity and anemia, while co-infections revealed complex morbidity patterns. Our results underscore the importance of control efforts that address multiple-helminth infections.

**DISCLOSURE** Nothing to disclose.

## PS2.035

### Extensive geographical variation in the prevalence of intestinal parasites in southern highland Rwanda

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**BACKGROUND** Intestinal parasites are common in the southern highland region of Rwanda. Available data suggest large urban-rural differences in the prevalence of soil-transmitted helminths (STHs) and *Giardia duodenalis* as well as urban-rural disparities with respect to factors associated with infection.

**METHODS** We collected stool samples from 1023 schoolchildren in 11 subdistricts of Huye district, Rwanda. Socio-economic, behavioral and household data were collected by questionnaires. Also, stool samples were collected from 419 pigs if present in the children's households. Intestinal parasites were detected by wet mount microscopy, mini-FLOTAC, and PCR.

**RESULTS** The large majority of children were clinically inapparent. By wet mount microscopy, 25.8% of the children showed infection with *Ascaris lumbricoides*, and 10.3% harboured *G. duodenalis*. PCR produced substantially higher prevalences; other parasites were comparatively rare. The prevalence by wet mount microscopy of *A. lumbricoides* (3.5–43.3%) and *G. duodenalis* (3.7–16.8%) varied largely between subdistricts. Factors associated with intestinal parasites included proxy indicators of low socio-economic status and risk behavior, varying between subdistricts. *Ascaris* was frequent among pigs (29.1%), again with a large prevalence range (5.9–54.1%). Notably, human *Ascaris* infections were found more frequently in subdistricts with high prevalence of porcine infection but this

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association did not hold true on the subdistrict level or in multivariate analysis.

**RESULTS** The data show a pronounced heterogeneity in the prevalence of intestinal parasites and of associated factors within a limited geographical area of Rwanda. Our data provide limited spatial evidence for porcine-human transmission of *Ascaris* in this region.

**DISCLOSURE** Nothing to disclose.

**PS2.036****Haematological profiles, iron deficiency and erythrocyte polymorphisms among African migrants in Germany**

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**OBJECTIVES** Individuals of African and European ancestry show differing haematological values, but respective data among established, first-generation African migrants in Europe are scarce. We assessed haematological profiles in Ghanaian migrants in Berlin, Germany, compared these to German and Ghanaian reference data, and analysed the contribution of iron deficiency and erythrocyte polymorphisms to anaemia.

**METHODS** Among 576 Ghanaians, blood counts were performed, haemoglobinopathies and glucose-6-phosphate dehydrogenase (G6PD) deficiency were genotyped, and ferritin and C-reactive protein were measured.

**RESULTS** Most individuals (median age, 45 years) resided in Germany for more than a decade (median, 18 years). By WHO definition, 30.9% of females and 9.4% of males were anaemic. Median haemoglobin (Hb) levels were 0.8 g/dl lower than among Germans. Yet, applying reference values from Ghana, only 1.9% of the migrants were considered anaemic. Alpha-thalassaemia (33.9%), Hb variants (28.3%), and G6PD deficiency (23.6%) were frequent as was iron deficiency in women (32.0%; men, 3.9%). The population fraction of anaemia attributable to various factors was 29% for iron deficiency and each 14% for alpha-thalassaemia and G6PD deficiency. Excluding these factors as well as sickle cell disease, the prevalence of anaemia remained high (women, 18.4%; men, 6.5%). The same was true when applying uncensored thresholds proposed for African-Americans (women, 19.3%; men, 7.8%).

**CONCLUSIONS** Among first-generation Ghanaian migrants in Germany, iron deficiency and erythrocyte polymorphisms are frequent but only partly explain the increased prevalence of anaemia. Hb thresholds for the definition of anaemia in this group may need to be revised.

**DISCLOSURE** Nothing to disclose.

**PS2.037****Lymphatic filariasis baseline survey prior to mass drug administration in Ogun state, Nigeria**

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**INTRODUCTION** In preparation for Mass Drug Administration by National Lymphatic Filariasis Elimination Programme, a

baseline epidemiological investigation on lymphatic filariasis (LF) was conducted in two sentinel sites of Ogun State, Nigeria. The study was carried out in Ado-Odo Ota and Abeokuta South Local Government Areas (LGAs) to determine LF prevalence, microfilarial density and the abundance of *Wucheraria bancrofti* in the mosquito vectors.

**MATERIALS AND METHODS** Microscopic examination of thick blood smears of 299 and 288 participants from Ado-Odo Ota and Abeokuta South LGAs was conducted. Visual observations of clinical manifestations of chronic infection and questionnaire administration were also conducted. Indoor resting mosquitoes were collected using the pyrethrum spray technique and CDC light traps and mosquitoes were dissected for filarial larvae.

**RESULTS** Microfilaria prevalences were 4.0% and 2.4% in Ado-odo Ota and Abeokuta South LGAs. The microfilarial density (mfd) was 30.6 and 23.9 mf/ml in the same areas. No clinical manifestations of the infection were found at both sites. Knowledge of LF by inhabitants was very low in the two areas. *Anopheles gambiae* s.l and *Culex* species mosquitoes were collected but none was found positive for stage L3 infective larvae.

**CONCLUSIONS** Mass awareness campaigns on the goal of mass drug administration, cause of LF, mode of transmission, the relationship between infection and clinical signs/symptoms is advocated so as to increase acceptance and support of the control programme by the community.

**DISCLOSURE** Nothing to disclose.

**PS2.038****Onchocerciasis (river blindness) in Africa: alternative strategies, treatment needs and costs**

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**BACKGROUND** Onchocerciasis (river blindness) is a parasitic disease transmitted by blackflies. Symptoms include severe itching, skin lesions, and vision impairment including blindness. More than 99% of all cases are concentrated in sub-Saharan Africa. Fortunately, vector control and community-directed treatment with ivermectin have significantly decreased morbidity, and the treatment goal is shifting from control to elimination in Africa.

**METHODS** We estimated financial resources and societal opportunity costs associated with scaling up community-directed treatment with ivermectin and implementing surveillance and response systems in endemic African regions for alternative treatment strategies that were developed as scenarios of control, elimination, and eradication. We used a micro-costing approach that allows adjustment for time-variant resource utilization depending on epidemiological trends and for heterogeneity in the demographic, epidemiological, and political situation.

**RESULTS** Surveillance costs for the elimination and eradication scenarios would be three times higher than those for the control scenario. However, rapid scale-up of ivermectin treatment in the elimination and eradication scenarios would result in substantial cost-savings in the long term, mainly because regular active surveillance would allow treatments to end earlier than in the control scenario, thereby saving the economic costs of community volunteers and donated ivermectin.

**CONCLUSIONS** To realize the cost-savings, policymakers should keep empowering community volunteers, and the

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pharmaceutical companies would need to continue drug donation. To sustain the high surveillance costs required for elimination and eradication, endemic countries would need to enhance their domestic funding capacity. Societal and political willingness would be critical to sustaining all of these efforts in the long term.

DISCLOSURE Nothing to disclose.

## PS2.039

### Prevalence and risk factors of helminths and intestinal protozoa infection among children from public schools in Nepal

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**BACKGROUND** Intestinal parasitic infections among children represent a major public health problem in Nepal, and may compromise nutritional benefits from vegetable consumption. We aimed to assess intestinal helminth and protozoa infections and their risk factors among children in order to design adequate health interventions in the frame of the 'Vegetable go to School' project, which are possibly related to the improvement of school vegetable gardens.

**MATERIALS AND METHODS** In January and February 2015 a cross-sectional survey was carried out in school children of grade VI and VII (aged 8–15 years) from 16 randomly selected schools in the Dolakha and Ramechhap districts of Nepal. Out of 724 registered children, 552 provided one stool sample. They were examined by the standardized Kato-Katz method for the presence of helminth eggs, by the formal ether concentration method for protozoan cysts and by the wet mount technique for protozoan trophozoites. Water quality (pH, free and total chlorine, turbidity, faecal coliform) at Point of Use by students was assessed using the Delagua Water Quality Testing Kit. Information on potential risk factors such as the sanitary situation in school and hygiene behaviour of school children were collected using a questionnaire. Uni- and multivariable logistic regression analysis was used to predict the infection status by the examined risk factors.

**RESULTS** The overall prevalence of infection with helminth and intestinal protozoa was 20.3% and 6.2%, respectively.

Hookworm (8.3%) was the most common helminth species. *Trichuris trichiura*, *Hymenolepis nana*, *Ascaris lumbricoides*, *Enterobius vermicularis*, and *Strongyloides stercoralis* were diagnosed in 8.2%, 2.5%, 0.5%, 0.4% and 0.4%, respectively. The prevalence of *Giardia intestinalis* was 6.2%. No *Entamoeba histolytica* infected child was identified. Strongest predictors for a helminth infection were handwashing practices (OR 1.3, 95% CI 0.87–2.17) and not using sanitary facilities for defecation (OR 1.2, 95% CI 0.41–3.72). The 16 schools use 37 water sources of which 30 were functional. Water sources of 16 schools were found contaminated with faecal coliforms (53.3%).

**CONCLUSION** Considerable infection rates of intestinal parasitic infection were present in school children in Nepal. Risk factors analysis indicated that hygiene behaviour of school children, and contaminated water sources in the school are possible sources of infection. Future intervention may address these risks.

DISCLOSURE Nothing to disclose.

## PS2.040

### Challenges in the diagnosis of lymphatic filariasis in Conakry, Republic of Guinea

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**BACKGROUND** The decision to treat entire communities using mass drug administration (MDA) for the control of lymphatic filariasis (LF) must be supported by local information. In the Republic of Guinea, there is evidence of ongoing LF transmission with the exception of the most densely populated parts of the country, including the capital Conakry. The aim of this study was to determine whether transmission of LF occurs in Conakry to foster LF control and elimination efforts.

**METHODS** The prevalence of circulating filarial antigen of *Wuchereria bancrofti* was assessed by Immunochromatography card test (ICT) in 611 people recruited from all five districts of Conakry. Mosquitoes were collected by means of exit traps and pyrethrum knock-down spray sheet collections monthly over a 1-year period. A random sample of mosquitoes were dissected and examined for *W. bancrofti* larvae, while the remainder were analysed by loop-mediated isothermal amplification (LAMP) assay and conventional polymerase chain reaction (PCR) for detection of *W. bancrofti* DNA. Interviews were conducted to establish migration status of elephantiasis patients.

**RESULTS** Circulating filarial antigen test revealed no infection in the 611 humans examined. A total of 14 334 mosquitoes were collected; mainly *Culex* ( $n = 14\,135$ ; 98.6%) and a small number of *Anopheles* ( $n = 161$ ; 1.1%). Out of the 1312 *Culex* spp. (9.3%) and 51 *A. gambiae* (31.7%) dissected, none was infected with any stage of *W. bancrofti*. However, the LAMP assay revealed that 1.8% of *A. gambiae* and 0.3% of *Culex* spp. were positive, while PCR determined respective prevalences of 0% and 0.2%. 23 subjects infected with elephantiasis of the leg were interviewed, of which 18 (78.3%) originated from regions other than Conakry.

**CONCLUSION** This study revealed the presence of *W. bancrofti* DNA in mosquitoes, despite the apparent absence of infection in the human population. Even if the infection rate in *A. gambiae* determined by LAMP may be considered too high to completely rule out transmission, the number of samples analysed was quite low. To focus the study on areas where high infection rates were observed, in combination with increased sample size could provide more specific insight on the LF infection level in Conakry.

DISCLOSURE Nothing to disclose.

## PS2.041

### Critical appraisal of global burden of disease studies: experiences and findings from working on estimates for foodborne trematodiasis

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**INTRODUCTION** In the wake of the Global Burden of Disease (GBD) studies, the use of disability-adjusted life years (DALYs)



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as a measure to identify, monitor and evaluate global health challenges has risen to prominence. DALYs aim at measuring health losses due to a certain condition by combining years of life lost due to premature death with years lived with disability and have become a powerful 'currency' in health economics and health policy. Whereas the first GBD studies triggered fervent discussions about the accuracy of basic modelling input and output data, conceptual issues and project governance, the more recent GBD 2010 study evoked less controversy. While this silence could suggest widespread satisfaction, it may rather be a sign of perplexity of how to further improve GBD studies and the DALY measure. The presented work aims at revitalising some of these fundamental discussions, thereby promoting the search for future improvements.

**METHODS** Insights into burden of disease studies were gained while estimating the global burden of foodborne trematodiasis (FBT) for the first time ever and working as an expert for the GBD 2010 study, the GBD 2013 study and the World Health Organisation's Foodborne Disease Burden Epidemiology Reference Group. Additional evidence was produced through independent research on the theoretical conceptualisation of DALYs. Crucial experiences and findings from these efforts are summarised and their importance highlighted with examples from our work on the global burden of FBT.

**RESULTS** Mainly due to the scarcity of suitable input data, differences in estimation methods, conceptual flaws and communication problems, current global burden estimates for FBT vary from 0.7 to 3.6 million DALYs. Even though the identified problems may have been aggravated in our work as we focused on a cluster of neglected tropical diseases (i.e. FBT), many of the further detailed issues may be equally relevant in the assessment of other conditions. Based on our experiences and findings, recommendations for future research and improvements of GBD studies are presented.

**CONCLUSIONS** The critical appraisal and discussion of burden of disease studies and associated measurement units is essential to further advance their reliability and validity and to ensure the correct interpretation and use of the respective results.

Otherwise, there is a risk of ill-informed public health decision making when relying on such burden of disease assessments.

**DISCLOSURE** Nothing to disclose.

**PS2.042****Serum leptin concentration is associated with intestinal parasitic infection and co-infection in children of rural Mexico**

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Leptin is a hormone responsible for appetite control and immune functions. Intestinal parasites have been shown to be associated to leptin concentration and food intake in animal models; however information about this association in humans is lacking. The objective of this cross-sectional study was to evaluate the association between intestinal parasite infections with serum leptin concentration in school-aged children from a rural area in Querétaro, Mexico. A total 291 children (8 ± 1.2 year) participated in the study. Body fat percentage was measured by DXA; high body fat for girls was considered above 30% and above 25% for boys. Serum leptin concentrations were determined by ELISA from a fasting blood sample. Infections with soil transmit-

ted helminths and/or with protozoa were diagnosed by stool microscopy. ANCOVA was used to determine differences in leptin concentration between non-infected, infected and co-infected children. The prevalence of intestinal parasite infection was 62%; 14% of the children had co-infections (i.e. more than one parasite). Among girls with a normal percentage of body fat, those with parasitic co-infections had higher serum concentrations of leptin ( $2.10 \pm 2.23 \mu\text{g/l}$ ) than mono-infected ( $1.56 \pm 1.51 \mu\text{g/l}$ ) and non-infected girls ( $1.33 \pm 1.45 \mu\text{g/l}$ ) ( $P = 0.02$ ). In contrast, co-infected girls with a high percentage of body fat had lower leptin concentrations ( $3.76 \pm 1.53 \mu\text{g/l}$ ) than mono-infected ( $4.12 \pm 2.15 \mu\text{g/l}$ ) and non-infected girls ( $5.6 \pm 2.6 \mu\text{g/l}$ ) ( $P = 0.03$ ). No differences in leptin concentration were found between (co)parasitized and non-parasitized boys. In summary, we found an association between parasitic (co)-infections and serum leptin concentrations, and the results suggest that this association is gender- and body fat-dependent. Further studies are needed to elucidate the pathways that may be involved and to assess a causal relationship.

**DISCLOSURE** Nothing to disclose.

**PS2.043****Mini-FLOTAC and Fill-FLOTAC: results and insights from the field**

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Faecal egg count (FEC) techniques are common approaches for the diagnosis of soil transmitted helminths (hookworms, ascarids, trichurids). FEC are widely used to measure the prevalence and intensity of infections for epidemiological surveys, to quantify the efficacy of chemotherapy, and to detect anthelmintic resistance. Mini-FLOTAC combined with Fill-FLOTAC was tailored for epidemiological monitoring and surveillance, where large numbers of faecal samples must be rapidly, yet reliably examined. Mini-FLOTAC is based on two components (the base and the reading disc) and includes two 1-ml flotation chambers (total volume = 2 ml). Fill-FLOTAC is a disposable sampling kit, which consists of a container, a collector and a filter, thus facilitating the performance of the first four consecutive steps of the Mini-FLOTAC technique, i.e. sample collection and weighing, homogenisation, filtration and filling. Results of recent studies in different settings of Europe, Africa, Asia and southern America demonstrated that Mini-FLOTAC is a sensitive and accurate technique for detecting and counting STH eggs. Advantages and disadvantages of Mini-FLOTAC compared with standard methods recommended by the World Health Organization (WHO) for the diagnosis of STHs are discussed including the strategies of preserving and pooling stool faecal samples.

**DISCLOSURE** Nothing to disclose.

**PS2.044****Concomitant infections with *Plasmodium falciparum* and soil-transmitted helminths in Ogele Community of Kwara State, Nigeria**

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Prevalence of malaria and soil-transmitted helminth infections, and the burden of diseases are enormous in sub-Saharan Africa.



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Co-infections are common due to overlap in their geographical distribution. A cross-sectional survey was conducted to assess the prevalence, intensity and association between malarial parasite and soil-transmitted helminths infections in Ogele community, Kwara State. Fresh blood and faecal samples ( $n = 471$ ) randomly collected from volunteers were examined parasitologically using blood film and Kato-Katz smear technique respectively. Associated factors were investigated using structured pre-tested questionnaires. A total of 383 (81.3%) were infected with at least one parasite species, with the prevalence and (mean intensity) of 63.7% [ $n = 300$ ; (2313.64 parasite/ $\mu$ l of blood)] of *Plasmodium falciparum*, 63.1% [ $n = 297$ ; (3152.14 epg)] of *Ascaris lumbricoides*, 53.3% [ $n = 251$ ; (1043.52 epg)] of *Trichuris trichiura* and 30.1% [ $n = 251$ ; (981.65 epg)] of hookworm. The prevalence of all parasites species was age-dependent ( $P < 0.05$ ). Sixty three percent of the study population harboured at least two or more parasites concurrently. The co-occurrence of *A. lumbricoides* (5.867, 95% CI: 3.304–10.418) and *T. trichiura* (1.530, 95% CI: 0.826–2.474) were higher in individuals infected with *P. falciparum* infection as compared to individuals without. Similarly, heavy infection due to *A. lumbricoides* and *T. trichiura* infections were also associated with high parasitaemia of *P. falciparum*. Logistic regression analysis showed that unemployment (adjusted OR 1.95, 95% CI: 1.12–3.38), presence of bush around houses (3.01, 95% CI: 1.88–4.83) and closeness of dumpsites to human habitation (1.89, 95% CI: 1.18–3.03) were significantly associated with co-occurrence of parasitic infection. The high prevalence of polyparasitism in this study area may complicate disease condition and management practices. Therefore, integrated intervention strategies are needed to mitigate burden of diseases in the most vulnerable population groups. **DISCLOSURE** Nothing to disclose.

**PS2.045****Onchocerciasis: history of control strategies and recent epidemiology in Africa**

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**BACKGROUND** In Africa, remarkable progress has been made in the fight against onchocerciasis since 1974 with the Onchocerciasis Control Programme in West Africa (OCP) and continued since 1995 with the African Programme for Onchocerciasis Control (APOC). Here, we review control strategies used since the beginning of the fight in order to identify the challenges for current plans to eliminate onchocerciasis in Africa.

**METHODS** A two-stage systematic search was carried out in PubMed and EMBASE, covering articles published up to 2015. Full text articles were accessed through the WHO HINARI system.

**RESULTS** Following research by the General Service of Mobile Hygiene and Prophylaxis (SGHMP) based in Bobo-Dioulasso since 1944, the ancestor of Centre MURAZ, onchocerciasis was recognized as a public health problem in West Africa in 1950. To interrupt transmission and control the disease, OCCGE, the Organization for Coordination and Cooperation in the fight against major endemic diseases in West Africa, and others services in Nigeria and Kenya, conducted vector control campaigns until 1968. In pursue of these efforts, WHO created OCP in West Africa in 1974. Vector control was later combined with treatment of eligible populations with ivermectin when the drug was registered for onchocerciasis in 1987 and made

available for the treatment of the people in endemic communities. In 1994, APOC was launched and adopted a strategy of Community-Directed Treatment with Ivermectin (CDTI). APOC targeted CDTI to hyperendemic onchocerciasis areas in African countries not covered by the OCP. Assessments of ivermectin treatment coverage and disease prevalence were carried out to verify that coverage was at least 65% and to assess the decrease in community microfilarial load and the prevalence of onchocerciasis infection respectively. In 2011 and 2012, the overall therapeutic coverage in CDTI projects was high at 76.4–77.4% but 3 of 24 reporting countries failed to achieve 65% coverage. However in 2013, an unsatisfactory average therapeutic coverage of 59.5% (median: 63.6%) was recorded in 24 of the 28 endemic countries.

**CONCLUSION** The main challenges for the elimination of onchocerciasis in Africa are the sustainability of CDTI programs, improvement of therapeutic and geographic coverages, extension of treatment to hypoendemic areas and intensification of monitoring and evaluation efforts.

**DISCLOSURE** Nothing to disclose.

**PS2.046****The prevalence of *Cryptosporidium* and *Giardia* infections among adults in Usoma village western Kenya, an area endemic for schistosomiasis, soil transmitted helminths and malaria**

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**INTRODUCTION** The burden of neglected parasitic diseases, especially those in the tropics, is currently attracting global attention due to the subtle nature of their impacts on infected individuals. Cryptosporidiosis and Giardiasis are included in the World Health Organization's neglected diseases initiative but their impacts and burden are not fully documented.

**METHODS** A cross sectional study was designed to determine the prevalence of *Cryptosporidium* and *Giardia* infections in adults living in Usoma village, western Kenya. Usoma village is an endemic area for schistosomiasis, soil transmitted helminths (STHs) and malaria, with HIV prevalence rates above the national average. In addition to this, diarrheal cases in the area are often attributed to unknown etiology. 152 adults were consented and enrolled in the study. The participants provided stool samples for the diagnosis of *Cryptosporidium* spp. using the modified acid fast staining, *Giardia lamblia* by the formalin-ethyl acetate method and Kato-Katz examination for *Schistosoma mansoni* and STHs diagnosis. A finger-prick blood sample was also collected for malaria and HIV testing.

**RESULTS** The prevalence of infection for cryptosporidiosis and giardiasis was 25.66% and 4.61% respectively. *Schistosoma mansoni*, STHs, HIV and malaria infections were at 77.63%, 23.03%, 32.24%, 13% and respectively. Watery stool consistency was statistically significantly associated with cryptosporidiosis and giardiasis infection ( $P < 0.0001$ ). Symptoms of abdominal pain were also significantly associated with *Schistosoma mansoni* infection ( $P < 0.04$ ).

**DISCUSSION AND CONCLUSION** This study determined the prevalence of parasitic infections present in an adult population and it provides useful baseline information necessary for further understanding the nature of *Cryptosporidium* and *Giardia* co-infections with other intestinal parasites. However further studies need to be carried out to understand how these diseases

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interact and affect resistance/susceptibility or clinical outcomes of other parasitic diseases in co-infected populations.  
DISCLOSURE Nothing to disclose.

**PS2.047****Association of gastrointestinal nematode infections on antimalarial total IgG in malaria asymptomatic schoolchildren in Mfou**

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Gastrointestinal nematode infections are common in malaria endemic areas. An interaction between the two parasites would be of considerable public health importance. The present study was designed to investigate the effects of concomitant malaria and GINi on the anti-malarial total immunoglobulin Gamma level in schoolchildren in Mfou (Cameroon).

503 school children aged 3–16 years were examined. Finger prick blood samples were collected. Thick and thin blood smears were examined for the presence of malaria parasites, parasites species and densities. Fresh stool samples were collected, processed and examined for gastrointestinal nematodes using the Kato Katz technique. Immunoglobulin gamma levels were determined using ELISA for three asexual stage recombinant antigens.

A total of 69 (33.82%) had simple or mixed co-infection with a predominance of *P. falciparum*/A. *lumbricoides*. Sixty-six children (75%) tested by ELISA were classified as higher anti-malarial total IgG producers. Mixed co-infected children had higher total IgG than those with simple co-infection but the difference was not significant.

These findings reveal that malaria/GIN co-infection has no effect on the production of antimalarial total IgG in the studied population. However, future studies should examine the effect of malaria/helminths co-infection on antimalarial IgG subclasses.  
KEYWORDS Malaria; Gastro-intestinal nematode; anti-malarial total IgG; School aged children.

DISCLOSURE Nothing to disclose.

**PS2.048****Geohelminth co-infections associated with outcome of benzimidazole treatment for individual species**

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Geohelminth infections represent a significant threat to public health in countries of the tropics and sub-tropics. Co-infections of geohelminth species are common. Mass Drug Administration (MDA) programmes based on the principle of 'preventive chemotherapy' with broad-spectrum anthelmintics such as albendazole are widely used to reduce the burden of disease. Whilst treatment with a broad spectrum anthelmintic may quickly reduce the faecal egg count of several co-infecting species, there may be a residual burden of infection of one or more species as assessed in short-term follow-up surveys. The underlying factors for lack of efficacy have not been comprehensively described. One issue

that may play a role is co-infections with other species that are susceptible to the same medicine. In this analysis, data several studies were re-analysed to assess the degree of association between hookworms, *Ascaris lumbricoides* and *Trichuris trichiura* pre- and post-treatment. The results suggest that the potential impact of MDA programmes that use a single treatment regimen in all circumstances may need re-evaluation.

DISCLOSURE Nothing to disclose.

**PS2.049****Distribution and risk factors for *Plasmodium* and helminth co-infections: a cross sectional survey among children in Bagamoyo district, coastal region of Tanzania**

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**INTRODUCTION** *Plasmodium* and soil transmitted helminth infections (STH) are a major public health problem, particularly among children. There are conflicting findings on potential association between these two parasites. This study investigated *Plasmodium* and helminth co-infections among children aged 2 months–9 years living in Bagamoyo district, a coastal region of Tanzania.

**MATERIALS AND METHODS** A community-based, cross-sectional survey was conducted among 1033 children. Stool, urine and blood samples were examined using a broad set of quality controlled diagnostic methods for common STH (*Ascaris lumbricoides*, hookworm, *Strongyloides stercoralis*, *Enterobius vermicularis*, *Trichuris trichiura*), *Schistosoma* species and *Wuchereria bancrofti*. Blood slides and malaria rapid diagnostic tests (mRDTs) were utilized for *Plasmodium* diagnosis.

**RESULTS** In 992 children analyzed, the prevalence of *Plasmodium* infection was 13% (130/992), helminth 28.5% (283/992); 5% (50/992) had co-infection with *Plasmodium* and helminth. The prevalence rate of *Plasmodium*, specific STH and co-infections increased significantly with age ( $P < 0.001$ ), with older children mostly affected except for *S. stercoralis* mono-infection and co-infections. Spatial variations of co-infection prevalence were observed between and within villages. There was a trend for STH infections to be associated with *Plasmodium* infection [OR adjusted for age group 1.4, 95% CI (1.0–2.1)], which was more marked for *S. stercoralis* (OR = 2.2, 95% CI (1.1–4.3)). Age and not schooling were risk factors for *Plasmodium* and STH co-infection.

**CONCLUSION** The findings suggest that STH and *Plasmodium* infections tend to occur in the same children, with increasing prevalence of co-infection with age. This calls for an integrated approach such as using mass chemotherapy with dual effect (e.g. ivermectin) coupled with improved housing, sanitation and hygiene for the control of both parasitic infections.

**ACKNOWLEDGMENTS** The author's acknowledge all staff of the IDEA project, children and their parents who agreed to participate in this study. We are particularly obliged to Raymond Singo, Shabani Halfan, Rehema Mangoli, and Tatu Nassor for the field and laboratory work, the data unit (BRTC) for entering the data and providing ample support. Additionally, we acknowledge the Bagamoyo district officials, specifically the

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district immunization and vaccination officer (DIVO) Farah Mohammed for his great collaboration.  
DISCLOSURE Nothing to disclose.

**PS2.050****Assessment the prevalence of intestinal parasites and associated risk factors among preschool children in Riyadh, Saudi Arabia**

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Intestinal parasite infections are a major public health problem in children. The study aimed to assess the prevalence of intestinal parasites and associated risk factors among preschool children in Riyadh city. Samples were obtained from 255 preschool children: a single stool sample was collected and examined microscopically for the presence of intestinal parasites using a formalin-ether sedimentation technique. The overall prevalence of parasites was 45 (17.7%), most of them had diarrhea 40 (15.7%) ( $P < 0.05$ ). The prevalence rates of infection in boys and girls were 20.4% and 15.9% respectively. In all preschool children, the highest infection rate was 23.3% among the age group 3–5 years. We detected 7 types of intestinal parasites among preschool children, the most common was *Giardia lamblia* (37.8%). Intestinal parasitic infection and certain socio-demographic factors were related. Concerning the parents, educational level was highly significant ( $P < 0.001$ ). Working mothers, presence of house maid, attending daycare centers and poor hygienic measures and moderate socioeconomic standards played roles as predisposing factors for transmission of infection. The prevalence of infection with intestinal parasites between two different areas of Riyadh was not significant.  
DISCLOSURE Nothing to disclose.

**PS2.051****Genetic characterization of *Fasciola* isolates from West Azerbaijan Province, Iran based on ITS1 and ITS2 sequence of ribosomal DNA**

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**BACKGROUND** Fascioliasis, caused by *Fasciola hepatica* and *Fasciola gigantica*, is of medical and economic importance worldwide. Molecular approaches with compare traditional methods using for identification and characterization of *Fasciola* spp. are precise and reliable. The aims of the current study was molecular characterization of *Fasciola* spp. in West Azerbaijan Province, Iran and then comparative analysis of them with GenBank sequences.

**METHODS** A total number of 580 isolates were collected from 90 slaughtered cattle ( $n = 50$ ) and sheep ( $n = 40$ ). After morphological identification and DNA extraction, designing specific primer used to amplification of ITS1, 5.8 s and ITS2 regions, 50 samples were conducted to sequence, randomly.

**RESULT** Using morphometric characters 99.14% and 0.86% of isolates identified as *F. hepatica* and *F. gigantica*, respectively. PCR amplification of 1081 bp fragment and sequencing result showed 100% similarity with *F. hepatica* in ITS1 (428 bp), 5.8 s (158 bp), and ITS2 (366 bp) regions. Sequence comparison among current study sequences and GenBank data showed 98% identity with 11 nucleotide mismatches. However, on the

phylogenetic tree, *F. hepatica* sequences of West Azerbaijan province were in a close relationship with Iranian, Asian, and African isolates.

**CONCLUSIONS** It could be concluded that only *F. hepatica* is distributed among sheep and cattle in West Azerbaijan province. However, 5 and 6 bp variation in ITS1 and ITS2 regions, respectively, is not enough to separation of *Fasciola* spp. Therefore, more studies are essential for designing new molecular markers to correct species identification.

**DISCLOSURE** Of 107 sequences of *Fasciola* species submitted to the GenBank from Iran, 62.6% belonged to *F. hepatica*, 24.3% to *F. gigantica*, and the remaining 13.1% was recorded as *Fasciola* sp. Registered sequences in GenBank are related to 18s, ITS1, 5.8s, ITS2, 28s, ND1 (mitochondrial NADH dehydrogenase1), COI (cytochrome C oxidase I), and CatL1 (Cathepsin L1) regions.

**PS2.052****Prevalence and factors associated with soil-transmitted helminthiasis in infants in Gulu, Northern Uganda**F. Oola<sup>1</sup>, E. Mupere<sup>1</sup>, J. Mugalu<sup>1</sup> and B. Haneberg<sup>2</sup><sup>1</sup>Makerere University College of Health Sciences, Kampala, Uganda;<sup>2</sup>Norwegian Institute of Public Health, Oslo, Norway

An estimated 1.5 billion people, or 24% of the world's population, are infected with soil-transmitted helminths (STH), with up to 1 billion preschool- and school-age children thought to live in areas considered to be of high intensity for STH transmission. In Uganda, one in every four people is at risk of infection with soil-transmitted helminths. As such, STH remains an important contributor to morbidity and mortality within the Ugandan population, including among infants and children. However, despite no scientific evidence for exclusion, Uganda's national deworming guidelines do not provide for soil-transmitted helminthiasis control in infants.

The overall objective of this study was to establish the prevalence and factors associated with soil-transmitted helminthiasis in infants aged 6–12 months in a typical Ugandan rural community. The 6–12 month age bracket marks the oral stage of an infant's growth and development where they derive great pleasure by placing every object in their mouth, thus putting them at great risk of infection with soil-transmitted helminths.

A quantitative cross-sectional community survey was conducted in 65 villages across Gulu district. Home-based fully structured interviews were performed with the caregivers of 768 infants aged 6–12 months old who were randomly selected through multistage cluster and probability proportional to size sampling. Using Standard Operating Procedures, stool specimens were obtained for laboratory investigations from the study participants.

The stool samples are currently being analysed to determine the burden and to identify factors which are associated with STH in Ugandan infants. In addition to adding to the previous evidence about the burden of STH in Uganda, the results from this study are expected to inform future policy decisions within the Ugandan health system.

**DISCLOSURE** Nothing to disclose.

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## PS2.053

**Functional assessment of circulating lymphatic progenitor cells and peripheral blood mononuclear cells from filarial induced secondary lymphedema subjects for therapeutic interventions**A. A. Nathan<sup>1</sup>, S. Babu<sup>2</sup>, M. Dixit<sup>3</sup> and S. B. Anand<sup>1</sup><sup>1</sup>Department of Genetic Engineering, School of Biotechnology, Madurai Kamaraj University, Madurai, India; <sup>2</sup>NIH-ICER, National Institute for Research in Tuberculosis (NIRT), Chennai, India; <sup>3</sup>Department of Biotechnology, Indian Institute of Technology Madras, Chennai, India

**INTRODUCTION AND OBJECTIVES** Lymphatic Endothelial progenitor cells (LEPCs) are the subset of peripheral blood derived mononuclear cells (PBMCs). They are capable of differentiating into mature lymphatic endothelial cells. In secondary lymphedema condition, formations of new lymphatic vessels are greatly impaired. The transport capacity of lymphatic vessels is also decreased. LEPCs based revascularization therapies are still lacking for the treatment for such chronic complications. The objective of our study was to enumerate the circulating levels of progenitor cells and to evaluate the functional abilities of the progenitor cells derived from PBMCs from endemic normals and secondary lymphedema subjects.

**METHODOLOGY** PBMCs were isolated from 10 ml of peripheral blood after obtaining an informed consent from the study subjects (control group and filarial infected group) as per ICMR guidelines. Binax ICT cards were employed to screen for filarial infection. Hematological profiles were carried out using serum and plasma samples. Both CD34<sup>+</sup> and VEGFR3<sup>+</sup> cell counts were scored using flow cytometry. Trypan Blue staining was followed to confirm the cell viability in both groups. The migratory potential in response to SDF-1 $\alpha$  (100 ng/ml) and adhesion of PBMCs to fibronectin (25  $\mu$ g/ml) was determined by Transwell migration assay and seeding them on fibronectin coated tissue culture plates respectively. The tube forming ability was tested by co-culturing PBMCs with mature endothelial cells (ECV304) on matrigel. The expression profiles of lymphatic markers like Prox-1, Podoplanin and VEGFR3 was carried out using RT-PCR.

**RESULTS AND CONCLUSION** Of the total 30 subjects recruited for the study, 15 subject exhibits chronic lymphedema (Grade 1) due to filarial infection. Flow cytometry analysis shows there is a significant difference in the CD34<sup>+</sup> and VEGFR3<sup>+</sup> cell counts. 90% of the cells were viable in both the groups. Gene expression analysis through RT-PCR revealed significant decrease in the expression of VEGFR3 and Podoplanin in PBMCs obtained from lymphedema subjects. The adhesion ability of isolated PBMCs to fibronectin and migration in response to SDF-1 $\alpha$  was significantly altered whereas tube forming ability over matrigel has no difference. Additionally, the progenitor cells obtained from lymphedema subjects acquired endothelial phenotype in culture similar to those obtained from healthy controls.

**DISCLOSURE** Nothing to disclose.

## PS2.054

**Onchocerciasis DNA vaccine development: multifunctional 'moonlighting' proteins of *Onchocerca volvulus* as candidate vaccine antigens?**V. Steisslinger<sup>1</sup>, A. Renz<sup>2,3</sup>, D. M. D. Achukwi<sup>4</sup>, N. W. Brattig<sup>1</sup> and K. D. Erttmann<sup>1</sup><sup>1</sup>Molekulare Medizin, Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany; <sup>2</sup>Institute of Evolution and Ecology, University Tübingen, Tübingen, Germany; <sup>3</sup>Institute of Agricultural Research for Development, Wakwa Regional Center, Ngaoundere, Cameroon;<sup>4</sup>Institute of Evolution and Ecology, Wakwa Regional Centre, Ngaoundere, Cameroon

Onchocerciasis is a vaccine-preventable disease, which to date could not be eradicated by vector control and mass drug administration of ivermectin alone. Ideally, a complementary vaccine would support the microfilaricidal effect of the chemotherapy by eliminating the remaining low-level microfilarial loads seen during therapy, which still allow transmission to occur. Targeting different functions vital for the parasite by combining several multifunctional parasite antigens could possibly promote the protective potential of such a multivalent vaccine.

Over the past years, our group identified, cloned and characterised several *O. volvulus* antigens as putative candidates. Of these candidate molecules, *Ov*-glyceraldehyde-3-phosphate dehydrogenase (*Ov*-GAPDH) and *Ov*-enolase are highly multifunctional so called 'moonlighting' proteins.

The multifunctionality of *Ov*-GAPDH and *Ov*-enolase are apparent by the binding of plasminogen indicating a role in host-parasite interaction. Moreover, in histological analysis polyclonal anti-*Ov*-GAPDH rabbit antibodies stained structures unrelated to glycolysis, such as cell nuclei that were labelled after macrofilaricidal treatment. Further, *Ov*-GAPDH was localized in the labyrinths of the hypodermis and the fluid in the pseudocoeloma cavity indicative for the release of the protein and its exposure to the host immune system for recognition of non-host related epitopes. In 2002 at the National Institute of Health (NIH) the third moonlighting member of the glycolytic pathway, the *Ov*-fructose-1,6-bisphosphate aldolase, was reported by McCarthy et al. as target of protective immunity in humans, and thus should also be included in a multivalent vaccine of moonlighting proteins. Our vaccination experiments with *Ov*-GAPDH. DNA revealed immunogenicity and compatibility in cattle and mice and showed a strong anti-microfilarial and an adulticidal effect in the *Litomosoides sigmodontis* mouse model of filariasis.

These observations warrant further exploration of the protective potential of multifunctional *Ov*-proteins in the cattle model of onchocerciasis to finally develop the multivalent vaccine mentioned above.

**DISCLOSURE** Nothing to disclose.



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## PS2.055

## Urban farming and risk of intestinal helminth infection for vegetable producers in Ouagadougou, Burkina Faso

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In Ouagadougou, Burkina Faso, the scarcity of freshwater is a critical problem, and the reuse of marginal quality water in urban agriculture has been common for decades. This practice contributes interestingly to the urban food basket and the socio-economic earnings of vulnerable segments of the population. However, it is dangerous due to the potential health risks associated to it. Polluted water use in urban agricultural fields may become a vehicle for a number of helminth infections for exposed groups like farmers. To prevent these health risks a regular assessment of the parasite species and their load in the various water sources used for vegetables irrigation in Ouagadougou sites is necessary.

From December 2012 to December 2013, water samples were collected twice a month from Ouagadougou 4 major vegetables sites. A total of 197 water samples were analyzed for their parasitological quality using modified Baileger methods.

The result showed that parasites concentration in water samples (1–11 egg/l) are above the threshold levels set by the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) for unrestricted irrigation. Different protozoa and helminths belonging to 9 species were identified: *Ankylostoma duodenalis*, *Hymenolepis nana*, *Ascaris lumbricoides*, *Taenia* ssp, *Strongyloides stercoralis*, *Entamoeba histolytica*, *Giardia lamblia*, *Entamoeba coli*. Despite variation in isolated parasites, eggs of *Ascaris lumbricoides* and *Ankylostoma duodenalis* were common in all water samples. Furthermore, 14.87% of collected eggs have proven to be viable with predominance of helminthes eggs.

As the activities of vegetable farmers expose them to water containing helminths, it is necessary to quantify the risk in further studies and to better control this potential route of parasitic diseases spread in the population.

DISCLOSURE Nothing to disclose.

## PS2.056

## Cytokine profile in helminth and malaria infections in afebrile and febrile children in Ibadan, Southwest Nigeria

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**INTRODUCTION** Intestinal helminths and malaria are among the most prevalent infectious diseases in tropical Africa. The effect of the co-infections on immune responses in individuals is not clearly understood. We therefore investigated the immune

response (Th1 and Th2) profile in children with and without symptoms.

**MATERIALS AND METHODS** A total of 78 afebrile school children (20 helminth-malaria co-infected, 17 helminth infected, 19 malaria infected and 22 uninfected) and 75 febrile children (14 helminth-malaria co-infected, 16 helminth infected, 20 malaria infected and 25 uninfected) were recruited into the study. Helminths were detected using direct microscopy technique. Coarse quantification of helminths ova was done using Kato-Katz method while malaria parasite detection and quantification was done using Giemsa-stained thick and thin blood films, respectively. Circulating TNF- $\alpha$ , IFN- $\gamma$ , IL-1, IL-10 and IL-6 concentrations were assessed by ELISA from serum samples. Data were analysed using analysis of variance.

**RESULTS** Among the afebrile school children, IL-10 was significantly increased in helminth infected children compared with helminth-malaria co-infected, malaria infected and uninfected groups ( $P < 0.05$ ). IFN- $\gamma$  was significantly elevated in malaria and malaria-helminth coinfection relative to helminth alone ( $P < 0.05$ ). IL-1 level was significantly higher in single infection of helminth and malaria relative to coinfection and the uninfected groups ( $P < 0.05$ ). An insignificant difference was observed for IL-6 and TNF- $\alpha$  concentrations across all the four groups while among febrile children, IL-6 was significantly increased among helminth alone and helminth-malaria coinfection relative to malaria infected group ( $P < 0.05$ ). IL-10 was significantly elevated in co-infected group compared with helminth or malaria infected group while TNF- $\alpha$  was significantly increased in helminth and helminth-malaria coinfection compared with uninfected or malaria infected group ( $P < 0.05$ ). IFN- $\gamma$  level was insignificant in the infection groups relative to uninfected group ( $P < 0.05$ ). IL-1 level similar across the groups.

**CONCLUSIONS** Helminth infection seems to upregulate Th2 immune response among children with symptomatic uncomplicated malaria while there was no significant changes in Th immune response among afebrile children.

DISCLOSURE Nothing to disclose.

## PS2.057

Genetic variation of *Indoplanorbis exustus* (Gastropoda: Plaurbidae), intermediate host of foodborne trematodes in Southeast Asia

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*Indoplanorbis exustus* is a freshwater snail found across India, central Asia through Southeast Asia as well as Arabia and Africa. It is medically and economically important, and could transmit several species of *Schistosoma* which infect cattle and cause reduced livestock productivity. In addition, other medically important parasitic trematodes, e.g. *Echinostoma*, also use this snail as intermediate host. Then present study aims to explore the genetic diversity of *I. exustus* distributed throughout Southeast Asia. Mitochondrial cytochrome oxidase subunit 1 (CO1) was used as molecular marker in this study. 413 specimens of *I. exustus* were naturally collected from 11 different localities in Thailand, Lao PDR, Cambodia and the Philippines. Another 46 specimens from Sri Lanka and Bangladesh were examined as outside region comparison. High genetic diversity was observed

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in Southeast Asian isolates. At least 42 haplotypes were detected in current investigation, of these 28 haplotypes were from Southeast Asian isolates. All Southeast Asian haplotypes were clustered as monophyletic group, except the four specimens collected from Kampong Cham province, Cambodia, which was huge genetically distinct from other specimens from Southeast Asia. In addition, they were aligned in between the specimens from Sri Lanka and Bangladesh. This shows that cryptic species (morphological similar but genetically distinct) could exist in Southeast Asian isolates. However, to prove this hypothesis, greater sample sizes and more localities of *I. exustus* need to be examined throughout Southeast Asia.

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DISCLOSURE Nothing to disclose.

## PS2.058

## Looking inside the chemical biology of the three GSK anti-kinetoplastid boxes and beyond

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As part of the fight against the neglected tropical diseases, recently GlaxoSmithKline has published three anti-kinetoplastid chemical boxes of around 200 compounds each as an open source for future lead discovery or chemical biology research. Using whole-cell phenotypic assays, the high-throughput screening (HTS) diversity set of 1.8 million compounds was screened against three kinetoplastids: *Leishmania donovani*, *Trypanosoma cruzi* and *Trypanosoma brucei*, being the first parallel HTS program which has been disclosed for any pharma compound set against the three kinetoplastids most relevant to human disease.

The most relevant whole cell phenotypic assay has been used in the HTS campaigns. For *Trypanosoma brucei* viability, fluorescent and luminescence methods were selected against the bloodstream form of the parasite. In *Trypanosoma cruzi* intracellular parasites have been quantified using beta-galactosidase activity and an imaging assay have been developed for hits confirmation. An enzymatic assay against *T. cruzi* cytochrome CYP51 was included for preliminary flag of a known mode of action. An axenic assay of *Leishmania donovani* amastigotes was used to select the active compounds tested against infected human macrophages. For all compounds included in the boxes a value for HepG2 have been reported to assess toxicity.

In this presentation we aim at discussing the different methodologies used in the HTS campaigns and the novel assays developed for the compound prioritisation and characterization.

DISCLOSURE Nothing to disclose.

## PS2.059

## Nifurtimox eflornithine combination therapy phase IIb field trial (NECT Field): final effectiveness and safety results

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**INTRODUCTION** *Trypanosoma brucei* (T.b.) *gambiense* Human African trypanosomiasis (HAT; sleeping sickness) is a fatal disease. Until 2009, available treatments for 2nd stage HAT were complicated to use (eflornithine monotherapy) or toxic and with low efficacy in certain areas (melarsoprol). Nifurtimox-eflornithine combination therapy (NECT) was shown non inferior to that of eflornithine therapy and also presented safety advantages in a randomised controlled trial (RCT) and was added to the WHO List of Essential Medicines (EML) for adults in 2009 and for children in 2013. NECT Field trial documents its overall safety and final effectiveness at 24 months after treatment under field conditions.

**MATERIAL AND METHODS** A multicentre, open label, single arm, phase IIb study of the use of NECT for 2nd stage T.b. *gambiense* HAT. All patients who could take oral medication were treated with NECT. Inclusion criteria were extended to children and pregnant women. Follow-up visits were done every 6 months until 24 months after end of treatment.

**RESULTS** Between May 2009 and May 2010, 630 patients were included, but 1 died before being treated; 100 of them were children below 12 years of age, 14 were pregnant and 33 breastfeeding women. Only 15 patients were completely lost to follow-up (2%). Out of 614 patients included in the final modified intention to treat analysis (mITT), 577 were considered cured, showing 94% effectiveness. Final safety results brought 28 deaths (11 related) and a total of 67 serious adverse events (SAE). Ninety-two percent of patients showed at least one adverse event. No new safety signal was detected. The presentation will include additional published pharmacovigilance results and information on the present use in endemic countries.

**CONCLUSIONS** The use of NECT for treatment of second stage HAT is safe and effective in field settings and has become since the first line treatment for second stage gambiense sleeping sickness in all affected countries.

DISCLOSURE Nothing to disclose.

## PS2.060

## Direct comparison of the card agglutination test for trypanosomiasis (CATT) and a rapid diagnostic test in a highly endemic district

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**INTRODUCTION** Screening for human African trypanosomiasis (HAT) due to T.b. *gambiense* relies until now on the Card Agglutination Test for Trypanosomiasis (CATT), an antibody detection test. In 2014 a specificity of CATT of 99.9% was

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observed during routine screening operations in Bandundu, the most HAT-endemic province of the Democratic Republic of the Congo (DRC). Recently rapid diagnostic tests (RDT) were developed that are based on the LiTAT 1.3 (i.e. the CATT-antigen) and LiTAT 1.5 antigens. We compared the diagnostic accuracy of the CATT and RDT in a head-to-head comparison during HAT screening operations in a sub-district of an endemic zone in Bandundu province (DRC).

**METHODOLOGY** In the subdistrict of Beno all inhabitants were invited for HAT screening using CATT (ITM, Antwerp, Belgium) and RDT (SD BIOLINE HAT, Standard Diagnostics Inc, Gyeonggi-do, Republic of Korea) in parallel. For all subjects testing positive to either test as well as for one negative household control each, a blood sample was collected on filter paper to be tested with loop mediated isothermal amplification (LAMP) at the provincial laboratory of Bandundu. All those testing positive to any test are revisited and invited for parasitological confirmation tests performed on the spot. Sensitivity and specificity with 95% CI as well as kappa for concordance between the two tests will be presented.

**RESULTS** We examined 4867 persons out of a total population of 4931 (99%). 140 (3%) tested positive to at least one screening test, 109 (2%) to the RDT and 54 (1%) to CATT. Only 23 (0.5%) were positive on both tests, resulting in a kappa value of 0.27 (95% CI 0.24–0.30). LAMP results are available for 79 sero-suspects so far and 24 (30%) tested positive. An additional 31 LAMP-positives were identified among seronegative controls. Parasitological confirmation data will be available end of April, 2015.

**CONCLUSION** Concordance between RDT and CATT was weak. Sensitivity and specificity estimates for RDT and CATT will be presented based on full parasitological information. The proportion of LAMP-positives was similar in serological HAT-suspects and in seronegative controls.

**DISCLOSURE** Nothing to disclose.

**PS2.061****Development and comparison of different diagnostic assays to analyze Chagas (*Trypanosoma cruzi*) disease**

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Chagas disease, caused by infection with the protozoan parasite *Trypanosoma cruzi*, affects 8–11 million individuals worldwide. It is endemic from the south of the US to Central America and South America. The disease is commonly transmitted by an insect vector but may also be spread through blood transfusion and organ transplantation, ingestion of food contaminated with parasites and from a mother to her fetus. Without specific treatment, the mortality rate among such children is high. Early diagnosis is essential so that etiological treatment can be administered. There are two phases of Chagas disease: the acute phase and the chronic phase. Both phases can be symptom free or life threatening.

During the chronic phase, the infection may remain silent for decades or even for life. However, some people develop cardiac or intestinal complications. Screening of donated blood, blood components, and solid organ donors, as well as donors of cells, tissues, and cell and tissue products for *T. cruzi* is mandated in all Chagas-endemic countries and has been implemented. Due to

travelling to endemic regions and immigration from endemic regions Chagas can be found also in Europe.

Here we describe a new Novalisa ELISA and lineblot for diagnosis of Chagas disease. These test systems are taking advantage of the chimeric multiepitope antigen TcF (IDRI). The test was evaluated in endemic countries like Colombia and Guatemala with chronic patients (symptomatic and asymptomatic), pregnant women and newborns and a Chagas negative control group.

Overall performance of both test systems, ELISA and blot, was excellent. In addition both new test systems were the only one who could reliably detect congenital transmission of Chagas from a mother to the child, making it essential for screening of new borns in endemic countries to provide treatment as early as possible. In addition the assays were capable of detecting infections with both *Trypanosoma cruzi* lineages.

In our hands NovaTec Immundiagnostica NovaLisa ELISA and NovaLine Lineblots can reveal positive patients that currently used in house tests can not detect. This is especially important for pregnant women to secure the safety of the unborn child as well as for chronic and asymptomatic patients who can develop severe disease years after infection. Results were confirmed by qRT-PCR and compared with results of other commercial kits.

**DISCLOSURE** A part of this work was performed at a company.

**PS2.062****Development and evaluation of a serological Chikungunya antibody detection assay in tropical outbreak settings**

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Chikungunya (also named breakbone fever) is a highly emerging disease in many tropical settings with great socioeconomic impact. Causative agent for this disease is a single-stranded, enveloped RNA-Virus that belongs to the genera Alphavirus of the togavirus family (Togaviridae). Chikungunya-Viruses are transmitted to humans by bloodsucking mosquitoes (*Aedes aegypti*, *Aedes albopictus*). In general the viruses are not transmitted from human to human but transmissions from infected pregnant women to unborn children have been proved. The symptoms of Chikungunya include fever which can reach 39°C (102.2°F), a petechial or maculopapular rash usually involving the limbs and trunk, and arthralgia or arthritis affecting multiple joints which can be debilitating. The symptoms can also include headache, conjunctival injection and slight photophobia. The fever typically lasts for 2 days and abruptly comes down. However other symptoms, namely joint pain, intense headache, insomnia and an extreme degree of prostration last for a variable period, usually for about 5–7 days. But patients have complained of joint pain for much longer periods depending on age. The severity of the disease as well as its duration is less in younger patients and pregnant women. Heavy damage to somebody's health or death is rare. Alphaviruses rarely appear in Europe but can be noticed as import or travel associated infection.

The aim of this work was to develop an serological assay to detect IgG and IgM antibodies against Chikungunya and to evaluate in endemic outbreak settings.

An IgG-capture and IgM-capture ELISA was developed. Both take advantage of native antigens produced with a proprietary technique which was exclusively developed for this serological antibody detection assay. In-house measurements as well as external evaluations in many endemic regions of the world conducted by well know tropical institutes revealed excellent clinical



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sensitivity and specificity as well as high positive and negative predictive values (all above 95%). Data from the current outbreak in the Caribbean will be discussed.

Therefore the newly developed ELISA seems to be a superior tool to diagnose past and acute Chikungunya infection in common and outbreak settings all over the world. It will assist diagnosis of travel returners with unknown fever as well as military in endemic operation area.

**DISCLOSURE** This work was performed by a company.

**PS2.063****Development of a novel malaria antibody assay utilizing antigens from all 5 human pathogenic *Plasmodium* species**

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The proper diagnosis of malaria is essential to provide early treatment and improve the prognosis of patients. Serological methods often fail in diagnosing newborns due to their altered immune system, resulting in a need for new diagnostic methods reliably working with sample from patients ranging from 0 to 12 month of age. Transfusion-transmitted malaria is rare, but it may produce severe problems in the safety of blood transfusion and blood related products due to the lack of reliable procedure to evaluate donors potentially exposed to malaria. Microscopy, still considered the gold standard for diagnosing malaria. It is time consuming and requires trained expertise. Moreover, errors occasionally occur especially at low parasitaemia, limiting its use in blood banking and screening of populations.

PCR shows a high sensitivity even at low parasitaemia and can distinguish between *Plasmodium* species, but it is expensive and a state of the art laboratory is needed. ELISAs are known to be ideal for high throughput screening with high sensitivity and specificity, but it also requires trained personal and an equipped laboratory. Line Blots are often used as confirmatory tests since they provide high sensitivity and specificity. There is hardly any lab equipment needed to perform this kind of assay. In addition, blots can also be used in automated processes for high throughput screening.

In our study, blots seem to be a good tool for diagnosing malaria in newborns. Here we show an improved diagnostic performance of the new antibody detection Systems (ELISA and Lineblot) utilizing early and late antigens of all 5 human pathogenic *Plasmodium* species (*P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae*, *P. knowlesi*) compared to test systems only relying on antigens derived from one or two Plasmodium species.

The novel Lineblot is able to discriminate between all 5 parasite species. Assays with a limited number of antigens often fail to detect antibodies from certain regions of the world. For evaluation purpose, we collected samples from all over the world, including samples from newborns. We evaluated the performance of ELISA and Lineblot directly in endemic countries with samples of patients who presented symptoms akin to malaria infection in local hospitals.

**DISCLOSURE** This work was partly performed at a Company.

**PS2.064****Optimisation of PCR sampling techniques for assessment of parasitological response in patients with chronic Chagas disease**

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Chagas disease (CD) ranks among the world's most neglected diseases. An increasing body of data has pointed to a strong biological rationale for the use of PCR as a surrogate marker of therapeutic response in CD. However, in chronic CD (CCD), parasite burden is low and consequently, even most sensitive standardized PCR techniques have achieved around 70% of diagnostic sensitivity (Schijman *et al*, PLOS NTD, 2011; Ramirez *et al*, J.Mol.Diag 2015). A DNDi/MSF-sponsored trial evaluated sampling procedures for PCR testing to assess parasitological response in CCD benznidazole (BZN)-treated patients in Bolivia (NCT01678599).

**MATERIALS AND METHODS** Open label, longitudinal, prospective, non-randomized, single arm, multicenter, methodological study. *Primary objective:* To estimate gain in sensitivity with multiple-sample strategies of PCR compared to the current standard (single 10 ml sample) to detect CCD at baseline (BL). *Secondary objectives:*

- 1 To identify optimal sampling schedule at end of treatment (EOT) (Day 60 + 7 days);
- 2 To evaluate the parasitological response after treatment with BZN;
- 3 To describe the changes in parasitological load after treatment, by quantitative PCR at BL, EOT, months (M) 6 and 12;
- 4 To estimate the relative reduction of parasite load at EOT, M6 and 12.

**RESULTS** 16 communities in Narciso Campero district- Bolivia, with 220 subjects enrolled (positive serology). 194 subjects had 3 PCR results at BL. Single sample sensitivity was 76.4%. PCR analysis of 3 samples reached a sensitivity of 91.4% if 1 missing sample = negative outcome ( $n = 220$ ); 92.3% if 1 missing sample = patient discarded ( $n = 194$ ). The pragmatic gain in sensitivity was 15% ( $n = 220$ ) and significant (95%CI = 10.56–20.42%). A larger volume of blood (10 ml vs. 5 ml) did not increase sensitivity. The 3 samples could be taken one after the other some minutes apart, with no need for 7 days interval. Sustained parasitological response to BNZ treatment was 64% at M12 (based on 3 PCR at EOT and M12,  $n = 111$ ). However, depending on the definition of success rate there is significant variability with several intermediary estimations.

**DISCUSSION** This trial contributes to the standardization of methodology for PCR testing in CCD. Multiple, serial samples lead to a significant gain in PCR sensitivity. A proposed optimal strategy for PCR sampling in CCD patients would involve a total of three 5 ml samples taken minutes apart, at each of the timepoints of planned evaluation.

**DISCLOSURE** Nothing to disclose.



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## PS2.065

## Pharmacokinetic drug–drug interaction study of benznidazole and E1224 in healthy male volunteers

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**INTRODUCTION** Chagas disease (CD) is an important global neglected tropical disease, where new, better-tolerated therapeutic options are needed. Benznidazole (BNZ) is the drug of choice for treating adults and children with CD. E1224 (ravuconazole [RVZ] prodrug) is an antifungal drug with promising anti-*T. cruzi* activity, but unsatisfactory clinical results in monotherapy. Combination treatment is a well-recognised modality with potential in CD to improve efficacy and safety and reduce putative risk of resistance. An *in vivo* interaction study in healthy volunteers was designed to assess the pharmacokinetics (PK) and safety interaction of BNZ and E1224.

**MATERIAL AND METHODS** 28 healthy male volunteers were enrolled in an open-label, single-center, sequential single- and multiple-oral dose trial as follows: Day (D) 1 BNZ single dose (2.5 mg/kg); D4 to D15 E1224 multiple dose [400 mg loading dose QD for 3 days (D4–6) followed by 100 mg QD for 9 days (D7–D15); D9 BNZ single dose (2.5 mg/kg); D12–D15 BNZ multiple dose (2.5 mg/kg twice daily); on D12–D15 BNZ bid, with a 12 h interval between administrations; E1224 and BNZ concomitantly on D9 and D12–D15. E1224 and BNZ concentrations were assessed by LC/MS/MS methods with dried blood spots. Samples were collected at predetermined timepoints for assessment of PK parameters, area under the curve (AUC), peak concentration ( $C_{max}$ ) and time to  $C_{max}$  ( $t_{max}$ ). Criteria for PK interaction was 90% confidence interval for the ratios of AUC and  $C_{max}$ .

**RESULTS** Both compounds were well tolerated, in monotherapy and combination. 13 non-serious adverse events (AEs) were experienced by 9 out of 28 subjects, most frequently skin/subcutaneous disorders ( $n = 4$ ), with no treatment discontinuations or serious AEs. 1344 blood samples were obtained. Rate/extent of BNZ absorption was strictly comparable when given alone or with concomitant RVZ at steady-state.  $C_{max}$  (CV%)/ $t_{max}$  (range) for BNZ on D1 and D8 were 3477.36 (26.4)/3 (1–6) and 3326.93 (25.7)/3 (1–6), respectively.  $C_{max}$  (CV%)/ $t_{max}$  (range) for RVZ on D9 and D15 were 6851.90 (38.5)/1 (1–6) and 9025.17 (43.7)/3 (1–6), respectively. Overall RVZ exposure increased by about 35% with concomitant BNZ at steady-state.

**CONCLUSIONS** There were no clinically relevant safety interactions between E1224 and BNZ. With the lack of interaction of RVZ on BNZ PK and the limited impact of BNZ on RVZ PK, it appears that coadministration of RVZ and BNZ may not require any E1224 dosing adaptation.

**DISCLOSURE** Nothing to disclose.

## PS2.066

## Population pharmacokinetics of E1224, a prodrug of ravuconazole for the treatment of Chagas disease

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**INTRODUCTION** Chagas disease (CD) is an important neglected tropical disease of the Americas, caused by infection with the parasite *Trypanosoma cruzi*. Available treatments for CD are limited and new, safer, therapeutic options are needed. Ravuconazole, an antifungal drug, has shown promising activity against *T. cruzi*. A prospective study of the ravuconazole (RAV) prodrug E1224 was designed to evaluate the effectiveness, safety, and pharmacokinetics of the drug in CD patients. We report here the population pharmacokinetics (POPPK) results of this trial.

**MATERIAL AND METHODS** 139 chronic indeterminate CD adult patients were enrolled and randomized to 1 of 3 E1224 oral administration groups:

- 1 E1224 'High dose' (HD): E1224, 400 mg QD for the first 3 days, followed by 400 mg weekly for 8 weeks. ( $N = 45$ ; 32 females; mean weight: 64.8 kg; mean age: 30.8 years)
- 2 E1224 'Low dose' (LD): E1224, 200 mg QD for the first 3 days, followed by 200 mg weekly for 8 weeks. ( $N = 48$ ; 37 females; mean weight: 65.7 kg; mean age: 31.9 years)
- 3 E1224 'Short High dose' (SD). E1224, 400 mg QD for the first 3 days, followed by 400 mg weekly for 4 weeks. ( $N = 46$ ; 35 females; mean weight: 58.6 kg; mean age: 28.2 years)

RAV plasma concentrations were measured by HPLC-MS/MS. Data were modelled using NONMEM software (version 7.2) for POPK analysis.

**RESULTS** A total of 1251 RAV measurements were obtained. Median peak concentrations were: HD: 6429.31  $\mu\text{g/l}$ ; LD: 3338.12  $\mu\text{g/l}$ ; and SD 7684.1  $\mu\text{g/l}$ . A two compartment model with first order oral absorption best fit the data for all groups. Diagnostic plots (i.e. goodness of fit and visual predicted check), suggested adequate fit of the model to the data. No significant differences in pharmacokinetics parameters were observed among groups. POPPK model parameter estimates were as follows, expressed as median value and inter-individual variability (IIV):  $K_a$  (absorption): 0.9/h (84%);  $V_{central}$ : 44.4 l (15.3%);  $Cl$  0.89 l/h (24.8%);  $Q$ : 15.7 l/h. (27.5%);  $V_{periph}$ : 239 l (42.4%). Residual error: 28.8%.

**CONCLUSIONS** This study describes for the first time the POPPK of RAV after oral E1224 administration for treatment of patients with CD. POPPK parameters were consistent with the pharmacokinetic behaviour of the drug in other populations. Systemic exposure reached expected concentrations in all three groups, steady state was reached after the third dose, and trough concentrations were stable during the weekly dosing period.

**DISCLOSURE** F. Duncanson and M. Everson work for Eisai Inc., the manufacturer of E1224. The product has been licensed to DNDi for evaluation in the treatment of Chagas disease.

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## PS2.067

**Efficacy of oral administration of E1224 in combination with benznidazole on experimental *Trypanosoma cruzi* infection**I. Ribeiro<sup>1</sup>, L. F. Diniz<sup>2</sup>, A. L. Mazzeti<sup>2</sup>, L. W. R. Mota<sup>2</sup> and M. T. Bahia<sup>2</sup><sup>1</sup>Drugs for Neglected Diseases Initiative, Geneva, Switzerland;<sup>2</sup>Laboratório de Doença de Doenças Parasitárias, Escola de Medicina, Universidade Federal de Ouro Preto, Ouro Preto, Brazil

Chagas disease remains a challenging infection due to the unavailability of well tolerated and easy-to-use treatments, and consistently efficacious drugs. Combination therapy is proposed as an alternative therapeutic approach, as it may improve treatment efficacy whilst decreasing toxicity and the likelihood of resistance development. In this study, we evaluated the effect of treatment with benznidazole (Bz) when combined with E1224 (pro-drug of ravuconazole) in experimental acute murine infection.

**MATERIALS AND METHODS** Female Swiss mice were infected with *T. cruzi* Colombian strain, highly resistant to Bz. Oral treatment of infected animals was started on the 4th day post-inoculation, at E1224 doses of 37.5 or 50 mg/kg/day (mpk) and Bz 75 or 100 mpk administered individually or in combination. Cure was assessed through fresh blood examination during and up to 60 days post-treatment, followed by blood real-time PCR assay (30 and 180 days post-treatment), before and after cyclophosphamide immunosuppression. Serological testing was also implemented.

**RESULTS** Bz/E1224 combinations were well tolerated and all treatments, in monotherapy or combinations, prevented the death of infected animals, while the mortality in the control group was 80%. Both drugs were very effective in suppressing parasitemia during the treatment period. However, after the end of the treatment, parasitological and PCR assays indicated no cure among animals treated with different doses of E1224 or Bz in monotherapy. Combination therapy using E1224 at 50mpk plus Bz100 mpk and E1224 at 37.5mpk plus Bz 75mpk induced 100% and 40% cure rates, respectively. Furthermore, cured animals had significantly lower levels of serum anti-*T. cruzi* IgG than those of the untreated animals, and similar to healthy mice.

**CONCLUSIONS** Our results demonstrated a positive interaction between E1224 and Bz in the treatment of *T. cruzi* murine infection. In addition, this study expands the available preclinical data on drug combinations on azole and Bz compounds and provides the basis for further studies, since anti-*T. cruzi* chemotherapy is moving towards multidrug treatment regimens.

**DISCLOSURE** Nothing to disclose.

## PS2.068

**Comparison of the performance of the SD BIOLINE HAT rapid test and CATT in various diagnostic algorithms for gambiense human African trypanosomiasis**C. Lumbala<sup>1</sup>, P. R. Bessell<sup>2</sup>, P. Lutumba<sup>3,4</sup>, B. Sylvain<sup>5</sup>, S. Biéler<sup>6</sup> and J. M. Ndung'u<sup>6</sup>

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Early diagnosis of human African trypanosomiasis (HAT) relies on screening large numbers of at-risk individuals. Screening for HAT has been carried out with the card agglutination test for trypanosomiasis (CATT) which is limited by its requirement for cold storage, electricity and its multi-test packaging format.

Recently, Standard Diagnostics (SD)/Alere developed an individually formatted and thermostable rapid diagnostic test (RDT). Evaluation studies found that the SD BIOLINE HAT RDT prototype was less sensitive and specific than CATT. The prototype was optimized and we present a study to evaluate the performance of CATT and the optimized RDT in the Democratic Republic of the Congo.

The study followed a clinical trial format. Participants were enrolled actively by four mobile teams, and passively at four healthcare facilities in three provinces. Each participant was tested with the RDT and CATT and each test was read by two independent readers. Participants positive by CATT were retested with CATT on 1:8 diluted plasma (CATT 1:8), and positives to CATT or RDT were tested by visual inspection for motile parasites in body fluids (on lymph node aspirate, on blood or cerebrospinal fluid). Cases were those with visible parasites and controls had no visible parasites or history of HAT. Results were analysed in four algorithms – RDT and CATT as standalone tests and each test followed by CATT 1:8.

During 5 months 131 cases and 13 527 controls were enrolled. The sensitivity of the RDT was 92.0% [95% confidence intervals (CIs) = 86.1, 95.5], and was significantly higher than CATT, which was 69.1% (95% CIs = 60.7, 76.4). The sensitivity of all the algorithms decreased when followed by CATT 1:8, to 52.8% (95% CIs = 44.1, 61.3) for the RDT and 59.2% (95% CIs = 50.4, 67.4) for CATT. The specificity of the RDT was 97.1% (95% CIs = 96.8–97.4), significantly lower than CATT which was 98.0% (95% CIs = 97.8, 98.2). Specificity was over 99.5% when a positive screening test was retested with CATT 1:8. Sensitivity and specificity for both screening tests were non-significantly higher in passive than active screening. Agreement between readers was very good.

This study has demonstrated that an algorithm in which the SD BIOLINE HAT RDT is used for screening is optimal for case detection in both passive and active screening settings. However, its lower specificity will increase the burden on screening teams by generating more false positives.

**DISCLOSURE** Nothing to disclose.

## PS2.070

**Evaluation of cytokine profile in benznidazole related cutaneous reaction, and potential association with specific HLA alleles and drug concentration in serum**F. Salvador<sup>1</sup>, A. Sánchez-Montalvá<sup>1</sup>, M. Martínez-Gallo<sup>2</sup>, A. Sala-Cunill<sup>3</sup>, L. Viñas<sup>2</sup>, M. García-Prat<sup>2</sup>, G. Aparicio<sup>4</sup>, A. Sao Avilés<sup>1</sup>, M. A. Artaza<sup>5</sup> and I. Molina<sup>1</sup>

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**INTRODUCTION** Major drawback of benznidazole is the high adverse events rate (40–70%); skin toxicity lead to definitive withdrawal of treatment in 15–30% of patients. In this study we describe cutaneous reactions in patients with Chagas disease (CD) treated with benznidazole, analyze the serum cytokine profile, and evaluate the potential association of cutaneous reaction with benznidazole concentration in serum and specific class I and II HLA alleles.

**MATERIAL AND METHODS** Prospective observational study was performed following the next inclusion criteria: age over 18 years and diagnosis of CD. Exclusion criteria: previous treatment of CD, pregnancy, and immunosuppression.

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Benznidazole was administered at a dose of 100 mg/8 h for 60 days. Blood cell count, general biochemistry and serum cytokine profile were performed at day 0, 15 and 60 of treatment. HLA class I (A, B, C) and II (DR) alleles were determined in all patients. Skin biopsy was performed when cutaneous reaction was detected. Benznidazole concentration in serum was determined at the time of cutaneous reaction, or at day 15 of treatment in patients without skin reaction.

**RESULTS** 52 patients were included, median age was 36 (22–55) years, 39 (75%) patients were female, and 50 (96.1%) patients were from Bolivia. Twenty (38.5%) patients presented cutaneous reaction (maculopapular exanthema, histopathological findings consistent with toxicodermia), and median time of appearance after starting treatment was 9 (7–48) days. Treatment was interrupted in 11 (21.1%) patients. Patients with toxicodermia presented higher proportion of eosinophilia during treatment (60% vs. 21.9%,  $P = 0.005$ ), and higher serum concentrations of IL-5 and IL-10 ( $P < 0.001$  and  $P = 0.012$  respectively) at day 15 of treatment compared with patients without cutaneous reaction. No differences were found in other cytokines between both groups. No association was found between toxicodermia and HLA alleles. Nevertheless, treatment interruption was more frequent in patients carrying HLA-B\*3505 allele compared with those patients negative for HLA-B\*3505 (45.5% vs. 15.4%,  $P = 0.033$ ). No differences in mean benznidazole concentration were observed among patients with and without cutaneous reaction (5.36 vs. 6.02  $\mu\text{g/ml}$ ,  $P = 0.181$ ).

**CONCLUSIONS** Toxicodermia associated with benznidazole is due to a delayed hypersensitivity reaction. HLA-B\*3505 allele could be associated with severe benznidazole related toxicodermia, but larger studies are required.

**DISCLOSURE** Nothing to disclose.

**PS2.071****Helminth-mediated immunomodulation in the *Trypanosoma cruzi* parasitaemia of Chagas disease patients**

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**INTRODUCTION** Helminth infections are highly prevalent in tropical and subtropical areas, coexisting in Chagas disease (CD) endemic areas. It is known that helminth infections in humans may modulate the host immune system, changing the Th1/Th2 polarization. This immunological disturbance could modify the immune response to other infections, such as *Trypanosoma cruzi* infection. This study aims to evaluate the impact of helminth infection on clinical presentation and parasitaemia of CD patients.

**MATERIAL AND METHODS** A prospective observational study was performed at Vall d'Hebron University Hospital. Inclusion criteria: age over 18 years, diagnosis of CD, and not having received specific treatment for CD previously to the inclusion. The study protocol included: blood cell count, detection of *T. cruzi* parasitaemia measured by real time PCR (rt-PCR), detection of IgG anti-*S. stercoralis* by ELISA, 12-lead electrocardiogram, chest x-ray, barium enema, microscopic examination of stool samples from three different days using direct techniques and after concentration techniques (Ritchie's formalin-ether technique), and specific faecal culture for *S. stercoralis* larvae. Definition of helminth infection included:

confirmed infections through direct observation, and probable infection (presence of eosinophilia and positive *S. stercoralis* serology in the absence of other causes of eosinophilia).

**RESULTS** Overall, 65 patients were included, the median age was 38 (range 18–67) years, 49 (75.4%) were women and most of them came from Bolivia (96.9%). Median time of residence in our country was 9 (1–14) years. Cardiac involvement was present in 12 (18.5%) patients and digestive involvement in 18 (27.7%). *T. cruzi* rt-PCR was positive in 28 (43.1%) patients. Helminth infection was diagnosed in 12 (18.5%) patients: 2 confirmed infections (*Hymenolepis nana* and *S. stercoralis*) and 10 probable infections. No differences were observed in cardiac and digestive involvement between patients with and without helminth infection. Nevertheless, the proportion of patients with positive *T. cruzi* rt-PCR was higher among patients with helminth infection compared with patients without helminth infection (75% vs. 35.8%,  $P = 0.022$ ).

**CONCLUSIONS** Helminth infection is frequent among patients with CD. The proportion of patients with positive *T. cruzi* rt-PCR is higher among patients with a coexisting helminth infection, probably due to the immunomodulatory effects of the helminths.

**DISCLOSURE** Nothing to disclose.

**PS2.072****External quality control program for real-time PCR testing in a multi-centre, randomised controlled clinical trial in Chagas disease**

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**INTRODUCTION** Real-time PCR (qPCR) testing is an increasingly recommended diagnostic endpoint in clinical trials of drug candidates for Chagas disease (CD). Recent studies have described and assessed good performing characteristics in optimised methods, however no formal external quality control (EQC) program provides performance assessment for the assays in use in existing clinical trials. An EQC program was devised for a DNDi-sponsored phase II randomized, multicenter, placebo-controlled, safety and efficacy study to evaluate three oral E1224 (a prodrug of ravuconazole) dosing regimens and benznidazole for the treatment of adult patients with chronic CD in Bolivia (DNDi-CH-E1224-001; NCT01489228).

**MATERIALS AND METHODS** Standardised operating procedures were shared among different laboratories (LAB) (study site – IIBISMED-UNSAM and EQC LAB – INGBI-CONICET). Four panels containing seronegative blood samples spiked with 1, 10 and 100 parasite equivalents (Peq)/ml of cultured epimastigotes from four *T. cruzi* stocks, classified in different discrete typing units (DTU): TcIa (K98) and TcId (Silvio X10), TcV (LL014-1-R1) and TcVI (ClBrenner (CLBr)), and 4 negative controls were prepared by INGBI-CONICET. Samples were analysed in parallel, at 3-month intervals, at INGBI-CONICET and IIBISMED-UNSAM by different



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operators, blinded to sample allocation. Accordance (within laboratory agreement) and Concordance (between laboratory agreement) were calculated. Concordance odds ratio (COR) was calculated as follows ( $COR = \text{accordance} * (100 - \text{concordance}) / \text{concordance} * (100 - \text{accordance})$ ). Bootstrap standard error and 95% CI were calculated.

**RESULTS** qPCR percentage of accordance/concordance/COR at 1, 10 and 100 Peq/ml for the different stocks was, respectively: 1 TcId Silvio X10- 78.1/79.7/0.91; 71.7/70.3/1.07; 100/100/1; 2 TcId K98- 100/100/1; 100/100/1; 100/100/1; 3 TcV LL014-1-R1- 78.6/79.4/0.95; 66.8/67.2/0.99; 100/100/1; 4 TcVCLBr- 79.7/78.9/1.05; 100/100/1; 100/100/1;

All stocks-49.8/50.3/0.98; 86.6/86.7/0.99; 100/100/1. There was no statistical difference in the results across parasite stocks.

**CONCLUSIONS** There was a high within and between laboratory agreement in this study, independently of the *T. cruzi* DTU and stock. An EQC program for molecular diagnosis of Chagas disease is feasible and informative, allowing broader implementation of qPCR testing in clinical trial settings and potentially in reference laboratories in public health.

**DISCLOSURE** Nothing to disclose.

## PS2.073

## Trypanocidal and immunomodulatory activity of entomopathogenic bacteria

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*Trypanosoma cruzi* is the causative agent of Chagas Disease, a neglected tropical disease widely spread in Americas and responsible for great losses in the public health. Drugs currently available for treatment are unsatisfactory, mainly due to low effectiveness on *T. cruzi* amastigote, emergence of parasite resistance or severe adverse reactions. The enteric bacteria *Xenorhabdus nematophila* and *Photorhabdus luminescens* are highly pathogenic against a broad range of insects. They produce huge numbers of secondary metabolites, many with toxic effects on eukaryotic cells. Therefore, we tested if these bacteria are also toxic towards *T. cruzi*. We assessed the trypanocidal and immunomodulatory activity of the cell-free bacterial culture fluids on trypomastigotes and amastigotes forms of *T. cruzi* *in vitro*. To carry it on, trypomastigotes were incubated with the bacterial culture fluid in a concentration ranging from 0.5% to 25% (v/v) or only culture medium as control. To access the toxicity on amastigote forms, macrophages were overnight incubated with trypomastigotes (5 trypomastigotes:1 macrophage) to develop up to intracellular amastigotes form, then the plate was washed and the SN was added at concentrations 2.5; 5 e 10% (v/v). Parasite viability was accessed at 48 h. The toxicity of bacterial culture fluid on macrophages was also accessed in the same concentration range. Both bacterial culture fluids of *P. luminescens* and *X. nematophila* effectively killed the trypomastigote form in a concentration-dependent manner [IC<sub>50</sub> values of 3.02% and 0.72% (v/v), respectively]. Culture fluid start to kill trypomastigote as soon as 3 h (78% viability at 0.5% *Xenorhabdus* and 79% at 2.5% *Photorhabdus* fluid culture). Furthermore, *P. luminescens* culture fluid reduced the number of infected

macrophages and the number of amastigote per macrophages after 48 h of incubation at low concentration. However, both bacterial fluids caused potent cytotoxicity only at the high concentrations of the culture fluids. The selective index values (macrophages CC<sub>50</sub>/amastigotes IC<sub>50</sub>) for *P. luminescens* and *X. nematophila* were determined as 8.82 and 13.15, respectively, indicating that both bacteria displayed marked parasite selectivity. Moreover, both culture fluids stimulated the trypanocidal activity of macrophages by a mechanism independent of nitric oxide. Summarizing, our studies reveal that entomopathogenic bacteria are potential sources of putative novel drugs against Chagas Disease.

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**DISCLOSURE** Nothing to disclose.

## PS2.074

## Neglected route of transmission of a neglected tropical disease: mother-to-child transmission of chagas disease in El Salvador

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**INTRODUCTION** Chagas disease, a neglected tropical disease caused by transmissions of *Trypanosoma cruzi* (*T. cruzi*), is one of the greatest public health challenges in Latin America. In El Salvador, mother-to-child transmission is hardly addressed, while vector control in communities and blood screening at blood banks have been strengthened. Neither the reality of mother-to-child transmission of Chagas disease nor its necessary interventions have not been identified. This study was aimed at estimating the incidence of mother-to-child transmission and mother-to-child transmission rate of *T. cruzi* in four municipalities of El Salvador.

**MATERIALS AND METHODS** Community-based serological tests on *T. cruzi* were conducted, by targeting all pregnant women and infants born to seropositive pregnant women (i.e. census) registered at four local health centers in two provinces. To determine *T. cruzi* seropositivity of pregnant women, serological test was conducted for blood samples collected on filter paper and venous blood samples. Those who were positive for both types of samples were defined as the seropositive. To determine *T. cruzi* seropositivity of infants, two-stage serological test was conducted for venous blood samples of infants born to seropositive pregnant women at ages (i) 6–8 months and (ii) 9–16 months.

**RESULTS** Of 943 pregnant women, 36 (3.8%) were seropositive. Of these, 32 proceeded to serological tests of their infants at the age of 6–8 months. Six infants seropositive at the age of 6–8 months proceeded to second-stage testing at the age of 9–16 months. As the result, one infant was identified to be congenitally infected. Annual incidence of mother-to-child



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transmission and mother-to-child transmission rate were estimated at respectively  $\geq 0.14\%$  and  $\geq 4.0\%$ .

**CONCLUSION** As serological tests at the age of 6–8 months produced five false positives of congenital transmission, identification of seropositive infants at the age of 9–16 months is appropriate. Estimated number of infants infected through mother-to-child transmission of Chagas disease ( $\geq 170$  per annum) was much higher than that of HIV ( $< 7$  per annum). PMTCT of Chagas disease is not feasible, as medications against Chagas disease are not applicable to pregnant and breastfeeding women. However, medications are effective during infancy. Therefore, earlier identification of Chagas disease among children born to seropositive mothers is a key to earlier medication for infected infants.

**DISCLOSURE** Nothing to disclose.

## PS2.075

### Risk factors for transmission of Chagas disease among pregnant women in El Salvador

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**INTRODUCTION** Chagas disease, a neglected tropical disease caused by transmissions of *Trypanosoma cruzi* (*T. cruzi*), is one of the greatest public health concerns in Latin America. In the areas where vectorial transmission has been interrupted, mother-to-child transmission is one of the major routes of transmissions. However, earlier studies in El Salvador neither profiled pregnant women infected with *T. cruzi* nor identified the risk factors for the infection. This study is aimed at determining the seroprevalence of Chagas disease among pregnant women and estimating the risk factors for Chagas disease in El Salvador. **MATERIALS AND METHODS** Community-based serological tests on *T. cruzi* and structured interviews on socioeconomic status were conducted by targeting all pregnant women registered at three health centers in Sonsonate province, El Salvador. To determine *T. cruzi* seropositivity, two-stage serological test was employed: (i) first enzyme-linked immunosorbent assay (ELISA) test for blood samples collected on filter paper; and (ii) second ELISA Chagatest for venous blood samples. Those who were positive for both types of samples were defined as the seropositive.

**RESULTS** Of 797 pregnant women, 29 (3.6%) were infected with *T. cruzi*. None had clinical symptoms of Chagas disease. Bivariate analysis showed association between seropositivity and maternal age  $\geq 35$  years, anemia, being illiterate, having no formal school education and having knowledge on Chagas disease ( $P < 0.05$ ). The results of multivariate analysis indicate that maternal age  $\geq 35$  years and anemia were significantly associated with being infected with *T. cruzi* (OR = 3.541 and OR = 5.197 respectively). A majority of the seropositive aged

$\geq 35$  years might have been infected during their childhood or adolescence. Anemia might have been caused by:

- 1 chronic malnutrition;
- 2 routine loss of blood through repeated blood sucking by vector bugs; or
- 3 alteration of the immunological reaction to respond to a parasite during acute phase of Chagas disease.

**CONCLUSION** Systematic blood screening for pregnant women against *T. cruzi* infection during pregnancies would help identify mother-to-child transmission in time for earlier medications for infected infants. We recommend that the national Chagas disease control programme be better coordinated with the national maternal and child health programme to introduce blood screening for *T. cruzi* during antenatal visits.

**DISCLOSURE** Nothing to disclose.

## PS2.076

### Nifurtimox tolerance in Chagas patients with previous adverse effects to benznidazol

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**INTRODUCTION** Adverse effects are frequent with the two drugs currently approved for Chagas disease treatment (benznidazol and nifurtimox). Potentially, cross-reactions may occur due to similarities between both.

**METHODS** We performed a retrospective observational study.

We included patients who discontinued benznidazol due to adverse effects and were treated subsequently with nifurtimox between February 2008 and 2015. Nifurtimox was prescribed at doses of 8 mg/kg/day for 60 days.

**RESULTS** 33 patients were included, all of them Bolivian, 27 (82%) women, with a median age of 31 (IQR 24–39) years. Twenty-three (70%) patients were in the indeterminate chronic phase, five (15%) had cardiac involvement, three (9%) had gastrointestinal involvement, and two (6%) patients had both cardiac and gastrointestinal involvement. Thirty-two (97%) patients had discontinued benznidazol due to cutaneous reaction, and one patient due to abnormal liver enzymes. Median time between benznidazol discontinuation and start of nifurtimox was 240 (IQR 120–375) days. Twenty-three (79%) developed any adverse reaction to nifurtimox, being the most common gastrointestinal effects (27.5%). Seven (21%) patients developed psychiatric symptoms and four (12%) had a cutaneous reaction. Seventeen (51.5%) patients had to interrupt therapy due to adverse effects, mainly due to gastrointestinal effects (six patients) and cutaneous reaction (four patients). No patient developed severe reactions, and all the symptoms disappeared after nifurtimox withdrawal. Among patients that had to discontinue the drug, the median time of treatment duration was 15 (IQR 10–21) days.

**CONCLUSIONS** The adverse event ratio in patients treated with nifurtimox as a second-line therapy after benznidazol withdrawal seems to be similar as if used as a first-line therapy. Due to the frequency of adverse effects and their potential severity, strict monitoring is mandatory during treatment.

**DISCLOSURE** Nothing to disclose.

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## PS2.077

**Imported cases of Chikungunya in Barcelona as a reflection of the current American outbreak**C. Bocanegra<sup>1</sup>, A. Antón<sup>2</sup>, E. Sulleiro<sup>3</sup>, D. Pou<sup>1</sup>, F. Salvador<sup>3</sup>, S. Roure<sup>4</sup>, L. Gimferrer<sup>2</sup>, M. Espasa<sup>1</sup>, L. Franco<sup>5</sup>, I. Molina<sup>3</sup> and L. Valerio<sup>4</sup><sup>1</sup>Unidad de Medicina Tropical Drassanes-Vall d'Hebron, PROSICS Barcelona, Barcelona, Spain; <sup>2</sup>Hospital Universitari Vall d'Hebron, Barcelona, Spain; <sup>3</sup>Hospital Universitari Vall d'Hebron, PROSICS Barcelona, Barcelona, Spain; <sup>4</sup>Unidad de Medicina Tropical y Salud Internacional Metropolitana Nord, PROSICS Barcelona, Barcelona, Spain; <sup>5</sup>Instituto de Salud Carlos III, Madrid, Spain

**INTRODUCTION** Chikungunya virus (CHIKV) is causing a major epidemic in the Americas since December 2013. *Aedes albopictus*, one of the main vectors, is well established in Spain. Travelling between these two areas is common due to tourism, family visits and trade.

**METHODS** A retrospective observational study. We included all cases of America-imported CHIKV diagnosed in three Units of Tropical Medicine in Barcelona (March–September 2014).

**RESULTS** Twenty-six CHIKV cases from six American countries were diagnosed, the most frequent country of origin being the Dominican Republic (69.2%). At the onset, fever was present in 96.1% of patients, followed by arthralgias and fatigue (88.5%). Seven patients (27%) had visible arthritis. Three months after the onset 53.3% continued presenting arthralgias, 46.7% fatigue and 13.3% had arthritis. Viremia was detected by real time-polymerase chain reaction (RT-PCR) in two patients (7.7%). The other 24 (92.3%) individuals were diagnosed by ELISA serology (CHIKV IgM+). Two patients showed both positive IgM for dengue virus and CHIKV. Phylogenetic study demonstrated CHIK-Asian strain as responsible.

**CONCLUSIONS** Clinical symptoms were mild although persisting. Diagnosis was mainly based in ELISA serology and RT-PCR. Dengue and CHIKV co-infection could not be uncommon in areas where both diseases and vectors are endemic. Imported cases in Spain are increasing due to the American outbreak; in this context, surveillance and preventive activities are essential in order to avoid any eventual European spreading of the disease.

**DISCLOSURE** Nothing to disclose.

## PS2.078

**'Mothers committed to Chagas' disease: taking action here and there'®, a community health workers' training program performed in Spain**M. Navarro<sup>1</sup>, B. Navaza<sup>1</sup>, T. Blasco<sup>2,3</sup>, L. García San Miguel<sup>2</sup>, I. Clavería<sup>4</sup> and M. González<sup>1</sup><sup>1</sup>Fundación Mundo Sano, Madrid, Spain; <sup>2</sup>Centro Nacional de Medicina Tropical, Instituto de Salud Carlos III, Madrid, Spain; <sup>3</sup>RICET (Red de investigación Cooperativa en Enfermedades Tropicales), Madrid, Spain; <sup>4</sup>Unidad de Medicina Tropical Drassanes-Vall d'Hebron, PROSICS, Barcelona, Spain

**INTRODUCTION** Chagas disease has overcome borders and become global. Spain is the country most affected by Chagas disease in Europe, and the second globally in terms of infection among migrants (after US). More than 60% of the estimated people with Chagas disease (more than 45 000 adults) are women of child-bearing age. Mother to child transmission of *Trypanosoma cruzi* is feasible in non-endemic countries. Europe still faces an underdiagnosis of 90%. Among population from endemic areas, lack of knowledge, stigma and fear are still linked to the disease.

**MATERIALS AND METHODS** From February to September 2013, Fundación Mundo Sano recruited and trained in Madrid four *T. cruzi*+ mothers as community health workers (CHW) specialized in Chagas disease. They came from Bolivia (Cochabamba and Santa Cruz), and their average age was 34.7 (28–47 year). Qualitative research was performed concurrently in order to evaluate the program and the evolution of their experiences related to Chagas disease.

**RESULTS** After the training, all mothers showed improved knowledge about Chagas disease and maternal and child health, and their evaluations of the program were excellent. Their way to face the disease also changed. They started to perform activities among their communities, showing their commitment to the program. Since then (14 months), in Spain, the population at-risk (par) has been informed: 424 through 30 chats given to groups, 460 par individually (in person/by telephone), around 300 have been tested thanks to the program (35 people were accompanied to the consultation by the CHW), and more than 7000 par have received informative material). Last July (2014) in Cochabamba (Bolivia): 185 par were informed through 25 chats performed in hospitals and churches.

**CONCLUSIONS** These CHW specialized in Chagas disease represent a global, pioneering and very useful tool in our settings (*here*, non-endemic countries) and in their countries of origin (*there*). The program is going to be replicated in Barcelona and in Madrid (second edition) in 2015.

**DISCLOSURE** Nothing to disclose.

## PS2.079

**Overcoming underdiagnosis of Chagas disease in non-endemic settings through *in situ* screening campaigns**M. Navarro<sup>1</sup>, B. Monge-Maillor<sup>2</sup>, F. F. Norman<sup>2</sup>, J. A. Pérez-Molina<sup>2</sup> and R. López-Vélez<sup>2</sup><sup>1</sup>Fundación Mundo Sano, Madrid, Spain; <sup>2</sup>National Referral Unit for Tropical Diseases, Infectious Diseases Department, Ramón y Cajal University Hospital, IRICYS, Madrid, Spain

**INTRODUCTION** Chagas disease (CD) is endemic in Latin America (LA) but it has overcome borders. Spain is the European country with the highest prevalence, and an important underdiagnosis has been reported. There is a lack of knowledge about CD. In this study we describe an event with *in situ* screening for *T. cruzi* infection, organized by a hospital and a non-profit organization in Madrid, Spain.

**METHODS** On the eve of the International Day of CD (14th April, 2014), a multitudinous cultural event aimed at migrants from LA was held in a Bolivian restaurant in Madrid. The community health workers from the program 'Mothers committed to CD'® (Mundo Sano) led the previous informational campaign, collected participants' data and gave information about CD during the event. *In situ* screening for *T. cruzi* was offered to all attendees in a place that was set aside and arranged for testing. An informed consent was requested and data were treated confidentially. Negative serology results and appointments for the medical consultation (only for those *T. cruzi*+) were communicated by telephone, from the hospital, as well as a questionnaire to explore knowledge and perceptions on CD.

**RESULTS** A total of 229 people accepted to be screened. Median age: 36 years (IQR 29–43 year). 150 (65.5%) were women and 194 (84.7%) came from Bolivia. Serology: 177/229 (77.3%) were negative, 50/229 (21.8%) positive and 2 (0.87%) indeterminate.

A total of 196 (85.5%) completed the questionnaires: 167/196 (85.2%) knew the vectorial transmission of CD, 153/196

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(78.1%) congenital transmission, 144/196 (73.5%) knew that CD can be transmitted through blood transfusion and 118/196 (60.2%) through organ transplantation. 166/196 (84.7%), knew that CD can affect the heart; 105/196 (53.6%) the digestive tract and 164/196 (83.7%) that the person can feel asymptomatic while being infected. When analyzing questionnaires answered by women of childbearing age (15–45 years), 76/98 (77.6%) knew that CD can be vertically transmitted.

**CONCLUSIONS** The initiative was successful (widely accepted by the target population and a high rate of participation) and efficient (in terms of CD prevalence). Even though a lack of knowledge about CD prevails, the level of knowledge observed in this study was better than that in previous interventions. This highlights that similar initiatives are needed in order to overcome underdiagnosis, to control transmission and to improve quality of life of patients with CD.

**DISCLOSURE** Nothing to disclose.

## PS2.080

## Treating Chagas disease in Spain: the example of a 'non-neglected' tropical disease in a non-endemic country

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**INTRODUCTION** Population from endemic areas of *Trypanosoma cruzi* represents in Spain around two million people. Thus, Spain is the most affected country of Chagas disease in Europe, and the second globally in terms of infection among migrants (after US). Several estimations launch a figure between 45 000 and 65 000 migrants infected with *T. cruzi* living in Spain. Healthcare access was universal for all people in Spain. Nevertheless, since a Royal Decree launched in September 2012, barriers of access to the health system have been enhanced, and many migrants are currently in a situation of vulnerability.

Benznidazole (the first-line treatment option for Chagas disease) shortage occurred at the end of 2011 could have made Chagas disease a neglected tropical disease also in developed countries.

We describe the process and results of the re-availability of benznidazole in Spain, a non-endemic country of Chagas disease. **METHODS** Database with the requested orders of benznidazole from the Spanish hospitals, managed by Fundación Mundo Sano and the laboratory that imports the drug from Argentina.

**RESULTS** The drug started to be produced by a different laboratory in Argentina in 2012 (ELEA). Since November 2012, benznidazole is available in Spain as foreign medication, through the Spanish Drug Agency (Agencia Española de Medicamentos y Productos Sanitarios). Fundación Mundo Sano is contributing since then to facilitate the access to the treatment. Globally, 134 healthcare centers in Spain have requested this drug for their patients. In the first 4 months of the re-availability of the drug in Spain, around 900 treatments were given (1738 bottles of 100 mg and 12 of 50 mg). From November 2012 to February 2015, around 3450 treatments were administered to patients with Chagas disease (6703 bottles of 100 mg and 228 u. of 50 mg). Fifty-eight percent of the treated patients are living in four regions of Spain: Catalonia, Madrid, Murcia and Valencia.

**CONCLUSIONS** These data show how Spanish healthcare professionals are attending a Neglected Tropical Disease in a non-endemic country, contributing to its visibility.

**DISCLOSURE** Nothing to disclose.

## PS2.081

Prevalence and determinants of *Trypanosoma cruzi* infection among citizens of Bolivian descent living in Munich, Germany

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**INTRODUCTION** Chagas disease (CD) affects 7 million humans worldwide and is responsible for 10 000 estimated deaths annually. Due to increased population mobility between highly endemic regions and non-endemic countries, CD has become an international health issue. Migration of Latin-American migrants from Spain (most CD-affected country in Europe) to other European countries is increasing lately. Germany lacks surveillance data. A cross-sectional, descriptive study was started in 2013 as a pilot project to determine the prevalence and determinants of CD among citizens of Bolivian descent living in Munich, Germany.

**MATERIALS AND METHODS** Citizens of Bolivian descent living in Munich were asked to participate in this study. Participants completed a questionnaire in order to collect socio-economic as well as medical data. Peripheral blood was drawn and specific antibodies against *Trypanosoma cruzi* antigens were determined by ELISA and IFAT. If positive, PCR diagnostic, clinical staging and management of CD was initiated.

Qualitative research was conducted through two interviews (one women *T. cruzi*+, one women with unknown serological status) and a focus group (three subjects *T. cruzi*-), all in Spanish language, in order to assess the impact of CD for individuals and the Bolivian community.

**RESULTS** Between June 2013 and 2014 so far 43 citizens of Bolivian descent living in Munich could be enrolled. Four participants (9.3%) tested sero-positive on *T. cruzi* (ELISA and IFAT), two of these also in PCR. Two of them were treated with benznidazole. Two of the *T. cruzi* positive subjects had a mother with CD. 55.8% of all participants (2 of the 4 *T. cruzi*+) had no knowledge about symptoms of CD and 30.2% (1/4 *T. cruzi*+) about ways of transmission. 27.9% (0/4 *T. cruzi*+) had donated blood in the past without prior serological tests on CD, 62.8% (3/4 *T. cruzi*+) were willing to donate blood and 53.5% (3/4 *T. cruzi*+) to donate organs. Regarding qualitative research, mainly a lack of knowledge about CD, stigma and fears associated with CD were identified.

**CONCLUSIONS** Regarding the lack of epidemiological data about CD in Germany and the absence of measures controlling non-vectorial transmission, the prevalence in this pilot study is alarming. Prevalence and determinants of CD in Germany have to be investigated further in a nationwide study and sensible control strategies coupled with information campaigns should be put in place.

Authors S. Hohnerlein and N. Berens-Riha contributed to this abstract equally.

**DISCLOSURE** Nothing to disclose



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## PS2.082

**Trypanosoma cruzi PCR: a useful tool for the control of therapeutic failure?**

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**INTRODUCTION** Although described in 1909, there have been few advances in the management of Chagas disease (CD). The only remaining therapeutic options are benznidazole and nifurtimox. Both have significant side effects and there are no good markers of cure or treatment failure in the short or medium term. Some studies suggest the detection of *T. cruzi* DNA by PCR in treated patients as a marker of treatment failure.

The aim of this study is to describe the behavior of the *T. cruzi* parasitemia measured by a real-time PCR (RT-PCR) before and after treatment with benznidazole.

**MATERIAL AND METHODS** A retrospective and observational study that included adult patients with chronic CD treated with benznidazole in UMTSI HUVH-Drassanes was conducted between 2009 and 2014. A RT-PCR was performed in all patients before and at least one after treatment at the HUVH Microbiology Department. Immunosuppressed patients were excluded.

In the RT-PCR a 160 bp of satellite DNA fragment of *T. cruzi* was amplified by using TCZ1/TCZ2 primers and TaqMan probe type TZ3 (Acta Tropica 2007, 103: 195–200).

**RESULTS** Fifty-two patients were included in the study, mean age was 34.5 years (18–61 years). Twenty-seven (51.9%) were male and 51 (98.1%) were from Bolivia. Thirty-five (67.3%), presented the indeterminate chronic phase, 6 (11.8%) had digestive disorders, 12 (23.1%) had cardiac disorders, and 2 (3.8%) presented both conditions. The *T. cruzi* RT-PCR was positive before treatment in 20 (38.5%) patients. No significant differences between patients with positive or negative RT-PCR in relation to epidemiological or clinical variables were observed. The time between treatment and the first RT-PCR was 16.4 months (5–30 months). A single RT-PCR post-treatment determination was carried out in 32 cases, 2 in 18 cases, and 3 determinations were performed in 2 cases. 100% of the *T. cruzi* RT-PCR were negative after treatment. 100% of *T. cruzi* serology remained positive after treatment.

**CONCLUSIONS** No statistically significant differences in clinical and epidemiological characteristics were found regarding the results of RT-PCR.

The 100% of the cases included in the study had a negative *T. cruzi* RT-PCR after treatment, indicating that benznidazole decreases the circulating DNA in blood.

Parasitemia detection by RT-PCR could be a marker of treatment follow-up; however it is not a good healing marker.

**DISCLOSURE** Nothing to disclose.

## PS2.083

**An in vitro assay to assess antichagasic candidates for sterile cure**

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**INTRODUCTION** The hemoflagellate parasite *Trypanosoma cruzi* is the causative agent of Chagas' disease also called American trypanosomiasis. According to WHO estimates 7–8 million individuals are infected mainly in the endemic countries of Latin America. Migration and travel have distributed Chagas' disease to other continents including Europe and North America. The existing drugs, Benznidazole and Nifurtimox have limited efficacy and severe side effects. New, safe, efficacious and cheap drugs are needed urgently. Recently two azoles, posaconazole and E1224, a prodrug of ravuconazole, have failed in clinical trials. We investigated cidal-static effects of CYP51 inhibitors.

**MATERIAL AND METHOD** A small number of azoles were tested in the standard *T. cruzi* reporter gene assay using the *LacZ* transfected Tuluahen strain. To study cidal-static effects by azoles, *T. cruzi* intracellular amastigotes were assessed for their ability to recover from transient exposure to azoles. For the readout numbers of intracellular amastigotes and numbers of infected and uninfected host cells were counted.

**RESULTS** All tested azoles showed lower IC50 values in the standard assay than the reference drugs benznidazole and nifurtimox. None of the tested azoles led to 100% cure of the infected cells. A small percentage of host cells remained infected, however, with a very low parasite load. In a drug washout experiment it was shown that the surviving intracellular parasites were viable and able to infect new cells.

**CONCLUSION** The tested azoles exhibited very good IC50 values, but were not able to cure 100% of the infected cells. These results suggest that the azoles are static rather than cidal compounds. This could be a reason for treatment failure of CYP51 inhibitors in clinical trials.

**DISCLOSURE** Nothing to disclose.

## PS2.084

**Bringing the 'A-game' to the 'E-game': modelling the impact of current and emerging drug treatments for the 'end-game' of HAT Trypanosoma brucei (T.b.) gambiense elimination**

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Human African trypanosomiasis (HAT) *T.b. gambiense* is a Neglected Tropical Disease (NTD) targeted for elimination within the next decade. The current treatment for HAT, nifurtimox-efflornithine combination therapy (NECT), is a chemotherapy regimen that requires intense health care resources and requires patients to travel to specialised treatment centres. The objective of this analysis was to evaluate the potential impact of two new drug treatments in the pipeline to assess their potential impact on reducing HAT transmission as we near towards the end stages of elimination.

A model was developed to dynamically simulate the transmission of HAT *T.b. gambiense* in several transmission areas over a time period of 30 years. For the purpose of evaluating the end



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game of elimination, a low transmission setting was chosen. Input parameters associated with varying coverage levels, treatment recovery rates and mortality rates were run through the model to look at the varying impacts of four strategies:

- 1 NECT only
- 2 fexinidazole only approved in 2016
- 3 fexinidazole approved in 2016 and oxaborole approved in 2019
- 4 oxaborole approved in 2019.

The model predicted that elimination targets would not be achieved using the current treatment pathway of NECT alone. However, when rapid diagnostics and fexinidazole were made available, transmission was reduced towards elimination targets. Furthermore, if oxaborole makes it to the market in 2019, transmission could be further reduced, accelerating the timeline towards elimination.

New treatment interventions are key to HAT elimination and reducing transmission of HAT *T.b. gambiense* in the near future. Additional considerations regarding the total costs, cost-effectiveness and role that vector control may play in elimination should also be considered in further evaluation of the elimination strategies for HAT *T.b. gambiense*.

**DISCLOSURE** This project was funded by Grant #: OPP1037660 from the Bill and Melinda Gates Foundation and research question initiated by the Novartis Institute for Tropical Disease and Swiss Tropical and Public Health Institute.

**PS2.085****Modelling health systems implications of current and emerging technologies for HAT *Trypanosoma brucei* (*T.b. gambiense*)**

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Over the next decade, is expected that human African trypanosomiasis (HAT) will be eliminated. The declining prevalence of infection will change the current reliance on vertical surveillance programs, to a paradigm where patients will be more likely to report symptoms at a local health centre. New diagnostics and interventions could change the future of service delivery of case detection and treatment and access to local services would reduce out-of-pocket (OOP) expenditures and the inconvenience of travelling long distances for patients needing treatment. It is proposed that the integration of programs into the local health centres (LHC) could be modelled to forecast outcomes related to service delivery, patient accessibility, time spent in the health system (HS) and resources used with current and new interventions

A discrete-event simulation (DES) HS model was developed with SIMUL8® to simulate a patients' movement through the HS. Different health system structures of both integrated (new diagnostics and treatments) and non-integrated (current) approaches were constructed in the model. Data from current and emerging diagnostics and treatments were included in the model to measure the impact of switching from a non-integrated to integrated HS. A sensitivity analysis was also conducted.

The results suggest that an integrated HS will increase accessibility and decrease delays in patient diagnosis and treatment; however, this will depend on the LHC's ability to accurately diagnose cases and remain equipped to assess patients.

An integrated health system could lead to improvements in coverage and reducing inequity in access to HAT treatment but the sustainability of local health resources in the affected African

nations should not be overlooked. The analysis shows that health systems' modelling can be useful tool in evaluating the broader implications of disease elimination.

**DISCLOSURE** This project was funded by Grant #: OPP1037660 from the Bill and Melinda Gates Foundation.

**PS2.086*****Trypanosoma cruzi* discrete typing units alters differently the signaling through Slamf1 receptor**

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Chagas disease is an important problem of public health in the Americas. It is caused by the protozoan *Trypanosoma cruzi*, which due to its high genetic variability has been classified into six different Discrete Typing Units (DTUs) associated with geographical distribution, transmission cycle and clinical manifestation. The pathogenesis mechanism is still unclear but the interaction macrophage-parasite has been implicated. In the case of the parasite, the cell surface is principally composed by glycoproteins as transsialidases and mucins. These are involved in the parasite entry and associated with some molecules in macrophages, as Toll Like Receptors and recently the Signalling Lymphocytic Activation Molecule (Slam). Slam receptors are a family of pathogen adhesion molecules that are involved in signaling between immune cells regulating for instance T cell proliferation, antibody production, cytotoxic responses and *Ifn*, *Tnf* and *Il6* production. One of these receptors, Slamf1 is a microbial sensor able to positively regulate NADPH oxidase (Nox2). In addition, the role of Slamf1 receptor in *T. cruzi* infection has been studied in Slamf1 receptor deficient mice where it has been associated with a more efficiently elimination of parasites and a high survival rate compared with the wild type control.

A model of macrophage infection by *T. cruzi* was used. In this model *Slamf1*<sup>-/-</sup> peritoneal macrophages are infected with the six DTUs, in a rate of 5 parasites per Macrophage. The parasite load is measured at 3 different times; with these different times the idea is to evaluate three phases of *T. cruzi* infection, at 1 h the interaction, the internalization at 6 and the replication at 24 h post infection. Also we evaluated the expression of gene involved in the immune response in macrophages as *Irg1*, *Arg1*, *Il1b*, *Il6*, *Il10*, *Tnf*, and *Cybb* during *T. cruzi* infection in *Slamf1*<sup>-/-</sup> peritoneal macrophages by real time quantitative PCR.

The genetic variability of *T. cruzi* affects the parasite load in infected macrophages; some strains are more infective than others, for the case of *Slamf1*<sup>-/-</sup> and BALB/c the most infective is Dm28 and the less Bug. Interestingly, Slamf1 receptor is required for infection affecting mainly interaction and internalization of most strains, except for M6421 and VFRA. Cytokines were lower in *Slamf1*<sup>-/-</sup> macrophages than BALB/c macrophages after infection with the strains except *Cybb*.

**DISCLOSURE** Nothing to disclose.

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## PS2.087

**Integration of diagnosis and treatment of sleeping sickness in primary healthcare facilities in the Democratic Republic of the Congo**

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**BACKGROUND** Control of human African trypanosomiasis (HAT) in the Democratic Republic of Congo (DRC) has always been a vertical programme, although attempts at integration in general health services were made in recent years. Now that HAT prevalence is declining, the integration question becomes even more crucial. We studied the level of attainment of integration of HAT case detection and management in primary care centres in two high-prevalence districts in the province of Bandundu, DRC.

**METHODS** We visited all 43 first-line health centres of Mushie and Kwamouth districts, conducted structured interviews and inspected facilities using a standardized checklist. We focused on: availability of well trained staff – besides HAT, we also tested for knowledge on tuberculosis; availability of equipment, consumables and supplies; and utilization of the services.

**RESULTS** All health centres were operating but most were poorly equipped, and attendance rates were very low. We observed a median of 14 outpatient consultations per facility (IQR 8–21) in the week prior to our visit, that is two patients per day. The staff had good knowledge on presenting symptoms, diagnosis and treatment of both HAT and tuberculosis. Nine centres were accredited by the national programme as HAT diagnosis and treatment centres, but the most sensitive diagnostic confirmation test, the mini-anion exchange centrifugation technique (mAECT), was not present in any. Although all nine were performing the CATT screening test, only two had the required cold chain in working order.

**CONCLUSION** In these high-prevalence districts in DRC, staff is well-acquainted with HAT but lack the tools required for an adequate diagnostic procedure. Attendance rates of these primary care centres are extremely low, making timely recognition of a resurgence of HAT unlikely in the current state of affairs.

**DISCLOSURE** Nothing to disclose.

## PS2.088

**Safety and efficacy of fexinidazole against rhodesiense human African trypanosomiasis: approach to conducting a clinical trial for a very rare, neglected disease**

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Rhodesiense human African trypanosomiasis (HAT) is the zoonotic, acute form of sleeping sickness in Eastern Africa. The disease is rapidly lethal if untreated and has caused large epidemics. During the past 15 years efforts by the national HAT control

programmes and key stakeholders have brought down the patient number to around 100 per year. In 2014, the WHO called for the elimination of rhodesiense HAT as a public health problem by 2020. Elimination requires a multisectoral approach including new treatment options to replace suramin and melarsoprol that have long schedules and can cause severe adverse drug reactions. The new oral drug fexinidazole has shown activity against *T. brucei gambiense* and *rhodesiense* *in vitro* and *in vivo* and a good safety profile in healthy volunteers. Fexinidazole is approaching the end of a pivotal trial against Gambiense HAT. We are planning a trial to make fexinidazole also available against Rhodesiense HAT.

Due to the very low patient numbers and high melarsoprol toxicity, a randomized controlled trial with a melarsoprol arm is not an option. We foresee enrolment of <50 patients per year in two hospitals in Uganda and Malawi. Further challenges include the remoteness of the affected populations and the potential underreporting of Rhodesiense HAT cases due to a moderate suspicion index, fear (of toxic drugs, lumbar puncture) and stigma. To mitigate these limitations community mobilization by local media and sensibilisation through health surveillance assistants will be implemented.

The trial design chosen in consequence is a one-armed trial in second stage patients using historical data from the trial centres as comparator. The same selection criteria will be applied to avoid a selection bias. Death at end of hospitalisation was selected as a robust endpoint. The sample size calculation considers the significant inter-centre variability of treatment-emergent mortality rates (5–20%) and that five times more control than fexinidazole patient data will be available. 104 enrolled patients would yield 80% power. The number of patients continues to decrease hence the enrolment will be limited to two years with e.g. 80 patients providing a power of 69%, 60 patients of 57%. The few expected first stage patients will be enrolled under an observational amendment to the protocol. The statistical analysis will be stratified by centre to take into account the major variation of death rate across sites.

**DISCLOSURE** Nothing to disclose.

## PS2.089

**Acute Chagas disease in the Brazilian Amazon: vulnerable populations in Pará state**

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**INTRODUCTION** The need of local knowledge may contribute to the neglected status of some public health problems. By 2005, mainly research institutes made detection of Acute Chagas Disease (ACD) cases in the Brazilian Amazon. From 2006 onwards, given the increasing record of annual autochthonous cases, the Pará State Program for Chagas Disease Control was formally implemented. Out of 934 ACD cases recorded in Pará by the Program, between 2005 and 2012, 19.6% ( $n = 184$ ) occurred in Abaetetuba municipality, then considered the second most important municipality with higher records of ACD cases in Pará. Here, we report features of Abaetetuba's epidemiological risk profile for ACD.

**MATERIALS AND METHODS** Information on ACD cases for the period 2005–2012 was provided by the National

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Information System (SINAN) database and climate data, such as temperature (°C), pluviometry (mm), relative humidity (%) and wind speed (m/s), by the National Institute of Meteorology (INMET). Population risk for ACD was estimated by the annual incidence (Positive cases/Population  $\times$  100 000). To assess the association between selected variables and ACD occurrence, a Logistic Regression Model was applied as well as a Poisson Linear model with correction of heterogeneity of data (Quasi-Poisson method). Analyses were developed in the statistical language R Program.

**RESULTS** The ACD distribution during an eight-year period showed a seasonal pattern, with increases of case-series on July and November, and epidemic peak in October. Maximum incidence in 2012 of 41.55 per 100 000 people. Fever, oedema and feeding with acai fruit were associated risk factors for ACD. The island environments were identified as those with higher risk for Chagas transmission, although most cases occurred in urban areas.

**CONCLUSION** The results allow for addressing Chagas Disease Control Program strategies to approach an evidence-based ACD management, in increasing the knowledge of the exposed local population.

**KEYWORDS** Acute Chagas Disease, epidemiology, Amazon.

**DISCLOSURE** Nothing to disclose.

## PS2.090

## Epidemiological features of acute Chagas disease in the Brazilian Amazon

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**BACKGROUND** The magnitude for Acute Chagas Disease (ACD), as a public health problem, usually has no records as numerous cases, even in endemic areas. Conversely, the chronic form affects 8–14 million people in Latin America. Natural transmission of the etiologic agent, *Trypanosoma cruzi*, occurs through the bite of triatomine bugs vectors. Oral transmission occurs through the consumption of food contaminated with triatomines or their faeces or by ingesting raw or undercooked meat from infected wild mammal hosts. In the Amazon basin, the population is affected by consumption of açaí berry (fruit of the palm tree *Euterpe oleracea*), the most common contaminated food involved in outbreaks of orally transmitted Chagas disease.

**METHODOLOGY/PRINCIPAL FINDINGS** To assess the epidemiological situation of ACD in the State of Pará (period 2006–2012), an Intensification Plan of Chagas' Disease Control Actions designed to assist the local situation allowed for the ACD surveillance systematization. This plan selected 94 municipalities (79.7% of Pará's population). The population was stratified according history of acute cases and incentives received for açaí palm plantation. ACD diagnosis considered parasitological, serological, and clinical-epidemiological criteria, according the Brazil Ministry of Health guidelines. The Brazilian Notifiable Diseases Information System (Sistema Nacional de Agravos de Notificações-SINAN) was used as database. The ACD incidence increased in the Brazilian Amazon (Pará) the 7-year period, with record of 977 ACD confirmed cases; a 68.4% occurred by oral transmission and in 28.6% of cases, açaí berry

was the food involved in transmission. For both males and females, the 20–59 age group was the most affected. Diagnosis was laboratory confirmed in 98.1% of cases.

**CONCLUSION/SIGNIFICANCE** Official government data indicate a serious epidemiological situation for this emerging and neglected disease, characterizing the Amazonian state of Pará as an endemic area for Chagas Disease.

**KEYWORDS** Acute Chagas Disease, Amazon basin, epidemiology, oral transmission.

**DISCLOSURE** Nothing to disclose.

## PS2.091

## Chagas disease surveillance is possible in the Brazilian Amazon: the Pará state experience

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**INTRODUCTION** In 2006 the Pará state Chagas Disease Control Program began surveillance of this disease in the Amazon region. Increasing Chagas cases and outbreaks in the region, mainly in Pará state, were related to consumption of contaminated food, especially the açaí fruit (*Euterpe oleracea*). The objective here is to describe the Chagas Disease Surveillance in the Amazon region in Pará.

**MATERIALS AND METHODS** In 2007 the state and the Ministry of Health produced a Work Plan with guidelines for surveillance, namely sanitary, entomological, reservoirs and laboratory surveillance linked to education, social mobilization, health care of three level complexity and management. The Work Plan selected 94 municipalities (79.7% of the population) as priority areas for Chagas Disease transmission.

**RESULTS** From 2006 to 2012, 977 acute cases were confirmed, as a result of local epidemiological research, capacity building and knowledge management (training courseware production: brochures, posters, manuals both for community health workers and higher-level professionals), lectures, seminars. Further outcomes were the International Seminar on Chagas Disease (2009), other scientific meetings, the development of field protocols with multisectoral participation and the joint authorship of *Guidelines for surveillance, prevention, control and clinical management of Acute Chagas Disease transmitted by food*, with PAHO-WHO/2009.

**CONCLUSIONS** One of the strongest points in Pará experience for Chagas Disease Surveillance is the integrating vision to get three levels of government (municipal, state, and federal) and different social sectors to cooperate, to effectively make visible an old disease, whose forms of transmission affect quality of life of the Amazonian populations. Chagas Disease can be controlled, and even for the most serious conditions, such as established heart disease, the quality of life of people can be improved.

**KEYWORDS** Chagas Disease, surveillance, Amazon region.

**DISCLOSURE** Nothing to disclose.

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## PS2.092

Stage-specific reporter gene expression in *Trypanosoma cruzi*A. F. Fesser<sup>1,2</sup>, R. S. Schmidt<sup>1,2</sup>, P. Mäser<sup>1,2</sup>, M. Cal<sup>1,2</sup> and M. Kaiser<sup>1,2</sup><sup>1</sup>Swiss Tropical & Public Health Institute, Basel, Switzerland; <sup>2</sup>Basel University, Basel, Switzerland

About 7 million people globally are affected by Chagas' disease caused by *Trypanosoma cruzi*. After decades of chronic infection, 30% of the patients develop cardiac and/or digestive symptoms. The current standard drugs (benznidazole and nifurtimox) are not satisfying in regard to their efficacy and safety. Recently, two CYP51 inhibitors (posaconazole and ravuconazole) have been tested in drug trials. Although *in vitro* results had been promising, both drugs showed a low sustained efficacy, which rendered them unusable for treatment. Therefore, new methods in the drug discovery process are needed. Stage-specific assays are one *in vitro* tool to increase the predictability of preclinical data. *T. cruzi* has four morphologically distinct stages. The relevant stages for assay purposes are the two forms occurring in humans: the intracellular, proliferative amastigotes and the extracellular, infectious trypomastigotes. Depending on the action of a drug, its effects on parasite survival may be different on the two stages. In order to quantify these effects, the project aims at establishing an assay using a *T. cruzi* parasite that expresses reporter genes specific to the amastigote and trypomastigote stages. In order to create the transgenic parasite, we are combining comparative transcriptomics with reverse genetics in *T. cruzi*.

DISCLOSURE Nothing to disclose.

## PS2.093

## Alternative strategies for case finding in human African trypanosomiasis in the Democratic Republic of the Congo

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**INTRODUCTION** In the Democratic Republic of the Congo case finding for human African trypanosomiasis (HAT) is done by mobile teams that travel by car from village to village and invite the population to a mass screening event in a public place. When HAT prevalence is low this approach becomes less efficient. We explored an alternative outreach strategy based on single health workers. We evaluated effectiveness and cost-effectiveness.

**METHODS** Single health workers on motorcycles visited house to house and screened all those present with a rapid diagnostic test (RDT) for HAT. For those testing positive a blood sample (whole blood as well as buffy coat) was collected on filter paper and tested by loop mediated isothermal amplification (LAMP) at a central RDT laboratory. All LAMP-positives were revisited and invited for a full diagnostic workup. A palm-held device (PDA) was used for data entry, including geographic coordinates. For the purpose of this evaluation, we also sampled one RDT-negative household member for each RDT-positive and a mobile team rescreened the population within 1 year. Effectiveness is calculated as the proportion among all cases identified that were found by the new approach. Cost per person screened will be calculated for both approaches.

**RESULTS** Field procedures worked well and acceptability was excellent. Using a PDA allowed easy and accurate data recording. To date 24 123 persons were screened, 78 per health worker per day on average. Out of those 957 (4.0%) tested RDT-positive, 100 of whom also tested positive to LAMP. A further 106 LAMP-positives were found among RDT-negative controls. LAMP-positives could easily be retrieved but were often reluctant to present at a health facility for diagnostic confirmation. So far 25 HAT cases were identified among LAMP-positives, 16 were positive on whole blood only, 15 on buffy coat only. Five additional HAT cases were identified among LAMP-negative subjects with HAT-related symptoms. Effectiveness and cost-effectiveness data will be presented.

**CONCLUSION** The new approach works well and is less of a burden on the population screened. Cost-effectiveness data are still pending but major efficiency gains can be expected from more flexible and rationalized planning using the geographic data collected. LAMP as a second screening step appears less reliable and referral of LAMP-positives is problematic. Alternative options for diagnostic confirmation need to be explored.

DISCLOSURE Nothing to disclose.

## PS2.094

## Review of activities leading to the implementation of the PATTEC initiative

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African Heads of State and Government, at the 36th Ordinary Summit held in Lomé, Togo, in July 2000, adopted a Decision AHG/Dec. 156 (XXXVI), urging Member States to act collectively to embark on a Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC). Within the framework of this decision, the African Union Commission was assigned the task of guiding and coordinating activities to implement the decision. The report to be presented will cover the last 3 years' activities and summarize the achievements leading to the successful implementation of Tsetse and Trypanosomiasis suppression/eradication Campaign in affected countries and within the PATTEC Coordination Office based on the following: Advocacy & awareness creation, Capacity building and training, Facilitation of technology transfer, Partnerships building and cooperation, Resource mobilization, Support to T&T affected countries to develop T&T suppression/eradication's projects/programmes' proposals, monitoring and evaluation of projects, Strategic direction and formulation of standards and Policy briefs and guidance.

DISCLOSURE Nothing to disclose.



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## PS2.095

**Chagas disease in the Brazilian Amazon: serological and parasitological survey in risk areas**

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**INTRODUCTION** Although there is no consensus about criteria for determining risk areas for Chagas Disease (CD) in the Amazon region, it is recognized that those are areas where Acute Chagas Disease (ACD) occurs and their prediction depends on systematic studies. In Brazil, a first study (1975–1980 period) revealed a positivity national mean of 4.22 and 0.56 for the Pará state. The second national survey gave a prevalence of zero for Pará. In 2012, Abaetetuba municipality had an incidence of 41.93 per 100 000 inhabitants. This study aimed to determine positivity rates for *Trypanosoma cruzi* infections in urban, rural and island areas of Abaetetuba municipality, Pará state.

**MATERIALS AND METHODS** From Abaetetuba people, fingertip blood samples were collected on filter paper Whatman No.1 to apply screening test with ELISA. In addition, when reported fever in the last thirty days and/or contact with triatomines had occurred, a fingerprick sample was collected over a slide for direct fresh test, as well as a venous blood sample, for buffy coat analysis and analysis by IFA, ELISA, HAI and IgM. Positive samples on filter paper and confirmed by serum were diagnosed as positive for *T. cruzi* infection. All participants gave informed consent.

**RESULTS** 4699 samples (75.63% of population) were considered valid for processing and statistical analysis. Overall prevalence was 2.54 per thousand inhabitants; the islands showed a higher prevalence. In 12 (0.25%) serum samples the diagnosis of CD was confirmed and of these, 6 (50%) samples showed IgM reagent, confirming the diagnosis of ACD.

**CONCLUSIONS** Detected prevalence was significantly higher than in previous studies. We found evidence of ACD occurrence in island residents. Our results show the importance of population surveys as a tool to identify risk areas and groups, to optimize context strategies for the local control of the disease.

**KEYWORDS** Acute Chagas Disease, Amazon, Prevalence.

**DISCLOSURE** Nothing to disclose.

## PS2.097

**Health systems' building blocks: the technical, political, legal and ethical – a new framework**

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**INTRODUCTION** Health systems emerge at the confluence of streams of normative dynamics and sets of structured practices: the political, the technical, the legal and the ethical. These streams become intertwined, mutually reinforcing or limiting one another. They contribute to establish the normative frameworks that make possible the existence and evolution of health systems. The paper is a theoretical reflection on the normative characteristics of these streams and their mutual influence.

**METHODS** This is a theoretical paper; It articulates concepts from political science and political philosophy, and empirical

elements drawn from texts on legal and ethical cases, mainly from health systems of Portuguese speaking countries.

**RESULTS** Technical normativity is mainly (but not exclusively) oriented towards achieving efficacy, effectiveness, efficiency, and to some extent equity. Ethical normativity asserts fundamental non-negotiable principals. Legal norms and rights structure the system and its functionality. Political normativity is the more volatile of these domains; operates with less formalized guiding norms, and through dynamic power games. Technical, ethical and legal normativity are in contrast more stable, with sets of formal and standardized rules.

**CONCLUSIONS** The discussion of the normative domains carried out in this paper identified elements and factors affecting the success or failure of their contribution to health systems; The technical depends on skills and resources; the political depends on interests and commitments; the ethical on individuals' conscious deliberation; and the legal on the functionality of the institutional apparatus in charge of producing and applying the law. There are institutions and fields of social practices corresponding to each of these domains requiring attention for any endeavour to improve health systems. The proposed framework expands, and includes crucial aspects left out by the established health systems approach based on the six pillars concept.

**DISCLOSURE** Nothing to disclose.

## PS2.098

**The risk of infectious diseases introduction into non-infected countries by travelers visiting endemic countries**

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This work is an attempt to estimate the risk of infections importation and exportation by travelers. In it we propose a model that takes into account the force of infection of the disease in the endemic country, which can either be a visited country (source of infection importation) or a country from where local residents export the infection when travel in the latent condition for disease-free countries. The model is deterministic but a preliminary stochastic formulation is presented in the appendix. It considers two countries: one is the host home-country and the other is the source country (with an endemic infectious disease). Susceptible individuals travel from their home-country to the endemic country and eventually return infected. The input of the model is the force of infection at the visited/source country which is assumed to be known and we assume that, in the case of disease importation, travelers are subject to the same risk of infection as local residents but do not contribute to it. In the case of disease exportation, the model calculates the probability that a latent individual travels from an endemic (or epidemic) country to a disease-free country. We exemplify the model with two distinct situation, namely, the risk of dengue importation from Thailand to Europe and the risk of Ebola exportation from Liberia to the USA.

**DISCLOSURE** Nothing to disclose.

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**PS2.099****Important increase in maternal health care coverage by abolishing user fees for deliveries in Roma referral hospital, Lesotho**

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**INTRODUCTION** In Lesotho maternal and neonatal mortality are particularly high. Due to limited coverage of delivery services, geographic and financial access barriers, one fifth of women give birth outside the health facilities. A policy of maternal services free of charge at primary care level is in place, but women pay for referral transport and hospital care. A free of charge pilot at Roma hospital was supported by MSF to show feasibility and positive effects on institutional delivery coverage. **MATERIALS AND METHODS** A qualitative survey explored patients' experience with payment system in place before pilot. Routine monitoring provided evolution of number of deliveries, origin of women, type of care, cost of services. Patient exit interviews verified effective policy implementation and measured users' satisfaction. Additional information on delivery coverage in rest of the district was collected from activity reports.

**RESULTS** Several women expressed concerns about inability to pay in case referral and hospital care would be required, making them reluctant to deliver at health centres. After intervention an increase of 41% of deliveries at the hospital was registered. A shift of deliveries from health centres to hospital was excluded. Only 51% of women delivering at Roma hospital knew about subvention system for free care. Financial barriers were clearly identified as argument for home delivery, with a shortfall in money mid-month reducing likelihood of health facility delivery. The subsidy system was easily applicable in existing hospital administration and cost averaged 130 maloti (10.7 USD) per delivery. Training and maintaining staffing levels allowed more efficient use of existing resources.

**CONCLUSION** Financial barriers by patient fees are often underestimated by health workers. In Roma hospital fees constituted a deterrent for institutional deliveries. A simple subsidy system paying instead of women allowed to increase uptake of services available. More information dissemination is needed at community level. In Lesotho subsidies directed at assuring all maternal services free of charge to patients could significantly increase institutional delivery rates and contribute to reduce maternal mortality.

**DISCLOSURE** Nothing to disclose.

**PS2.100****Rural households' access, usage and financing of essential medicines after implementation of the free healthcare policy: findings of two mid-hill villages in Nepal**

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**INTRODUCTION** There has been a strong global health effort to promote Universal Health Coverage (UHC) in low-income countries to ensure all people can access medicines and health services without suffering financial adversity. Accordingly, the Nepal Government initiated a free Essential Health Care Services programme which provides basic healthcare services and a

limited number of free medicines. However, a majority of the rural population and poor still lack essential medicines.

**MATERIALS AND METHODS** We carried out a study on access to and use of medicines in Rivan and Dhampus villages in Western Nepal. The study tools were adapted from standardised methodology developed by the World Health Organization and included surveys, semi-structured interviews and key informant interviews.

**RESULTS** A 100% availability of medicines and no stock-outs or expired medicines were found. 92% of the health service users (HSU) from a disadvantaged group did not report any discrimination in accessing services and medicines; 55% of HSU said that the health post (HP) is geographically accessible. However, 76% of HSU reported dissatisfaction with the quality and coverage of free medicines. Households' interviews showed inappropriate labelling, storage and non-compliance, and a preference towards using private drug retailers (PDR) for medicines in 62% of households. Also, 45% of households had members with non-communicable diseases (NCD) and they spent on average USD 6.34 per month on NCD medicines, mostly through out-of-pocket expenditure (81%). Key informant interviews revealed problems in medicines supply and storage provision in both HPs and highlighted the contributions of local community to improve health services in Dhampus village.

**CONCLUSIONS** This study shows that access to medicines in public health facilities has improved but utilisation is low, logistics remains poor, the majority of people still prefer PDR for medicines and financing of medicines is mostly through out-of-pocket expenditure. The need remains to improve quality, coverage and logistics of free medicines, to promote quality use of medicines, to explore local stakeholders' role to improve rural health services and to ensure sustainable healthcare financing mechanisms to realise the goal of UHC.

**DISCLOSURE** Nothing to disclose.

**PS2.101****Comparison of learning environments of residents in new and existing family medicine specialty training programs in Tajikistan**

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**INTRODUCTION** Contrary to Europe or the United States with 3 to 6 year long specialty training programs for medical doctors, Tajikistan has been training specialists in 1-year post-graduate training programs (1YP). In order to increase the number of family doctors (FD) in rural areas and improve the quality of family medicine (FM) specialty training, we developed since 2013 a 2-year FM specialty training (2YP) that emphasises clinical learning under supervision of experienced FDs in district health services. Since there is evidence that the learning environment has an impact on satisfaction and job aspirations, in April 2015 we analysed the perception of the learning environment of 1YP and 2YP residents.

**METHODS AND MATERIALS** Questions from existing questionnaires were selected and divided into the categories "practical job", "teaching and learning", "teaching staff", and "social aspects". All 51 residents enrolled in the 2YP and a comparison group of 20 residents enrolled in the capital based 1YP were asked to participate. Data was then analysed with Epi Info 7, comparing 1YP/2YP, training locations, and gender.

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**RESULTS** Data was obtained from 67 residents - 52.2% from rural centres and 59.7% female. Cronbach's alpha was 0.92, indicating excellent internal consistency of the questionnaire. Total score of the 2YP was overall positive (79.5%). The 2YP scored significantly higher than the 1YP on overall score, practical job, and teaching and learning. 2YP residents trained in a training clinic in the capital rated their experience slightly higher than those in rural health centres (83.3% vs 77.4%). There were no significant differences between genders in the overall score.

**CONCLUSIONS** Residents' rating of the learning environment favours the decentralised 2YP, which may ultimately lead to doctors who are higher qualified staying in rural areas as intended by the program. Additional testing and time are needed to determine the outcomes of the 2YP in terms of knowledge and skills as well as its effect on the district workforce.

**DISCLOSURE** This study was conducted in the frame of the Medical Education Project supported by the Swiss Agency for Development and Cooperation

**PS2.103****Livestock wealth and social capital as insurance against climate risk: a case study of Samburu County in Kenya**

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We use data from 500 households in Samburu County (Kenya) to explore how the natural environment and market accessibility affect coping and adaptation strategies of pastoralists. In particular, we ask whether households accumulate livestock wealth and invest in structural and cognitive social capital to protect themselves against climate risk. Overall, we find weak evidence that households accumulate livestock wealth in response to living in a drier environment, but find no evidence that households invest in either structural or cognitive social capital as insurance against climate risks. However, coping strategies vary across social groups. For example, while rainfall does not robustly affect our measure of cognitive social capital (trust) – we do find that the sub-samples of poor and financially-integrated households (i.e., those who have relatively good access to credit and ability to save money) display greater mutual trust in drier environments. The results from this study can be used for priority setting by government policy makers and development agencies for programs aimed at safeguarding household livelihoods in arid and semi-arid lands (ASALs).

**DISCLOSURE** Nothing to disclose.

**PS2.104****Adherence to paediatric antimalarials and antibiotics purchased at private sector drug shops in Eastern Uganda**

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**BACKGROUND** Little is known about adherence to medication purchased in the private sector in low income countries. There is particularly no evidence on adherence to antibiotics purchased for children under-5-years of age from private sector drug shops in these settings. Low adherence to first-line medication can lead to microbial resistance, higher expenditure on second or third-line drugs and increased morbidity.

**OBJECTIVE** To determine the level of adherence to anti-malaria drugs (Artemisinin Combination Therapy – ACTs) and antibiotics (amoxicillin) purchased for children under 5 years of age from drug shops in Eastern Uganda.

**METHODS** 20 drug shops were randomly selected from all registered drug shops ( $N = 44$ ) in one district in Eastern Uganda. Sample size was estimated for cross sectional studies based on 95% CI, 5% error margin and 10% non-response. The outcome variable was adherence to drugs bought at the drug shop, measured using both pill count and caregiver reports on day 4 for ACTs and day 6 for amoxicillin. Patients were clearly classified as non-adherent if they have any leftover tablet(s) in the blister pack. All drugs sold were pre-packaged, age-specific, single dose, and sold in blister packets with pictures demonstrating how and when the medication should be taken. The study was conducted between May and June 2012 during an intervention program which introduced the WHO/UNICEF recommended integrated community case management of malaria, pneumonia and diarrhoea intervention at private sector drug shops in Uganda.

**RESULTS** A total of 499 children were recruited into the study. Adherence to ACTs was assessed in 259 children and adherence to amoxicillin was assessed in 240 children. 85% of the children still had the blister packet that was dispensed with the medication and showed this to the data collectors. Adherence to both ACTs and amoxicillin was similarly low, 54% and 53% respectively. The main reasons for non-adherence were improvement in symptoms of the child (38%) and caretaker forgetfulness (35%). Detailed predictors of non-adherence will be presented.

**CONCLUSION** We found low adherence to ACTs and amoxicillin purchased at drug shops for children under-5 years of age. Community awareness on importance of completing doses by children is recommended. Further, drug sellers dispensing drug should emphasize completion of doses to caretakers of children.

**DISCLOSURE** Nothing to disclose

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## PS2.105

**Barriers to antiretroviral therapy (ART) initiation for treatment-eligible HIV-positive pregnant women in Swaziland**

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**OBJECTIVE** To determine the facilitating factors and barriers associated with initiation of ART among eligible HIV-positive pregnant women who deliver in health facilities in Swaziland. **METHODS** Convenience sampling was used to recruit HIV-positive, treatment-eligible, postpartum women and health care workers (HCWs) within maternal and child health (MCH) units; participants came from both urban and rural areas. Focus group discussions (FGDs) and in-depth interviews were conducted to gain an understanding of what influences a pregnant women's decision to initiate antiretroviral treatment (ART). Seven FGDs (of 5–11 participants) were conducted by EGPAF staff, four with HCWs, two with clients that chose to initiate ART, and one with clients who chose not to initiate ART ( $n = 59$ ). A total of 83 interviews were conducted by EGPAF-trained nurses; 50 with women who did initiate and 33 with women who did not initiate. Audio from the FGD and interviews was recorded and transcribed.

**RESULTS** Four themes emerged regarding barriers to ART initiation: stigma and disclosure, facility challenges, lack of ART knowledge, and anxiety around a lifelong commitment to ART. Participants reported fear of disclosure to partners and lack of knowledge on how to disclose. Facility issues included lack of privacy and difficulties receiving CD4 test results. Lack of ART knowledge, including fear of side effects from medicines was a significant concern of the patients (not HCWs). Concerns around non-adherence, developing resistance, or not being able to access drugs were the main factors related to fear of lifelong ART. Suggested solutions included improved privacy for ART collection, access to rapid CD4 testing, community-level education about HIV and ART and stronger disclosure counseling and support groups.

**CONCLUSION** This study revealed several barriers to acceptance of ART among eligible pregnant women that will be critical to address, particularly as WHO ART guidelines move towards lifelong ART for all HIV-positive women.

**DISCLOSURE** Nothing to disclose.

## PS2.106

**Access to health facility and treatment outcome for tuberculosis in natives, regular and irregular migrants in a clinic of northern Italy**

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**INTRODUCTION** A total 5 million regular migrants live in Italy; in addition about 500 000 foreigners are estimated to be present irregularly. In 2013, 62% of tuberculosis (TB) cases in Italy was diagnosed in migrants. There is lack of data about differences in TB diagnosis and outcome between regular and irregular migrants.

**MATERIALS AND METHODS** We revised TB cases followed in our clinic from 2006 to 2014. We analysed differences in time to diagnose and TB outcome between Italians and migrants. The analysis was conducted also in migrant subgroups: both regular and irregular. Treatment completion and cure are considered positive outcomes while negative outcome includes default, transfer out and death.

**RESULTS** 627 TB cases are considered in our analysis, 151 Italians (24.1%) and 476 migrants (75.9%) 58 of whom are irregular. There is a significant difference in age at diagnosis ( $34.1 \pm 12.7$  in migrants and  $51.1 \pm 28.5$  in Italians,  $P < 0.001$ ). 51.1% of migrants are from Asia, 33.2% from Africa, 13.4% from other European countries, few patients come from Latin America (2.3%). The mean time from arrival in Italy to TB diagnosis is 6.6 years. The proportion of migrants not inscribed to the National Health System is different according to region of origin: 32/158 (20.3%) from Africa, 3/11 (27.3%) from Latin America, 10/64 (15.6%) from Europe and 13/243 (5.3%) from Asia.

Time from beginning of symptoms and TB diagnosis is similar in Italians and migrants: 31 vs. 37 days of cough and 130 vs. 123 days of general symptoms. Delay from first access to a sanitary facility to diagnosis was 49 days for migrants and 72 days for Italians ( $P = 0.083$ ). Treatment outcomes is not statistically different in Italians (85.4% of positive outcome) and migrants (81.7% of positive outcome).

There are no significant differences in duration of general symptoms (128 vs. 90 days) and time from first access to a sanitary facility to diagnosis (52 vs. 25 days) between regular and irregular migrants. A significant difference is found in duration of cough (32 days in regulars and 72 days in irregular migrants,  $P < 0.001$ ). Treatment outcome was significantly worse in irregular migrants (65.5% of positive outcome) than in regular migrants (84.4% of positive outcome) (OR 2.8 CI 95% 1.5–5.0,  $P < 0.001$ ).

**CONCLUSIONS** Irregular migrants have worse treatment outcome and delayed facility access compared to regular ones: the duration of cough before diagnosis is a risk factor for new cases and TB spread in this population.

**DISCLOSURE** Nothing to disclose.

## PS2.107

**Imported malaria: epidemiological and clinical features of 394 cases observed in the last 6 years in Brescia, northern Italy**

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**INTRODUCTION** Malaria is the most common travel-related disease in the European Region. In Italy, the pattern of cases in the last years shows a decrease in both Italians and foreigners. The present paper analyzes the recent trend of imported malaria in Brescia, northern Italy.

**MATERIALS AND METHODS** Clinical charts of patients with malaria during the period 2009–2014 were retrospectively reviewed. Anagraphical, parasitological and clinical findings were analyzed.

**RESULTS** 394 cases occurred in our centre in the last 6 years, the most part in males (70.8%), adult men accounting for 218 cases (55.3%). We observed 90 pediatric cases (22.8%; age <16 years). A total 301 patients were from endemic areas (76.4%), 57 were from Italy or non-endemic countries (14.5%)



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and 34 over 90 children were born in Italy (37.8%). The first travel destination was West Africa (71.3%), while the Indian subcontinent was the second visited region (11.7%). Only 3 patients over 394 did a right prophylaxis. Malaria was caused by *P. falciparum* in 315 pts (80%) (including one *P. vivax* mixed), by *P. vivax* in 54 (13.7%) (36 coming from Pakistan), by *P. ovale* in 21 (5.3%) (10 diagnosed in 2014), by *P. malariae* in 4 (1%). In 7 symptomatic cases with negative haemoscopic result diagnosis was based on PCR test (3 *P. falciparum*, 3 *P. ovale*, 1 *P. malariae*). Complicated malaria happened in 42 patients (10.6%) according to clinical events (23 cases including 3 with MOF, 3 with ARDS, 6 with anemia) or to hyperparasitaemia (19 cases with a mean 9% parassitaemia including 2 cases with 50%). All, but one due to *P. vivax* with ARDS, were caused by *P. falciparum*. Clinically complicated cases required significantly longer hospitalization (10 vs. 4 mean days with a maximum of 53 days,  $P < 0.001$ ). Patients born in Italy had increased risk of clinically complicated malaria (OR 3.9,  $P = 0.002$ ), even higher restricting analyses to paediatric cases (OR 5.5,  $P = 0.008$ ). No deaths were registered. E.v. Artesunate use for complicated malaria increased from 25% in 2009 to 89% in 2014.

**CONCLUSIONS** Our data show a stable trend of imported malaria cases, the most part occurring in immigrant adult male population. Pediatric cases roughly represent a fifth of all; among them, children born in Italy are a high-risk group for severe malaria. No deaths were observed despite MOF and hyperparasitaemic cases. An improvement in management of severe cases is represented by enhanced e.v. Artesunate use, according to WHO and ECCMID guidelines.

**DISCLOSURE** Nothing to disclose.

## PS2.108

### Volunteering for better health: the impact of volunteers in development cooperation programmes

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**INTRODUCTION** The Red Cross and Red Crescent Movement takes pride to base its activities on the world's largest volunteer network: more than 17 million volunteers are actively involved all over the world, 6 million of them are engaged in the health sector. However, their impact on the health of the beneficiaries has never been assessed. The Swiss Red Cross promotes volunteers as important change-agents and bridge-builders between the health system and the community. This study was conducted to shed light on the impact of the volunteers on the health and wellbeing of the beneficiaries as well as on their role in the health system.

**METHODS** A qualitative social science approach was chosen and 84 individual interviews in seven purposefully selected study sites (Belarus, El Salvador, Ecuador, Ghana, Kyrgyzstan, Laos and Togo) conducted with volunteers, beneficiaries, project coordinators and health care professionals. The interviews followed a pre-defined topic guide in the local language. Interviews were transcribed, translated, coded and analyzed. In each country a short film was produced to depict the work and impact of the volunteers. However, the perceived qualitative impact mentioned during the interviews was not triangulated with data from the respective local health information systems. **RESULTS** Volunteers performed a broad spectrum of health tasks and were in general well accepted, trusted and respected by the beneficiaries as well as by the health care professionals. They mainly influence behavior change in terms of personal and

environmental hygiene, as well as lifestyle and foster good health seeking practices, such as regular attendance of antenatal care or intake of medicines. They play a key role to improve mental wellbeing of particularly the elderly and lonely population. While health professionals acknowledge their role as cultural and language translators and as additional assistants to the health system, they are aware of the necessity not to overburden them, to provide incentives for retention and to continuously invest in training, particularly in data collection and monitoring. **CONCLUSION** Volunteers are important change agents which make a difference particularly in preventive health activities. They help to bridge the gap between the provider and demand side in the health system. Investments in volunteer's management, as well as in their knowledge, skills, retention and motivation are essential and cost not to be underestimated. **DISCLOSURE** Nothing to disclose.

## PS2.109

### Trends in malaria case management following changes in the treatment policy to artemisinin combination therapy at the Mbakong Health Centre 2006–2012, Cameroon: a retrospective study

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**INTRODUCTION** In 2004, following the recommendations of the WHO, Cameroon changed its malaria treatment policy from monotherapy to artemisinin-based combination therapy (ACT) as the first-line treatment for uncomplicated malaria. We report an investigation into trends of case management following this change in policy.

**METHOD** Data was collected retrospectively, through consultation and perusal of laboratory and prescription registers of the Mbakong Health Centre. Analysis of data was carried out using SPSS and SAS Statistics.

**RESULTS** Data presented herein demonstrate that from 2006 to 2012, a total of 2484 (58.7%) of the prescriptions received by patients were anti-malarials, 1989 (47.0%) were antibiotics and 1935 (45.7%) were antipyretics. The anti-malarials prescribed were ACT 1216 (47.6%), quinine 1044 (40.8%) or SP 296 (11.6%). Of the 1216 patients prescribed an ACT, 441 (36.3%) had a positive malaria parasite confirmation, 746 (61.3%) were negative for *Plasmodium* while 29 (2.4%) were treated without a test. Quinine intake was recorded in 566 (54.2%) patients positive for *Plasmodium*. ACT prescription increased from 23% in 2007 to between 44% and 45% in 2008–2009. During this period there was a corresponding drop in the prescription of quinine from 38% in 2007 to 13% in 2009 ( $r = -0.43$ ,  $P > 0.05$ ). SP was restrictively prescribed to women of childbearing age after 2008. Antibiotic prescription dropped from 53.7% to 39.3% from 2010 to 2012. The odds of being prescribed an antibiotic was significantly higher in patients with a negative malaria result compared to malaria positive patients (OR = 6.12, CI 4.74–7.91,  $P < 0.00001$ ).

**CONCLUSION** Overall, there is overdiagnosis and treatment of malaria departing from the WHO guidelines. Although there is

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an overall increase in the prescription of ACT and less frequent prescription of quinine, the old practice is still rampant. Noticeably fewer prescriptions of SP for febrile cases was observed. To achieve appropriate treatment of uncomplicated malaria, healthcare workers need to adhere to guidelines and use available drugs rationally.

DISCLOSURE Nothing to disclose.

**PS2.110**

**Comparing the effect of educational outreach on infectious diseases management by mid-level health providers with and without prior core course: a cluster randomized trial in Uganda**

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**BACKGROUND** Two hypotheses to compare the effect of On-site support (OSS) on facility performance in infectious diseases care between two groups of mid-level health providers (MLP) were tested on 12 facility performance indicators:

- 1 OSS would be more effective in MLP with prior training in Integrated Management of Infectious Diseases (IMID) than in those without (No-IMID) and
- 2 OSS would redistribute patient workload to No-IMID MLP.

**METHODS** Thirty-six Ugandan primary care facilities were randomized 1:1 to parallel OSS and IMID (Arm A) and IMID only (Arm B) arms. Two MLP per facility participated in IMID training, and Arm A received OSS beginning in April 2010. OSS was 2-day sessions per month for nine consecutive months. Outpatient data were collected from November 2009 to December 2010 using a revised Ministry of Health outpatient medical form. The incremental effect of OSS was measured by the difference in pre/post changes across arms (ratio of relative risks = RRR). Pre/post increases in provider-to-patient ratio were obtained using a *t*-test. We compare the effect of OSS between the IMID and No-IMID MLP.

**RESULTS** Among IMID MLP, OSS was associated with statistically significant improvements in three indicators: malaria cases receiving appropriate antimalarial (adjusted RRR (aRRR) = 1.26, 99%CI = 1.02–1.56), patients with negative malaria test results prescribed antimalarial (aRRR = 0.49, 99%CI = 0.26–0.92) and patients with AFB smear negative results receiving empiric treatment for acute respiratory infection (aRRR = 2.04, 99%CI = 1.06–3.94). Among No-IMID MLP, OSS was associated with statistically significant improvements in two indicators: emergency and priority patients admitted, detained or referred (aRRR = 2.12, 99%CI = 1.05–4.28) and emergency patients receiving at least one appropriate treatment (aRRR = 1.98, 99%CI = 1.21–3.24). Although patient-to-provider ratio increased most in Arm A IMID MLP, changes in all four MLP groups were generally not statistically significant.

**CONCLUSIONS** The incremental effects of OSS were heterogeneous. Patients treated by MLP who attended IMID benefited from improvements in a different set of performance indicator than other patients. Increases in workload in MLP who attended IMID were not statistically significant.

DISCLOSURE Nothing to disclose.

**PS2.111**

**Disease diagnosis in primary care in Uganda**

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**BACKGROUND** The overall burden of disease (BOD) especially for infectious diseases is higher in Sub-Saharan Africa than other regions of the world. Existing data collected through the Health Management Information System (HMIS) may not be optimal to measure BOD. The Infectious Diseases Capacity Building Evaluation (IDCAP) cooperated with the Ugandan Ministry of Health to improve the quality of HMIS data. We describe diagnoses with associated clinical assessments and laboratory investigations of outpatients attending primary care in Uganda.

**METHODS** IDCAP supported HMIS data collection at 36 health center IVs in Uganda for 5 months (November 2009–March 2010) prior to implementation of the IDCAP interventions. Descriptive analyses were performed on a cross-sectional dataset of 209 734 outpatient visits during this period. **RESULTS** Over 500 illnesses were diagnosed. Infectious diseases accounted for 76.3% of these and over 30% of visits resulted in multiple diagnoses. Malaria (48.3%), cough/cold (19.4%), and intestinal worms (6.6%) were the most frequently diagnosed illnesses. Body weight was recorded for 36.8% of patients and <10% had other clinical assessments recorded. Malaria smears (64.2%) and HIV tests (12.2%) accounted for the majority of 84 638 laboratory tests ordered. Fewer than 30% of patients for whom a laboratory investigation was available to confirm the clinical impression had the specific test performed.

**CONCLUSIONS** We observed a broad range of diagnoses, a high percentage of multiple diagnoses including true comorbidities, and underutilization of laboratory support. This emphasizes the complexity of illnesses to be addressed by primary healthcare workers. An improved HMIS collecting timely, quality data is needed. This would adequately describe the burden of disease and processes of care at primary care level, enable appropriate national guidelines, programs and policies and improve accountability for the quality of care.

DISCLOSURE Nothing to disclose.

**PS2.112**

**Assessment of the role of patent medicine vendors (PMVs) in malaria case management for sustainable malaria control in Nigeria**

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**BRIEF INTRODUCTION** Malaria is endemic in Nigeria and a leading cause of morbidity and mortality especially amongst children and pregnant women. Patent medicine vendors (PMVs) are ubiquitous street level drug sellers found all over Nigeria and are the first point of contact in 70% of cases for sick people. This study assessed the ability of PMVs to effectively manage and refer community members with malaria using the malaria case management approach.

**MATERIALS AND METHODS** This was a cross-sectional study which used simple random sampling to select a sample of 120 PMVs from a list of 240 registered PMVs in Nasarawa LGA, Kano. A structured, mostly close-ended interviewer administered

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questionnaire was used for data collection after obtaining ethical approval and informed written consent of the respondents. The data were analyzed using MINITAB® 12.21 software.

Percentages were used to describe categorical variables while quantitative variables were described using the mean. The chi squared test was used to assess the significance of associations. **RESULTS** The PMVs were mainly married men with secondary school education and a mean age of 32.3 years. A third of the respondents had good knowledge of uncomplicated malaria but (63.8%) had poor knowledge of severe malaria, (94.8%) of the respondents had poor knowledge of rapid diagnostic tests to confirm malaria and their knowledge of artemisinin based combination therapy was poor. Educational status of respondents and good practice of malaria case management had a statistically significant association.

**CONCLUSION** There still exist significant knowledge and practice gaps regarding key components of malaria case management amongst PMVs in Kano despite series of trainings by malaria partners. There is need to strengthen trainings using harmonized tools and the capacity building approach in a coordinated manner for sustainable malaria control in Nigeria.

**DISCLOSURE** Nothing to disclose.

**PS2.113****Knowledge and attitude of prostate cancer prevention amongst university teachers in Northern Nigeria**

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**BRIEF INTRODUCTION** Men constitute over 50% of Nigeria's population which is estimated at about 170 million people. Health and general literacy rates in Northern Nigeria are among the lowest in the world. Global cancer estimates and local studies indicate a worldwide increasing incidence of prostate cancer which suggests prostate cancer is an emerging epidemic and a leading cause of cancer amongst men in Nigeria. This study assessed the knowledge of, and attitude towards prostate cancer prevention among male university lecturers in Northern Nigeria.

**MATERIALS AND METHODS** Two hundred and fifty men were enrolled for the study after selecting them using multistage sampling technique that used a cross-sectional study design after obtaining their informed consent. Percentages and means were used to describe categorical and quantitative variables respectively. The  $\chi^2$  test was used to assess the significance of associations and a *P*-value of  $\geq 0.05$  was considered statistically significant.

**RESULTS** The mean age of the respondents was  $44 \pm 7.5$  years. Knowledge of prostate cancer prevention was poor (55%) but the level of positive attitude towards prostate cancer prevention was high (74.2%) amongst the respondents. The level of knowledge of the respondents regarding prostate cancer prevention was significantly associated with age, marital status and membership of science based faculties.

**CONCLUSION** These findings regarding prostate cancer prevention in Nigeria imply that there is urgent need for public health services to provide health promotion by targeting prostate cancer prevention to members of tertiary educational institutions through strengthening of national cancer screening and awareness programmes, as well as enactment of national policies and guidelines for prostate cancer management and prevention.

**DISCLOSURE** Nothing to disclose.

**PS2.114****Health service access, utilisation and perceived quality in Dhading district, Nepal**

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**INTRODUCTION** Nepal is one of the poorest countries in the world with per capita gross domestic product of US \$ 210. It has a high mortality rate, attributable to poor access to health facilities or qualified health personnel. Distances between household and health post may be more than 5 h drive in remote areas, with no reliable transport system. Previous studies highlighted that women in particular have problems in accessing general and reproductive healthcare services. Most births occur at home: approximately 81% by traditional birth attendance and unskilled birth attendance and 7% unattended. Moreover, though abortion was legalized in 2002, the actual acceptability in rural Nepal remains unexplored.

**MATERIALS AND METHODS** Here, we explore factors associated with utilisation of primary healthcare services, with a focus on women's access to primary healthcare, pre- and post-natal services and medical abortion in Dhading district of Nepal. Results are based on a rapid ethnographic study involving 11 key informant interviews, including community members, health workers and policy makers in Dhading district, conducted in March and April 2015.

**RESULTS** Though pre-natal services are well known and frequently utilized, post-natal services are underutilized, being seen as important mainly in emergencies. Medical abortion is not well known nor provided at local health posts due to lack of available specialized staff. Overall, quality was valued above geographical accessibility, with community members preferring to travel substantially further to reach a health post with which they were satisfied. Common complaints and challenges included inaccurate diagnosis and treatment, problems with drugs prescribed (costly, expired, stock-outs, poor variety), unfair treatment and poor staff attitudes (related to leadership and management).

**CONCLUSIONS** Externally auditing of health posts may help increase quality, ensure utilization and improve patient satisfaction of all health posts in the area, as may the provision of standard complaint procedures. Though drug availability remains a significant challenge in Nepal, proper stock management may help buffer difficulties. Furthermore, incentivising the use of post-natal services, as is currently the case for anti-natal services, may help encourage utilization. Further research is needed to quantitatively measure the acceptability and demand of a range of reproductive health services, including medical abortion.

**DISCLOSURE** Nothing to disclose.

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**PS2.115****The health system and access to artemisinin-based combination therapies: a population-based study in the Kasena-Nankana District of Northern Ghana**D. K. Azongo<sup>1</sup>, F. Atugba<sup>2</sup>, T. Awine<sup>3</sup>, A. R. Oduro<sup>4</sup> and F. N. Binka<sup>5</sup><sup>1</sup>Navrongo Health and Demographic Surveillance System, Navrongo, Ghana; <sup>2</sup>Navrongo Health Research Centre, Navrongo, Ghana; <sup>3</sup>Data Management, Navrongo, Ghana; <sup>4</sup>Administration, Navrongo Health Research Centre, Navrongo, Ghana; <sup>5</sup>University of Allied Sciences, Ho, Ghana

**INTRODUCTION** Since 2001, the WHO recommended Artemisinin-based Combination Therapies as the first line drugs for the treatment of uncomplicated malaria in malaria endemic countries. In Ghana, after the policy change, little is known about the predictor to prompt and effective treatment to Artemisinin-based Combination Therapies. There is also little understanding of the patterns of other anti-malarial drugs used for the treatment of malaria in real life health systems.

**METHODS** A 2-week recall period was used to interview members of households who experienced fever/malaria in the prior 2 weeks. A detailed questionnaire was administered to obtain information on whether treatment was sought and received within 24 or 48 h after the onset of illness, the type of antimalarial drugs used for treatment and source of treatment. In all, 1512 people were interviewed and included in the analysis.

**RESULTS** The results show that of the 1512 who reported malaria, 89.1% (95% CI: 0.87–0.91) obtained treatment with antimalarials. Access to an official point of Artemisinin-based Combination Therapies provider within 24 h was 23% (95% CI: 0.21–0.25) and ACTs were the most preferred drugs for the treatment of fever/malaria. The use of mono therapies such as Chloroquine was still widely used in the district despite the policy change that has been in existence since 2004.

**CONCLUSION** Physical access to Artemisinin-based Combination Therapies providers is very low compared to the target set by the Roll Back programme of 80% by 2015. The results also suggest that mono therapies including Chloroquine are still commonly used for treating malaria in the district. The study demonstrates that INDEPTH HDSS sites provides good platform in sub-Sahara Africa for pharmacovigilance of post-licenses and marketing of antimalarial drugs for an effective health system.

**DISCLOSURE** Nothing to disclose.

**PS2.116****Community level understanding of the concept of pre-referral treatment and impact on referral-related decision-making following provision of rectal artesunate. A qualitative study in Western Uganda**A. Nuwa<sup>1</sup>, C. Strachan<sup>2</sup>, D. Muhangi<sup>3</sup>, P. Okui<sup>4</sup>, M. Helinski<sup>2</sup> and J. K. Tibenderana<sup>2</sup><sup>1</sup>Malaria Consortium Uganda, Kampala, Uganda; <sup>2</sup>Malaria Consortium Africa, Kampala, Uganda; <sup>3</sup>Social Work and Social Administration, Makerere University, Kampala, Uganda; <sup>4</sup>National Malaria Control Programme, Ministry of Health, Kampala, Uganda

**INTRODUCTION** Successful pre-referral treatment with rectal artesunate (RAS) for suspected severe malaria requires operative linkages between community health workers (CHWs) and referral facilities, as well as acceptance of pre-referral treatment and adherence to referral practices by both caregivers and CHWs. This study investigated how the concept of 'pre-referral

treatment' is used in referral related decision-making following provision of RAS at the community level.

**METHODS** Qualitative data was collected through 62 in-depth narrative interviews with caregivers of children under five who received RAS within the previous 3 months, as well as associated CHWs who provided the treatment. Nineteen focus group discussions incorporating 'vignettes' from the narrative interviews were held with male and female caregivers; 12 with CHWs and women representatives, and 20 semi-structured interviews with traditional healers. Thematic analysis followed the Framework approach.

**RESULTS** The CHWs were generally aware of the scope of information to be given to caregivers on prescribing RAS including urgency for referral, yet there was insufficient emphasis on RAS not being a full treatment for severe malaria.

Information shared by the CHW was influenced by the condition of the child and perceived readiness of the caregiver to accept advice. Adherence to referral advice was found to be positively affected by the severity of symptoms. Knowledge of, or experience with, traditional herbal rectal medications positively contributed to the acceptability of RAS. Previous experience with Artemisinin-based Combination Therapy as a treatment for uncomplicated malaria appeared to reinforce RAS as a comparative complete treatment for severe malaria, thus reducing likelihood to complete referral.

**CONCLUSIONS** Caregiver interpretation of CHW advice relating to pre-referral treatment was found to influence their decisions to promptly complete referral. CHW advice should emphasise the purpose of RAS is to only provide temporary relief prior to facility-based treatment, that it is not a full treatment for severe malaria, and dangers of not completing referral. Behaviour change communication and training activities could help promote these messages.

**DISCLOSURE** Nothing to disclose.

**PS2.117****Access to health services. Challenges and lessons learned from the Swiss Red Cross review**

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**INTRODUCTION** In line with its health policy 2012–2017, the Swiss Red Cross (SRC) implements projects to enable equitable access to health services.

**METHODS** In 2014 the SRC commissioned the Swiss TPH to conduct a post-ex review of five country projects to assess the long-term impact of initiatives beyond project completion to improve the access of poor and vulnerable groups to health services. Levesque et al's (2013) framework of access to health care was used, which examines five dimensions of accessibility associated with services provided (approachability, acceptability, availability and accommodation, affordability and appropriateness) and five corresponding abilities of communities to interact with the dimensions of accessibility to generate access (ability to perceive; to seek, to reach, to pay and to engage). Fieldwork was conducted in Bolivia, Ghana, Nepal, Laos and Cambodia and from the individual country case-studies an overall qualitative analysis was conducted to determine elements that support sustained access.

**RESULTS** Elements who fostered access included: Participatory health promotion and maintenance of community groups raises the approachability of services and communities' ability to perceive the need for care. Community-level change agents are



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essential to establishing new health-related decision-making practices. Integration of traditional practitioners and traditional practises into the formal health sector reduces conflicting beliefs and broadens access. Human resources and their motivation and commitment, fostered by capacity building and loyalty, allow continuation of services and even rise in patient numbers. However, where transport remains unaffordable or where exemption systems have failed to continue, inequalities can re-emerge after projects complete and better-off, urban populations benefit from health system strengthening while poor rural people's access is hampered.

**CONCLUSIONS** While access to health services was largely sustained, long term access for poor and marginalised groups beyond project completion requires special mechanisms to sustain on the long run. This includes ring-fencing health funds for the poor, adapting health promotion to cultures and beliefs and maintaining community and volunteer momentum through continued and embedded supervision. The review also highlighted the importance of central level and policy influence to support the sustainability of community-level health initiatives in the longer-term.

**DISCLOSURE** Nothing to disclose.

**PS2.119****Challenges to wider acceptability of herbal medicine**

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**INTRODUCTION** The global biodiversity of plant species coupled with the rich heritage of traditional knowledge worldwide has resulted in a wealth of ethnobotanical literature. However comparatively few drugs have reached the chemists' shelves even in an environment of increasing drug resistance and few antibiotics are in the pipeline. This is probably the biggest challenge.

**RESULTS AND DISCUSSION** This paper will highlight some of the contributing factors both in product development and formulation of policy. Under product development, the issues that will be discussed along with relevant examples from our work on anti-diarrhoeal and anti-tuberculosis activity of medicinal plants will include

- 1 The importance of linking ethnobotanical information with extract preparation and reverse pharmacology
- 2 Demonstrate the importance of relevant bioassays in validation of herbal remedies
- 3 The limitations in conventional methods of standardization which get reflected in the variability of efficacy. The debate on use of crude extract versus active principal will also be addressed.

In addition, the paper will also focus on certain lacunae in policy viz. benefit sharing and investment by industry, both two sides of the same coin.

**DISCLOSURE** Nothing to disclose.

**PS2.120****Demand side interventions to increase maternal health service utilization and practice of birth spacing on Idjwi Island, South Kivu, Democratic Republic of Congo: who is participating?**

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**BACKGROUND** Concerted efforts to increase the availability of quality maternal health services in low and middle income countries (LMICs) have not resulted in optimal levels of service use in many settings (Finlayson & Downe 2013). Utilization remains especially low in sub Saharan Africa (SSA) (Moyer & Mustafa 2014). Demand side interventions aim to reduce barriers to service use and incentivize individuals to adopt specific health behaviors. These strategies, especially conditional cash transfers (CCTs), are growing in popularity in SSA and are endorsed by influential policy actors despite a lack of evidence (Ranganathan & Lagarde 2012).

**METHODS** A community-based, longitudinal study will measure the comparative effectiveness of demand side strategies in increasing maternal health service utilization in South Kivu, Democratic Republic of Congo (DRC). In one arm of the study, female community health workers surveyed approximately 1500 households in 6 randomly selected villages in the health zone of Idjwi. We identified women who gave birth during a target period and trained female surveyors administered a digital questionnaire to approximately 500 eligible women giving informed consent for participation. Questionnaires explored socio-demographics, maternal health service use, family planning, birth spacing and participation in demand side interventions. Stata v 13 will be used in analysis.

**RESULTS** We will produce descriptive statistics of women of reproductive age in the health zone comprising Idjwi island, DRC. Our main result will be profiles of demand side intervention participants, non-participants and drop outs.

**DISCUSSION** Our analysis will fill a literature gap on the functioning of demand side interventions, particularly CCTs, in SSA. We will determine characteristics of who the interventions do and do not reach on the island, a setting with a high fertility rate undergoing significant demographic and economic changes in recent years (Thomson, 2012). We will place these findings in the larger context of contested interdisciplinary debates on the accessibility, ethics and effectiveness of demand side strategies to improve health outcomes and encourage service use in LMIC settings.

**DISCLOSURE** Nothing to disclose.

**PS2.121****On the origin of Ebola. Popular interpretations versus the epidemiology discourse in Macenta, Guinea**

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In December 2013, a 2-year old child died from a viral haemorrhagic fever in Méliandou village in the South-East of Guinea, the likely index case of a major epidemic. When the virus was formally identified as Ebola, epidemiological investigations started while local people tried to understand the deaths in their

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communities. Mainly evolving in parallel, others overlapping, these epidemiological and popular explanations are driven by different explanatory models, one biomedical and the other traditional-religious. We describe the popular discourse to better understand health seeking behaviour and the strong reluctance and sometimes aggressive attitude of communities regarding the epidemic control measures.

Preliminary ethnographic observations were carried out by ST in October–November 2014 for the Global Outbreak and Alert Response Network (GOARN) of the World Health Organization. Deployed in the Forest Region of Macenta, ST conducted in-depth interviews, informal conversations and participative observations among local dwellers to understand their perception and knowledge on the history and origin of the Ebola outbreak in Guinea.

At the beginning of the epidemic, some citizens involved in the outbreak response attributed the first deaths in the Forest Region to the transmission of a virus by contact with fluids of patients, but others believed them to be the breach of a taboo. According to them, the touching of a fetish belonging to a sick person who was also a member of a secret society of one particular ethnic group brought about the chain of illness and deaths. Therefore, it was initially perceived that dying of Ebola was restricted to this particular ethnic group, challenging the acceptability of biomedical preventive discourses.

Although considerable efforts have been made at the level of Ebola outbreak response procedures to improve communication and social mobilization, the anthropological approach remains essential to adapt this response to local realities. The outbreak response must systematically document popular discourse(s), rumours, codes, practices, knowledge and opinions related to the outbreak and use this information to adapt communication messages. To be effective, the control interventions have to take into account the popular perception as well as the socio-cultural and political context and address rumours on a case-by-case basis and in real time without resorting to overall generalisations that can increase misinterpretations.

**DISCLOSURE** Nothing to disclose.

**PS2.122****Dog ownership and rabies control among the Mnsi community, Mpumalanga, South Africa: social and cultural determinants at the wildlife interface**

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Canine rabies is endemic in many parts of Africa, where domestic dogs are the primary reservoir of the virus and responsible for the vast majority of human exposures. Rabies can be controlled through mass dog vaccination. Effectiveness depends on accessibility of dogs and the ease of restraint for vaccination, which, in turn, is determined by factors such as the proportion of unowned dogs and the nature of dog-human relationships. Understanding these aspects - which may vary geographically or be affected by socio-cultural determinants - is helpful in guiding long-term rabies control. Awareness of the risk of rabies transmission from infected animals and the appropriate response after potential exposure are also essential to reduce human cases. To improve educational messages in rabies vaccination campaigns,

this study assessed the community's knowledge and perceptions of dogs, rabies and the related risk behaviours in a recently-infected area of South Africa.

Seventeen focus group discussions stratified by sex, age and dog ownership status were organised in the Mnsi Community, a site located in Mpumalanga Province in north-east South Africa. Additionally and combined with participative observations, 29 in-depth interviews with hunters and lodge managers were conducted in the same area.

Communities own dogs for guarding homes, livestock and crops. Hunting dogs are highly valued, despite the illegality of bushmeat hunting. People are aware of rabies and its zoonotic nature. A dog's bite is always associated with rabies risk and children are most aware about health seeking behaviours. Female respondents thought that humans can also be infected if they eat animals that were bitten by a rabid dog or share their drinking water. There was a lack of understanding of how dogs become infected. In general vaccination is perceived as a means to prevent diseases from spreading to humans and other animals, to cure or/and to protect from diseases. However, for hunters dog vaccination is a scheme set up by game lodges to poison their dogs. Dog owners felt that vaccinators could better inform them of the diseases against which their dogs were being vaccinated.

Lack of awareness and misinterpretation of promotion messages among adults hinders participation in dog vaccination campaigns. Novel intersectoral strategies are needed, such as the involvement of health clinics and game lodges to tackle rumours, clarify the procedure and create good relationships with the community.

**DISCLOSURE** Nothing to disclose.

**PS2.123****Qualitative study on factors influencing population participation in a community program against malnutrition in the area of Segue in Mali**

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**BACKGROUND AND OBJECTIVES** Malnutrition is a major public health problem in low-income countries, where it is responsible for the death of about 1 million children per year. In Mali, a community care program for acute malnutrition (PECMA) was established in 2007, but coverage remains variable across the country. This study aims to describe the factors behind the low participation of target population in this community program.

**METHOD** A qualitative estimate based on ethnographic method and on the principles of participatory evaluation was used. The target population consisted of all local stakeholders involved in nutritional interventions in the area of Segue. More specifically, health professionals, local NGO, as well as community health workers and parents of young children segue area were recruited to participate in this study. The methodology was based on the triangulation of three different data sources: semi-structured interviews, participant observation and review of local documents on the program. Keeping a diary allowed to record field notes and research team reflections. The inductive thematic analysis and comparative data sources were used to identify the main factors behind the lack of participation in the program.

**RESULTS AND DISCUSSION** On one hand, environmental factors influencing coverage of PECMA significantly were economic (cost of prescriptions and transportation), geographic (time and distance to travel to the health center) and

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sociocultural (gender relations, low valuation of prevention, consultation with the traditional healer). On the other hand, large variations were found between and within villages on the knowledge, attitudes and practices related to malnutrition. The ignorance of the population of the causes and consequences of this disease often led to feelings of shame among parents of malnourished children. Furthermore, this study revealed that many program activities were not well established in the Segue area, with significant differences between villages. Strong leadership and frequent awareness sessions by the community health workers might be instrumental to mobilize the population on the issues of malnutrition allowing a better coverage of PECMA program.

DISCLOSURE Nothing to disclose.

**PS2.124****The effect of gender on mortality of patients on antiretroviral therapy in rural Mozambique**

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**BACKGROUND** It has been documented that male HIV-related health outcomes are inferior to women's. While more women access HIV health care, primarily due to routine HIV screening during antenatal care, men present later and at a more advanced disease stage. We compared mortality and lost to follow up (LTFU) between men and women, from a cohort of patients in Mozambique. These patients had initiated antiretroviral treatment (ART) at primary health care level between January 2010 and 2015.

**METHODS** Retrospective analysis of data collected from health centres in the rural district of Ancyabe, Cabo Delgado Province. All patients  $\geq 10$  years who had started ART during the study period were included in the analysis. STATA version 13.1 was used to analyse the data. Cox proportional hazards model was used to compare probabilities for survival and LTFU between genders.

**RESULTS** 2332 patients were included in the analysis. 69.5% were female, 30.5% male. Women started ART at a younger age: 31 vs. 37 years ( $P < 0.000$ ). Median CD4 count for women and men was 294 and 234 cells/ $\mu$ l ( $P = <0.000$ ), respectively. Men also presented with significantly higher WHO stage ( $P = 0.000$ ). Mortality was higher for men with a hazard ratio of 2.23 ( $P < 0.000$  CI 1.7–2.9), as was loss to follow up (LTFU) (HR 2.25  $P = 0.001$  CI 1.4–3.6. After stratification for baseline CD4 count and WHO staging the hazard ratio for both mortality and LTFU were not significantly different between genders.

**CONCLUSION** These results suggest that if HIV positive men sought treatment earlier and at a less advanced stage, their survival could equal that of HIV positive women. Interestingly, these two factors appear to also influence the risk of LTFU. Without detracting from the services for women and children, there needs to be greater focus on the early uptake of HIV services by men.

DISCLOSURE Nothing to disclose.

**PS2.126****Cultural epidemiology and community determinants of vaccine acceptance**

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**INTRODUCTION** Vaccines are among the most effective tools for the control, elimination and eradication of infectious diseases. Their effectiveness in programme settings relies on efficacy, health system capacity to ensure access, and community acceptance. Local community awareness and willingness to use available vaccines, however, have been a relatively neglected component of global vaccine strategies. Cultural epidemiological studies of community acceptance of oral cholera vaccines in three African countries, and acceptance of pandemic influenza vaccines in India, were undertaken to address community determinants of acceptance and use. This presentation reviews the approach and implications.

**MATERIALS AND METHODS** Studies of actual or anticipated oral cholera vaccine (OCV) acceptance and use were completed in three African settings (Zanzibar, Western Kenya and Democratic Republic of Congo), and a similar study for pandemic influenza using comparable methods was completed in Pune, India. Explanatory model interviews based on the integrated quantitative and qualitative framework of the Explanatory Model Interview Catalogue (EMIC) for cultural epidemiology were used in community surveys to assess the awareness, priority and use of these vaccines, and the role of illness experience, perceived causes, help-seeking experience and other relevant considerations affecting vaccine hesitancy and confidence.

**RESULTS** Despite high anticipated acceptance of OCVs – more than 93% for a free vaccine in three African study settings – and high regard for the efficacy of the pandemic influenza vaccine in Pune (95%), use of these vaccine has been much lower. Models based on cultural epidemiological variables to explain determinants of acceptance provide a better account than models limited to socio-demographics.

**CONCLUSIONS** These studies identified local determinants and indicated an approach that may be generalized. A generic protocol based on the research experience has been designed to answer questions about the influence of community determinants and to promote awareness, acceptance and use through community engagement. The suggested approach has been adapted to guide strategies for influenza vaccination of pregnant women in low- and middle-income countries. We review the approach, implementation plans and their relevance for meeting a fundamental global health challenge, acknowledging both the value and limitations of global strategies for local problems.

DISCLOSURE Nothing to disclose.

**PS2.127****Evaluation of a community based tuberculosis detection program depending on ethnical particularities**

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**INTRODUCTION** It is important to identify and evaluate tuberculosis (TB) contacts in order to give them the appropriate

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treatment as they may be at high risk for developing TB disease. Nowadays, immigrant's ethnical particularities may difficult these identifications.

**OBJECTIVES** To analyze the results of a community program designed to find TB contacts that don't have an easy access to health facilities because of their ethnical particularities.

**METHODS** A descriptive retrospective study was performed. All cases with a confirmed diagnosis of TB referred to the community agents of the Tropical Medicine Center of Barcelona because of the difficulties for contact tracing were included during 2012–2014. Demographic characteristics and community actions were analyzed. Community actions outcome was evaluated through complete completion of chemoprophylaxis in contacts with latent TB or complete treatment in contacts with TB disease. Statistical analysis was performed using SPSS v 18.

**RESULTS** 122 cases meet the inclusion criteria, predominantly males (67.2%), with a mean age of 33 (1–72). Most had pulmonary TB (72.1%). 316 contacts were found. Most of them were males (74.4%), aged between 17 and 30 years (40.1%).

North Africa cases had a mean of 3.23 contacts (0–8) and were more easily reached by phone than other groups, with an average of 4.7 (2–12) calls. Indian and Pakistani cases had an average of 3.78 [1–10] contacts, and needed the highest number of phone calls 29.6 [2–135] to localize them. Eastern Europe cases had 3.58 contacts (1–10) and needed more mediation 1.16 [1–5]. Sub-Saharan cases had more contacts 9.42 (1–76) and needed more home visits 0.95 [1–15] and informal encounters 0.4 [0–7].

TB disease was found in 12 contacts (3.80%). 11 were correctly treated (91.7%). 54 contacts (17.1%) had a latent TB infection and 43 (79.3%) finished chemoprophylaxis. 108 contacts (34.2%) were exposed but not infected. 77 contacts (24.4%) were not exposed and 65 (20.5%) were lost.

**CONCLUSIONS** Different community approaches are needed to track down TB cases with difficult access to health services, because of their ethnical particularities. The community activities are highly effective even if further actions and studies are needed in order to minimize losses.

**DISCLOSURE** Nothing to disclose.

## PS2.128

### Can *in situ* community screening interventions improve access to Chagas disease diagnosis?

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**INTRODUCTION** Nowadays, Chagas disease (CD) is a global problem in public health. Between 47 000 and 87 000 people are estimated to be infected in Spain, with an underdiagnosis of 92–95.2%. Community interventions must be developed in order to facilitate access to diagnosis. The aim of this study is to describe an *in situ* screening intervention among Bolivian migrants who attended a cultural event in Barcelona.

**MATERIALS AND METHODS** Descriptive study of CD prevalence among Bolivians who attended a cultural event. Participants were recruited by community health agents. A survey was designed to assess inclusion/exclusion criteria and to gather variables. Blood samples belonging to people who had never undergone screening were obtained in a mobile testing van

from the blood bank that was present at the event. Results were communicated at doctor's appointment previously scheduled by telephone.

An informed consent was requested, data were treated confidentially and a descriptive and bivariate study was performed. **RESULTS** From the 181 recruited, 12 people were excluded for not being Bolivian; 30 (17.7%) had been previously screened, and 8 refused to participate. Those excluded in the study were given an appointment to the medical consultation. 131 people accepted to undergo screening (77.5%); CI 95% (70.35–84.65%). Of those, 35 (26.7%) presented positive serology: 54.3% women with a mean age of 39.5, coming from Santa Cruz and Cochabamba (45.7% and 31.4% respectively). The average length of stay in Spain was of 9.2 years and 94.3% stated they had knowledge on C.D. 57.2% continued subsequent follow-up.

Prevalence for CD was 26.7%; CI 95% (19.3–35.1%).

**CONCLUSIONS** This intervention was very successful in terms of participation. This highlights the need of promoting screening activities in community spaces in order to facilitate access to diagnosis and to contribute to reduce the existing underdiagnosis as well as to implement other strategies to improve follow-up and accompaniment for affected people.

**DISCLOSURE** Nothing to disclose.

## PS2.129

### Process to develop and validate behavior change communication messages for community acquired pneumonia in children under-five years of age in rural North India: a qualitative study

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**INTRODUCTION** Community Acquired Pneumonia (CAP) is the leading cause of childhood deaths worldwide. Delay in symptom recognition, appropriate care seeking and community distrust in the public health system are possibly responsible for this. Objective of this work was to develop and validate culturally sensitive Behavior Change Communication (BCC) messages for symptom recognition, timely and qualified care seeking and building trust in public health system.

**MATERIALS AND METHODS** For message development 7 step process was followed:

- 1 theme identification based on formative analysis
- 2 creative conceptualization of message by communication experts
- 3 content reduction with focus on action words, images/characters and setting by inputs from multidisciplinary experts
- 4 pilot testing using Focus Group Discussions (FGD) in natural setup for understandability
- 5 selection/modification of messages, tagline/logo based on a balance of being popular and least likely to be misunderstood
- 6 validation by FGDs on caregivers, health workers for duration of attention, understandability, cultural acceptability and recall of appropriate action
- 7 harmonization and customization of final products.

**RESULTS** Messages were developed on

- 1 symptom recognition
- 2 where/when to seek care
- 3 risk vulnerability perception.



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Themes identified by formative research in 7 North Indian rural districts were developed into creative concepts. Messages were developed as simple narratives, highlighting positive/negative outcome of actions, common causes of delay. Focus was on immediacy, qualified care seeking, and symptoms of CAP. Message delivery was through health workers, female doctor, mother or community. Messages were validated by 49 FGDs in 7 rural districts in 05/14. During validation maximum attention was given to video followed by audio messages. Text messages needed one to one explanation since most were illiterate. Community empathized with videos which resulted in better recall. After validation, numbers of text messages were reduced, within messages contents/images merged, contents rephrased and dialogue delivery modified emphasizing appropriate action.

**CONCLUSIONS** Culturally sensitive CAP messages were developed through a multi-staged formative research process and are now ready for use. They need to accompany health systems strengthening efforts to increase confidence in government health facilities.

**ACKNOWLEDGEMENT** Funding-Bill & Melinda Gates Foundation.

**DISCLOSURE** Nothing to disclose.

## PS2.130

## Defining 'adoption' of clean cooking technology: a theoretical model of adoption

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**INTRODUCTION** The term 'adoption' is widely used in the literature when discussing the uptake of clean cooking (CC) technology, but there is no universally accepted definition for this term. In order to understand why people 'adopt' CC technology we need to know what factors are associated with the adoptive process, what constitutes sustainable adoption and what differences there are between a 'user' and an 'adopter'. **AIM** To review current definitions of adoption of clean-cooking technologies from literature and from primary survey data. To propose a definition of adoption and sustained adoption. This includes a conceptual model of what adoption is and a trans-theoretical model of the adoption process.

**METHODS** Systematic literature review to evaluate the current definitions for adoption of CC technology. Comparison of focus group discussion (FGD) data from three Andean regions of Peru; Cajamarca, La Libertad and Cusco. FGDs were conducted to identify the various programs and implementation processes; whether the implementation process had an impact on the user's perception of the program and if this had an impact on the adoption of the CC technology.

**RESULTS** The literature review and primary survey findings converged in characterising an 'adopter' as

- 1 desiring,
- 2 using,
- 3 maintaining and
- 4 investing in CC technology.

To complement this conceptual model a comprehensive, field-friendly framework has been created which providers can use to measure adoption and monitor and evaluate CC technology programs in the field. Achieving adoption was found to be most likely if survey participants experienced a participatory pre-contemplation phase. This means that the service user is actively involved and is able to impact the implementation of the CC technology.

**CONCLUSION** Program implementation and evaluation should consider the functional definition of an adopter and the inclusion of a participatory pre-contemplation phase when designing and implementing CC technology programs. This proposal requires piloting in the field and a consensus within the CC technology community of an accepted definition for adoption.

**DISCLOSURE** Nothing to disclose.

## PS2.131

Knowledge and practices on lepidopterism by *Hylesia metabus* (Cramer, 1775) (Lepidoptera: Saturniidae) in Yaguaraparo parish, Sucre State, Northeastern Venezuela

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**INTRODUCTION** Lepidopterism refers to ill effects due to contact with moths and butterflies, cause of dermatitis, urticarial and systemic reactions. In Venezuela, is associated to *Hylesia metabus* and represents an important public health problem to Northeastern country, with high environmental, social and economic impact. To address context health promotion strategies, this study focused on characterizing local knowledge and practices for lepidopterism prevention and control.

**MATERIALS AND METHODS** Following a cross-sectional design, a sample of 400 randomly selected people was surveyed in Yaguaraparo parish. By applying a scale of 0–4 points (4 to the best knowledge/practice), dimensions explored were knowledge about *H. metabus*, and about lepidopterism, lepidopterism prevention and control individual and community practices and knowledge and practices as a whole. On database made, descriptive statistics were applied, as well as analysis of variance and Tukey test for multiple comparisons for different dimensions, considering sex, age group, length of residence, provenance, education and occupation as intervening variables. **RESULTS** Knowledge about *Hylesia* was good (a mean of 2.61); on lepidopterism was fair ( $X = 1.65$ ), prevention practices were good ( $X = 2.52$ ), also for control ( $X = 2.74$ ). Out of 97% of respondents declared lepidopterism experience; 71% used medical and home treatment and the remaining 29% used home and self-medication treatment. The better-known and used measure to avoid contact with the butterfly was turning off lights (50.2%). Spatial insecticide application was the most frequent measure considered useful to remove butterflies from environment (68.2%). Before itching actions included taking antihistaminic (30.7%) and home treatment (27.4%), being topic alcohol the most used (23.5%). Education and occupation had significant influence on given responses.

**CONCLUSIONS** Parish population showed notions on lepidopterism, but their practices require improvement to reach a better level. Public health literacy in-context tools could help to

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deep in how to improve population awareness and empowerment.

DISCLOSURE Nothing to disclose.

**PS2.132**

**Stigma towards people living with sickle cell disease in Mokola Community, Ibadan North Local Government Area, Oyo State, Nigeria**

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**INTRODUCTION** Sickle cell disease is an inherited disorder of public health importance that has contributed significantly to high infant mortality rates worldwide. People living with sickle cell disease are at risk of stigmatization due to perceived negative attitudes about their illness, hence it has been observed that stigmatizing attitude is increasingly being recognised among people living with sickle cell disease. The aim of this study is to determine the level of stigma towards people living with sickle cell disease in Mokola community, Ibadan, Nigeria.

**METHOD** A cross sectional study was carried out using multi-stage sampling technique to select 500 respondents. A semi-structured interviewer administered questionnaire consisting of socio-demographics, knowledge and beliefs about sickle cell disease and stigmatizing attitude towards people living with sickle cell disease was used to elicit information from study participants. Stigmatisation was measured using social distance scale by Bogardus. Data collected was analyzed using descriptive statistics, chi-square for test of association and multinomial logistic regression to determine predictors of stigmatizing attitude at 5% significant level.

**RESULTS** The mean age of respondents  $33.4 \pm 10.4$  years, 56.4% were females, 58.4% were Christians and 37.8% had completed secondary school education. Among respondents' with low intimacy, 58.9% reported high stigma and 40.6% of those with moderate intimacy had low stigma while 73.3% of respondents with high intimacy had low stigma. Level of awareness was high (100%), 52.6% had poor knowledge, 55% had good belief, 52.4% had good attitude and 52.2% knew their genotype status. Monogamous setting (OR = 8.25, CI = 1.339–50.839) was the only predictor of moderate relative to low stigmatizing attitude while secondary education (OR = 2.04, CI = 1.166–3.570), good belief (OR = 0.49 CI = 0.313–0.792), high intimacy (OR = 0.25, CI = 0.145–0.455) and moderate intimacy (OR = 0.32, CI = 0.191–0.546) were the predictors of high relative to low stigmatizing attitude towards people living with sickle cell disease.

**CONCLUSION** There is a need for health education on causes, treatment and prevention of sickle cell disease. Anti-stigma intervention programmes should be put in place to reduce stigma towards people living with sickle cell disease.

**KEYWORDS** Sickle cell disease, Intimacy, Stigma.

DISCLOSURE Nothing to disclose.

**PS2.133**

**Paediatric health seeking and costing in Abidjan, Côte d'Ivoire**

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**BACKGROUND** Appropriate use of paediatric health services is essential for the management of childhood diseases. As financial barriers are known to restrict use, the Ivorian government introduced free under-five healthcare in 2011. The aim of this study was to investigate use and cost of paediatric healthcare in Abidjan, the economic capital of Côte d'Ivoire.

**METHODS** Households with children aged <5 years living in two districts of Abidjan were randomly selected. Mothers were administered a face-to-face questionnaire and interviewed about the most recent disease episode that occurred in their child, related health seeking, costs incurred and capacity to pay. Data were entered using EpiData and analyses were performed using SPSS.

**RESULTS** We interviewed 691 mothers. Main affections during the last disease episodes were: malaria (22.5% confirmed, 16.6% suspected), respiratory tract affections (34.2%), fever of unspecified origin (32.3%) and diarrhoea (19.9%). One third (33.1%) used traditional home remedies, and 4% consulted a traditional healer. Auto-medication was frequent: 23.0% used medication available at home and 22.2% bought new drugs at a pharmacy. Street vendors were a rare source of drugs for auto-medication (6.6%). 63.2% of children were brought to modern health services, of which 29.4% had multiple health services contacts. 408/585 (69.7%) health visits were performed in the public sector. While 229/600 (38.2%) of consultations (patient contacts) were free of charge, medication, concerning 96% of health visits, where only received without extra charge in 6.2%. Performed exams, concerning 30% of visits, were free in 28.8%.

The mean cost per disease episode was 19.20 USD (excluding 14 hospitalizations). Mean costs per consultation were 1.60 USD (3.25 USD if excluding free consultations), 13.55 USD for medication, and 6.30 USD for performed exams. Main mode of payment was out of pocket. Insurances were rare (10% of medication). Average cost for a traditional healer contact was 5.35 USD. 21.2% (138/650) claim their child's last disease episode had a financial impact on their everyday lives. 29.4% (191/649) state already having had to renounce buying prescribed medication due to financial difficulties.

**CONCLUSION** Our data indicate that even public facilities – contrary to government policies – do not always provide health services free of charge. Current costs are still too high for many disadvantaged families in this part of urban Côte d'Ivoire.

DISCLOSURE Nothing to disclose.

**PS2.134**

**Effect of socio-economic factors on malaria in pregnant women in south west of Nigeria**

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Malaria infection is a disease of the poor which is common in tropic and sub-tropic regions. The eradication of malaria in endemic areas called for the understanding of the people's culture, attitude, socio-economic status and environmental factors.

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This study assessed the role of socio-economic status and demographic characteristic of the people on the prevalence of malaria in south western Nigeria. A well designed and pretested questionnaire was used to carry out this research work. 204 pregnant women were enrolled for this study. Socioeconomic factors have significant effects on the prevalence of malaria in the study area. Malaria was more prevalent among those with menial jobs (craft work, farming and petty traders) compared to those who were civil servants. Moreover, 43.4% of pregnant women who were malaria positive earn below N5000 per month while only 7.4% and 5% of those who earned between N6000 and N15 000, and N15 000 above respectively were malaria positive. Most of the people studied found it difficult to pay for the prophylactic and chemotherapeutic drugs and therefore they resorted to using herbs for the treatment of malaria. More than 50% of those who had stagnant water and bushes around their houses were malaria positive. Majority of people enrolled for this study complained about the negative effect of insecticide treated bed net (ITN) and decided not to use it. This study showed that poor socio-economic status and lack of education are the major factors contributing to the high prevalence of malaria in the area studied.

DISCLOSURE Nothing to disclose.

**PS2.135****Gender inequality in HIV prevalence by area of residence in Sub-Saharan Africa**

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**INTRODUCTION** In Sub-Saharan Africa (SSA) prevalence of HIV is higher for women than for men, with women accounting for 58% of people living with HIV. Factors contributing to this gap are gender power imbalance, women's lower socioeconomic status, and women's higher biological susceptibility to HIV. In addition, young women tend to marry men that are older than themselves who are at increased risk of being infected. Recent trends show declining HIV incidence in SSA and our aim was therefore to examine whether changes have occurred in the female:male HIV prevalence ratio.

**METHODS** The analyses were based on data from the Demographic and Health Surveys which included HIV testing. These are nationally representative household surveys conducted on average every 5 years in most SSA countries on participants aged 15–49 years. The surveys were based on two-stage stratified cluster sampling. By using data from 18 countries with two survey rounds (2001–2008 vs. 2007–2014) and dividing the countries into 3 regions (Western/Central, Eastern and Southern) we were able to examine cross-country and regional changes in the female:male HIV prevalence ratio over time. Logistic regression models were run separately for each country and region. All analyses were stratified by sex and area of residence. **RESULTS** Overall, the prevalence ratio tended to be higher in urban than rural areas. Age adjusted analysis of changes over time indicate that in urban areas the prevalence ratio increased from the first to that last survey round in 12 countries and decreased in six countries (five and two were significant, respectively). Results from rural areas showed that nine countries had increasing and nine had decreasing prevalence ratios (six significant changes in total). Age-adjusted regional analysis showed an increase in the prevalence ratio from the first to the last survey round in urban Southern Africa and in rural Eastern Africa.

**CONCLUSION** Women continue to carry the greater burden of HIV in SSA and there is no clear change in the gap between men and women, as the direction and magnitude of change in the female:male HIV prevalence ratios vary greatly across SSA.

DISCLOSURE Nothing to disclose.

**PS2.136****Rural Indian caregivers recognition of pneumonia and health care seeking behavior: reasons why unqualified health care providers are often their first treatment preference**

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**INTRODUCTION** Health care in India is provided by public and private providers, the former being qualified in various disciplines of medicine, while the latter being either qualified or unqualified medical practitioners commonly referred to as registered medical practitioners (RMPs). Based on their prior experience, we elicited rural Indian caregivers' choice, with reasons, of health care providers for treating a hypothetical child under five years of age with CAP of varying severity.

**MATERIALS AND METHODS** In 7 districts of rural North India, qualitative research using key informant interviews (KIIs) and semi-structured interviews (SSIs) with narration of case scenarios of pneumonia, severe pneumonia and very severe pneumonia as well as focus group discussions (FGDs) with video presentations of these three severities of CAP were conducted. Respondents were caregivers of under-five children who had suffered from respiratory illness earlier.

**RESULTS** From September 2013 to January 2014, 28 KIIs, 42 SSIs, and 35 FGDs were conducted. Fast breathing without lower chest indrawing was not recognized as CAP and the majority initially tried home remedies. If there is no improvement, most preferred treatment by RMP for 2–3 days. On perceived deterioration caregivers took the child to private clinics in nearby towns. Public health facilities were visited mostly after trying other health care providers, or on their recommendation. The reasons for preference for RMPs was their 24/7 availability within the village, good standing in the community, social acceptability for women to visit him alone with the sick child, dispensing medicine including injects on demand for quick recover, charging lower fees which could be given in kind or even later, and their offering transport. Caregivers did not inquire about the professional qualification of providers. The visible physical attributes of a 'good provider' were availability of equipment/facilities such as: thermometers, blood pressure instruments, nebulizers, assistants, a clinic with a glass partition for the patient waiting area and charging higher fees than a RMP.

**CONCLUSIONS** Excess deaths by CAP in rural India are in part due to delayed recognition, delay in qualified care-seeking and inappropriate treatment since RMPs are the preferred health care provider. Interventions are needed to encourage RMPs to refer cases of CAP to doctors, making such referrals a win-win situation.

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DISCLOSURE Nothing to disclose.

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## PS2.137

**Malaria treatment-seeking behaviour and correlates among pregnant women in Ondo West Local Government Area, Nigeria**

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Delay in diagnosis and treatment of malaria increases morbidity and mortality among pregnant women. Several factors and knowledge about the causation of disease and its curability have direct correlation with the treatment seeking behaviour. This study was aimed at identify factors associated with different malaria treatment behaviours among pregnant women and explore these factors to gain information to guide the planning of preventive strategies and treatment of malaria among pregnant women in Ondo West Local Government Area. A descriptive cross-sectional study was conducted among 240 pregnant women who presented with signs and symptoms of malaria. They were selected consecutively through purposive sampling methods across the four selected ANC centres. A set of interviewer-administered questionnaire was used to collect data on socio-demographic characteristics, knowledge, and major influencing factors of treatment-seeking behaviours for the study. Knowledge of malaria was assessed on a scale of 100 points with scores  $\geq 75$  rated as high level knowledge while score of 50–74 as average knowledge. The mean age of the respondents was  $22 \pm 1.1$ . One hundred and eighty three (76.3%) had high knowledge of malaria transmission, symptoms, and prevention, despite this; only 100 (41.7%) sought early malaria treatment. Those with high level of malaria knowledge were 4.55 times more likely than those with average knowledge to seek for early malaria treatment (OR = 4.55, CI = 2.17–9.55). Those with no formal education were 99.7% less likely than those with post tertiary education to seek early malaria treatment (OR = 0.003, C.I = 0.00–0.07). Also, those who have only primary education were 96% less likely than those with post tertiary education to seek for early malaria treatment (OR = 0.04, C.I = 0.05–0.30). The pregnant women within age group of 18–24 years were 82% less likely than those of 35 years and above to seek early for malaria treatment (OR = 0.18, C.I = 0.04–0.84). In conclusion, whereas the knowledge of pregnant women about malaria cause, transmission, signs and symptom was good, most of the pregnant women still sought late for malaria treatment. It was noticed from the result that level of education, age, religion and level of knowledge all have significant relationships with treatment seeking behaviour. Therefore we recommend education campaigns to encourage early treatment seeking, especially among younger women and uneducated pregnant women, in Ondo West.

DISCLOSURE Nothing to disclose.

## PS2.138

**Ebolang: an epidemic facing the challenge of multilingualism. The case of Western Ivory Coast**

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Recent epidemic history has demonstrated the dependency of remote populations on global capacities for intervention, but also – allowance is made for magnifying media effects – the dependency of the system of global health on local resilience. Global welfare thus depends not only on access to health ser-

vices of poorer regions but concurrently with it on equal access to key knowledge on prevention, management of cases and, given poverty as a seedbed for health hazards (Chan 2014), of its economic and social consequences. The WHO's guide on 'Outbreak communication' insists that communication must be inclusive and participatory: 'total engagement of affected communities... as the key to control'. (2005: 16).

A workshop on the role of local languages in fighting Ebola in Western Ivory Coast, co-sponsored by the Swiss Research Center (CSRS), at the height of the threat in October 2014 near the border of two countries hardest hit by the pandemic, united 30+ linguists, social anthropologists, health workers and local resource persons around the hypothesis that those most directly exposed to the threat, doubly vulnerable to it due to lack of consolidated knowledge and of arguments to counter heterodox speculations on its nature – moreover perceived as a 'threat from the jungle' (NZZ, 6 November 2014) – would be, if provided with full access to information in their languages, a strategic human asset in the fight against it.

Results, corroborated by follow-up field inquiries, include:

- 1 a plea for historically exoglossic models of communication to be complemented, in a multilingual milieu privileging endoglossy, by pluralistic strategies for stabilizing relevant knowledge, ensuring its permanent reproducibility in local languages, reducing e.g. communicative dependency of less privileged key actors (elders, women);
- 2 the key role of local languages
  - a as an epistemological tool for 'understanding how people understand', as a prerequisite to acceptance (WHO guide, French version, 2008: 9);
  - b as a creative resource for the elaboration of a body of reference material,
  - c as workplace, attested by a sample of terminology and flyers for sensitization in 5 languages, validated through a 4-step cycle with all participant categories,
  - d as an agreed focus of further cooperation with local health authorities.

Making crisis communication sustainable remains a lasting challenge for extending full benefits of knowledge-based society to those still deprived from them.

DISCLOSURE Nothing to disclose.

## PS2.139

**Why gendered health promotion for non-communicable disease prevention matters: older Zanzibari women and their reluctance to follow the doctor's advice**S. Staudacher<sup>1,2,3</sup>

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Public Health professionals are warning about the serious cardiovascular and other complications of obesity and diabetes, as well as about further non-communicable diseases (NCDs), which could overwhelm developing countries, that are already straining under the burden of communicable diseases. Especially in urban areas and among older people an increase of NCDs can be observed. States and non-governmental organizations (NGOs) wish to improve programs, design laws and policies that respond effectively to the different situations of older women, compared to men. These governmental and NGO actors would like to foster older peoples' participation in health promotion to reduce



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the burden of NCDs, but often lack 'key indicators and data disaggregated by age and sex' (UNFPA and HelpAge International 2012). Furthermore, the perspectives and experiences of the older people themselves suffering from NCDs that would allow adapting interventions to cultural circumstances is often missing.

A medical anthropological research on the health of people above 60 years of age in the city of Zanzibar has shown that older women especially, often seemed reluctant to follow the doctors' advice to change their health behaviour. Medical staff in Zanzibar's urban hospitals gave 'gender-neutral' health advice to older patients but older men and women translated them differently into their everyday health practices. While for example men often adhered to recommendations of doing walking exercises to mitigate NCDs and their consequences, older women frequently disregarded the advice. Older women mostly agreed with the doctors that it was important to stay physically active but did not feel comfortable to go for a walk outside as it was recommended – since many of them were not used to leave their house to walk alone in the streets. An easy solution to this culturally inappropriate suggestion to do sports outside the private space could be to propose exercises that the women are able to do at home or together in groups with other older women in a more shielded place.

The paper thus argues for the need of gender sensitive approaches to enhance the participation of older men AND women in engaging in health promotion for NCD prevention, acknowledging their different ways of health practices in old age/their different ways of living. Such approaches can only be achieved by studying local constructions of gender norms related to age and the socio-cultural context.

DISCLOSURE Nothing to disclose.

**PS2.141**

**Health-related quality of life and its association to medication adherence in pulmonary tuberculosis in South Africa – a systematic review of qualitative and quantitative literature**

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**INTRODUCTION** Pulmonary tuberculosis (PTB) is a leading cause of morbidity and mortality in South Africa. Clinical parameters are important objective outcomes in PTB; however they often do not translate into meaningful patient outcomes, which can be assessed using patient-reported outcome (PRO) measures. Health-related quality of life (HRQOL) is a specific PR of multi-dimensional nature including physical, mental and social health domains and can provide additional information beyond clinical parameters. It has been shown to be associated to medication adherence. The main objective of this research is to understand patient-reported HRQOL and its association to medication adherence in PTB patients in South Africa.

**METHODS** A comprehensive search strategy was developed with regard to PTB focusing on: impact on patient-reported HRQOL; existence of a conceptual framework of PTB-specific HRQOL; determinants of medication adherence; association of HRQOL and medication adherence. Additional data extraction was performed by two independent researchers on longitudinal

studies assessing patient-reported HRQOL and medication adherence. Research gaps were identified with regard to patient-reported HRQOL and medication adherence in South Africa. **RESULTS** A total of 65 articles met the eligibility criteria. Ten HRQOL and one adherence studies performed a longitudinal design and applied different generic and disease specific HRQOL instruments, but a validated and reliable PTB-specific HRQOL instrument is lacking. Four HRQOL and seven adherence studies were performed in South Africa. Active PTB significantly impacted HRQOL and impairment of HRQOL was influenced by a number of factors, including socio-demographic (age, gender), socio-economic (income, education, housing condition, social security), disease-related (symptoms), therapy-related (side effects, adverse events), and psycho-social (depression, anxiety, isolation, stigmatization, financial burden) aspects. Similar factors were found to affect medication adherence. Although standard PTB treatment improved all health domains, psychological well-being and social functioning remained impaired in microbiologically cured patients after treatment. **CONCLUSION** Evidence of PTB impact on HRQOL and medication adherence in South Africa is missing. An assessment of HRQOL and its association in PTB in South Africa will improve current disease management programmes and national guidelines in South Africa.

DISCLOSURE Nothing to disclose.

**PS2.142**

**The perceptions and perspectives of patients and health care providers on chronic diseases management in rural South Africa: a qualitative study**

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**BACKGROUND** Preventive health care represents the future for health care delivery in South Africa to improve management of chronic diseases as this has been implemented for some time in several countries to tackle the increasing burden of chronic diseases. Individual person's health is unique, as they move in and out of chronic and acute health care phases, there is need to integrate chronic and acute care constructs to improve continuity of care and maximize health and improve wellbeing. The aim of this study was to determine the perceptions and perspectives of chronic patients' and nurses regarding chronic disease management in terms of barriers, facilitators and their experiences.

**METHODS** To meet our aim we used qualitative methods involving the collection of information by means of focus group discussions in Dikgale Health and Demographic Surveillance System (HDSS). All data was recorded, transcribed verbatim and analysed using data-driven thematic analysis.

**RESULTS** Our study showed that chronic disease patients have a first contact with health care professionals at the primary health care level in the study area. The main barriers mentioned by both the health care workers and chronic disease patients are lack of knowledge on chronic diseases, shortage of medication and shortage of nurses in the clinics which causes patients to wait for a long periods in a clinic. Health care workers are poorly trained on the management of chronic diseases. Lack of

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supervision by the district and provincial health managers together with poor dissemination of guidelines has been found to be a contributing factor to lack of knowledge in nurses among the clinics within the study area. Both patients and nurses mentioned the need to involve community health workers and traditional healers and integrate their services in order to early detect and manage chronic diseases in the community.

**CONCLUSIONS** Nurses and chronic disease patients mentioned similar barriers to chronic disease management. Concerted action is needed to strengthen the delivery of medications at the clinics, improve the chronic disease knowledge for both nurses and patients by conducting in-service trainings or workshops, increase the involvement of community health workers and establish a link (through formal referral system) with traditional healers.

**KEYWORDS** Chronic Disease Management, Chronic Patients, Knowledge, Medication Supply, Trainings, Nurses, Qualitative research.

**DISCLOSURE** Nothing to disclose.

**PS2.143****Evidence based interventions for improving management of chronic non-communicable diseases in Dikgale in Limpopo Province, South Africa**

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**BACKGROUND** Chronic disease management (CDM) is an approach to health care that keep people as healthy as possible through the prevention, early detection and management of chronic diseases. The aim of this study was to develop an integrated evidence-based model for the management of chronic non communicable diseases (NCDs) in a rural community of Dikgale in Limpopo Province, South Africa.

**METHODS** The study was conducted in Dikgale rural area of Limpopo Province in South Africa using a developmental study design. Data collected by quantitative research methods with the aim to determine the prevalence of chronic NCD risk factors and qualitative research methods with an aim to determine the perceptions, perspectives, challenges and barriers for chronic disease management by people with chronic conditions, the nurses, community health workers (CHWs), traditional health practitioners (THPs) and managers in the chronic disease programmes were analyzed using quality circles.

**FINDINGS** Epidemiological transition is occurring in Dikgale and this rural area already has a high burden of risk factors for NCDs. The main barriers mentioned by nurses, chronic disease patients, CHWs and THPs are lack of knowledge, shortage of medication and shortage of nurses in the clinics which causes patients to stay for a long period in clinics. Lack of training on the management of chronic diseases, supervision by the district/provincial health managers together with poor dissemination of guidelines has been found to be a contributing factor to lack of knowledge in nurses and CHWs. THPs revealed that the cultural insensitivity from the nurses (disrespect) makes them not to collaborate on health service delivery.

**CONCLUSIONS** Our study suggests an urgent need for adopting healthy life style modifications and the development of an integrated chronic care model. This highlights the need for health interventions that aim to control risk factors at the population level, improve a link with traditional healers and integrate their services in order to early detect and manage chronic diseases in the community. Therefore Primary Health Care (PHC) services should increasingly accommodate screening for chronic NCDs including risk factors. The developed model will serve as a contribution to the improvement of NCDs management in rural areas.

**KEYWORDS** Community involvement, Health System Performance, Integrated Chronic Disease Management, Interventions.

**DISCLOSURE** Nothing to disclose.

**PS2.144****Patients' perceived importance and performance of TB-HIV services in five hospitals in Indonesia**

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**INTRODUCTION** Indonesia is classified as a high TB, high TB/HIV and high MDR-TB burden priority country by WHO. There is thus a critical need to align TB and HIV services in the country's healthcare facilities, including hospitals. We aimed to assess patients' perceived importance and performance of TB-HIV related services in five hospitals in Indonesia.

**MATERIALS AND METHODS** This was a cross-sectional study in five hospitals in Indonesia. Seventy-five eligible TB patients were selected consecutively from the five hospitals (three private and two public). The subjects were interviewed with QUOTE (Quality of care as seen through the eyes of patient) TB instrument on their perceived importance and performance of TB-HIV related services. Data were analyzed descriptively. **RESULTS** Fewer than half of patients perceived information on TB-HIV linkage (42.7%), HIV prevention (42.7%), HIV test (22.7%), and Antiretroviral Therapy (22.7%) to be very important. Most patients did not receive any information on TB-HIV linkage (64.0%), HIV prevention (65.3%), HIV test (86.7%) and Antiretroviral Therapy (65.3%).

**CONCLUSIONS** This study shows lack of awareness of TB patients in regard to TB-HIV linkage and services. There is also a lack of HIV related information and services provided to TB patients in hospitals. While both hospital TB team and HIV team exist, the collaboration of the TB and HIV program at hospital level should be strengthened.

**DISCLOSURE** The study received financial support from Otsuka S.A.

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**PS2.145****Evaluating the rate of drug-therapy adherence among type 2 diabetes mellitus out-patients in a tertiary care hospital in North-West Nigeria**S. Mohammed<sup>1</sup>, C. K. Yilseng<sup>2</sup>, F. Sani-Bello<sup>3</sup> and N. Umar<sup>4</sup><sup>1</sup>Health Systems and Policy Research Unit, Department of Clinical Pharmacy and Pharm. Practice, Ahmadu Bello University, Zaria, Nigeria;<sup>2</sup>Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Nigeria;<sup>3</sup>Department of Medicine, Ahmadu Bello University, Zaria, Nigeria;<sup>4</sup>London School of Hygiene & Tropical Medicine, London, UK

**INTRODUCTION** Patient adherence to prescribed therapies in type 2 diabetes mellitus, including medications and lifestyle changes, is an area of importance due to the strong relationships between adherence, patient outcomes, and treatment costs. The objectives of this research study are to evaluate the rate of drug-therapy adherence among type 2 diabetes mellitus out-patients, and to identify possible factors responsible for poor adherence among these patients.

**METHODS AND MATERIALS** This retrospective cross-sectional study was conducted between August and September 2014 at Ahmadu Bello University Teaching Hospital (ABUTH) Zaria. 207 patients were recruited through systematic sampling. Patients' adherence was individually assessed during an exit interview using a structured questionnaire, based on Morisky 8-item medical adherence scale. Adherence level score was calculated; scores of 8, <8–6 and <6 were considered good, moderate and poor adherences respectively. The data was analyzed using statistical software. Chi-square was used to determine the relationship between adherence and socio-demographic characteristics of the patients. Furthermore, patients medical conditions and adherence to treatment with oral hypoglycemic agents was examined.

**RESULTS** Out of the 207 patients, 14% (29), 43.5% (90) and 42.4% (88) were in the good, moderate and poor adherence categories respectively. Significant differences ( $P < 0.05$ ) were found in gender, marital status, duration of disease condition, educational level and occupational status. Non-significant differences were found in terms of age, types of anti-hyperglycemic agents used and type of therapy.

**CONCLUSIONS** The rate of drug-therapy adherence among type 2 diabetes mellitus out-patients in ABUTH was found to be suboptimal (moderate adherence). Several factors in this study have been correlated with drug-therapy adherence among type 2 diabetes mellitus out-patients. Consideration of risk factors leading to poor adherence to treatment is fundamental before recommending any treatment method for diabetic patients in order to address problem of lack of adherence to medication therapy.

**DISCLOSURE** Nothing to disclose.

**PS2.146****Attitude and knowledge of primary health care physicians and local inhabitants about leishmaniasis in west Alexandria**

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**BACKGROUND** Leishmaniasis is a worldwide disease, affecting 88 countries, it is estimated that about 350 million people are at risk of leishmaniasis. Overall prevalence is 12 million people with annual mortality of about 60 000. Annual incidence is 1 500 000 cases of cutaneous leishmaniasis (CL) worldwide and half million cases of visceral Leishmaniasis (VL).

**OBJECTIVES** The objective of this study was to assess primary health care physicians' knowledge (PHP) and attitude about leishmaniasis and to assess awareness of local inhabitants about the disease and its vector in four areas in west Alexandria, Egypt. **METHODS** This study was a cross-sectional survey that was conducted in four PHC units in west Alexandria. All physicians currently working in these units during the study period were invited to participate, only 20 PHP completed the questionnaire. 60 local inhabitants were selected randomly from the four areas of the study, 15 from each area; data were collected through two different specially designed questionnaires.

**RESULTS** 11 (55%) percent of the physicians had satisfactory knowledge, they answered more than 9 (60%) questions out of a total 14 questions about leishmaniasis and sandfly. The second part of the questionnaire is concerned with attitude of the primary health care physicians about leishmaniasis, 17 (85%) had good attitude and 3 (15%) had poor attitude. The second questionnaire showed that the awareness of local inhabitants about leishmaniasis and sandfly as a vector of the disease is poor and needs to be corrected. Most of the respondents (90%) had not heard about leishmaniasis. Only 3 (5%) of the interviewed inhabitants said they knew the sandfly and its role in transmission of leishmaniasis.

**CONCLUSIONS** Knowledge and attitudes of physicians are acceptable. However, there is room for improvement through formal training courses and distribution of guidelines, in addition to raising the awareness of primary health care physicians about the importance of early detection and notification of cases of leishmaniasis. Moreover, health education for raising awareness of the public regarding the vector and the disease is necessary because related studies have demonstrated that if the inhabitants do not perceive mosquitoes to be responsible for diseases such as malaria they do not take enough measures to protect themselves against the vector.

**KEYWORDS** leishmaniasis, PHP, knowledge, attitude, local inhabitants.

**DISCLOSURE** Nothing to disclose.

**PS2.147****Trends in provider behavior captured through routine monitoring of case management of fever among accredited providers in Uganda**

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Coverage of fever case management interventions remains low across sub-Saharan Africa, including Uganda. While many caregivers seek treatment for symptoms of fever in the private sector, private sector outlets may not have adequate diagnostics, training, waste management, and first line quality assured treatments to ensure appropriate case management.

The Malaria Consortium together with FIND, PSI and WHO are implementing a project creating a private sector market for quality assured RDTs in malaria endemic countries from April 2013 to date targeting private sector. Accredited outlet types including drug shops, pharmacies and clinics have been established, and participating members received training in integrated case management for febrile illnesses, supportive supervision, quality assured malaria rapid diagnostic test kits, and waste management services.

Malaria Consortium UNITAID Private Sector RDT project implements a program monitoring system that collects routine data on a monthly basis. Data are captured by accredited private

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providers in a client register on phones and outpatient slips, and which includes information on symptoms (e.g. fever), assessment (e.g. RDT results), and case management (i.e. referral, treatment). The register facilitates tracking numbers of patients, number of treatments administered, outcome of treatment and the extent to which providers are providing correct case management according to the treatment algorithm. Patient register data were entered into a database for calculation of indicators across the project. Trends in provider behavior over time will be presented. Implications for improving quality of care in the private sector, and approaches to effectively monitoring private providers will be discussed.

**DISCLOSURE** Nothing to disclose.

**PS2.148****Sustaining the future of HIV/TB counseling: time to formalize the role of lay counselors**

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**BACKGROUND** In many settings with a high HIV/TB burden, task-shifting strategies have relied on lay workers to provide HIV testing and counseling (HTC) and adherence support. While in some countries these tasks were integrated into the work of existing community cadres, in other settings new basic cadres have been created, supported mainly through international funds. Agreements made with donors have mostly been to provide temporary support until a long-term solution was found. Unfortunately, there are few examples where ministries of health have been able to absorb lay counselors into their health system or otherwise sustain their work.

**METHODS** We aim to document the role of lay counselors in HTC and adherence support and assess bottlenecks related to operationalization and sustained support through a convenience sample of eight countries across sub-Saharan Africa: Guinea, Lesotho, Malawi, Mozambique, South Africa, Swaziland, Zambia, and Zimbabwe. Sources of information include literature review; review of national policies; donor proposals and key informant interviews with government staff and partners around harmonization of approaches (including job profiles, training, supervision and entry criteria), inclusion in national strategies, and financing of lay counselors.

**RESULTS** Lay counselors have played a critical role in scaling up HIV and TB services. In most countries, however, task-shifting to lay counselors is done in the absence of a supportive policy framework and is inadequately addressed by national human resources for health strategic plans. Countries have taken several steps in recognizing the lay counselors and harmonizing approaches to training, job descriptions and support, but formal integration of this cadre into national health care systems is limited.

**CONCLUSION** The current trend of reduced donor support for recurrent costs, such as salaries of lay counselors, combined with lack of national prioritization, threaten the sustainability of this cadre and the important support they provide to HIV and TB service delivery. Counseling services are critical to many of the recommendations put forward in the 2013 WHO consolidated guidelines on the use of ARV drugs, including viral load monitoring and early initiation of antiretroviral therapy (ART), and are also key to reaching the '90-90-90' targets put forward by UNAIDS.

**DISCLOSURE** Nothing to disclose.

**PS2.150****The role of the family in smoking behaviour among children in Jakarta, Indonesia**

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In Indonesia, the prevalence of smoking among 5–9 year-old children has increased from 0.4% in 2001 to 2% in 2007. Among present adult smokers (>20 years), 17% started to smoke before the age of 13 years. This study identified factors related to smoking behaviour among 8–12 year-old children in Jakarta, Indonesia using a questionnaire-based cross-sectional survey to obtain smoking status and possible predictors towards smoking habit. The total sample size was 1097 students among 3rd–7th grade students from schools in Jakarta. Self-reported smoking status was defined as whether the child had smoked tobacco within the past 2 months prior to the interview. The prevalence of smoking was 13.4%. Logistic regression analysis showed that high parental approval of tobacco use (OR = 13.4; CI 95%: 5.1–35.1) was the strongest predictor on children smoking status, followed by low parental control (OR = 12.1; CI 95%: 6.9–21.2), being male (OR = 10.7; CI 95%: 5.3–21.7), mother (OR = 10.58; CI 95%: 3.96–28.28), father (OR = 7.69; CI 95%: 3.59–16.47), sibling (OR = 7.91; CI 95%: 4.41–14.17) smoking status. Smoking parents and siblings, low parental control, and high parental approval of smoking were related to higher odds of smoking among children. The results were used to make suggestions and recommendations for future intervention programs and tobacco-related research with a specific focus on children.

**DISCLOSURE** Nothing to disclose.

**PS2.151****Prevalence and social-structural determinants of extramarital affairs in South-Eastern Tanzania**

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**INTRODUCTION** Extramarital relations increase the risk of HIV transmission. Numerous articles in sub-Saharan Africa have been written about extramarital affairs, but there are relatively few observational data on social and structural factors influencing the behavior. This paper assesses prevalence and correlates of extramarital relations in Ifakara, Tanzania.

**METHOD AND MATERIALS** In order to identify factors influencing extramarital relations among adults in Ifakara, Tanzania a cross sectional study was used. Quantitative data were collected in 2013 on 3988 married individuals aged 15+. Chi-Square ( $\chi^2$ ) test was used to assess associations between extramarital affair and each of the independent variables. Factors associated with extramarital affair were identified in multivariable analysis using logistic regression.

**RESULTS** Overall prevalence of extramarital affair among married men and women in the last 12 months was 6.65% (12.9% for men and 3.5% for women). Only 7.3% of those engaged in extramarital affair had tested for HIV. The odds of engaging in extramarital affairs were significantly higher among men and women with stable income (OR = 2.39, 95% CI 1.47–3.90). Alcohol non-consumption significantly reduced the risk of engaging in extramarital affair among men and women (OR = 0.54, 95% CI 0.41–0.72). Men were three times more likely to engage in extramarital affair than females (OR = 3.50, 95% CI 2.59–4.74).



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**CONCLUSION** Both men and women in Ifakara town have extramarital affairs. Gender, income and alcohol consumption were the social structural factors associated with extramarital affairs. In the context of high risk of HIV transmission, this evidence offers better opportunities to formulate recommendations for interventions to address extramarital affairs. HIV prevention messages should inform about the risk of extramarital affairs and how higher income, alcohol consumption might increase people's likelihood to engage in extramarital affairs.

**KEYWORDS** Extramarital affair, social structural, adults, Ifakara, Tanzania.

**DISCLOSURE** Nothing to disclose.

**PS2.152****Hand washing with ash and mud, an accepted practice in Malawi: findings from a knowledge, attitudes and practice study**

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**INTRODUCTION** Improved water-sanitation and hygiene in Malawi could save hundreds of lives and prevent the population from poor health outcomes. Information about community members' behavior in WASH is limited. A field study in a Red Cross project was conducted to investigate the knowledge, attitudes and practices.

**METHODS** Using population-based sampling and structured questionnaires, 451 women from Mzimba and Salima Districts in Malawi were selected for administered interviews. 12 focus group discussions and six interviews with key informants were performed. Data analysis and findings were triangulated, with reference indicators from the national census.

**RESULTS** The study found that participants had partial access to boreholes (373/451), water containers (428/451) and traditional and unimproved latrines (273/451). Fewer houses had hand washing facilities (141/439) and cleaning agents at home (104/444). Hand washing at some of the critical times among the observations were significantly low: after handling animals (26/449), after caring for the sick (29/499), before feeding children (82/449), after urinating (141/449), after cleaning babies (162/449), after defecating (341/449) and before eating (352/449). About half of children under 2 years-old (92/192) had watery stool in the past 4 weeks.

It was observed that most families stored water for cooking and drinking but not washing nor hand washing. Interviews with key informants indicated that eating by hands was commonly practiced and clean hands were perceived as the absence of visible dirt and smell. Interviewees generally did not like the smell of soap on their hands, whilst the smell of other traditional cleaning agents such as ash and mud were accepted. These agents were available at no cost to the family because they practiced cooking with wood stoves. However, ash and mud were under-used for hand washing and absent in the national hygiene promotion and education.

**DISCLOSURE** Nothing to disclose.

**PS2.153****'The importance of blood is infinite': conceptions of blood as life force and fear of trial participation in a Fulani village in the Gambia**

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**BACKGROUND** Clinical trials require maximum participation and low drop-out rates to be successful. However, collecting blood samples from individuals recruited into clinical trials can be challenging when there is reticence about blood-taking. Fears of 'blood-stealing' and 'blood-selling' have ethical implications related to cultural sensitivity and informed consent. This study explores anxieties around blood-taking during a malaria treatment trial in the Gambia for which individuals were screened in their home compounds using rapid diagnostic tests (RDT). If found positive and eligible, individuals were invited to come to the clinic for informed consent and treatment.

**METHODS** This case study is based on ethnographic research in one village, which was theoretically selected from 12 participating villages due to reticence to screening for an MRC malaria treatment trial. The study was ancillary to the clinical trial 'Primaquine's gametocytocidal efficacy in malaria asymptomatic carriers treated with dihydroartemisinin-piperaquine' carried out in the Gambia between 2013 and 2014. Data collection methods included in-depth interviews, participant observation, informal conversations and group discussions.

**RESULTS** In total only 176 of 411 inhabitants in the village accepted having a bloodspot taken to screen for malaria. Although trial recruitment was initially high, some families unprecedentedly refused screening when rumors started spreading that the trial team was taking too much blood. Concerns about 'loss of blood' were equated with loss of strength and lack of good food to replenish bodily forces. All families in the study village were preoccupied with harvesting their millet fields at the time of recruitment for the trial. Those who hesitated to get screened weighed up their ability to work on the fields against the 'loss of blood and strength' that was believed to be a consequence of participating in the trial.

**CONCLUSION** A common recommendation to prevent and avoid rumours against public health interventions and trials is the provision of full and consistent information, which is thought to lead to more accurate knowledge of the purpose of the intervention. However, even when information provision is continuous, the emergence of rumours can be related to times of uncertainty and is often a reflection of structural inequalities and diverging value orientations between communities and public health institutions.

**DISCLOSURE** Nothing to disclose.

**PS2.155****Knowledge, attitude and practice towards infection control measures amongst healthcare workers in a medical teaching hospital of Calicut district, Kerala, India**

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**INTRODUCTION** Healthcare workers must know the various measures for their own protection. They should improve organization of work, implement standard precautions and

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dispose biomedical waste properly to prevent occupational exposure. This study aimed at assessing the knowledge and attitude towards infection control measures amongst healthcare workers in a medical teaching hospital of Calicut district, Kerala, India.

**MATERIALS AND METHODS** This cross-sectional study was conducted by using a pretested semi-structured proforma, by interview cum observational technique. 120 healthcare workers (70 hospital staff including nurses and technicians and 50 medical interns) were selected using convenient sampling and their knowledge, attitude and practice towards infection control measures were studied.

**RESULTS** Of the 120 participants, the majority (85.8%) was aware of disposing used needles and syringes in puncture-resistant containers but only 55.7% were actually practicing it. 75.8% of the participants were aware about not recapping the needles after use but on observation, only 35.4% were practicing this. All healthcare workers were aware about the indication for using masks and gloves while handling patients, while only 77.1% were using them. We also found that only 61.8% washed their hands after attending every patient, 94.3% cleaned the area with a sterile swab before giving injections and only 35.7% of the labs/wards/operation theatres had three colored bags. A few (11.7%) of the workers have already been exposed to infectious blood samples and some (19.2%) are still not immunized against Hepatitis B.

**CONCLUSION** There is a need for improvement in the knowledge, attitude and practice of infection control measures among healthcare workers for both self and patient's protection. They should also get themselves immunized against Hepatitis B and report accidental exposure to infectious samples to the infection control committee.

**DISCLOSURE** Nothing to disclose.

**PS2.157****Knowledge, attitudes and practices about tuberculosis and choice of communication channels in Thailand**

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**BACKGROUND** The aim of this study was to assess tuberculosis (TB) knowledge, attitudes and practice in both the general population and in risk groups in Thailand.

**METHODOLOGY** In a cross-sectional survey a general population ( $N = 3074$ ) and family members of a TB patient ( $N = 559$ ) were randomly selected using multistage cluster sampling and interviewed.

**RESULTS** The average TB knowledge score was 5.7 (maximum = 10) in the Thai and 5.1 in the migrant and ethnic minorities general population, 6.3 in Thais with a family member with TB and 5.4 in migrants and ethnic minorities with a family member with TB. In multivariate linear regression among the Thai general population higher education, higher income and knowing a person from the community with TB was significantly associated with level of TB knowledge. Across the different study populations 18.6% indicated that they had ever undergone a TB screening test. Multivariate logistic regression found that older age, lower education, being a migrant or belong to an ethnic minority group, residing in an area supported by the Global Fund, better TB knowledge, having a family member with TB, and knowing other people in the community with TB was associated having screened for TB.

**CONCLUSION** This study revealed deficiencies in the public health knowledge about TB, in particular among migrants and

ethnic minorities in Thailand. Socio-demographic factors should be considered when designing communication strategies and TB prevention and control interventions.

**DISCLOSURE** Nothing to disclose.

**PS2.158****Knowledge, attitudes and practices regarding malaria among the residents of Nouakchott, Mauritania**

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Malaria accounts for over 22% of the total morbidity in outpatients and about 51% of deaths in health facilities in Mauritania.. In Nouakchott, the capital city of Mauritania, malaria cases, mostly due to *Plasmodium vivax*, have dramatically increased in the recent years with more than 2000 laboratory-confirmed cases in Teyarett health center in 2013. The objective of this study was to determine the knowledge, attitudes and practices (KAP) of the household community in Nouakchott regarding malaria in order to provide information to plan community-oriented malaria control activities. A randomly selected sample of 1796 households in nine districts of Nouakchott was surveyed from May to June 2013 using a pre-tested survey instrument, which consisted of 95 questions on demographic characteristics, socioeconomic factors, educational status, knowledge and perceptions of malaria, burden and severity of disease, treatment-seeking behavior, and malaria prevention practices. The survey was performed by face-to-face interview of adults. Women represented 79% (1415/1794) of the interviewed individuals. Almost all individuals (99.6%; 1790/1796) were aware of malaria, and 91.8% (1650/1796) of them mentioned the radio (47.2%) and television (44.6%) as the main sources of information on malaria. Of 1796 interviewed persons, 1718 (95.5%) correctly associated malaria with mosquito bites. The main signs and symptoms of malaria mentioned were fever (85.6%), headache (73.7%), chills (70.1%), and vomiting (60%). Sixty percent of respondents reported having used anti-malarial drugs prior to hospital attendance. Thirty nine percent (715 households) owned at least one insecticide-treated bednet, and 72.8% of bednets had been purchased by the owners themselves. However, concerning the prophylactic use of anti-malarial drugs during travels to endemic areas, only three respondents were able to use the drugs correctly. The majority of persons interviewed for this study (84.6%) recommended the mass distribution of insecticide-treated bednets to control malaria. This assessment of knowledge, attitudes, and practices showed a broad awareness of malaria and also highlights the behaviors to target for limiting the flow of parasite strains, potentially responsible for epidemic, resurgence or spread of antimalarials resistance.

**DISCLOSURE** Nothing to disclose.

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## PS2.159

**Socio-cultural factors influencing pregnant women's adherence to anti-malarial treatment in rural Gambia**F. Jaiteh<sup>1</sup>, S. Dierickx<sup>2</sup>, S. O'Neill<sup>2</sup>, U. D' Alessandro<sup>1,3</sup>, J. Balen<sup>4</sup> and K. P. Grietens<sup>2,5,6</sup><sup>1</sup>Medical Research Council, The Gambia Unit, Banjul, Gambia; <sup>2</sup>Medical Anthropology Unit, Institute of Tropical Medicine Antwerp, Antwerp, Belgium; <sup>3</sup>London School of Hygiene & Tropical Medicine, London, UK; <sup>4</sup>School of Health and Related Research, University of Sheffield, Sheffield, UK; <sup>5</sup>School of Health Development, Nagasaki University, Nagasaki, Japan; <sup>6</sup>Partners for Applied Social Sciences (PASS) International, Antwerp, Belgium

**INTRODUCTION** Non-adherence to anti-malarial treatment in pregnancy has been identified as a major barrier to malaria control efforts. There is limited evidence on the cultural and contextual factors that influence adherence to anti-malarial treatment in pregnancy. This qualitative study was part of the trial Community Based Scheduled Screening and Treatment of Malaria in Pregnancy for Improved Maternal and Infant Health (COSMIC) and looked to understand the socio-cultural factors influencing adherence to medication provided for the treatment of malaria in pregnancy.

**METHOD** Between June–August 2014, an explorative ethnographic study was conducted in three villages in the Upper River Region of The Gambia. Data collected included participant observation and semi-structured interviews. In-depth semi-structured interviews were conducted with 30 participants, which included women of reproductive age ( $n = 15$ ), mothers-in-law ( $n = 5$ ), husbands ( $n = 4$ ) and health workers ( $n = 6$ ). All interview transcripts and field notes were entered, coded and analysed using NVivo Version 10.

**RESULTS** The study identified reasons for non-adherence to anti-malarial medication to be based on pregnant women and community members lay interpretation of the symptoms of malaria in pregnancy, women's misconceptions on the purpose and efficacy of anti-malarials; as well as strong familial influences on the use of alternative traditional anti-malarial medication. Pregnant adolescents and older women were identified as those at most risk of non-adherence due to limited contacts with health workers. For adolescents, limited contact was as a result of delayed disclosure of pregnancy linked to feelings of awkwardness and social shyness. For older mothers, delayed disclosure of pregnancy was associated with their social role and position.

**CONCLUSION** Insufficient information on malaria in pregnancy treatment is a concern in rural areas of Gambia. Culturally adapted community-based health information and treatment should be targeted to pregnant women especially adolescents and older pregnant women who are at risk of being isolated from treatment for malaria in pregnancy. Additionally, mothers-in-law and husbands should be included in facility and community based health promotion programs targeted at pregnant women.

**DISCLOSURE** Nothing to disclose.

## PS2.160

**Assessment of knowledge and behaviour of cardiovascular risk factors among adults in communities of South Tajikistan**

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**INTRODUCTION** Health literacy is linked to individual and community empowerment by improving access to and use of

health information by people. This research assessed the health knowledge and -behaviour of community group members in Tajikistan about cardiovascular (CVD) risk factors so to address them through health promotion and -education activities within the 'Enhancing Primary Health Care Services Project'.

**METHODS AND MATERIAL** An instrument on CVD risk factors was developed in 2015 by a national committee of experts from the fields of healthy lifestyle, family medicine, community groups, and health education. The items were evaluated according to the criteria 'wording', 'appropriateness', 'difficulty' and 'relevance'. Items with a content validity index  $<0.75$  were removed. The instrument was then refined by the experts and pilot tested. Data were analysed along characteristics such as age, gender, rural/urban, demography and occupation. **RESULTS** 1197 adults were interviewed and complete data were obtained from 1183 participants. The female to male ratio was 7:3. 'Stress', 'high blood pressure' and 'obesity' were most cited cardiovascular risk factors. Countermeasures included 'losing weight', 'actively controlling blood pressure', and 'eating less sugar and fat'. The knowledge question 'in diabetes patients, the insulin system works normally' was correctly answered less likely by woman than men (OR = 0.63), people having their own business (OR = 0.53) or people having no regular job (OR = 0.58) compared to those working in the public sector, people financially depending from relatives, pension or social aid (OR = 0.54) contrary to those with a regular salary, and more likely by people from urban areas (OR = 2.17) than those from rural areas.

**CONCLUSION** Our findings indicate that poor health knowledge is more common among deprived population groups in Tajikistan. The content and language of health promoting behaviour messages should thus be tailored to educational and occupational characteristics of the population.

**DISCLOSURE** Nothing to disclose.

## PS2.161

**The attitudes and degree of awareness about MERS-CoV among Saudis of different ages**

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**BACKGROUND** Middle East respiratory syndrome coronavirus (MERS-CoV) that causes Middle East Respiratory Syndrome (MERS) disease was first identified in 2012 in Saudi Arabia. Since then, cases have spread within the Kingdom and some cases were transmitted to other Middle Eastern countries, Europe and the United States. However, the Kingdom of Saudi Arabia (KSA) remains the epicenter of this serious respiratory infection that is associated with high mortality rates. This accentuates the public health concerns because Saudi Arabia receives millions of pilgrims from all over the world.

**AIMS** This study investigated the attitudes and degree of awareness about Middle East Respiratory Syndrome-Coronavirus (MERS-Cov) among Saudis of different ages.

**PATIENTS AND METHODS** Structured anonymous closed ended dichotomous questionnaires were distributed to a large population of Saudi men and women of different ages. The questionnaires included questions about modes of transmission of corona virus, clinical features, outcome of infection, the impact of infection on pilgrimage, methods of prevention, the governmental efforts to combat spread, the availability of information.

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**RESULTS** Respondents were recruited for the study by random selection. Sixty-eight percent of respondents have good knowledge about the mode of transmission, 82% were aware about the seriousness of the infection, 51% responded positively to non availability of curative treatment or vaccine. 74% knew the modes of prevention and 93% believed that the government efforts were successful. Of the respondents, 41% considered Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) was a serious risk during Hajj or Umrah. Government media, the Saudi Ministry of health posters, radio and television, the social media was the main source of information among young adults and older participants.

**CONCLUSION** The findings suggest that the level of awareness about MERS-Cov in among this Saudi population is high and the level of perception reasonable. The governmental health education campaign is critical for increasing Middle East Respiratory Syndrome -Coronavirus (MERS-Cov) infection awareness.

**DISCLOSURE** Nothing to disclose.

**PS2.162****Knowledge and attitude towards HIV vaccine trial concepts among youth of Mangalore City**

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*Public Health Dentistry, Yenepoya University, Mangalore, India*

**BACKGROUND** AIDS vaccine is seen as the ultimate prevention tool that will complement the existing prevention strategies in place. Patients participate in HIV vaccine trials with hope that developing a safe and effective AIDS vaccine is possible. To begin to understand adolescent attitudes to these complex issues, and inform our future work with adolescents in HIV vaccine trials, we undertook a formative study examining attitudes towards such trials, potential motivating factors and hypothetical willingness to participate, among youth.

**METHODS** A self-administered, facilitated questionnaire was administered to 277 students in pre university colleges, Mangalore, India from August 2012 to February 2013. The questionnaire explored general HIV knowledge, perception of adolescent risk, knowledge of vaccine concepts, willingness to participate in future vaccine trials, perceived personal and social harms and benefits associated with participation as well as barriers and facilitators to participating in future HIV vaccine trials.

**RESULTS** 277 college-going youth provided consent to participate, and if under 18, we also obtained written consent from a parent. Of the 241 participants who responded to the question on HIV testing, 10% indicated that they have tested for HIV. Of The majority (57%) of participants believed that parents should give permission for their child's HIV test while most of the participants (84%) believed that parents should know the HIV status of their child.

**CONCLUSIONS** The youth report high degrees of willingness to participate in HIV vaccine trials. This may be related to the high levels of adolescent HIV risk perception. The spectre of HIV infection looms regardless of age group, and adolescents are no exception. Indeed, public health practice would seem to indicate that effective vaccination of this subgroup above all would result in the greatest reduction in new infections.

**DISCLOSURE** Nothing to disclose.

**PS2.163****Knowledge and attitude regarding hepatitis B virus infection and vaccine among hospital patients**

S. S. Katpattil

*Public Health Dentistry, Yenepoya University, Mangalore, India*

**BACKGROUND** Hepatitis B is a potentially life-threatening infection caused by the hepatitis B virus. It is the most serious type of viral hepatitis. About 400 million people have the virus, with most of these people living in Asia. Clearly, this is a significant public health and medical problem. With this background, the study was conducted to evaluate knowledge and attitude regarding HBV (Hepatitis B virus) infection and its vaccine among the patients attending tertiary care hospital.

**MATERIALS AND METHODS** A cross-sectional study was done among 856 patients attending a tertiary care hospital, at Mangalore, India, from November 2010 to May 2011 after approval from the institutional ethical committee. A pretested structured questionnaire was used to measure the participants' knowledge and attitude regarding HBV (Hepatitis B virus) infection and its vaccine after obtaining informed consent.

**RESULTS** In all, 856 patients (698 male and 158 female) were studied. 50% of those who were aware had no knowledge about route of transmission, infectivity, or importance of vaccination. Educated individuals were more aware about hepatitis B vaccine ( $P < 0.05$ ). The percentage of vaccination was 25% among study subjects. Lack of awareness was the common reason for non – vaccination (50%); of them.

**CONCLUSIONS** Knowledge of Hepatitis B disease and vaccine was low and misconceptions were common. About one third of the population are vaccinated for hepatitis B. Emphasis should especially be laid on awareness campaigns to educate the public that hepatitis B is vaccine preventable disease. Knowledge of hepatitis B may be useful in determining health care interventions strengthening community-based care for patients.

**DISCLOSURE** Nothing to disclose.

**PS2.164****Public health needs applied linguistics – communication optimisation at an international research project**

K. Pelikan

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Communication can be seen as the backbone of every collaboration and hence is essential for international research projects. External communication and different methods for facilitating 'research into action' are a highly discussed and well elaborated topic. Unfortunately, reducing communication to dissemination by neglecting internal communication is a common approach in science although the implications are obvious.

With the aim of achieving efficient knowledge transfer by optimisation of the project communication in mind, the internal communication of an international research project in the area of public health will be the topic of this presentation, the case study of a PhD in applied linguistics. Operating in six countries, the project examined the access to seven tracer medicines in Africa and India. Coming from different countries and disciplines and speaking different mother tongues, project members formed a heterogenic group working together daily.

After defining efficient communication in this setting and identifying some barriers to efficient knowledge transfer, the access



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to communication optimisation and its accomplishment will be discussed in this presentation. At the presented project the interplay of knowledge management, data management and communication played an essential role for the success of the communication and therewith for the success of the research project. Different methods from applied linguistics, their application, as well as their limitations will be complemented by methods from other disciplines used. All these methods focus on conscious communication optimisation by direct intervention – but within the project were also unconsciously developments, such as a project specific terminology.

Following a hands on approach, the results of this study will be presented with suggestions for validation and application for further research projects. The used combination of methods leads to results related to communication issues caused by the used language, the project's communication structure, and the used information technology.

This presentation aims to give evidence that there is a need for considering about internal communication, combined with an overview on how to use applied linguistics for communication optimisation in science.

DISCLOSURE Nothing to disclose.

**PS2.165****Determinants of cessation of exclusive breastfeeding in Ankesha Guagusa Woreda, Awi Zone, Northwest Ethiopia: a cross-sectional study**

T. Yeneabat

*Debre Markos University, Debre Markos, Ethiopia*

**BACKGROUND** Exclusive breastfeeding (EBF) is defined as the practice of feeding only breast milk (including expressed breast milk) and no other liquids and solid foods except medications during the first 6 months. Regardless of this recommendation, the time to cessation of exclusive breastfeeding is different in different countries of the world being dependent on different socio-demographic factors, obstetric factors and characteristics of the infant. The risk of diarrheal morbidity and mortality is higher among those who are not on exclusive breastfeeding than those who are. In Ethiopia, health extension workers have been delivering this key message since 2005 after the endorsement of the national infant and young child feeding guideline. However, there is no study that evaluated the time to cessation of exclusive breastfeeding in the study area. The objective of this study was to determine cessation of exclusive breastfeeding and its determinants among mothers of index infants.

**METHODS** A community-based cross-sectional study was conducted from February 13 to March 3, 2012 in Ankesha Guagusa Woreda using both quantitative and qualitative methods. A total of 592 mothers of index children were included in the study using multistage sampling method. Data were collected using an interviewer-administered structured questionnaire. Bivariate and multivariable Cox regression analyses were done to identify factors associated with cessation of exclusive breastfeeding.

**RESULTS** In this study, 392 (69.63%) events of cessation of EBF occurred. Among these, 224 (57.1%) events occurred before 6 months of age, while 145 (37.0%) and 23 (5.9%) occurred at 6 months and after 6 months of age of the index infant respectively. The median duration of EBF was 6.36 months in rural and 5.13 months in urban and this difference was statistically significant on Log rank (Cox-mantel) test.

Maternal and paternal occupational status, place of residence, postnatal counseling on EBF, mode of delivery, and birth order of the index infant were significant determinants of cessation of EBF.

**CONCLUSION** An effort that can ensure the implementation of national strategy on Infant and Young Child Feeding (IYCF) should be undertaken through provision of postnatal care counseling on EBF, routine follow up and support of those mothers having infants emphasizing for working mothers.

DISCLOSURE Authors have no any conflict of interest.

**PS2.166****Factors associated with non-utilization of postnatal care in Ankesha Guagusa Woreda, Awi Zone, Northwest Ethiopia: a cross-sectional study**

T. Yeneabat

*Debre Markos University, Debre Markos, Ethiopia*

**BACKGROUND** For both newborns and mothers, the highest risk of death occurs at delivery, followed by the first hours and days after childbirth. Reduction of maternal mortality by half by the year of 2015 is one of the millennium development goals (MDG5). Maternal mortality, however, is still a problem of many developing countries including Ethiopia, where the maternal mortality rate was 676 per 100 000 live births. Postnatal care service was considered as one of the key instrument to achieve the MDG5. Despite its advantages, utilization of postnatal care is low in Ethiopia.

**OBJECTIVE** This study was aimed to assess factors associated with non-utilization of postnatal care in Ankesha Guagusa Woreda, Awi Zone, Northwest Ethiopia.

**METHODS** A community-based cross-sectional study was conducted from February 13 to March 03/2012. The study included a total of 592 mothers of index infants using a multi-stage sampling method. Data were collected by interviewer-administered structured questionnaire. Bivariate and multivariate regression analyses were performed. Level of significance was  $P < 0.05$  at 95% confidence interval.

**RESULTS** 563 mothers were included in the analysis (response rate 95.1%). The mean ( $\pm$ SD) age of mothers was 29.27 ( $\pm 6.29$ ) years. The prevalence of non-utilization of postnatal care in the study area was 42.5%. In multivariate logistic regression, mothers under age 26, educational level of the partner being primary, those who have no food insecurity and mothers in the group of richer wealth index were significantly associated with non-utilization of postnatal care. Mothers who had no antenatal care visit, were vaginally delivered and those assisted by relatives/friends/neighbors had higher odds of non-utilization of postnatal care. However, non-utilization of postnatal care is less likely in mothers who home delivered of their last child and with second and third birth order infants.

**CONCLUSION** Prevalence of non-utilization of postnatal care is high in the study area, especially by younger mothers and those who have not attended antenatal care.

DISCLOSURE Authors have no any conflict of interest.

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**PS2.167****Study on the knowledge, attitudes and practices of malaria and malaria treatment in the small-scale gold mining sector in Suriname, South America**

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**INTRODUCTION** We present the methods, results and conclusion of a knowledge, attitudes and practices study related to malaria treatment in the small-scale gold mining sector in Suriname, South America, executed in 2013. Purpose of the study was to improve access to adequate treatment and adherence to malaria treatment regimes in gold mining areas, thus contributing to the eradication of malaria in Suriname.

**METHODS** Data were collected through survey interviews with miners with a recent history of (suspected) malaria, and qualitative interviews with health experts in three mining areas in Suriname, close to the French Guiana border.

**RESULTS** Diagnosis-seeking and malaria treatment behaviours of inhabitants of gold mining areas are complex, inconsistent, and largely based on practical considerations. A significant share of respondents had experienced their latest malaria in the month preceding the interview (39.8%,  $N = 216$ ). More than half of the interviewees had their latest experience with (suspected) malaria in French Guiana. Persons working in French Guiana also reported more cases of malaria than persons working exclusively in Suriname.

The large distance to formal malaria treatment locations, coupled with easy access to illicit malaria medication in Suriname, motivate self-medication. 127 of a total of 216 interviewees (58.8%) reported that they had used over-the-counter medication at least once in the past 1½ years. Gold miners relying on self-medication were less likely than persons who were diagnosed with malaria to complete their treatment (40.2% vs. 78.9%).

Finally, almost one third of respondents among those who had said that one should complete the cure, had pills left the last time he or she used malaria medication (30.1%;  $N = 156$ ). Overall, less than one third (30.8%) of persons with (suspected) malaria followed the correct steps for malaria treatment the last time they fell ill.

**CONCLUSIONS** The study results suggest that theoretical knowledge of correct malaria treatment does not necessarily translate into responsible treatment behaviour. Besides, malaria, and its eradication should be viewed as a transnational topic. A significant share of malaria cases in Suriname is made up of persons who contracted malaria in French Guyana or in the Suriname-French Guiana border region.

**DISCLOSURE** Report submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.

**PS2.168****Determinants of knowledge, attitude and practice on malaria among residents in Pawe District, North West Ethiopia: a cross-sectional study**

H. B. Beyene, A. H. Mekuria and N. F. Telele

*Microbiology, Immunology and Parasitology, Addis Ababa University, Addis Ababa, Ethiopia*

**INTRODUCTION** A reasonable high knowledge score towards malaria and habit of practicing preventive and control measures by the individual households and the community at large

contribute much to the overall reduction of the malaria burden. Hence this study aimed to assess the knowledge, attitude and practice towards malaria and associated factors.

**METHODS** A community-based, cross sectional study was carried out in the period November, 2010 to January, 2011 in Pawe district, North West Ethiopia. Multi-stage random sampling was carried out to select representative households. A pre-tested structured questionnaire ( $n = 406$ ) was used for data collection. Data was entered and analyzed using SPSS 16.0. Proportions, Odds ratio and 95% CI were computed.

**RESULTS** A 71.5% of subjects mentioned at least three symptoms of malaria. Fifty six percent associated malaria with hunger/skipping meals, as a cause and most (67%), affirmed that mosquitoes transmit the disease. Significant proportions (79.8%) were aware that mosquitoes bite during night. Sleeping under bed net and avoiding collected water sources were identified as major malaria preventive measures by 89.7% and 34% of respondents, respectively. About 69.2% reported that they were using bed nets correctly. Over 50% of the respondents reported delay in treatment. Participants who had education >5th grade and those who received health education from a health facility scored high on knowledge about malaria, correct use of bed nets and early treatment seeking habits [OR (95% CI) = 4.9 (1.4–8), 1.8 (1.4–2.5), 2.2 (1.7–4.1), respectively]. Living in locations away from a health facility with walking time of 60 min or longer was associated with delay in treatment (OR = 1.3, 95% CI = (1.1–2.0)).

**CONCLUSIONS** Though malaria knowledge and attitude scores were high, practice of nationally approved malaria preventive and control measures including early treatment seeking behavior was poor. Inaccessibility of health facility, illiteracy, and lack of health education were determinant factors that affected community KAP towards malaria. Hence, a comprehensive health education, promotion of community education and health facility coverage should be prioritized. Responsible bodies are also urged to ensure that all individual in a household use ITNs correctly, adapt integrated vector control approach and seek treatment early.

**KEYWORDS** Malaria, Determinants, KAP, Pawe, Northwest Ethiopia.

**DISCLOSURE** We authors declare that we have no conflict of interest.

**PS2.169****Effectiveness of Anapanasati meditation on health status of climacteric women**

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**INTRODUCTION** Most women approach menopause have experience with multiple physical and psychological symptoms resulting from the female hormone change which may affect to their social life. This study aims to study the effectiveness of Anapanasati meditation on physical health status, psychological health status and sociological health status of climacteric women.

**MATERIALS AND METHODS** Quasi-experiment was used in this study. Climacteric women were divided into two groups. Twenty four were enrolled in an experimental group. They were trained in Anapanasati meditation for 12 weeks. The control group, twenty-five climacteric women received health advice from health care provider.

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**RESULTS** After the Anapanasati meditation practice, the experimental group significantly improved physical health status, holistic health status ( $P < 0.001$ ) and psychological health status and sociological health status ( $P < 0.01$ ) compared to before the meditation. The experiment group had significantly better physical health status, holistic health status than the control group ( $P < 0.01$ ). There were no significant differences observed between the health status and sociological health status of experiment group and control group. The meditation also showed benefit on decrease systolic blood pressure, pulse rate and respiratory rate.

**CONCLUSIONS** The health promotion of climacteric women by using the Anapanasati meditation can promote the good health status.

**DISCLOSURE** Nothing to disclose.

**PS2.170****Using the behavioral economic model (BEM) to create practical field applications to improve ICS adoption**

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**INTRODUCTION** While the identification of determinants of improved cook stove (ICS) adoption are important and necessary, there can be difficulties with translating these findings in to practical, field applications.

**AIMS** Understanding the enablers and barriers to ICS adoption from policy to household level, can be used to inform program effectiveness and determine the level of impact. The (BEM) provides a framework with which to analyse human behavior through an economic perspective. Using a framework that is based on how people make decisions can be used to help formulate diagnoses and practical solutions for improving ICS adoption. When applied there is a potential for the BEM to be used to translate the enablers and barriers in to usable program designs and improve ICS adoption rates.

**METHODOLOGY** Three communities in Andean Peru (Cajamarca, Cuzco and La Libertad) were involved in focus groups, questionnaires and key informant interviews to identify enablers and barriers of ICS adoption. The methodologies were designed using the socio-economic model (SEM) to ensure that determinants of ICS adoption were explored at from the policy to household level. We will then apply the BEM to the enablers and barriers of ICS adoption, and create practical diagnoses and solutions in a case study format.

**RESULTS** It was found that many of the determinants to ICS adoption could be grouped using a framework of domains and one solution may be viable for a number of barriers. This suggests that by using a holistic, mixed methodology barriers to ICS could be eliminated with relatively few comprehensive solutions.

**CONCLUSION** Practical applications of BEM modelling using the local knowledge of enablers and barriers for ICS adoption can a-priori inform program implementation. The benefit of using the SEM and the BEM models together is that they complement each other and together can be used to form a thorough and complete analysis and solutions for improving

rates of ICS adoption in the field. The application of BEM modelling should be tested in the field. We would encourage the practical use of both the SEM and the BEM in the field to improve long-term adoption of ICS in Andean communities.

**DISCLOSURE** Nothing to disclose.

**PS2.171****Impact of South-to-South technical assistance from Rwanda & Zambia in couples voluntary HIV counseling and testing (CVCT) achievements in 21 countries**

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<sup>1</sup>Rwanda Zambia HIV Research Group, Kigali, Rwanda; <sup>2</sup>Emory University, Atlanta, GA, USA; <sup>3</sup>Projet San Francisco, Kigali, Rwanda; <sup>4</sup>Zambia Emory HIV Research Project, Lusaka, Zambia

**BACKGROUND** CVCT is recommended by WHO for HIV prevention and is associated with reduction in HIV, STI and unplanned pregnancy. Fewer than 5% of African couples have been jointly tested and it is thus critical that CVCT be expanded. The RZHRG Center of Excellence provides training and technical assistance (TTA) to countries and partners wishing to implement CVCT as standard of care in ongoing service delivery or research activities.

**METHOD** Primary data from RZHRG was analyzed to describe TTA events from 2009–2015. TA events were classified as high-level advocacy (including policy, workshops and study tours of RZHRG sites), technical assistance for needs assessments, data management or other program implementation needs and training (of trainers, service providers, community-level promoters and others). Data from recipient countries were analyzed to investigate resulting country-adapted CVCT models, as well as changes in uptake of CVCT.

**RESULT** RZHRG conducted 63 TA events in 21 countries ranging from development of national strategic plans and international workshops to CVCT curriculum adaptations and trainings. Countries such as Botswana and Uganda have demonstrated higher success in CVCT implementation through the roll out of a national CVCT strategy. Increased uptake of CVCT led to increased identification of discordant couples.

Countries such as Ghana and Ivory Coast have made strong commitments to expand CVCT services and are making good progress to that end. Through RZHRG TA, several countries including Namibia and South Africa have an extensive number of trainers across levels and sectors available to scale-up CVCT training efforts. Kenya, Mozambique, Tanzania and Swaziland have sent high level observers to Rwanda and Zambia.

**CONCLUSION** Through TTA, recipient countries were able to acquire tools and skills and multiple levels, which enabled them to more effectively plan for and implement CVCT. This program increased capacity of countries to prioritize and expand locally tailored CVCT activities.

**DISCLOSURE** Nothing to disclose.

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**PS2.172****Chances and challenges of civil-military joint ventures: experiences from the German Ebola Task Force in Liberia**C. E. Frey<sup>1</sup>, C. Janke<sup>2</sup>, H. Sudeck<sup>1</sup> and D. F. Wiemer<sup>1</sup><sup>1</sup>Department of Tropical Medicine at the Bernhard Nocht Institute, German Armed Forces Hospital, Hamburg, Germany; <sup>2</sup>German Armed Forces Medical Command, Munich, Germany

In August 2014 WHO declared the outbreak of Ebola-Virus-Disease (EVD) in West Africa a 'public health emergency of international concern' pushing governments and non-governmental organisations (NGO) to contribute in the fight against the epidemic. On September 22nd the German minister of defence encouraged soldiers to volunteer for a mission to contain EVD in Liberia together with German Red Cross (GRC) volunteers.

The decision to recruit soldiers on a voluntary basis for a joint operation together with members of an NGO was as such unprecedented in German history. Although the mission – by definition – was non-military and pursued humanitarian objectives only, the German constitution does not allow the deployment of soldiers without parliamentary mandate. Therefore, a legal auxiliary construction of German Armed Forces (GAF) acting as 'junior partner' of the GRC was implemented to allow for such an assignment. This was a hitherto unknown position to the military to which it needed to adapt gradually especially as it provided for the majority of volunteers and key logistics including an airlift to transport much needed relief supplies. The concept of volunteering was new to the GAF, still recruitment was facilitated by an existing network of experienced soldiers most of them working for specialized military departments of infectious diseases. Also common requirements like special, tailored-to-mission training before deployment, a routine in GAF, were met by military personnel. This thorough preparation was a solid basis for a successful and safe mission, however it had to be combined with a maximum of flexibility to fully respond to the ever changing epidemiological situation. Being embedded into inter-ministerial structures with a complex administration and a hierarchic decision-making process with differing perceptions in Liberia and in Germany, this was a challenge especially to GAF. Additionally, both partners needed to learn to define responsibilities, to interact with each other and after all to overcome a certain mental reservation.

Considering the ongoing discourse on risks and benefits of military participation in humanitarian action, GAF and GRC are no natural partners and both were brought together rather by need and interdependence than by request. Nonetheless, this cooperation could serve as a model for future disaster relief interventions. Therefore, key issues will be identified and presented.

**DISCLOSURE** Nothing to disclose.

**PS2.173****Vaccinations in acute humanitarian emergencies: Minkamman, Lakes State, South Sudan**I. Ciglenecki<sup>1</sup>, S. Masson<sup>2</sup>, N. Peyraud<sup>1</sup>, M. Simonelli<sup>1</sup>, A. Ventura<sup>1</sup>, C. Dorion<sup>1</sup>, F. Luquero<sup>2</sup> and M. Rulli<sup>1</sup><sup>1</sup>Médecins Sans Frontières, Geneva, Switzerland; <sup>2</sup>Epicentre, Paris, France

**INTRODUCTION** Since December 2013, armed conflict led to a massive displacement of the population in South Sudan and by March 2014, around 80 000 internally displaced persons settled around Minkamman in Awarial County, Lakes State. The population thought remain unstable, with constant movements in and out of the camp. Mass population movements are often

associated with overcrowding and lack of access to basic commodities, and are placing displaced population at increased risk of vaccine preventable diseases. WHO has recently issued a decision making framework guiding actors on how to prioritise vaccines in complex emergencies. MSF, one of the main humanitarian actors providing care in Minkamman, applied this tool to define vaccination priorities. We prioritised vaccines targeting epidemic prone diseases (measles, cholera, meningitis) and main childhood killers (pentavalent, pneumococcal and rotavirus vaccine). We were able to conduct of campaigns against epidemic-prone diseases and report on the feasibility of those.

**METHODS** Mass measles vaccination coupled with oral polio vaccine was organized immediately after the arrival of displaced population. Oral cholera vaccine (OCV) was offered to all individuals older than 1 year (excluding pregnant women) in two vaccinations rounds 3 weeks apart, followed by a catch-up round a month later. The second OCV round was coupled with mass vaccination campaign with meningococcal A (MenA) vaccines, targeting all aged 1–30 years. We conducted retrospective cluster survey to estimate coverage of each vaccine delivered in mass campaigns among those eligible.

**RESULTS** Measles vaccination coverage was estimated at 73.9% (95% CI: 68.8–78.3). The OCV coverage was 65.5% [95% CI: 61.2–69.6] for two doses, and 84.1% (95% CI: 81.5–86.3) for at least one dose (prior to catch-up round). The MenA coverage was estimated at 77.3% (95% CI: 73.5–80.8). No outbreak of targeted diseases was reported in the camp.

**CONCLUSION** We successfully organized a series of vaccination campaigns targeting outbreak-prone diseases in a complex emergency, but were unable to conduct vaccination campaigns against main childhood killers. With highly mobile population it was difficult to achieve high vaccination coverage. Nevertheless the outbreaks of targeted disease were prevented, despite large measles and cholera outbreak on-going elsewhere in the country. Vaccines are available, efficient public health tool, largely underused in humanitarian settings.

**DISCLOSURE** Nothing to disclose.

**PS2.174****Impact of HIV on maternal morbidity, birth outcomes and infant health in Southern Mozambique**R. Gonzalez<sup>1,2</sup>, M. Ruperez<sup>1,2</sup>, E. J. Sevens<sup>2,3</sup>, A. Vala<sup>2</sup>, S. Maculuvu<sup>2</sup>, H. Bulu<sup>2</sup>, A. Nhacolo<sup>2</sup>, A. Mayor<sup>1,2</sup>, J. J. Aponte<sup>1,2</sup>, E. Macete<sup>2</sup> and C. Menendez<sup>1,2</sup><sup>1</sup>ISGlobal, Barcelona, Spain; <sup>2</sup>Manhiça Health Research Centre (CISM), Manhiça, Mozambique; <sup>3</sup>Faculty of Medicine, Eduardo Mondlane University, Maputo, Mozambique

**INTRODUCTION** The impact of HIV infection on maternal and infant's health has mainly been studied in industrialized countries, where the disease burden and health systems are not comparable with the African region. The effect of HIV infection on maternal health, birth outcomes and infant health and survival was analysed in two contemporary cohorts of HIV-negative and HIV-positive pregnant women from southern Mozambique.

**METHODS** Pregnant women attending the first antenatal clinic (ANC) visit were recruited and followed until 1 month after delivery. Recently diagnosed HIV-positive women received antiretroviral therapy (ART) based on their CD4 counts and their clinical stage. Maternal anaemia, morbidity and pregnancy outcomes were assessed. Infants were followed-up until they were 1 month old.



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**RESULTS** A total of 1183 HIV-negative and 561 HIV-positive pregnant women contributed to this analysis. At delivery, 21% of the HIV-positive women reported being on ART, and 70% reported having received ARVs for prevention of mother to child transmission (MTCT). Women positive for HIV were more likely to have anemia both at the first ANC visit and at delivery than women negative for HIV (71.5% vs. 54.8% and 49.4% vs. 40.6%, respectively,  $P < 0.001$ ).

The incidence of all-cause hospital admissions was higher among HIV-positive women compared to HIV-negative women (RR, 2.1, [95% CI, 1.5–2.9];  $P < 0.001$ ). HIV-positive women had an increased risk of stillbirths (RR, 2.16 [95% CI 1.17–3.96],  $P = 0.013$ ). No differences were found in the proportion of peripheral *P. falciparum* parasitemia, placental malaria, mean birth weight, preterm births, miscarriages, maternal and neonatal deaths between groups. The proportion of infants with severe acute malnutrition at 1 month of age was significantly higher in those born to HIV-positive mothers than in infants born to HIV-negative women (2.2% vs. 0.9%,  $P = 0.023$ ).

**CONCLUSIONS** Despite the scale up of ARVs for pregnant women in the last decade in Mozambique, maternal HIV infection is associated with maternal morbidity, poor pregnancy outcomes and infant malnutrition. Public health efforts should be made to improve deployment of ARVs during pregnancy and infancy. Monitoring the effects of HIV infection on both maternal and infant's health should continue in order to evaluate the impact and guide control strategies.

**DISCLOSURE** Nothing to disclose.

## PS2.175

### Effectiveness and safety of cotrimoxazole and sulfadoxine-pyrimethamine in preventing malaria infection during pregnancy in HIV negative pregnant women in Zambia

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Malaria in pregnancy (MIP) is a major public health problem in sub-Saharan Africa where at least 30 million pregnant women are at risk of *Plasmodium falciparum* infection every year. MIP causes significant maternal and infant morbidity and mortality. In Zambia, the main strategy for prevention of MIP is intermittent preventive treatment with sulfadoxine-pyrimethamine (SP-IPTp) and about 73% of pregnant women receive at least two doses of SP-IPTp during pregnancy. In the context of increasing malaria parasite resistance to sulfadoxine-pyrimethamine (SP), the efficacy of daily cotrimoxazole (CTX) for malaria prophylaxis during pregnancy in HIV negative pregnant women was evaluated in Nchelenge district, Zambia.

A total of 750 pregnant women of gestational age of 16–28 weeks were randomized to receive either SP-IPTp or two tablets of CTX (400 mg sulphamethoxazole and 80 mg trimethoprim) daily during pregnancy. Women were followed up

monthly until delivery. Birth weights of the babies were taken within 24 h of delivery.

Birth outcomes were documented in 306 (81%) women in the daily CTX group and 307 (82%) in the SP-IPTp group. The mean birth weights were 3016 grams (95% CI: 2961–3071) and 3034 grams (95% CI: 2977–3090) in the CTX and the SP-IPTp groups respectively. There was no significant difference in the prevalence of low birth weight infants [RR: 1.1; 95% CI: 0.66–1.22;  $P = 0.57$ ] between the daily CTX and SP-IPTp group.

The risk of maternal peripheral parasitemia at delivery was 24% lower in women who received daily CTX compared to those who received SP-IPT [RR: 0.76; 95% CI: 0.63–0.92;  $P = 0.01$ ]. Between groups, there were no differences in the prevalence of placental malaria infection, maternal anemia or severe maternal anemia (a week after delivery).

There were no differences in the prevalence of serious adverse events including caesarean section [RR: 1.63; 95% CI: 0.82–3.20;  $P = 0.12$ ], still births and perinatal mortality [RR: 1.01; 95% CI: 0.71–1.43;  $P = 0.59$ ]. Daily CTX prophylaxis was comparable to SP-IPTp in preventing malaria infection in pregnant women in Nchelenge, Zambia.

**ACKNOWLEDGEMENTS** This study was funded by the Prince Leopold Institute of Tropical Medicine, Antwerp, Belgium.

**DISCLOSURE** Nothing to disclose.

## PS2.176

### The role of men in promoting maternal and newborn health in Burkina Faso

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**INTRODUCTION** In Burkina Faso, the Swiss nongovernmental organisation (NGO) Enfants du Monde, the local NGO Fondation pour le Développement Communautaire/Burkina Faso and UNFPA are supporting Ministry of Health to implement the Health Promotion pillar of the maternal and newborn health (MNH) Road Map. Within the programme, participatory community assessments conducted with community members, including women of reproductive age and male partners, highlight that men act as important household gatekeepers in decisions related to MNH, either facilitating or limiting women's access to resources, including health services. Working with men to help them become active participants in MNH and to assist women in building resilience against MNH problems has become one of the axes of these efforts in response to demands from community members.

**METHODS** Interventions aiming to influence the role of men and thereby increase women's access to MNH services have been implemented since 2010. These include community meetings, household discussions with couples, and implementation of a strategy entitled Pougside songho, or 'Model Husbands.' Within this strategy designed with health workers and community members, men who are exhibiting positive behaviours in supporting women are trained to educate other men in the community on care for women and newborns, on accompanying women to health services and on danger signs.

**RESULTS** Men are accompanying women to health facilities for antenatal care (ANC) and for birth in increased numbers (279 in 2012 to 635 in 2014). Men are increasingly aware of care practices for women during and after pregnancy and for newborns. Utilization of MNH services among women increased

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between 2011–2014: Contraceptive prevalence rate increased from 32% to 58%; initiation of ANC in the 1st trimester increased from 35–47%; postnatal care increased from 38% to 56%; number of births at home went from 25 in 2011 to 37 in 2012 to only six in 2014. Healthcare providers report improved interactions with women and families, increased community participation in care and increased social cohesion and dialogue within the family.

**CONCLUSION** These results suggest that interventions are successfully influencing the roles of men in MNH and that as a result women are better able to access the MNH services which they need. This highlights the importance of targeting men in order increase women's access to MNH services and increase health equity.

**DISCLOSURE** Nothing to disclose.

**PS2.177****Malaria and gravidity interact to modify maternal haemoglobin concentrations during pregnancy**

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**BACKGROUND** Since the implementation of intermittent preventive treatment (IPTp) in sub-Saharan Africa, the effect of malaria-focused preventive measures on anaemia in relation to gravidity has been seldom investigated.

**METHODS AND MATERIALS** We analysed data from three studies carried out in nearby areas in south Benin between 2005 and 2012. At inclusion (ANV1) women's age, area of residence, schooling, parity, gestational age, weight and height were recorded. Thick blood smears were performed on ANV1, second visit (ANV2) and at delivery. Women's serum ferritin and CRP concentrations were also assessed.

The impact of parity on maternal haemoglobin (Hb) was analysed using a logistic or linear regression.

**RESULTS** In total, data from 3591 pregnant women were analysed. Both univariate and multivariate analyses showed a constant association between Hb concentrations and gravidity in the three periods of Hb assessment (ANV1, ANV2 and delivery). Mean Hb concentration was significantly lower in primigravidae than in multigravidae at ANV1 (mean difference =  $-2.4$  g/L,  $P < 0.001$ ). Afterwards, it increased importantly in primigravidae only, with a tendency to reversal between primigravidae and multigravidae which was confirmed at delivery (mean difference =  $2.8$  g/L,  $<0.001$ ). The prevalence of malaria was halved between ANV1 and delivery in primigravidae while it decreased only by 38% among multigravidae, who were less prone to be infected (malaria prevalence at ANV1, 20% and 10% respectively). Iron deficiency was more common in multigravidae, and it decreased slightly in this group between ANV1 and delivery.

**CONCLUSION** In a context of IPTp, primigravidae were shown to improve progressively haemoglobin concentration throughout pregnancy. In multigravidae, the improvement was less perceptible as anaemia was mainly due to iron deficiency. There is a need to reinforce malaria prevention strategies in both groups.

**ACKNOWLEDGEMENTS** We thank the women who participated in the three studies, study staff of the studies, French Institute of

Research for Development, European Union, Malaria in Pregnancy consortium, Bill and Melinda Gates Foundation and MiPPAD executive committee.

**DISCLOSURE** Nothing to disclose.

**PS2.178****Determinants of low maternal and newborn health service utilisation in Haiti**

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**INTRODUCTION** Haiti suffers from among the world's poorest maternal and newborn health (MNH) indicators and utilisation of skilled MNH care by women remains alarmingly low. In 2013, the Swiss non-governmental organizations Enfants du Monde and Médecins du Monde Suisse initiated a project based on the World Health Organization's framework for Working with Individuals, Families and Communities to improve MNH in Petit and Grand Goâve. This programme aims to address the underlying determinants at the community level preventing women and families from accessing MNH services and enjoying optimal MNH. During 2013 and 2014 a participatory community assessment (PCA) and baseline study were conducted to better understand these determinants and lay the groundwork for intervention planning.

**METHODS** For the PCA, six roundtable discussions were conducted with 118 community members.

A mixed-methods approach was used for the baseline. The quantitative component consisted of a randomized survey of 320 women who had given birth during the previous year. Qualitative methods included focus groups discussions with women ( $n = 8$ ) and male partners ( $n = 2$ ) and semi-structured interviews ( $n = 10$ ) with health workers.

**RESULTS** The PCA highlighted a number of factors which contribute to low utilisation of MNH services, which were then explored in depth during the baseline. Notably, awareness of the need to seek health services for both routine care and in response to complications is low and women and men are not aware of danger signs for women and newborns. Cultural practices play a critical role. Women tend to prefer care provided by traditional and spiritual healers and giving birth at home where they can be surrounded by family, have personalized care and give birth in the position of their choice. Moreover, women express low satisfaction regarding formal health services and interactions with providers. Finally, financial limitations play an important role. Women do not know that certain MNH services are to be provided free of charge and they, and their partners, are not inclined to use limited household financial resources to pay for them.

**CONCLUSIONS** These studies revealed a number of social, economic and cultural factors operate at the local level which contribute to preventing women and newborns from accessing MNH services. Effectively improving MNH in Haiti requires not only strengthening the health system but also action at community level to tackle these determinants.

**DISCLOSURE** Nothing to disclose.

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## PS2.179

**Development of a perinatal care guideline during an outbreak of chikungunya and evaluation of neonatal outcomes**

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M. Boele van Hensbroek<sup>3</sup>, R. Voigt<sup>1</sup> and J. Hoj<sup>2</sup>

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**BACKGROUND** Since July 2014 the Caribbean region has been enduring an outbreak of chikungunya virus infection (ChikV). Presenting symptoms in adults are fever, rash and joint pain. However in neonates severe outcomes due to encephalopathy as a consequence of maternal intrapartum infection have been described. Therefore we developed and evaluated a structured approach for suspected ChikV infected mothers and their offspring. In this study we describe the neonatal outcomes in case of maternal ChikV infection and provide a guideline for perinatal care in ChikV infections based on our experiences and literature.

**MATERIAL AND METHODS** A cross sectional study among all pregnant women with clinical symptoms of ChikV during pregnancy and neonates from mothers who were having symptoms intrapartum (3 days antepartum to 3 days postpartum) was conducted in Saint Elisabeth Hospital, Willemstad, Curacao from September 2014 until March 2015. Neonates from suspected mothers having symptoms intrapartum were admitted and observed at the neonatal ward for 7 days. Collection of a fixed set of clinical and laboratory variables in suspected neonates and MRI, within 3 months of age, was done. **RESULTS AND FINDINGS** In total 92 women were enrolled. So far 55 (60%) of the women tested were ChikV positive. Two intra-uterine dead were seen at respectively 21 and 25 weeks gestational age. Three neonates were born premature at 33 and two at 36 weeks gestational age. 13 neonates with suspected intrapartum maternal infection were enrolled; 11 neonates were admitted because of suspected intrapartum maternal infection and two due to severe symptoms (convulsions and intracerebral bleeding) where in retrospect the mother had a confirmed intrapartum ChikV infection. Seven neonates (54%) had severe symptoms; 6 (46%) suspected encephalitis including two neonates with severe convulsions and one neonate had fulminant intracerebral bleeding. Two neonates died <96 h post-partum. MRI was performed during neonatal period or at the age of 3 months, results will follow.

**CONCLUSION** Maternal-fetal transmission can cause severe neonatal outcomes. It is therefore essential, during chikungunya epidemics, to apply a structural approach for observation and supportive care to minimize complications due to severe illness. Here we provide a guideline for perinatal care in Chikungunya infection based on our experiences and literature.

**DISCLOSURE** Nothing to disclose.

## PS2.180

**Can the WAMI index at 6 months predict Bayley Scales of infant development score at 15 months?**

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**INTRODUCTION** The WAMI index is a newly developed tool that measures socioeconomic status by an aggregated score that includes access to improved sanitation, eight selected assets,

maternal education, and household income. The Bayley Scales of Infant Development (the Bayley) is one of the most widely used infant tests in the world that assesses cognitive development. The aim of this study was to determine if the WAMI index at 6 months can predict Bayley scores at 15 months.

**METHODS AND MATERIALS** The study population ( $n = 159$ ) is set in a rural setting of Tanzania. The WAMI index was measured at 6 months. The Bayley was administered at 15 months. A linear regression analysis was performed in SPSS, testing total Bayley score, Bayley motor score and Bayley cognitive score, using backward stepwise method for selection of determinants.

**RESULTS** Multiple regression analysis of determinants of Bayley cognitive score at 15 months showed that assets were a significant determinant ( $P = 0.002$ ); the other predictors were not significant. In this model beta was 0.273 (95% CI 0.326, 1.413), and the model explained 7% of the variation in Bayley cognitive score (adjusted  $R^2 = 0.067$ ). Analysis of Bayley motor and total score at 15 months did not show any significant associations with assets. The total score of the WAMI index at 6 months did not show any significant associations with Bayley cognitive, motor or total score at 15 months.

**CONCLUSIONS** There were statistically significant associations between assets at 6 months and Bayley cognitive score at 15 months. However, there were no other statistically significant associations from our study. In our dataset, the WAMI index at 6 months did not predict Bayley scores at 15 months of age.

This result may be due to a small study population that was selected for other purposes, and we suggest the associations are studied in a study with a larger sample size.

**DISCLOSURE** This study is part of the MAL-ED project sponsored by the Bill and Melinda Gates Foundation.

## PS2.181

**CD20, CD3, placental malaria infections and low birth weight in an area of unstable malaria transmission in Central Sudan**

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**BACKGROUND** Malaria during pregnancy is the main cause of low birth weight (LBW) in the tropics. There are few studies concerning B and T lymphocyte infiltrates in placental malaria infections or their potential association with LBW babies.

**METHODS** A case-control study was conducted at the Medani Hospital, Central Sudan. Cases were women who had LBW deliveries (infants weighed <2500 g) and controls were parturient women with normal birth weight babies.

Sociodemographic and medical characteristics were gathered from both groups of women using questionnaires. Cases and controls were investigated for malaria using microscopic blood film analysis, placental histology, and immunohistochemistry for detection of B (CD20) and T lymphocytes (CD3).

**RESULTS** The two groups (97 in each arm) were well matched in their basic characteristics.

There were no malaria-positive blood films in either the cases or the controls. Twenty-nine (30.0%) vs. 24 (24.7%) ( $P = 0.519$ ) of the cases vs. the controls had placental malaria infections on histological examination. Three (3.1%), two (2.1%) and 24 (24.7%) vs. two (2.1%), two (2.1%) and 20 (20.6%) of the placentae showed evidence of acute, chronic and



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past malarial infections on histopathological examination of the two groups (case-control), respectively, while 68 (70.1%) vs. 73 (75.3%) of them showed no signs of infection;  $P = 0.420$ . Women with placental malaria infections had significantly fewer CD20 cell infiltrates [6 (11.3% vs. 95 (67.4%),  $P < 0.001$ )] and higher numbers of CD3 cell infiltrates [50 (94.3%) vs. 42 (29.8%),  $P < 0.001$ ] than those without placental malaria infection. Logistic regression analysis showed that neither placental malaria infections nor CD3 or CD20 were associated with LBW. **CONCLUSIONS** Significantly higher rates of CD3 T cells and lower rates of CD20 B cells were found in women with placental malaria infections compared with those without such infections. Neither placental malaria infection nor CD3 or CD20 are associated with LBW.

**DISCLOSURE** Nothing to disclose.

**PS2.182****What do women say about the quality of maternal and newborn care services in rural Malawi?**

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**INTRODUCTION** Clients' experience with the care they receive at a health facility shape either positive or negative perceptions about quality of care, and determines future service utilization. Studies that have assessed quality of maternal care from clients' perspectives are limited in Malawi. Therefore, this study aimed at gaining insights about women's experiences and their perceptions about quality of maternal and newborn care services in rural Malawi.

**METHODS AND MATERIALS** We conducted in-depth interviews with 36 women exiting antenatal and postnatal clinics, and those discharged from labor wards in 12 health facilities. Further, we conducted 14 focus group discussions (FGDs) with 168 women who had completed a pregnancy within a year prior to interviews, in catchments areas of the facilities. Furthermore, we conducted in-depth interviewed with 12 nurses (one per facility). The study was conducted from June to August 2014. Interviews were digitally recorded and transcribed verbatim. Data were analyzed using content analysis. **RESULTS** Overall, women had negative perceptions about the quality of care due to poor experiences at the facilities. They complained of poor interpersonal-relations i.e. being disrespected and humiliated by the nurses during delivery; inefficient services i.e. long waiting times; poor nursing care services i.e. inadequate examinations and unmonitored labor and; unsatisfactory physical conditions i.e. small delivery rooms and poor hygiene. While only a few nurses acknowledged the presence of the stated behaviors, most of them agreed that waiting time was too long and examinations are inadequate. However, this was attributed to work load due to few staff. Furthermore, the nurses attested to the small delivery rooms and poor hygiene.

**CONCLUSIONS** Our study suggests poor experiences and perceptions of maternal and newborn care services in Malawi. Most of which are associated with the provider-patient interactions and competence of the providers. As such, urgent interventions are needed to address these.

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**PS2.183****Providers' preference among different statistical models for assessing pro-poor service delivery status of health facilities for maternal and neonatal health (MNH) care in Bangladesh**

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**BACKGROUND** Rich-poor disparity for different MNH indicators are usually assessed by community surveys through determining relative socio-economic status (SES). However, surveys are expensive and not conducted in regular fashion. Different established statistical models like benefit incidence ratio (BIR), sequential sampling technique (SST) and lot quality assurance sampling (LQAS) are available for assessing equitable service delivery from facilities. However, so far, not enough initiatives have been taken for implementation any of these models. Current study aimed to assess providers' opinion on user-friendliness among BIR, SST and LQAS models.

**METHODS** Each of the three different models was used by 86 providers selected from a wide range of health facilities. The implementation process had two steps. In the first step, the SES status of the client was determined by asking a pre-set of questions regarding ownership of selected household assets. A poor was detected by an aggregated score, less than that corresponding to bottom 40% of the population level, estimated through principal component analysis. The second step involved determining the pro-poor service delivery status of the facility by using minimum required number of clients (ranging 9 to 50) using each of the three models. After implementation, the providers were interviewed for their opinion on acceptability of the models.

**RESULTS** More than half (56%) of the care providers reported SST to be the easiest one for analysis and decision-making. The corresponding figures for BIR and LQAS were 15% and 29% respectively. When the care providers were asked about their opinions for overall satisfaction level in using the different statistical models, 67%, 19%, and 14% reported in favour of SST, LQAS, and BIR respectively. Although the average time required for analysis and decision-making between the LQAS (17 min) and SST (18 min) did not statistically differ, that for BIR was high (21 min) ( $P = 0.000$ ). When the care providers were asked about having any problem in implementing the models, a few of the providers mentioned about the requirement of further training and additional time for this activity.

**CONCLUSIONS** The SST was found as the most preferred statistical method for analysis and decision-making for assessing equity in service delivery. This method has potential to be used with any standard monitoring tool to monitor gain in equity in service delivery from a health facility.

**DISCLOSURE** Nothing to disclose.



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## PS2.184

**Developing a brief tool for assessing pro-poorness of service delivery from public health facilities for maternal and neonatal health (MNH) care in Bangladesh**S. Akhter<sup>1</sup>, M. Rahman<sup>1</sup>, R. Thomas<sup>2</sup>, A. Bhuiya<sup>1</sup> and M. E. Chowdhury<sup>1</sup><sup>1</sup>Center for Equity and Health Systems, International Center for Diarrheal Diseases Research in Bangladesh (ICDDR, B), Dhaka, Bangladesh; <sup>2</sup>UNFPA, Dhaka, Bangladesh

**BACKGROUND** Rich-poor disparity for different maternal and neonatal health (MNH) indicators are usually assessed by community surveys through determining relative socio-economic status (SES). However, surveys are expensive and not conducted in regular fashion and also difficult to use at the point of service delivery. Intervention programmes have been developed and implemented to strengthen facility-based MNH service delivery. However, there is lack of a simple tool to monitor the pro-poorness of service delivery of the health facilities as a result of a programme.

**OBJECTIVE** This study aimed at developing a simple tool (list of minimum number of assets) to correctly identify the poor patients at health facility level for assessing pro-poorness of service delivery of a health facility.

**METHODOLOGY** Using publicly-available BDHS 2011 data and applying principal component analysis (PCA) technique we identified a set of minimum number of assets to correctly identify the poor. The list of minimum number of asset variables that met the basic assumptions of PCA analysis and generated a wealth index having the highest sensitivity, specificity, and kappa agreement to identify the poor was considered the final asset list for this study.

**RESULTS** To classify an individual as poor or non-poor, we had identified the lists of minimum number of assets-12 assets for urban households and 19 assets for rural households. These lists generated a wealth index that had high sensitivity (94.8% for urban households and 90.7% for rural households), and high specificity (94.6% for urban households and 91.9% for rural households). We had considered the national indices for urban and rural households from Bangladesh demographic and health survey (BDHS) 2011 as the gold standards. These final tools showed 'excellent agreement' (kappa = 0.89 for urban households and = 0.82 for rural households) and 'high internal coherence' (Cronbach's alpha = 0.88 for urban households and = 0.82 for rural households) with the national indices for urban and rural households. The generated wealth indices from both tools were also strongly correlated (R = 0.97 for both urban and rural households).

**CONCLUSIONS** This simple, valid, and reliable tool for identifying poor patients at the point of service delivery, has potential to be implemented in a larger scale to monitor pro-poorness of service delivery from different types of health facilities in Bangladesh and other developing countries.

**DISCLOSURE** Nothing to disclose.

## PS2.185

**For what do district health managers in Ghana use their working time? A time use survey in three districts**M. Bonenberger<sup>1,2</sup>, M. Aikins<sup>3</sup>, P. Akweongo<sup>3</sup>, X. Bosch-Capblanch<sup>1,2</sup> and K. Wyss<sup>1,2</sup><sup>1</sup>Swiss Centre for International Health, Swiss Tropical and Public Health Institute, Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>School of Public Health, University of Ghana, Legon, Ghana

**BACKGROUND** Ineffective district health management potentially impacts on health system performance and service delivery. However, little is known about district health managing practices and time allocation in resource-constrained health systems. Therefore, a time use study was conducted in order to understand work time allocation patterns of district health managers in Ghana.

**METHODS** All 21 district health managers working in three districts of the Eastern Region were included in the study and followed for 3 months. Daily retrospective interviews about their time use were conducted, covering 1182 person-days of observation. Time use of all district health managers combined was assessed as well as the different managerial cadres and work time allocation patterns over time.

**RESULTS** District health managers used most of their working time for data management (16.6%), attending workshops (12.3%), financial management (8.7%), training of staff (7.1%), drug and supply management (5.0%), and travelling (9.6%). The study found significant variations of time use across the managerial cadres as well as high weekly variations of time use impelled mainly by a national vertical program.

**CONCLUSIONS** District health managers in Ghana use substantial amounts of their working time in only few activities and vertical programs greatly influence their time use. Our findings suggest that efficiency gains are possible for district health managers. However, these are unlikely to be achieved without improvements within the general health system, as inefficiencies seem to be largely caused by external factors.

**DISCLOSURE** MB received financial support from the Freiwillige Akademische Gesellschaft (FAG) Basel, Switzerland. Funding for the project was received from the European Commission's Seventh Framework Programme under grant agreement no 266334.

## PS2.186

**Factors influencing the work efficiency of district health managers in low-resource settings: a qualitative study in Ghana**M. Bonenberger<sup>1,2</sup>, M. Aikins<sup>3</sup>, P. Akweongo<sup>3</sup> and K. Wyss<sup>1,2</sup><sup>1</sup>Swiss Centre for International Health, Swiss Tropical and Public Health Institute, Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland; <sup>3</sup>School of Public Health, University of Ghana, Legon, Ghana

**BACKGROUND** There is evidence that district health managers influence health system performance and thus, poor and inefficient district health management is likely to negatively affect health systems. This study aims to identify factors affecting inefficient district management practices, strategies to cope with these factors, and possible ways to improve efficiency.

**METHODS** We conducted 19 semi-structured interviews with district health managers in three districts of the Eastern Region in Ghana, which comprised 90% of the district health managerial workforce working in these districts during data

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collection in 2013. The data was analysed through a thematic framework method analysis.

**RESULTS** Financial constraints, human resource shortages, inadequate means of transport, and poor communication of upcoming activities from the regional and national levels were identified as key factors for inefficient district health management. Strategies to cope with such factors included reutilisation of vertical program funds and donor funds to carry out field activities, prioritising time-bound activities, and making extensive use of unqualified personnel to carry out managerial activities. The main suggestion from respondents on how to improve managerial efficiency were with regard to improving planning, communication and time management skills of district health managers, but also these of managers at all other levels of the health system, from the sub-district level to the national level.

**CONCLUSIONS** Inefficient district management is a result of constraining factors at all levels of the health system and are not caused by district health managers alone. Interventions to improve efficiency at district level can only yield positive results if a systems approach is used which tackles inadequacies in the entire health system.

**DISCLOSURE** MB received financial support from the Freiwillige Akademische Gesellschaft (FAG) Basel, Switzerland. Funding for the project was received from the European Commission's Seventh Framework Programme (FP7) under grant agreement no 266334.

**PS2.187****Social inequalities in cervical cancer risk – Mozambique**

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**OBJECTIVES** Cervical cancer is the most common cause of cancer morbidity and mortality in sub-Saharan Africa. Social factors are mostly ignored in cervical cancer research. The objective of this study was to identify social inequalities in cervical cancer risk.

**METHODS** A hospital based case-control study was conducted, comparing 133 patients diagnosed with invasive cervical cancer admitted to the department of oncology (cases) with 120 age-matched patients free of any cervical malignancy admitted to the department of gynecology (controls). Data were collected by standardized interviews by nurses at the Central Hospital, Maputo. Social inequalities were measured by education, employment and income.

**RESULTS** Statistical analyses showed that education was most strongly associated with cervical cancer risk. Cancer cervix patients were generally less educated than the controls, and significantly more of them had only <2–3 years of schooling. Illiteracy was more common among the cancer cervix patients (30% vs. 7% in controls). Illiterate women were less likely to attend health education classes, to consult health professionals, and were subsequently diagnosed at a later stage than educated women. Low educational attainment was associated with adverse sexual and reproductive behavior. There were no significant differences in employment rate between cases and controls; however the cancer patients were generally in poorer occupational positions than the controls. Although the cancer patients reported poorer employment, there were no differences between the groups as to adequacy of income.

**CONCLUSION** Social inequalities in cervical cancer risk were evident. Poorly educated and illiterate women had a significant excess risk of cervical cancer.

**DISCLOSURE** Nothing to disclose.

**PS2.188****When is procurement expected to harm clinical practice – a qualitative study**

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**INTRODUCTION** Certain healthcare system processes are assumed to constrain the delivery of good quality of care. The procurement of high-risk medical devices influences long-term clinical results. Quality of care can be influenced in terms of clinical practice of medical devices respectively underlying procurement process practices. The main research objective of this project was to understand the relationship between procurement processes for orthopaedic medical devices and clinical practice in three European countries as well as Mexico.

**METHODS** 59 interviews of different stakeholders were performed in four countries to assess procurement processes of orthopaedic devices. Interviews took place in Mexico ( $n = 24$ , 40.6%), Switzerland ( $n = 14$ , 23.8%), UK and Germany (each  $n = 10$ , 17.0%). One interviewee represented the EU. 23 (39.0%) participants were government officials, 19 (32.2%) were hospital staff or medical supplier, and 17 (28.8%) were surgeons. An analytical conceptual model was applied to determine differences across countries and across stakeholders.

**RESULTS** Respondents emphasized the close interrelationship between procurement process and clinical practice. If disconnected, it negatively impacts the quality of the rendered service, clinical use and clinical efficacy of medical devices. The four countries differed in their purchase strategy and in the way in which the procurement processes involved the surgeon in decision-making. In Mexico (tendering) and Germany (buying syndicates) price partially overrules important factors related to clinical practice. Surgeons' needs and participation in decision-making are disregarded and limited. In Switzerland and UK, self-regulating processes prevail. Surgeons, suppliers, and government officials shared similar opinions. Differences were derived from stakeholders with a focus on regulatory or strategic health care provision. This was peculiar for Mexico. Only government officials with advisory function emphasized findings on procurement strongly.

**CONCLUSIONS** An understanding of opinions and experiences of stakeholders having certain powers to influence procurement process practices in Mexico based on programmes improving quality or increasing the use of clinical evidence is missing. The assessment of the relationship between procurement process interrelations and quality of care will help to improve the purchase of medical devices in general and the purchase of orthopaedic medical devices in particular.

**DISCLOSURE** Nothing to disclose.

**PS2.189****Health system actors' participation in primary health care in Nepal**

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**BACKGROUND** Community participation in Primary Health Care (PHC) has been a major theme in health system debates since the declaration of Alma Ata on PHC in 1978. The government of Nepal and other health providers have

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incorporated community participation into their health policies and programme. However, community participation has mostly been understood as villagers using available services and not as active contributors to their design, delivery and local appropriateness.

**METHOD** A qualitative study was conducted to understand community participation in PHC in Nepal. Forty-one semi-structured interviews and four focus group discussions were conducted with different stakeholders from 21 groups of health systems actors in two Village Development Committees (VDCs). Interviews were transcribed and translated, then coded using NVivo10. Themes and subthemes were developed from these codes using an inductive approach, before a thematic framework was applied for analysis.

**FINDINGS** Financial benefit, social power and spiritual gains are the main motivators for participation, however, there is limited understanding of what participation means amongst key actors. There are not enabling relationships between actors to facilitate community participation, whilst poverty, gender, caste and social hierarchy were found to be the main barriers for community participation in PHC. Contrary to high community engagement in socio-cultural activities in the villages, there is less participation in PHC than the government and some outside agencies claim, with village members still only engaging with PHC as service users.

**CONCLUSION** Community participation in the two VDCs remains low. Levels of engagement are influenced by factors including; local context, socio-economic status, gender, ethnicity, caste, politics and ease of access to services. If communities are to be engaged with all aspects of PHC delivery, a greater understanding of what participation means is required as well as a focus upon the root causes of peoples' participation and non-participation.

**DISCLOSURE** Nothing to disclose.

**PS2.190****Prioritizing neglected tropical diseases to achieve universal health care in the Philippines: lessons from four villages in Leyte province**

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**INTRODUCTION** The year 2015 is the fifth year of the drive towards Universal Health Care (UHC) in the Philippines. However, achieving UHC in the context of the post-2015 agenda will require prioritizing neglected tropical diseases (NTDs) that continue to affect poor communities.

**METHODOLOGY** In March 2015, using the Kato-Katz technique we examined stool specimens of adults and children who belong to 209 randomly-selected families in four rural villages in Leyte, Philippines. Nutritional status of children was described using BMI-for-age. The wealth index of each family was calculated based on the asset-based approach. Adults were

interviewed about past treatment and access to the national social health insurance (PhilHealth) and conditional cash transfer (CCT) programs. Data analysis was done using the Generalized Linear Mixed Model.

**RESULTS** Prevalence of schistosomiasis (SCH), soil-transmitted helminthiasis (STH), and co-infection, respectively, was 13.7%, 64.0%, and 10.5% in adults ( $n = 408$ ) and 11.6%, 65.1%, and 9.1% in children ( $n = 519$ ). An adult with SCH was 2.8 times likely to have a child with SCH; conversely, a child with SCH was 13.8 and 5.8 times likely to have a parent and sibling, respectively, with SCH. An adult with STH was 3.9 times likely to have a child with STH; a child with STH was 4.6 times likely to have a parent with STH. An adult with co-infection was 2.9 times likely to have a child with co-infection; a child with co-infection was 16.9 and 4.8 times likely to have a parent and sibling, respectively, with co-infection. Wealth index was inversely associated with SCH (OR = 0.8) and co-infection (OR = 0.8) in adults and STH (OR = 0.8) in children. An adult with PhilHealth was 2.5 times likely to have co-infection, while a child in a CCT family was 2.9 and 2.8 times likely to have SCH and co-infection, respectively. Being underweight was not associated with SCH or STH in children. Previous treatment was not associated with SCH or STH in adults and children.

**CONCLUSION** Results indicate that effective control of SCH and STH in these villages remains far from reach. Consistent with the global emphasis on integrated control that goes beyond mass treatment, results suggest the need for a creative control strategy that targets families at-risk. Moreover, as UHC cannot be achieved through coverage alone, findings also suggest the need to examine how the current drive towards UHC should set the stage for better NTD control in support of the post-2015 agenda.

**DISCLOSURE** This work was supported by the Ateneo de Manila University, Philippines.

**PS2.191****Social inequality and occurrence of Dengue**

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**INTRODUCTION** The occurrence of most infectious diseases is associated with poor living conditions (LC). However, with regard to dengue, there is still controversy about this relationship. The objective of this study was to verify the existence of social inequalities in the spatial distribution of dengue in Itabuna/Brazil, 2009.

**METHODS AND MATERIALS** An ecological study was carried out, with census tracts (CT) as units of analysis. An index of living conditions (LCI) was calculated for each CT of the city. These were grouped into four strata of best, middle, low, and very low LC and then dengue incidence and Relative Risk/RR was calculated for each stratum. Spatial autocorrelation was evaluated by the Moran Global Index. The relationship between spatial distribution of dengue incidence and LCI, and among LCI and each variable that makes up this index, beyond of the Premix Index (PI) was examined by spatial linear regression.

**RESULTS** The incidence of dengue in Itabuna was 7387.7/100 000 inhabitants. All CT notified cases of dengue, but those of better LC had higher rates. Significant spatial autocorrelation (0.542;  $P = 0.01$ ) between LC and PI was identified. The incidence of dengue in CT with better LC (10 379/100 000) was 2.5 times higher than that in the very low LC. Spatial linear

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regression indicated a significant negative association ( $\beta = -0.007$ ;  $P = 0.05$ ) between dengue incidence and LCI.

**CONCLUSION** The epidemic transmission of dengue virus in Itabuna occurred throughout all urban area, regardless of class social. Possibly, the highest risk of dengue observed in stratum of best LC was due to others factors, such as:

1. Higher level of herd immunity, preexistent among the poor-est, to circulating serotype;

2. Greater receptivity of the environmental conditions of the homes of the wealthier for proliferation of *Aedes aegypti* and hence, greater circulation of this mosquitoes in those areas.

**KEYWORDS** Dengue; Spatial distribution; Living Conditions, Social Inequality.

**DISCLOSURE** Nothing to disclose.

**PS2.192****Racial disparities in child health: a longitudinal analysis of mothers employing the multiple disadvantage model**

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**INTRODUCTION** A study employing the recently developed multiple disadvantage model examined racial disparities in associations between children's health and their mothers' health, mental health, access to care, substance use, social relationships, and social structural factors.

**METHOD** The sample for this secondary data analysis was nationally representative, comprising 4373 mothers of newborns, interviewed for the Fragile Families and Child Wellbeing Study (FFCWS). The mothers were interviewed five times by FFCWS between 1998 and 2009. The outcome variable, *child health*, was measured by a mother's report of a child's general health based on two categories, 'poor' and 'good'; 2149 African American children, 1244 Hispanic children, and 980 White children were involved.

**RESULTS** Generalized estimating equations conducted separately for the three ethnic groups showed likelihood of reported good health to be associated positively with mother's health (current health and health during pregnancy). The impact of mother's health on child's health was stronger among African American than White mothers. For African American children, good health's likelihood was associated with mothers' educational level, receipt of informal child care, receipt of public health insurance, uninsured status, and absence of depression. For Hispanic children, good health's likelihood was associated with mothers' educational level, receipt of substance-use treatment, and non-receipt of public assistance.

**CONCLUSIONS** Fostering good health in mothers appears to be vital for children's good health. This is especially so for African American mothers, whose access to informal child care and public health insurance is also important for their children's health. Additionally, for African American mothers with depression, promotion of help-seeking behaviors is important. Hispanic mothers in this study were willing to pursue substance-use treatment. Immigrant Hispanic mothers probably received little public assistance, due to restrictive policies.

**DISCLOSURE** Nothing to disclose.

**PS2.193****Understanding the motivation and performance of community health volunteers involved in the delivery of health programmes: a realist inquiry**

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Trained and supported community health volunteers can contribute to better health outcomes low and middle income countries. However, the extent to which the capacity building strategy influences the performance of community health volunteers needs further exploration. This paper presents the result of a realist inquiry that aimed to understand the factors influencing the performance of Red Cross (RC) community health volunteers involved in the delivery of an immunisation programme in Kampala (Uganda).

Given the complexity of capacity building intervention, we used a realist approach. A case study design was adopted and two cases were selected in Kampala (each case is a RC branch run by a programme manager). We collected data through mixed methods, including document review, participant observation, interviews with the two branch managers and with 30 volunteers.

People decide to volunteer with RC in Kampala for extrinsic motives on one extreme to intrinsic motives at the other end. How their motivation evolves over time is influenced by how the RC managers respond to them. A capacity building programme – that include autonomy supportive supervision, skill and knowledge enhancement – adapted to the different sub-groups of volunteers lead to satisfaction of the three key drivers of volunteer motivation: feelings of autonomy, of competences and of connectedness. This contributes to higher retention, better task performance and well-being among the volunteers. Enabling contextual conditions include RC responsiveness to community needs and recognition from the Uganda RC Society and the community to the volunteers.

A management approach that caters for the different motivational states and changing needs of the volunteers will lead to better performance. The findings inform the Uganda RC Society on their local operations. As part of a larger research, they will contribute to strengthen RC capacity building programmes.

**DISCLOSURE** Competing interests: None Funding The study is funded by the International Federation of Red Cross and Red Crescent Societies (Geneva, Switzerland). Gaëlle Vareilles is the recipient of a PhD grant under the IFRC funding that provides a monthly stipend and a bench fee to cover local travel and research expenses.

**PS2.194****Prison food provisions, family support and vulnerability to health risks in Zambia**

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**BACKGROUND** Despite much conjecture, little empirical research exists to document the environmental, social and



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cultural dynamics influencing inmate health in sub-Saharan African prisons. Forming part of a larger programme seeking to strengthen Zambian prison health systems this study was carried out to improve policy makers' and programmers' understanding of the interplay between structural and behavioural factors driving health practice(s) among Zambian male inmates.

**METHODS** In-depth interviews were carried out with a simple random sample of 79 male inmates and 30 prison officers from four Zambian prison facilities. Sites were selected to achieve representation of high, medium and low-security prisons of varying distance from major urban hubs. Interviews were audio-recorded and later translated and transcribed for thematic analysis. All participants provided verbal informed consent.

**FINDINGS** Lack of access to good quality or sufficient quantity of food was reported by 67 of the 79 inmate respondents as directly or indirectly affecting their health. Central among the emerging themes was the inadequate amount and nutritional value of food provided by the prison system (*Food is not enough and there are no vegetables*; Male, Site 2) and the uneven access to familial support for supplemental nutrition and other resources (*Relatives are the ones who provide that support. Without them it is difficult*; respondent, Site 1). Inmates who lacked social connections and familial support described experiencing high levels of physical and mental stress (*When you don't have relatives to support you, [you] can become desperate*; Male, Site 3) which contributed to uneven social and power dynamics. These informal hierarchies underpinned a number of high-risk behaviours among some inmates, including coercive sexual and non-sexual relationships (*People [can] take advantage of others because of food*; Male, Site 3).

**CONCLUSIONS** Because of limited public provision of basic resources, a strong link exists between Zambian inmates' access to familial support and their ability to negotiate prison life. While the mechanisms differ, our findings that incarceration can be a powerful force in reproducing and reinforcing existing social inequities is parallel to observations from high income countries. Improvements in both the quality and quantity of nutrition provided by the prisons is important to address both direct and indirect health consequences of unequal access to food.

**DISCLOSURE** Nothing to disclose.

## PS2.195

## Quality analysis of the health information system data in the Democratic Republic of Congo

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**INTRODUCTION** The establishment of a high-quality health information system (HIS) in low-income countries is a WHO priority. In West and Central Africa, few countries have the ability to produce high-quality statistics with an impact on health policy.

**OBJECTIVE** To assess the quality of epidemiological surveillance data collection and analysis in the Democratic Republic of Congo.

**METHODS** We carried out a cross-sectional study in three health areas of the Maniema province. Data was collected from central offices, health centers and the general referral hospital. Data quality and data management system were evaluated using

operational action plans, monthly activity reports and collection tools regarding selected health indicators.

**RESULTS** Completeness of reporting was satisfactory but deadlines were seldom respected. Data accuracy of central offices was satisfactory. In comparison, health care establishments reported data with a very variable quality. The data management system evaluation showed several organizational and technical deficiencies. Data collection was not computerized. Trained collection and analysis workers were lacking. There was no self-evaluation and feed-back rarely existed.

**CONCLUSION** The HIS of this region of Congo is not in accordance with international norms of good quality data. Among the corrective actions, computerization of the data collection and analysis system, training of personnel and establishment of self-evaluation procedures seem necessary.

**DISCLOSURE** Nothing to disclose.

## PS2.196

## Seroprevalence of transfusion-transmitted infections in recipients in Chad

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**INTRODUCTION** In Chad, due to a low voluntary screening rate, seroprevalence of transfusion-transmitted infections (HIV, HBV, HCV, syphilis) in hospitalized patients is unknown. This situation induces a major nosocomial risk in health care centers.

**OBJECTIVE** To assess the seroprevalence of HIV, HBV, HCV and syphilis infections in patients requiring blood transfusion.

**METHODS** During 3 months, a prospective study was carried out in the national blood transfusion center of N'Djamena on blood samples of recipients from several health care centers of the capital. Patient selection was made with a standardized questionnaire. Patients admitted in infectious disease departments were excluded. We collected data related to age, sex, profession, marital status, indication for blood transfusion and HIV, HBV, HCV and syphilis serologies.

**RESULTS** We analyzed 302 samples (M: 76, F: 226). Global seroprevalence of HIV infection was 9.6% (three fold higher than the volunteer donors' rate). It was similar to the national prevalence between the ages of 16 and 35 years old. There was no difference regarding sex or socio-economic status. HBV seroprevalence was 6.62% (comparable to general population figures). In patients older than 65 years, it was 33%.

Seroprevalence of HIV-HBV coinfection was 1%. HCV seroprevalence was 3.64%, matching national data. Syphilis prevalence was 4% (alike national numbers). In total, one patient out of five was infected by HIV, HBV, HCV or syphilis.

**CONCLUSION** In this study, seroprevalence of transfusion-transmitted infections was very high. This alarming result highlights the need for reinforcing the prevention and management of blood exposure incidents in health care centers and encouraging voluntary screening in the general population.

**DISCLOSURE** Nothing to disclose.

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**PS2.197****The role of community-based health care centre on the health outcomes of the elderly: evidence from the Indonesian family life survey**

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The increasing trend of aging population in Indonesia and other developing countries is not only an indicator of demographic momentum, but it also leads to more consequential matters for the socioeconomic condition of elderly people. On the economic aspect, the increasing of elderly means increasing more budgets on social security. In the case of developing countries where social security functions have not been well established and performed optimally, the role of community and extended family is largely significant to maintain the quality of life of the elderly. Using the case of Indonesia, this study examines the role of *Posyandu Lansia* (Health Care Centre for the Elderly) on the quality of life of the aged. The determinants of elderly participation in *Posyandu Lansia* are also investigated. This study employs the rich longitudinal data of Indonesian Family Life Survey (IFLS). IFLS collects longitudinal data on household characteristics, the communities in which they live, and the health and education facilities they use. IFLS round 2007 provided a particular section of *Posyandu Lansia* in the community questionnaire. The results show that education attainment and knowledge on health facility and service increases the probability of participation in the community health care centre. Participation varies across regions. In addition, the presence of health care centre for the elderly in the village has a significant role in enhancing quality of life of elderly people through maintaining physical and mental health of the elderly. Controlling for individual characteristics and socioeconomic variables such as education, income, and access to formal health care facilities, the elder people who participate in the health care centre for the elderly in the village have less sickness period and lower level of depression. Hence, it can be concluded that the health care centre for the elderly in the community might provide informal support for people who have no mean or lack of formal support. The establishment of health care centre for the elderly in Indonesia is an alternative strategy to promote the quality of life of elderly which can be applied in other Asian countries, particularly the developing countries which might experience elderly explosion in the future.

**DISCLOSURE** Nothing to disclose.

**PS2.198****Addressing vulnerable populations' needs by redesigning community nursing services: findings from a research and development project in Republika Srpska**A. Bischoff<sup>1</sup> and A. Bukva-Mahmutović<sup>2</sup><sup>1</sup>*Division of Tropical and Humanitarian Medicine, Geneva University Hospitals, Genève, Switzerland;* <sup>2</sup>*Fami, Sarajevo, Bosnia and Herzegovina*

**INTRODUCTION** Most transition countries in Central and Eastern Europe and Central Asia are engaged in health reform initiatives aimed at introducing primary health care (PHC) centred on family medicine to enhance performance of their health systems. However, in some of these countries the introduction of PHC reforms has been particularly challenging. Bosnia and Herzegovina (BiH) is case in point. Due to its violent past, BiH is a vulnerable country in many ways. BiH comprises two autonomous entities: the Federation of Bosnia and

Herzegovina and Republika Srpska (RS). BiH is not only vulnerable due to its political deadlock, but also faces the challenge of increasingly vulnerable populations. The 2012 WHO review of social determinants found that 'health inequities are not diminishing and are increasing in many countries', among them BiH.

**METHODS** In RS, we conducted Focus Groups among various types of participants (political stakeholders, doctors, nurses, social workers, civil society members) and examined what types of vulnerable groups exist in BiH and what types of PHC services could meet their needs.

**RESULTS** Groups identified as being the most vulnerable ones included (in ranked order): elderly people, especially poor ones, living alone and/or in rural areas; disabled people; pregnant women and new mothers; people with chronic diseases; and members of ethnic minorities, particularly Roma. While physicians have a pivotal role in PHC, there was agreement that it was the nursing profession, and more specifically the community nurses that are best suited to care for vulnerable populations. The results helped to define the new profile of community nurses (as opposed to former so-called patronage nurses), this being a central component of the large project titled 'Strengthening Nursing in BiH'.

**CONCLUSIONS** In sum, a country that has suffered from political and social unrest needs health services that build bridges between factions, religions, ethnic divisions, displaced and vulnerable populations that are able to 'break the social stigma', as a nurse of a mental health centre put it. There is a consensus in BiH at almost all levels (entity, ministerial, institutional, human resources, medical, nursing, social services etc.) that the implementation (including re-definition, re-invention, re-design) of community nursing services is the way to go. The nurses involved in the redesigned services are called FMNiC: Family Medicine Nurses in the Community.

**DISCLOSURE** Nothing to disclose.

**PS2.199****The reality of task shifting in medicines management – a case study from Tanzania**K. A. Wiedenmayer<sup>1</sup>, S. Mapunjo<sup>2</sup> and N. Kapologwe<sup>3</sup><sup>1</sup>*Swiss Centre for International Health, Swiss Tropical and Public Health Institute, Basel, Switzerland;* <sup>2</sup>*Ministry of Health and Social Welfare, Dar es Salaam, Tanzania;* <sup>3</sup>*Regional Office of Health, Shinyanga, Tanzania*

**INTRODUCTION** Tanzania suffers from a severe shortage of human resources for health, including pharmaceutical staff. This shortage negatively affects the provision of pharmaceutical services and access to medicines, particularly in rural areas. Task shifting has been proposed as a way to mitigate the impact of health worker shortfalls. The aim of this study was to understand the context and extent of task shifting in pharmaceutical management in Dodoma Region, Tanzania.

**METHODS** A cross-sectional study was conducted in 270 public health facilities in 2011. A pre-tested questionnaire was administered to the person in charge of the health facility to collect data on staff employed and their respective pharmaceutical tasks. The national establishments for pharmaceutical staffing levels and national job descriptions of all facility cadres were also analysed.

**RESULTS** While the required staffing levels for pharmaceutical staff in 1999 were 50 for Dodoma Region, the region employed a total of only 14 pharmaceutical staff in 2011. Job descriptions revealed that, in addition to pharmaceutical staff, only nurses were required to provide dispensing and adherence counselling

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services. In 95.5% of studied health facilities, medicines supply management was done by non-pharmaceutically trained cadres, predominantly medical attendants.

**CONCLUSIONS** Task shifting is a reality in the pharmaceutical sector in Tanzania and it occurs mainly as a coping mechanism to the existing health workforce crisis, rather than a formal response to the shortage. In Dodoma Region, pharmacy-related tasks and supply management have informally been shifted to clinical health workers without policy guidance, explicit job descriptions, or the necessary support through systematic training. Implicit task shifting should be recognized and formalized. Job orientation, training and operational procedures may be useful to support the non-pharmaceutical health workers to effectively manage medicine supply.

**DISCLOSURE** The study was done in the frame of the Health Promotion and System Strengthening Project, funded by the Swiss Agency for Development and Cooperation.

**PS2.200****Child health services in Burkina Faso: quality of care and equity in utilization**

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Mortality of children under 5 years has decreased dramatically in the last 20 years, from 12 million in 1990 to 6.9 million in 2011. However, even if sub-Saharan African countries have experienced this trend, Africa remains the part of the world with the highest rates of infant mortality. Burkina Faso, is still far from achieving Millennium Development Goal 4 (to reduce child mortality by two thirds between 1990 and 2015). It is a country with one of the highest infant and child mortality rates in the world (146 deaths/1000 live births). This mortality rate is especially high in rural areas, among the poorest including children with the least educated mothers. Poor access to health services related to financial, geographical and cultural barriers and poor quality of care are important factors influencing the high rate of infant and child mortality. The objective of this study is to evaluate quality of child health services and equity in access of child health services. Household surveys and facility surveys have been, from October 2013 to February 2014 in 565 health facilities in 24 different districts of Burkina Faso. The main data collected were at: household level: socio-economic status, barriers to use of child health services, household health expenditures, perceptions of child health service quality, anthropometric measures, at health facility level: facility assessment (staff, infrastructures, equipment...), under five consultation observation and patient exit interviews (satisfaction...). The data are currently analysed and will lead to analyses of quality of care for child health services and equity in utilization of health services.

**DISCLOSURE** Nothing to disclose.

**PS2.201****Comparative research into how Turks living in Turkey and Germany perceive and use their health systems (Kocaeli and Dusseldorf examples)**

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Turkish economic migration to Germany began more than 50 years ago and today approximately 2.5 million Turks live in Germany (about 3% of the population); however, efforts to integrate them into German society have not been as successful as hoped for.

We aimed to analyze the similarities and differences in how Turks living in Turkey and Germany perceive and use the health system in their country. Therefore we interviewed 1130 people and 164 doctors in both Kocaeli and Düsseldorf.

36.3% of the Turks living in Düsseldorf who participated in this research said that they preferred to converse with their doctors in German, 33.3% in Turkish and 27.2% stated no preference. This result appears to be a level indicator of the extent to which Turks are integrated in Germany and German health system. Getting medicine from a pharmacy, consulting a mosque hodja and trying a folk remedy are rare in both groups, but more frequent in Düsseldorf than in Kocaeli.

One of the striking results in this study is that 11.5% of the Turks who live in Düsseldorf and 17.8% of those living in Kocaeli do not believe that the physicians can actually heal.

30.4% of the Turks who live in Düsseldorf had never been to a physician for a general check-up; in Kocaeli, up to 70%.

The results of this study and the data gathered show that the attitude of the Turks living in Kocaeli and Düsseldorf to the medical facilities is firstly affected by the health system itself. Culture and beliefs constitute a secondary effect on their behaviors. To find out whether they have any problems caused by the health system, similar comparative studies have to be carried out among Germans.

**DISCLOSURE** Nothing to disclose.

**PS2.202****Strategies to address physicians' geographic distribution imbalances in Portugal**

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**INTRODUCTION** Attracting and retaining health professionals in remote, rural and underserved areas is a problem which plays a significant role in reducing access to health services. This study focuses on describing the challenges faced at national level to ensure the population's access to physicians in the Portuguese National Health Services (NHS) and the strategies implemented to tackle this issue.

**METHODS AND MATERIALS** We analyzed information extracted from policy documents, technical documents and research. The documents were searched in government websites and databases and key-informants were consulted. The analysis aimed at responding to the following questions:

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1. What are the challenges faced by decision makers in Portugal to ensure the population's access to Human Resources for Health (HRH)?
2. Is the scarcity of physicians or asymmetric distribution identified among the problems?
3. What are the causes attributed to the asymmetric distribution? what are the strategies presented and implemented to address the asymmetric distribution? (5) is there any evaluation for these strategies?

**RESULTS** The need for a national HRH long-term plan in Portugal are recognized almost by all evaluation documents. There is a lack of documents showing concrete strategies. Key-informants commented strategies such as

1. Financial incentive through the residency period of physicians who commit to continue to work in an underserved areas during the same period after graduation;
2. Opening of medical schools;
3. Recruitment of foreign doctors through bilateral agreements, and
4. Providing financial and non-financial incentives during 5 years period – April 2015. No evaluation of these strategies was found.

**CONCLUSIONS** There is a need for collaboration between policymakers and researchers in order to assess the implemented strategies towards creating a more structured and cost-effective policymaking process and consequently increasing the population's access to physicians.

**DISCLOSURE** Nothing to disclose.

**PS2.203****Pragmatically and routinely costing malaria: reflections on practical experience in Ghana and Tanzania**

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**INTRODUCTION** Cost estimates of malaria interventions are essential to inform on-going planning and resource allocation. Although several guidelines and systems for cost and cost-effectiveness analyses of health interventions have been developed, there remains a great deal of variability in methods used across studies. In addition, costing studies are rarely done routinely to inform on-going budgeting and policy decisions.

**METHODS** Building on existing methodologies, data collection tools were developed to cost malaria service delivery from the health system perspective in Ghana and Tanzania. We estimated the costs of malaria case management, preventive treatment, and vector control including costs of programme management, supply chain and service delivery. Fifteen health facilities across three regions in Ghana and Tanzania were selected to represent the various service delivery levels and malaria endemicities.

**RESULTS** In both Ghana and Tanzania, supply chain costs accounted for more than 40% of total program costs. Training and capacity building, drugs and commodities, and monitoring and evaluation accounted for the largest proportion of program and supply chain costs in both countries.

Routine data collected through systems such as the District Health Information System (DHIS) significantly improved the collection of output and caseload data at health facilities. Challenges to estimate costs in this context included: multiple implementing partners, limited data availability, concerns around confidentiality of financial information, low implementation capacity.

**CONCLUSIONS** While cost estimates are necessary to provide data for resource mobilisation and allocation, the practical realities of routinely collecting cost data make it difficult to be prescriptive on the guidelines for collecting cost data at country level. Information systems that routinely collect financial data at health facilities and national level could streamline this process. Such systems and associated guidance documents should allow flexibility that reflects differences in implementation of activities across settings.

**DISCLOSURE** Nothing to disclose.

**PS2.204****Costs of dengue hospitalization and public prevention and control activities in urban Sri Lanka**

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**INTRODUCTION** Dengue has become a major public health problem in Sri Lanka; however, the economic impact of the disease has not been studied in this setting. This study assessed the costs of dengue prevention and control activities and the direct medical costs of dengue hospitalizations in the Colombo District, the most affected district with the highest dengue caseloads in the country.

**METHODS** The study was conducted in the epidemic year of 2012. Using information from the official databases of governmental agencies in charge of the dengue prevention and control activities in each administrative unit, we calculated the total financial costs of these activities and the average cost per capita. The direct medical costs of hospitalized dengue cases in the public health sector were derived using operational budgets and a sample of bed head tickets of adult and pediatric patients available from six secondary-level hospitals.

**RESULTS** In 2012, the total financial cost of dengue prevention and control activities in the Colombo District was about \$998 000, or \$0.43 per capita. The mean direct medical costs to the public health care system per case of hospitalized dengue fever (DF) and dengue haemorrhagic fever (DHF) were \$221 and \$316 for paediatric patients, respectively, and \$203 and \$272 for adult patients, respectively.

**CONCLUSION** These preliminary results highlight the high economic burden of dengue to the public health sector in the Colombo district in Sri Lanka during an epidemic year and contribute to the sparse literature on the economic burden of dengue in affected countries.

**ACKNOWLEDGEMENTS** This research was funded by 'DengueTools' of the 7th Framework Programme of the European Community.

**DISCLOSURE** Nothing to disclose.



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## PS2.205

**The cost of intensive routine control and cost-effectiveness of insecticide treated curtain deployment in a setting with low *Aedes aegypti* infestation**

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**INTRODUCTION** We evaluated the additional cost of implementing insecticide treated curtains (ITC) on top of intensive conventional routine *Aedes* control programme (ACP) activities.

**METHODS** We conducted the costing study in the city of Guantanamo, Cuba, from the perspective of the ACP nested in a ITC effectiveness trial, during 2009–2010. We assessed the cost of the ACP, the incremental cost of ITC deployment and the cost-effectiveness of ITC use on top of ACP routine activities.

**RESULTS** The annual cost of the routine ACP activities was 16.98 US\$ per household (p.h). 6714 ITC, were distributed in 3 015 households. The total average cost per ITC distributed was 3.42 US\$. Curtain purchase made up 74.3% of this cost. The annualized costs p.h. of ITC implementation was 3.86 US\$. The additional annualized cost for deploying ITC represented 49.0% of the ACP routine cost related to adult stage *Aedes* control. The trial did not lead to further reductions in the already relatively low *Aedes* infestation levels.

**CONCLUSIONS** At current curtain prices, ITC deployment can hardly be considered an option in Guantanamo and in comparable environments: the incremental cost effectiveness ratio (if any) will be too high.

**DISCLOSURE** Nothing to disclose.

## PS2.206

**Cost-effectiveness of a performance based financing strategy for reducing maternal and perinatal mortality in Malawi: a conceptual design**

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**INTRODUCTION** We aim to estimate the cost-effectiveness of a performance based financing strategy aimed at reducing maternal and perinatal mortality in Malawi.

**METHODS** We use a decision tree model to calculate the expected costs, health effects and cost-effectiveness of PBF from a societal perspective. Two alternatives are considered, including a performance based financing strategy and the status quo care. The model calculates Disability Adjusted Life Years (DALYs) due to morbidity and premature mortality from perinatal and maternal deaths and total costs per alternative. It will utilize information on i) institutional deliveries ii) incidence of maternal obstetric complications and iii) cause-specific case fatality ratios (CFRs) for obstetric complications obtained from an ongoing study.

Malawi life expectancies at birth and for women of reproductive age are used to calculate YLLs, which are discounted at 3% into year 2015 values and summed up. Each alternative is simultaneously fitted with associated treatments costs, including PBF implementation costs for the study arm. The costs are presented in year 2015 USD dollars after discounting. DALYs averted are

calculated assuming a hypothetical cohort of 500 000 women, standardized according to the age structure of women of reproductive age in the study areas. We conduct parametric bootstrapping based on 5000 iterations to calculate incremental cost-effectiveness ratios and associated 95% confidence intervals. Finally, multi-way and probabilistic sensitivity analyses are conducted to assess robustness of the model to extreme variations in key model parameters and assumptions.

To account for both perinatal and maternal deaths, the event pathways in each arm start tracking mothers after a perinatal event. All deliveries are then categorized as complicated (if associated with a maternal obstetric complication) or un-complicated, leading to death or recovery. Timely access to quality care is important for maternal survival, and the presumption is that PBF will stimulate better facility attendance for complications care. For facility based deliveries with obstetric complications, the model allows for the fact that some women may not receive adequate care. For mothers with obstetric complications who deliver outside of health facilities but subsequently present for care at health facilities, the model allows for the possibility that some of them get adequate care.

**DISCLOSURE** Funding source: Norad, KfW.

## PS2.207

**Cost and cost-effectiveness of an MSF district hospital in Ahmad Shah Baba, Kabul, Afghanistan**

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**INTRODUCTION** Ahmad Shah Baba (ASB) district hospital provides free health care to the growing population of Kabul district 12, mainly composed of returnees from Pakistan and displaced from other parts of Afghanistan. Since 2009 the facility has been managed in partnership between the Ministry of Public Health (MoPH) and Médecins Sans Frontières (MSF) with specific focus on maternity and outpatient services. This cost and cost-efficiency analysis aims to provide useful information for advocacy purpose. Additionally, data can be used to prepare the handover of ASB Hospital to external partners.

**METHODS** This retrospective study is based on data routinely collected by MSF in 2014 and therefore meets the criteria of the MSF Ethical Review Board for exemption from full ethics review. A service provider perspective was adopted, considering both financial and economic costs. To reach more accurate estimates, bottom-up (ingredients method) and top-down (activity based costing) approaches were applied. Sensitivity analysis was performed changing resources unit cost, to evaluate the impact on costs in the absence of MSF running the hospital. Data and information were collected and analysed in situ from 14/01 to 31/01 2015.

**RESULTS** Total costs of ASB hospital were estimated at \$2.8 million. Human resource is the key cost driver in terms of cost category, and maternity in terms of clinical department. Cost per outpatient consultation is \$6.22, cost per normal delivery is \$57.98 whereas it is \$293.91 for caesarean section. Cost per capita for deliveries (normal & caesarean section) is \$3.33. Sensitivity analysis estimates total hospital costs as \$1 million, \$2.25 per outpatient consultation and \$22.74 per normal delivery.

**CONCLUSION** The study provides relevant information on the level and distribution of resources in a district hospital in Kabul.

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There are no known similar studies. Comparison with the cost analysis of Basic Package of Health Services (BPHS) done by MoPH in January 2013 suggests a gap in funding for primary health care in Afghanistan: BPHS evaluates average per capita expenditure \$4.17 (and \$1.44 specifically for District Hospital), whereas this study estimates \$3.33 the amount per capita for deliveries only. Limitations related to sensitivity analysis have to be considered, since it was performed based on the current level of activities and staffing.

DISCLOSURE Nothing to disclose.

**PS2.208****Cost analysis study of oral antihypertensive agents available in Nepali markets**

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**BACKGROUND** The government of Nepal through its national health policy aims to become independent in the drug production. Hypertension is the major health burden causing high level of mortality, morbidity and life long treatment. There is unbelievable price variation on the antihypertensive agents marketed in Nepal which are manufactured in Nepal, India and Bangladesh. Thus the objective of the study is to evaluate the price variation in oral antihypertensive drugs marketed in Nepal either in single or combines dosage form.

**METHOD** Unit Cost of a selected drug in same strength dosage form was obtained through the field visit in the pharmacy store and department of drug administration (November 2014–January 2015).

The percentage variation of the drug was calculated through the formula of % variation =  $\frac{\text{Max unit price} - \text{Min Unit Price}}{\text{Min Unit price}} \times 100\%$

**RESULT** Percentage price variation of commonly used antihypertensive drug was found Amlodipine (5 mg): 1059%, Enalapril (5 mg): 5300%, Atenolol (12.5 mg): 684.31%, propranolol (40 mg): 368.73%, Ramipril (2.5 mg): 535.8%, Telmisartan (40 mg): 172.35%, Nefedipine (5 mg): 218%, diltiazem (60 mg): 206.25% Losartan (50 mg): 192.5%. Among the combination therapy Amlodipine 5 mg and Atenolol 50 mg: 419.09%, Amlodipine 5 mg and losartan 50 mg: 91.66% Losartan 50 mg and Hydrochlorothiazide 12.5 mg: 188.72% variation.

**CONCLUSION** The average trend of the drug price variation of oral hypertensive drugs marketed in Nepal have significant value. There should be immediate control mechanism of drug price variation for the cost effective treatment directing toward the maximizing the benefit of therapy and minimizing the negative personal and economical consequences.

DISCLOSURE Nothing to disclose.

**PS2.209****Prevalence of chronic infections and susceptibility to autochthonous infectious diseases in Latin American immigrants in Switzerland**

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**BACKGROUND** Curative and preventive health programs targeting immigrants should take account of their risk of suffering and transmitting imported chronic infectious diseases and of their susceptibility of acquiring autochthonous infections. Shared risk factors for distinct pathogens may result in chronic co-infections. Around 3 million recently-arrived Latin American immigrants live in Western Europe. We aimed at assessing the prevalence and co-occurrence of imported chronic infections and the susceptibility to highly prevalent local infections in this group.

**METHODS** In this retrospective study, we tested sera of Latin Americans immigrants who had participated in a community-based Chagas disease survey in Geneva for syphilis, hepatitis B, HIV, *Strongyloides stercoralis*, varicella-zoster and measles.

**RESULTS** The 1012 participants, aged 36 (16–78) years, mostly female (82.5%) and Bolivians (48%) had lived 4 (0.1–23) years outside Latin-America, with 12.8% (95% CI: 10.8–14.9) having *T. cruzi* infection. Preliminary results showed that overall, 181 (19.9%) had one chronic infection and 12 (1.2%) two or more. We found prevalence of 0.4% for chronic Hepatitis B, 1.5% (95% CI: 0.8–2.2) for HIV, 4.4% (95% CI: 3.2–5.6) for syphilis. Prevalence of *S. stercoralis* and factors associated with multiple infection are pending Susceptibility to VZV and measles were 0.7% and 1.6%, respectively.

**DISCUSSION** Initial results in this sample of recently arrived Latin-American immigrants show a consequent proportion of them having one or more chronic infections, with Chagas disease and syphilis being most frequent. This entails putting emphasis on chronic infections detection among those communities with specific attention to tackle risks of congenital transmission. Results of *S. stercoralis* prevalence and factors for multiple infections will be presented at the congress. Susceptibilities to autochthonous infections such as measles and VZV are similar or lower than those of the local population and do not call for specific preventive measures.

DISCLOSURE Nothing to disclose.

**PS2.211****Imported infections screening prior to chemotherapy for oncohaematological malignancies and bone marrow transplant**

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**INTRODUCTION** Reactivation of latent imported infections has been periodically reported in the literature in patients undergoing immune suppression. Sometimes these infections can have fatal outcomes. The data regarding imported infections reactivation in patients receiving steroid therapy, chemotherapy and bone marrow transplantation is scarce, and usually came from case-reports or series of cases.

**METHODS AND MATERIAL** We designed a prospective cohort study to determine the prevalence of imported infections in patients

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before drug-induced immune suppression from March 2013 to August 2014 and the rate of reactivation after specific treatment. We included all patients over 16 years old from low and middle income countries with an oncohaematological disease that requires immune suppression. Patients were screened for imported infections according to the country of origin. All patients were treated and followed up for 6 months to determine reactivation of imported infections. **RESULTS** Overall, we included 42 patients. Median age was 39 (IQR 31.51) years. Twenty five (59.5%) patients were male. The origin of the patients was as follow: Latin America 24 (57.1%), Sub-Saharan Africa 7 (16.7%), North Africa and Middle East 7 (16.7%) and Asia 4 (9.5%). Thirty three (78.6%) patients were diagnosed in Spain with a median of 3465 (IQR 1751, 4444) days after their arrival. Oncohaematological diseases included: leukemia, lymphoma, multiple myeloma, immune haemolytic anemia, solid tumours and others. Twenty (47.6%) patients were using steroids. Thirteen (31%) patients underwent hematopoietic stem cell transplantation. Patients with at least one imported infection account for 50% (21 patients) of the study population. Among the imported infections we found: HIV 1/42 (2.4%), hepatitis C infection 3/42 (7.1%) patients, hepatitis B infection (active and 'resolved') 8/42 (19%), *Treponema pallidum* infection 1/39 (2.6%), latent tuberculosis infection 11/36 (30.5%), *Strongyloides stercoralis* infection 4/34 (11.8%), Chagas disease 2/20 (10%), HTLV1 infection 1/18 (5.6%). We did not found any dimorphic fungus, *Leishmania sp.*, *Schistosomiasis sp.* or *Plasmodium sp.* infection. During the 6 months of follow up no reactivation of any imported disease was observed. **CONCLUSION** Patients with oncohaematological diseases from middle and low income countries have a high rate of imported infections. Proper treatment of the imported infections can avoid reactivation during a 6 months period. **DISCLOSURE** Nothing to disclose.

## PS2.212

## Prevalence of Chagas disease among Latin-American migrants in European countries

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**INTRODUCTION** Few studies have assessed the burden of Chagas disease (CD) in European countries and most of them are based on prevalence estimates from Latin-American (LA) countries that likely differ from the prevalence in migrants living in Europe. The aim of this study was to systematically review the existing data informing current understanding of the prevalence of CD in LA migrants living in European countries.

**METHODS** We conducted a systematic review and meta-analysis of studies reporting prevalence of CD in European countries belonging to the European Union (EU) before 2004 in accordance with the MOOSE guidelines and based on the database sources MEDLINE and Global Health. No restrictions were placed on study date, study design or language of publication. Prevalence studies based on community, antenatal care, blood banks or primary health care were included, whereas hospital-based studies were not included because of the high risk of selection bias. The pooled prevalence was estimated using random effect models based on DerSimonian & Laird method.

**RESULTS** We identified 18 studies conducted in five European countries; three studies were undertaken in blood banks, eight in antenatal units, six in primary care settings or communities and one study provided data both from blood bank and antenatal settings. The random effect pooled prevalence was 4.2% (95% CI: 2.2–6.7); and the heterogeneity of CD prevalence among studies was high ( $I^2 = 97\%$ ,  $P < 0.001$ ). Migrants from Bolivia had the highest prevalence of CD (18.1%, 95% CI: 13.9–22.7%) followed by those from Paraguay (5.5%, 95% CI: 3.5–7.9). When compared to PAHO estimates of national prevalence rates, the pooled prevalence of CD in migrants from Bolivia and from Paraguay living in Europe were significantly higher (prevalence ratio 2.67 and 2.17 respectively). The prevalence observed in Central American countries, despite large confidence intervals, was also higher than the official in-country estimates. **CONCLUSIONS** Prevalence of CD in LA migrants living in Europe is high, particularly in migrants from Bolivia and Paraguay. Data are highly heterogeneous dependent upon country of origin and within studies of migrants from the same country of origin. Country-specific prevalence differs from the estimates available from LA countries. Our meta-analysis provides prevalence estimates of CD that should be used to estimate the burden of disease in European countries. **DISCLOSURE** Nothing to disclose.

## PS2.213

## Imported schistosomiasis in Italy: a single centre case series

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**INTRODUCTION** Imported schistosomiasis in Europe have increased and few data are available in non-endemic countries.

**METHODS AND MATERIALS** Retrospective study of all patients diagnosed with schistosomiasis at CTD, Negrar (Italy) from 2010 to 2014. Inclusion criteria: age  $\geq 14$  years; diagnosis of schistosomiasis (at least one of: ova identification in urine, stool or biopsy; positive ELISA/IFAT serology; cathodic circulating schistosomal antigen (CCA) detection in urine). Epidemiological, clinical, imaging and lab data were recorded. **RESULTS** A total of 265 pts were retrieved [mean age 33.6 years (14–82), dominance of male sex (211, 79.6%)]. Pts were classified as migrants coming from endemic countries (228, 86.0%); expatriates (19, 7.2%) or travellers (18, 6.8%) (non-endemic countries natives resided in endemic area for at least or less than 6 months, respectively). The main continent of exposure were Africa (258, 97.4%), America (4, 1.5%), and Asia (3, 1.1%). The countries more represented were Mali (21.1%), Ghana (16.2%), Ivory Coast (8.7%) and Senegal (6.4%). A clinical history compatible with schistosomiasis was reported by 112 (42.3%) pts. One hundred and twenty-three (46.4%) pts were asymptomatic. Among those symptomatic, 96 (67.6%) had abdominal pain, 22 (15.5%) haematuria, 20 (14.1%) genito-urinary symptoms (14.1%), 4 (2.8%) rectal bleeding, three cough (2.1%) and 1 (0.7%) acute Katayama syndrome. The mean absolute eosinophil value (AEV) was 290/ $\mu$ l (range 20–2020), IgE 341/ml (range 5–25 500). Forty-eight (17.5%) pts had confirmed *S. mansoni* infection (ova in stools, tissue biopsy or CCA detection), 52 (out of 195 tested) *S. haematobium* (ova in the urine). Eight pts had microscopy-confirmed co-infection (7 *S. mansoni*/*S. haematobium*, one

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*S. mekongi/S. mansoni*). No significant correlation was found between: signs/symptoms and ultrasound findings (thick bladder wall, bladder lesions, bladder/liver cancer, periportal fibrosis, hepatomegaly, cirrhosis, portal hypertension or splenomegaly) ( $P = 0.68$ ), or active disease evidence (i.e. ova or CCA positivity) ( $P = 0.06$ ) or between increased AEV ( $\geq 300/\mu\text{l}$ ) and signs/symptoms ( $P = 0.33$ ). Conversely, a correlation was found between increased AEV and presence of eggs ( $P = 0.004$ ) or ultrasound findings ( $P = 0.004$ ).

**CONCLUSIONS** Our study shows that a huge proportion of asymptomatic pts coming from endemic countries have schistosomiasis. Screening is therefore advisable regardless the presence of symptoms or eosinophilia.

**DISCLOSURE** Nothing to disclose.

**PS2.214****Leptospirosis trends and climate induced outbreaks in the Netherlands: an emerging public health threat in Western Europe**

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**INTRODUCTION** Leptospirosis is a globally emerging disease with numerous outbreaks being reported worldwide over the past decade. The pathogen is endemic to western Europe and is mostly transmitted by exposure to contaminated water or urine from infected animals including peridomestic wildlife and livestock. Reports of outbreaks of leptospirosis have become more frequent globally and currently pose an increasing public health hazard in European countries. This study aims to assess temporal trends of leptospirosis in the Netherlands over the last 18 years and to investigate associations with climatic factors. The results will be compared to recent trends and emergence of outbreaks of leptospirosis in Germany and France between 2010 and 2014.

**METHODS** All serologically confirmed cases of leptospirosis notified in The Netherlands over the period 1996 to 2014 ( $N = 257$ ) were aggregated per month and incidence rates were determined as the number of new confirmed cases per 100,000. The data were merged with monthly climatic data extracted from online data repositories of the respective countries including mean, minimum and maximum monthly temperatures and precipitation. Secular and seasonal time trends were determined by conducting a time series decomposition to the Leptospirosis incidence rates. Temporal trends were further quantified by examining autocorrelation functions over incremental time lag intervals. An autoregressive model was fitted to the decomposed time series data to test for associations between leptospirosis and climatic factors at different time scales and lag intervals.

**RESULTS AND CONCLUSIONS** The preliminary results of the analysis show that in 2014 Leptospirosis a significant increase in the number of leptospirosis cases was observed in the Netherlands ( $\chi^2 = 111$ ,  $df = 1$ ,  $N = 60$ ,  $P < 0.001$ ). Autoregressive analysis showed that monthly average temperature are significantly associated to leptospirosis case rates. The model, however, only accounts for a limited amount of temporal variation in leptospirosis burden. Including other factors related to reservoirs and behavioral trends are expected to improve the model fit.

The results of this study show that climatic factors are associated with the emergence of Leptospirosis in Europe. Our data therefore support the hypothesis that climatic alterations can be

expected drive the emergence of leptospirosis outbreaks in Europe as well as globally.

**DISCLOSURE** Nothing to disclose.

**PS2.215****Cardiovascular profile of immigrants in Spain in the 21st century**

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**BACKGROUND** Cardiovascular disease (CVD) is a health problem worldwide. We studied the characteristics of CVD in foreign citizens from high income countries (FCHICs) and low- and middle-income countries (FCLMICs), living in Spain.

**METHODS** Foreign citizens (FCs) admitted to a Spanish hospital between 2000 and 2012 with a discharged diagnosis of CVD were included in the study. We compared FCHICs with FCLMICs and among different geographical groups.

**RESULTS** 32 020 FCs were admitted during the study period. 3728 (11.6%) patients were discharged with a diagnosis of CVD. Prevalence of admissions for CVD was lower in FCLMICs (7.1%) than in FCHICs (22.4%) ( $P < 0.001$ ). The percentage of women was higher in FCLMICs than in FCHICs (36% vs. 26.9%) ( $P < 0.001$ ), with Latin American women the majority in this group. The median age was 64.8 years, with patients from Sub-Saharan Africa the youngest. A progressive increment of admissions in both groups was detected from the years 2000 to 2012. The highest percentage of admissions for coronary heart disease were from United Kingdom (31.6%), valvular heart disease from Morocco (17.1%) and Algeria (8.3%), pericarditis from Morocco (21.4%) and Ecuador (17.9%) and pulmonary hypertension/pulmonary embolism from Argentina (17.7%).

**CONCLUSIONS** CVD is an extremely common cause of hospital admission worldwide. When a large group of patients from different countries is analyzed, differences in their cardiovascular profile can be discovered according to income, region of origin and ethnicity.

**DISCLOSURE** Nothing to disclose.

**PS2.216****Emergence of human leishmaniasis in the Bologna Province, Northeast Italy, 2013–14**

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**INTRODUCTION** Leishmaniasis is a phlebotomine-transmitted infection caused by protozoans belonging to the genus *Leishmania*. The species *L. infantum* is endemic in



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Mediterranean Europe, where it is responsible for systemic disease (visceral leishmaniasis, VL) and for skin lesions (cutaneous leishmaniasis, CL). Since the 1990s, human leishmaniasis has increased in Italy, with new VL foci detected within classical endemic areas (Tyrrhenian littoral, the southern peninsular regions and islands) and in northern regions previously regarded as non-endemic. Here, we report the emergence of leishmaniasis in the Bologna Province, Northeast Italy, between January 2013 and December 2014.

**METHODS AND MATERIALS** Histological diagnosis of CL was performed in cutaneous biopsies. Real-time PCR tests were also performed on bioptic specimens, while diagnosis of VL was performed by serological and molecular methods on peripheral blood and/or bone marrow aspirate. Whenever possible, microscopic examination of bone marrow aspirates was also conducted.

**RESULTS** Nineteen cases of CL were diagnosed at the Regional Center for Microbiological Emergencies, Microbiology Unit, St. Orsola-Malpighi University Hospital, Bologna, Italy (five in 2013 and 14 in 2014, respectively): leishmanial amastigotes as well as leishmanial DNA were detected in skin biopsies from 14 patients with suspected CL, while only leishmanial DNA was detected in five additional patients that presented with granulomatous reaction at histological examination. Further, serological and molecular tests indicated the presence of leishmania infection in 21 cases of suspected VL (14 in 2013 and seven in 2014, respectively), including five children below 3 years of age and two HIV-positive patients. Two additional VL cases residing in the same province were diagnosed in other laboratories outside Bologna.

**CONCLUSIONS** During the last 2-year period, 23 cases of VL and 19 cases of CL were detected in the Bologna Province. As an annual range of 2.6 cases of VL and 1.2 cases of CL was reported from 2008 to 2012, our findings show an increased identification of human leishmaniasis in the Bologna Province in the last 2 years. As cases of human leishmaniasis are raising in the Bologna Province, this protozoan infection should be considered an important public health concern and awareness about leishmaniasis endemicity should be increased among general practitioners and clinicians in Northeast Italy.

**DISCLOSURE** Nothing to disclose.

## PS2.217

### Uro-genital schistosomiasis screening in Italian subjects exposed to freshwater of Cavu River, Corsica (France)

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**INTRODUCTION** Fifteen cases of uro-genital schistosomiasis (UGS) acquired in Corsica (France) have been described in Europe since 2014, 66.7% of them were asymptomatic. All infections have been acquired swimming in the Cavu River during the summer 2011 and 2013. These are the first autochthonous cases acquired in a Mediterranean country, excluding African ones, after *S. haematobium* eradication occurred in the mid-1900s. Diagnosis of UGS by detection of specific antibodies is more sensitive than the detection of eggs in

urine, particularly in light infections. The Haut Conseil de la santé publique of France recommends the use of two different serologic tests during the screening of all exposed subjects, because false-negative reactions may occur. No clinical classification has yet been suggested for an empiric treatment. **METHODS AND MATERIALS** Subjects admitted to three Infectious Diseases Clinic who met the inclusion criteria (reporting freshwater contact in the Cavu River from the 2011) were considered eligible. Demographic, epidemiological and clinical data were collected through a questionnaire. The patients were submitted to different parasitological tests available at each site. Direct parasitological tests included the examination of one or more urine specimens. The serologic techniques included enzyme-linked immunosorbent assay (ELISA), indirect fluorescent antibody (IFA) or Western blot (WB). We defined a confirmed UGS a person with eggs of *S. haematobium* in urine and/or a positive reaction to WB; a probable UGS, a person with a positive serum schistosomal antibody test; a possible UGS, a person with uro-genital signs/symptoms or eosinophilia (Eo  $\geq 500/\text{ml}$ ).

**RESULTS** Forty-three patients were prospectively enrolled. Nine of them were classified with a UGS: one confirmed, two probable, six possible. The mean age was 21.8 years (range 5–69 years); 4 (44.4%) had eosinophilia (mean eosinophil count 428.9, min 40 max 1540); 7 (77.8%) reported uro-genital signs/symptoms (macroscopic haematuria, haematospermia, vaginal symptoms, urolithiasis). All patients were treated with praziquantel 40 mg/Kg single dose.

**CONCLUSIONS** Systematic screening has been suggested in exposed subjects, but in the absence of symptoms commercial serological tests for schistosomiasis have low sensitivity. We decided to treat all, including the 'possible' cases, considering the mild side effects of the treatment and the possible late severe sequelae/complications.

**DISCLOSURE** Nothing to disclose.

## PS2.218

### Imported strongyloidiasis: 187 cases of direct diagnosis

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**INTRODUCTION** Strongyloidiasis, a soil-transmitted helminthiasis, may persist in the host for indefinite time. Most infected individuals are asymptomatic showing only unexplained eosinophilia or hyper-immunoglobulin E (IgE). In case of immunosuppression, strongyloidiasis may become a disseminated life-threatening disease. The aim of this study is to describe 187 cases of strongyloidiasis diagnosed by detection of the parasite in faeces.

**METHODS AND MATERIAL** A retrospective review of *Strongyloides stercoralis* cases registered at laboratory of Microbiology from January 2008 to December 2013. Diagnosis was defined as the detection of larvae by formalin-ether concentration technique and/or by charcoal culture. Patients were classified as immigrants, travellers and visiting friends and relatives (VFR). Eosinophilia was considered when eosinophil count was  $>500/\mu\text{l}$  or eosinophil percentage  $>7\%$  in peripheral blood and hyper-IgE if level of IgE  $>500\text{U/ml}$ .

**RESULTS** One hundred eighty seven patients were included; men were 58.3%, with a mean age of 33 years (range: 6–73). Immigrants were 59.4%, VFR 39.6%, and two travellers. Areas

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of origin: Latin America 61.5%, Sub-Saharan Africa 31.0% and Asia 7.5%. Main countries: Bolivia 45.5%, Equatorial Guinea 15.5% and Ecuador 8.6%. Mean length of stay in Spain was 47 months (range: 0–290), mean length of trip for VFRs was 32 days (range: 14–2588). Main reasons for consultation were: eosinophilia 31.0% (57/184) of cases, screening 25.5%, screening for Chagas disease 23.4% and gastrointestinal symptoms 10.3% of cases. All patients were immunocompetents.

Diagnosis was achieved by stool exam in 84.5% of cases and the rest of them by charcoal culture (15.5%). Absolute eosinophilia was present in 81.7%, absolute eosinophil mean count was 1244 (range: 124–11 602); eosinophils percentage >7% was present in 91.5% of cases and mean percentage of eosinophils was 15.4% (range: 2.8–44.9). Hyper-IgE was present in 76.5% (104/136) of cases, IgE mean was 1875 U/ml (range: 10–14 663).

**CONCLUSIONS** Strongyloidiasis is a common helminthic infection in immigrants, regardless of the length of stay in the host country, especially if eosinophilia or hyper-IgE is present. In case of strongyloidiasis eosinophils percentage count seems to be more reliable than absolute count or hyper-IgE. In this series charcoal culture of faeces improved diagnostic sensitivity.

**DISCLOSURE** Nothing to disclose.

## PS2.220

### Hyper-reactive malarial splenomegaly (HMS) and early HMS. A single centre, retrospective-longitudinal study

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**INTRODUCTION** Hyper-reactive Malarial Splenomegaly (HMS) represents a chronic, potentially fatal complication of malaria. Case definition includes: gross splenomegaly, high level of antimalarial antibody and IgM, response to long-term antimalarial prophylaxis. We describe a large series observed between 1990 and 2014, including patients not fully meeting the case definition who might be regarded as early-HMS (e-HMS). The main research questions were: is a single antimalarial treatment effective for HMS? Does 'e-HMS' tend to evolve? **METHODS** The patient database was searched to retrieve all potentially eligible patients. Other causes of splenomegaly were excluded. HMS was defined according to Fakunle's criteria, but for response to prophylaxis, and had a spleen diameter  $\geq 16$  cm. Patients with an incomplete syndrome (defined by: high antimalarial antibody titre; splenomegaly of any size OR raised IgM; exclusion of other causes of splenomegaly) were tentatively classified as e-HMS. The clinical outcome at following visits was analyzed in relation to re-exposure to malaria, and to treatment (all HMS patients, and only part of those with e-HMS, were treated with a single antimalarial treatment and advised to follow an effective antimalarial prophylaxis, only if re-exposed). **RESULTS** One hundred and seventy-one subjects were retrieved, 44 with HMS and 127 with e-HMS. Caucasian expatriates were about 3/4th of the whole study population. Of patients with HMS for whom a short term follow-up (<6 months, median 43 days) was available before returning to endemic areas, 16/20 had improved/cured, three were unchanged and one had possibly worsened (increased IgM level but spleen diameter not available). Seventy-six patients with e-HMS had at least one follow-up visit. Of 47 re-exposed to malaria for a variable period, 22 (46%) had worsened, including 11 patients (23% of the whole group)

evolving to full-blown HMS: in particular, 12/18 (66%) of those not treated worsened, vs. 9/28 (32%) of those treated (info missing for one), while of 29 patients not re-exposed, 24 (93%) had improved or cured and 5 (7%) worsened ( $P = 0.000$ ).

**CONCLUSIONS** E-HMS is a definite clinical condition. Though the case definition may include false positives, e-HMS should be treated just as the full-blown HMS. For the latter, a single antimalarial treatment is probably adequate, and long term, effective prophylaxis is only necessary for patients exposed again to malaria transmission.

**DISCLOSURE** Nothing to disclose.

## PS2.221

### Screening for *Trypanosoma cruzi* antibodies and *Strongyloides stercoralis* antibodies in migrants to Italy coming from endemic areas using four immunological assays

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**INTRODUCTION** Chagas disease (CD) is caused by *T. cruzi* and strongyloidiasis is another infestation caused by *S. stercoralis*. Both are endemic in South America among the poorest people of these countries. Our work assesses the prevalence of *T. cruzi* and *S. stercoralis* antibodies in a population sample of migrants living in the metropolitan area of Milan coming from CD areas. The samples were collected from July 2013 to July 2014.

**MATERIALS AND METHODS** Serum samples from 497 patients were tested for IgG anti-*T. cruzi* with three different methods: Abbott Architect Chagas, BiosChile Chagas III and DIAPRO 'T. *cruzi* ELISA Ab'. All positive results were considered 'matched' when they result jointly positive to all methods while were considered 'discordant' the samples showing almost one negative result. Concordance between each pair of methods was evaluated by using Cohen's kappa coefficient (Ck). All samples were evaluated for IgG anti-*S. stercoralis* by EIA Bordier *Strongyloides ratti* assay.

**RESULT** 42 of the 497 (8.5%) samples tested were positive 'matched' to CD; 28 (5.6%) samples were positives 'discordant'. Architect method detected 47 positive samples (9.5%), with BiosChile assay the positive were 44 (8.9%), while the DiaPro method detected 48 positive samples (9.7%). The Ck shows an excellent degree of concordance ( $k > 0.80$ ) for all tests. Between Abbott and BiosChile methods the Ck was  $k = 0.940$ , between Abbott and DIAPRO methods was  $k = 0.919$ , while BiosChile and DIAPRO assays shows a  $k = 0.904$ . From our analysis, the pair Architect and BiosChile assays give the greatest degree of concordance. Among the 497 samples, 24 (4.8%) were positive to *S. stercoralis* test and 6 (25%) of these were positive to *T. cruzi* both. **CONCLUSION** 23 among 'matched' and 'discordant' positive patients to *T. cruzi* were admitted to infectious diseases department for cardiac and gastroenteric investigations. Our results confirm a high rate of seroprevalence for *T. cruzi* and *S. stercoralis* antibodies among South America people. Our results suggest that blood banks and transplantations networks dealing with patients from Latin America should implement screening protocol for CD. Considering the high percentage of occult

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strongyloidiasis among the positive 'matched' CD, it's very important the screening for strongyloidiasis before CD treatment. Further studies would be useful for evaluate a possible link between specific antibody levels and clinical assessment. DISCLOSURE Nothing to disclose.

## PS2.222

Clinical implications of *Trypanosoma cruzi*'s discrete typing units in a cohort of Latin American migrants

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Chagas disease is caused by the protozoan *Trypanosoma cruzi*. This is an endemic disease in the Americas, but increased migration to Europe has made it emerge in countries where it was previously unknown, being Spain the second non endemic country in number of patients. *T. cruzi* is a parasite with a wide genetic diversity, which has been grouped by consensus into six Discrete Typing Units (DTUs), with a seventh emerging genotype called TcBat also affecting humans. Some authors have linked these DTUs either to a specific epidemiological context or to the different clinical presentations. Our main objective was to describe the *T. cruzi* DTUs isolated from a population of chronically infected Latin American migrants attending a reference clinic in Madrid. In addition we determined DTUs after treatment in a subset of patients. 149 patients meeting this condition were selected for the study. Molecular characterization was performed by an algorithm that combines PCR of the intergenic region of the mini exon-gene, the 24Sx and 18S regions of rDNA and the variable region of the satellite DNA. A descriptive analysis was performed and associations between geographical/clinical data and the different DTUs were tested. DTUs could be determined in 105 out of 149 patients, 93.3% were from Bolivia, 67.7% were women and median age was 35 years (IQR 29–44). The most common DTU found was TcV (58; 55.2%), followed by TcIV (17; 16.2%), TcII (10; 9.5%) and TcI (4; 3.8%). TcIII and TcVI were not isolated from any patient, and 15.2% patients presented mixed infections. Additionally, 57% patients had different DTUs before and after treatment. No relationship was found before geographical origin or clinical spectrum. DTUs distribution from this study indicate active transmission of *T. cruzi* is occurring in Bolivia, in both domestic and sylvatic cycles. TcIV was confirmed as a cause of chronic human disease. The current results indicate no correlation between DTU and any specific clinical presentation associated with Chagas disease. Treatment with benznidazole does not always clear *T. cruzi*'s genetic material from blood, and DTUs detected in the same patient may vary over time indicating that polyparasitism is frequent.

DISCLOSURE Nothing to disclose.

## PS2.223

Active *Schistosoma haematobium* infection among West-African immigrants in the Paris region, France: a retrospective study (2004–2014)

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**INTRODUCTION** Imported active *Schistosoma haematobium* (SH) is still detected in municipal free Clinics of the Health Department of Paris. More than half of the patients are recent immigrants coming from endemic areas. In 2003, 13% (22/171) were found positive with viable eggs of SH in urine, some of them with symptoms. Only a few underwent ultrasonography.

In order to estimate the uro-nephrological risks, we retrospectively analysed the files of all patients diagnosed with SH in the last 11 years in our four clinics.

**MATERIAL AND METHODS** Methods: Clinical, laboratory data (urine reagent strip, parasitologic test of urine, creatininemia) and medical images (urinary tract ultrasonography) were analysed.

Results: 83 cases of active SH infection: 79 men, four women. Most of the cases are <35 years-old and come from the region of the Senegal River that lies in the junction of Mali, Senegal and Mauritania. Macrohaematuria: 21 (25%). Creatininemia: normal in all 45 patients who underwent the test. 57 underwent ultrasonography (70%); abnormal in 24 patients (30%); bladder abnormalities in 18 patients (21.5%): pseudopolyp (8), bladder wall thickness (8), mass (2).

**DISCUSSION** All patients received 1-day-praziquantel course and most of the patients with ultrasonography abnormalities received empirically 2 or 3 treatment at 6 months intervals. Some of the latter showed reversal according to ultrasound control after repeated treatment.

**CONCLUSION** Health professionals in non-tropical setting should consider SH when patients have recently settled and come from an endemic region (<5 years): urine reagent strip and urine microscopy are proposed. To those tested positive, praziquantel is the most convenient treatment in France, well tolerated, quite cheap and available in public pharmacies. Ultrasonography is required in order to detect and treat relatively frequent but mild complications of the bladder.

Further studies should assess the impact of praziquantel (repeated in time, at various intervals) on reversal of bladder morbidity in patients treated and no longer exposed to recontamination. This would bring additional support for strengthening health education to children, water supply and sanitation in endemic areas.

DISCLOSURE Nothing to disclose.

## PS2.224

## Seroprevalence of Chagas' disease in the Latin American community resident in Rome

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**INTRODUCTION** Chagas' disease (CD) is a parasitic infection due to *Trypanosoma cruzi*, endemic in Central and Southern America. The aim of this study was determine the seroprevalence of CD among the Latin American community (LAC) living in the urban area of Rome.

**METHODS AND MATERIALS** From February to June 2014, a screening program was offered by Médecins Sans Frontières and



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by the National Institute of Infectious Disease L. Spallanzani to the LAC resident in Rome using two different tests: CMIA-Abbott Diagnostics and ELISA-BiosChile. Patients positive at both tests were studied by DNA amplification using a nested-PCR.

**RESULTS** 375 patients were studied, 267 of whom (71.2%) were women. The mean age of this population was 42 years (range: 3–82 years). Overall, 118/375 (31.0%) subjects were born in Bolivia, 124/375 (33.1%) in Ecuador, 61/375 (16.3%) in Peru, 28/375 (7.5%) in Colombia, 19/375 (5.1%) in Italy, 20/375 (5.3%) in other LA countries. Anti-*T. cruzi* antibodies have been detected in the 8.8% (33/375) of the screened persons, 27/33 (81.8%) were female, with a median age of 49 years (range: 38–59). Among them, 28 (85%) subjects were from Bolivia, two subjects (6%) from El Salvador, one (3%) each from Brazil, Colombia, and Ecuador. The *T. cruzi* seroprevalence rate among Bolivian migrants was the 23.7% with a high prevalence among female Bolivians subject (82%, 23/28).

**DISCUSSION** The 8.8% *T. cruzi* seroprevalence rate observed in the general LAC in Rome is consistent with previous data from other European countries. As already described, the Bolivian immigrant population is at particularly high risk for CD. Chagas disease continues to be a silent and neglected disease: it is necessary to raise awareness and promote screening campaign in to prevent late stage complications or new infections.

**DISCLOSURE** Nothing to disclose.

**PS2.225****Descriptive analysis of parasite infections among immigrant Bolivian people attending an International Health Unit in Spain**

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**INTRODUCTION** In 2012, foreign residents in Europe comprised 6.5% of the population (Spain-12.3%). Ecuadorians, Colombians and Bolivians are commonest nationalities in Spain. Immigrants may carry some infectious disease as a result of higher prevalence in their country of origin, exposures and conditions during migration and resettlement. *Trypanosoma cruzi* (Chagas disease) and intestinal parasitosis infections are endemic in most of the Latin American countries. Due to the worldwide population mobility from Latin American, these diseases are being diagnosed in non-endemic areas. The aim of this study is to describe epidemiological, clinical and intestinal parasitosis infections and their relationship with Chagas disease in Bolivian immigrants living in our area.

**METHODOLOGY** This is a retrospective review of Bolivian people who visited the International Health Unit of Barcelona (IHUB), Hospital Vall Hebron-Spain, from January 2011 to December 2012. A descriptive analysis was done of the variables: sex, age, immigrants or VFR (immigrants visiting friends or relatives), attendance reason, length of stay in Europe, *T. cruzi* serology, and presence of intestinal parasites.

**RESULTS** A total of 351 patients were reviewed. Among them 61.3% (*n* = 215) were men with a mean age of 34.4 years (range: 8–62). Immigrant group was predominant

related to VFR group (67.2% vs. 32.8%). The mean time of stay in Europe was 6.2 years (range = 0–32). Most patients attended the IHUB for Chagas disease screening 72.6% (*n* = 255) and only 5.7% (*n* = 20) was due to clinical symptoms. In 59.5% (*n* = 209) a *T. cruzi* infection was found. The only variable related to Chagas infection was being older than 40 years (*P* = 0.0001). Intestinal parasitosis was present in 31.1% (*n* = 109), mainly *Strongyloides stercoralis* 17.9% (*n* = 63), followed by protozoa 8.8% (*n* = 31). No statistically significant association was detected between cases of *T. cruzi* infection and the presence of intestinal parasites.

**CONCLUSIONS** The prevalence of *T. cruzi* infection and intestinal parasitosis is high among Bolivian immigrant or VFR visited in IHUB. It is advisable to implement proper screening programs for these infections diseases in this population. No association was found between the presence of Chagas and intestinal parasites infections. However prospective studies would be desirable to confirm these results and even in countries of origin.

**DISCLOSURE** Nothing to disclose.

**PS2.226****The diseases that wash along with the wave of refugees challenge public health**

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The amount of refugees sheltering in Europe is constantly increasing. Along with them, they bring diseases that are endemic in their countries. To avoid the spread of imported infectious diseases, the German health authorities provide a medical screening for all refugees coming to Germany. Since September 2014, our department supports the local health authority of Hamburg by screening underage refugees. Clinical history examination, differential blood count and Hepatitis B serology are done. Stool samples are examined via microscopy and multiplex-real-time-PCR for enteroinvasive bacteria, protozoa and helminths. Between September 2014 and April 2015, 160 minor refugees (15–17 years old) were screened. By the time of presentation, about one third (33%) of the refugees complained about health problems. In 21 of 140 assessed blood samples, eosinophilia of more than 450/ $\mu$ l was found. This was strongly associated with provenance from sub-Saharan Africa (*P* = 0.007). 27% (10/37) of the refugees showed blood eosinophilia and 57% (8/14), respectively, came from Eritrea (*P* = 0.00004). Stool microscopy (114 samples) detected *Schistosoma mansoni* (*n* = 3), *Giardia duodenalis* (*n* = 2) and *Hymenolepis nana* (*n* = 1). Multiplex stool PCR (98 samples) tested nine more cases positive for Schistosoma [total *n* = 12 (7.5%)]. Schistosomiasis was associated with eosinophilia, origin from sub-Saharan Africa especially Eritrea. PCR also detected 10 further infections with *Giardia duodenalis*. [7.5% (12/160)] Occurrence of giardiasis did not show any regional preferences (Afghanistan, Algeria, Egypt, Benin, Eritrea) nor any association with clinical findings or ostensible health problems. Anti HBc was positive in 11.3% (18/160) of cases, three of them developed chronic hepatitis B. Anti HBc positivity was significantly higher in refugees from Sub-Sahara Africa (*P* < 0.001).

Eosinophilia, helminth and most protozoan infections – with the exception of giardiasis – are more frequent in refugees com-



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ing from sub-Saharan Africa than from other regions. Imported giardiasis is a problem because it is common, easily transmissible and hard to detect. Standard examinations of single stool probes are very insensitive; therefore examination for giardiasis via PCR should be considered.

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**DISCLOSURE** Nothing to disclose.

**PS2.227****Barriers to attend cervical screening services in Democratic Republic of Congo**

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The natural history of cervical cancer allows for interventions such as screening to detect precancerous lesions and prevent the onset of disease by treatment prior to the development of cancer. In high-income countries, screening and treatment strategies are well established and have proven to be effective in reducing incidence and mortality. However, Democratic Republic of Congo (DRC) does not have a national screening program and the population is not aware of the dangers to cervical cancer since there are no clinical signs and the majority of the population cannot afford medical care.

The objective of this study was to determine the perceptions and identify barriers exist to attend screening facilities. A qualitative study was performed in the health zone of Mont-Ngafula 1, Kinshasa, DRC.

Overall, cervical cancer screening as a preventive measure is positively perceived. However, three main barriers could be identified among the participant regardless of their sex: economical, geographical and cultural barriers.

Poverty was the main barrier to attend the screening center, even when the service is free of charge, the expenses to reach the facility is perceived to be a barrier. Secondly, the time spent at the facility is seen as a loss of income. The distance to the screening facility is also perceived as a barrier since it will result in expenses to reach the centre. Finally, cultural barriers were the main obstacles to attend screening. Women felt ashamed to undress and be examined when they are not feeling pain or discomfort and are afraid of knowing that they have cancer. Men often mentioned to refuse screening for their wives because they would need to undress for the doctor although they are not ill.

Nevertheless, with an informative campaign with well formulated messages, the population could be convinced of the benefits of cervical cancer screening.

**DISCLOSURE** Nothing to disclose.

**PS2.228****Persistence and transmission of intestinal parasites in immigrants in Southern Italy**

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**INTRODUCTION** Intestinal parasitic infections are amongst the most common infections worldwide. The constant increase of the migratory flows from developing nations together with the overall increase in international travels and climatic changes are contributing to the spread of parasitic infections in contexts where the prevalence was considered very low. The present study was planned to assess the persistence of intestinal parasites in immigrants stably living in the urban area of Naples (southern Italy) and the spread of infection within households with a lifestyle similar to that of the country of origin.

**METHODS AND MATERIALS** Between October 2008 and October 2014, a total of 2150 stool samples from immigrants were analysed with the FLOTAC dual technique. All the infected patients were pharmacologically treated. Of the 2150 analyzed subjects, 196 were randomly recruited and monitored again after 1 year in order to evaluate the persistence of intestinal parasites in immigrants having access to proper sanitation. In addition, a total of 482 cohabitants of positive subjects were recruited to evaluate the interfamilial spread of the intestinal parasites.

**RESULTS** In total 415/2150 subjects (19.3%) tested positive to the following intestinal parasites: hookworms (5.3%), *Trichuris trichura* (3.8%), *Ascaris lumbricoides* (0.6%), *Strongyloides stercoralis* (0.4%), *Trichostrongylus* spp. (0.3%), *Enterobius vermicularis* (0.2%), *Schistosoma mansoni* (1.3%), *Hymenolepis nana* (1.3%), *Taenia* spp. (0.1%), *Blastocystis hominis* (29.6%), *Entamoeba histolytica/dispar* (4.4%), *Entamoeba hartmanni* (2.7%), *Entamoeba coli* (12.7%), *Endolimax nana* (11.4%), *Giardia duodenalis* (3.2%), *Iodamoeba butschlii* (0.8%). No parasites were found in the 196 subjects monitored after 1 year. Only in 18 cohabitants there were subjects infected with the same parasitic species.

**CONCLUSIONS** Our study evidences that the prevalence of parasitic infections in immigrants is probably related to the poor sanitary habits of the country of origin and that acquisition of new sanitary regulations, together with the administration of an efficient pharmacological treatment, limits the transmission in the households and in the local population.

**DISCLOSURE** Nothing to disclose.

**PS2.229****Imported malaria and dengue fever in travellers from endemic countries: experience at the INMI 'L. Spallanzani' from 2009 to 2011**

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**INTRODUCTION** Dengue and malaria are among the most frequent causes of fever in travellers returning from tropical and subtropical countries.

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**METHODS AND MATERIALS** A retrospective study on imported febrile syndrome due to dengue and severe malaria infections at INMI Spallanzani, Rome, between 2011 and 2013: malaria was diagnosed by microscopy, rapid assay and PCR; dengue was diagnosed by serology (IgM and IgG), rapid assay (antigen, IgM and IgG) and PCR. WHO definitions for acute and severe cases were applied.

**RESULTS** Recent dengue was identified in 60 patients (pts). Seven pts had alert signs (mostly AST increase), two of them with severe illness, one due to secondary infection. Mean age was 42.7 (+/-12.5) years, 37 (61.7%) were males. All cases were imported: 31 (51.7%) from South-Eastern Asia, 12 (5%) from South America and 9 (15%) from Africa. Travel history included tourism (58.6%), work (27.6%) and visit to relatives (13.8%). Non-European origin was recorded in nine patients (five from Asia, two from Africa and South American). Fever (100%), arthromyalgia (75.8%), rash (48.3%), and nausea (27.6%) were common symptoms.

Severe malaria was reported in 35 pts with a mean of two WHO criteria: 12 pts (34%) with CNS involvement and 19 (54.3%) with liver involvement. The mean age was 39.4 (+/-13.7) years, 29 (82.8%) were males; 23 pts (65.7%) had a  $\geq 5\%$  parasitemia at diagnosis. Eighteen (51.4%) pts were Italian; 14 (4%) pts had undertaken the journey for tourism, 8 (22.8%) pts for visit to relatives, 5 (14.2%) pts for work, and 4 (11.4%) pts for humanitarian missions. Twenty-nine pts (82.9%) were infected in West Africa (Nigeria, Ghana, Ivory Coast and Benin). Nine pts (25.7%) reported that they had had a previous diagnosis of malaria.

In our cohort of febrile syndrome, multivariate analysis showed independent associations between the diagnosis of dengue and the presence of rash ( $P \leq 0.001$ ) and the travel destination – South East Asia ( $P = 0.002$ ), and between the diagnosis of severe malaria and the presence of CNS involvement ( $P = 0.05$ ) and the travel destination – West Africa ( $P < 0.001$ ).

**DISCUSSION** In our cohort of imported febrile syndrome a frequent involvement of the CNS and the origin from West Africa was independently associated to the severe malaria diagnosis. The appearance of a rash with centrifugal distribution and the origin of the patient from Southeast Asia were characteristic of an early diagnostic suspicion of dengue.

**DISCLOSURE** Nothing to disclose.

**PS2.230****Cross-sectional survey of domestic violence among African undocumented migrants attending general practice in a non-governmental association**

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**INTRODUCTION** Violence against women is a major public health problem due to long-term consequences. It can have different forms, such as physical, psychological or sexual. According to a WHO report published in 2013, it is estimated that 35% of women have experienced some type of domestic violence. Unfortunately, little is known about domestic violence in migrant African women. The aim of this study was to evaluate knowledge of violence against women among this group, who attended general practice consultations at Karibu Association, a non-Governmental Organization in Madrid that provides undocumented immigrants with basic needs.

**METHODS AND MATERIALS** A cross-sectional survey was conducted from September 2014 to December 2014 among

African undocumented women who attended medical consultation. An anonymous self-administered questionnaire was provided. In total, 32 surveys were collected. Statistical analysis was performed with SPSS programme.

**RESULTS** In terms of descriptive features, the median (range) age of women was 40 (24 to 69) years. The number of women in a close relationship at the time of the enquiry was 24/32. 75% lived with their partner/spouse, and only 6.25% lived on their own.

Almost 60% of women had felt afraid of current or previous partner, sometimes or quite often. Finally, only four of 32 women answered that doctor had asked them about abuse or violence, and 90.6% find it easier to talk about personal issues with female doctors.

**CONCLUSION** In our study, we can conclude, from the number of women living with a partner that they depend on them. Doctors usually do not ask about abuse. One of the reasons would be the lack of time during the consultation, or the poor knowledge of healthcare professionals about violence against women. More training is needed in health professionals in order to assess correctly this issue.

**DISCLOSURE** Nothing to disclose.

**PS2.231****Imported strongyloidiasis: epidemiological, clinical and laboratory characteristics in a regional hospital setting in Granollers, Barcelona**

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**BACKGROUND** Strongyloidiasis is caused by infection with *Strongyloides stercoralis*. Manifestations of infection can range from asymptomatic eosinophilia in the immunocompetent host to disseminated disease with septic shock in the immunocompromised host. It's endemic in tropical and subtropical regions. The most common manifestations are gastrointestinal, cutaneous, or pulmonary symptoms that persist for years; others simply have eosinophilia in the absence of symptoms. Due to travel movements and immigration it can also be seen in developed countries.

**METHODS** Review of Strongyloidiasis cases followed-up at the internal medicine department of a regional hospital setting in Granollers, Barcelona, during 2014.

**RESULTS** Seven patients were diagnosed with strongyloidiasis during that year, 75% males with an average age of 32 years. All were immigrants, six of them from Bolivia and one from Ecuador, living in Spain a mean of 8.6 years. No one case of recent travel was reported. Reason of consultation was: eosinophilia in three cases; eosinophilia and symptoms in three cases; screening in one case. All of them had been referral from their Family Doctor. Six patients presented comorbidities: one was immunocompromised, presenting a C3 stage HIV infection; four had Chagas disease; one presented other concomitant forms of parasitic infection. Most common manifestations were gastrointestinal ( $N = 5$ ), cutaneous ( $N = 3$ ). No one with respiratory symptoms. Eosinophilia and elevated IgE were present in six cases. Stool tests were performed in all patients

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(four of them were positive) and serology in 5 (four of them positive).

All patients received treatment with ivermectine and one patient with ivermectine+mebendazole. After treatment, symptoms were solved in all patients. Eosinophilia persisted in one patient despite of therapy.

**CONCLUSION** Strongyloidiasis in non-endemic areas is probably underestimated. Early detection is necessary in patients with high eosinophilic count or elevated IgE levels, even in asymptomatic patients. In negative stool culture, serology test should be considered.

**DISCLOSURE** Nothing to disclose.

**PS2.232****Malaria infection and potential risks of blood transfusion**

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**INTRODUCTION** According to the Portuguese legislation for blood donations (based on policies of the European Council and the European Parliament) individuals may donate blood after 1 or 3 years upon their return from endemic areas of malaria. Studies about malaria immune response have shown that individuals returning from endemic areas after 10 or more years since their last stay still possess antibodies against *Plasmodium* spp. in their bloodstream. Our serological results were according to these findings (data not shown), therefore we consider the possibility of these individuals transferring the parasite through blood transfusion. Thus, we analysed the potential risk of parasite transfer, regarding to serological result and the time of the last stay.

**METHODS AND MATERIALS** 377 individuals with previous stays in endemic areas of malaria, with or without malaria medical history were included in this study. We analysed serological reactivity against *Plasmodium* spp. in plasma samples using a serological test (MALARIA EIA TEST KIT®, BioRad-USA). We compared the approval and rejection rates of potential blood donors.

**RESULTS** Blood donations are allowed in the following situations:

1. Individuals who lived the first 5 years of life in an endemic country: 3 years after their return (clinical criterion – CC) or 4 months if serological test is negative (serological criterion – SC) ( $n = 65$ ): 1.1) SC: 75% of the individuals were serological negative, allowing blood donation; 1.2) CC: 58.5% of individuals would be approved. However, from these, 15.4% presented a reactive result.

2. Asymptomatic visitants of endemic areas (stays less than 1 year in endemic areas): 1 year after their return (CC) or 4 months if serological test is negative (SC) ( $n = 177$ ): 2.1) SC: all individuals would be approved, due to their negative serological result; 2.2) CC: 62.1% of individuals would be approved. However, 0.6% of these individuals tested positive for the serologic test.

**CONCLUSION** The results suggest that the use of serological criterion would approve more blood donations. The clinical criterion used alone seems to carry more risks to transfusion security, since this criterion would accept blood donations from individuals with positive serological results. Thus, the enforcement of a serological test becomes crucial to screen individuals with previous stays in endemic areas, who intend to

donate blood. New studies should be developed to better characterize the type of reactive antibodies.

**DISCLOSURE** Nothing to disclose.

**PS2.233****Travel advice in a travel clinic in Lisbon, Portugal**

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**INTRODUCTION** Travel advice by trained health professionals is mandatory for adequate counselling of travellers. In Portugal there are many travel clinics, both in the public and private health sector. We are still taking the first steps to standardize some procedures through the Portuguese Society of Travel Medicine, which was created this year. In our country, only medical doctors are allowed to prescribe vaccines or chemoprophylaxis. The travel clinic at the Institute of Hygiene and Tropical Medicine, Lisbon, has the highest number of consultations all over the country. This study aims to describe the main characteristics of travellers attending the clinic and type of malaria chemoprophylaxis and vaccines prescribed during 2013.

**METHODS AND MATERIALS** A cross-sectional survey was undertaken with a random sample of the medical registers. A systematic sampling was used.

**RESULTS** A total of 11 334 pre-travel consultations were performed, from which 67.4% of the travellers were male, 32.6% female, their age varied from 1 month to 88 years ( $P_{25} = 30$  years,  $P_{50} = 38$  years,  $P_{75} = 48$  years; 0.3% <9 months, 7.4% ≥60 years); 83.7% were Portuguese. Number of days from consultation to departure:  $P_{25} = 10$  days,  $P_{50} = 18$  days,  $P_{75} = 30$  days. Destinations included more than 70 different countries, 81% of which in Africa (48.1% of the travellers went to Angola); 61.1% travelled for work and 27.7% for tourism. Length of stay:  $P_{25} = 8$  days,  $P_{50} = 14$  days,  $P_{75} = 30$  days. Yellow fever, typhoid fever and tetanus/diphtheria vaccines had already been taken by 15.9%, 6.5% and 60.9% individuals, respectively. Data showed that the percentage of individuals vaccinated against typhoid fever, meningococcal meningitis and hepatitis A and B increases with length of stay, remaining stable for hepatitis A vaccine. The most frequent prescribed chemoprophylaxis to healthy travellers were: 62.1% atovaquone-proguanil (A-P) for stays of ≤1 week, 40.9% A-P and 39% mefloquine for stays between 2 and 4 weeks, 60.2% mefloquine for stays 2–3 months, 68.8% mefloquine and 15.6% doxycycline for stays 4–6 months. To travellers with neurologic, psychiatric or cardiac disease A-P, doxycycline or no malaria chemoprophylaxis were the more frequent options, depending on length of stay.

**CONCLUSIONS** This study allowed to describe travellers characteristics. The results showed that at this clinic the majority of medical prescriptions related to malaria chemoprophylaxis and vaccines follow international recommendations.

**DISCLOSURE** Nothing to disclose.

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## PS2.234

**Eosinophilia, a common finding in international health**

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**INTRODUCTION** Eosinophilia is a common analytical finding in immigrants and travelers and indicates probable parasitic infection in this population. The aim of this study is to describe epidemiological and clinical data of cases diagnosed of eosinophilia in the cooperative network +Redivi.

**MATERIAL AND METHODS** This is a prospective study of eosinophilia cases registered in +REDIVI from January 2009 to December 2012. This cooperative network was created in 2009, includes 21 Spanish national healthcare centers, and collects demographic and clinical data related to travelers and immigrants pathologies. We divided migrants in four groups: immigrants, VFR (immigrants that visit friends or relatives in their country of origin), travelers, and VFR-travelers (immigrant couple or children born in Europe). Eosinophilia was defined by each center, however the most common value was  $>500$  eosinophil/mm<sup>3</sup> or  $>7\%$ . Parasites related to eosinophilia were helminths, *Isospora belli* and *Dientamoeba fragilis*.

**RESULTS** A total of 5279 cases were registered in the study period in +Redivi. Eosinophilia was observed in 25.2% of the patients, mostly men 60.2% and immigrants 72.4%, with median age 31.2 (1–77) years. Most common countries of birth in immigrant group were Bolivia 32.0%, Equatorial Guinea 11.4%, and Pakistan 11.0%. In travelers, the most common visited countries were Thailand 7.5%, India 7.5%, and Senegal 4.7%. Median time of residence in Europe in immigrants was 3.7 (0–53) years. Most of the patients were asymptomatic 81.2%. Reasons for consultation were: altered laboratory results 43.2%, immigrant screening 38.0%, gastrointestinal symptoms 8.0%, skin symptoms 4.6% and febrile syndrome 2.0%. Immunosuppression was present in 2.5%, and it was due to HIV in 90.9%. Parasitosis was found in 66.7% cases with eosinophilia. There was a significant association between eosinophilia and presence of parasites ( $P < 0.005$ ). Multiple parasites were present in 13.5%. Most common parasites were *Strongyloides sp* 458, *Schistosoma sp* 147, hookworms 115, visceral leishmaniasis 95, and *Trichuris trichiura* 75.

**CONCLUSIONS** Eosinophilia is a common finding in +REDIVI. It is more frequent in men and immigrants, and its presence should be considered even in patients with long time of residence in Europe.

**DISCLOSURE** Nothing to disclose.

## PS2.235

**Development and evaluation of a clinical protocol for suspected Chikungunya cases aged below 6 months**

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**INTRODUCTION** Chikungunya is a viral infection transmitted by *Aedes aegypti* mosquitoes which can cause large epidemics. Such an epidemic was documented between August 2014 and January 2015 on the Caribbean island Curaçao. The symptoms in infants, especially in children below 6 months of age are often severe, mimicking septic disease, encephalitis or meningitis and thereby difficult to distinguish from other viral and treatable bacterial infections. Structured approach towards suspected infants in an epidemic area is therefore needed. We have developed and evaluated such a structured approach, which included a standard questionnaire and collection of a fixed set of clinical and laboratory variables in suspected children aged between 1 week and 6 months.

**METHOD** All suspect Chikungunya infected children less than 6 months of age and older than 7 days seen at the general pediatric ward of the St Elisabeth Hospital (SEHOS) in Willemstad, Curaçao, were included in the evaluation. In children below 2 months of age a full sepsis workup was performed. Serology for Chikungunya was done on the 3th or 4th day of the infection. The standard protocol was developed and applied on all suspected cases.

**RESULTS** A total of 27 patients were enrolled, 13 (48%) were aged below 2 months. In 14 (52%) children serology was performed, 10 (77%) below the age of 2 months. In total 10 (37%) children were serology positive and 4 (14.8%) were negative. Most of the missing data (85%) were from the epidemic peak in November and December. By 7 (25%) and 2 (7%) the urine and respectively blood culture were positive. However 22 (81%) of the children received antibiotics. Clinical symptoms were fever (26; 96%), agitation (16; 59%), poor nutritional intake (14; 52%), suboptimal circulation (6; 22%), respiratory distress (5; 18%), erythema (16; 59%) and bullae (4; 15%).

**CONCLUSION** Chikungunya infections, especially under the age of 6 months, can give severe clinical symptoms with difficult distinction between diseases like sepsis and meningitis. It is therefore essential, during Chikungunya epidemics, to apply a structural approach to help prevent unnecessary investigations and treatments, but also miss diagnosis.

**DISCLOSURE** Nothing to disclose.

## PS2.236

**Isolated lung echinococcosis mimicking post-TB pulmonary aspergilloma in a 26 year-old asylum seeker from Syria in Germany**

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**INTRODUCTION** Echinococcosis is a parasitic disease due to tapeworms of the *Echinococcus* genus and it is one of the neglected tropical diseases prioritized by the WHO. It mainly affects the liver but may also involve other organs, such as the lungs. Isolated pulmonary echinococcosis is a rare condition and



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it often does not appear among the differential diagnosis in patients presenting with cough, chest pain and mild hemoptysis in the Western world.

**CASE REPORT** A 26 year-old patient was referred to our tertiary institution due to abnormal findings on a routine chest x-ray performed as a screening for pulmonary TB. The patient was an asylum seeker from Syria who had spent most of his life illegally in Russia, therefore not being able to access any form of medical care. He admitted dry cough as well as breathing related chest pain and some episodes of mild hemoptysis. The physical examination as well as laboratory findings did not reveal any significant abnormality, apart from raised leukocytosis.

We performed a CT scan of the chest and upper abdomen in which a TB- typical cavitory lesion in the left upper lobe was described. The cavitory lesion of about 35 × 30 mm appeared only partially air-filled. Part of it was occupied by a spherical structure with radiological features resembling an aspergilloma.

Based on the morphological findings and on medical history the patient was diagnosed with aspergilloma of the left upper lobe, most likely established on an existing cavitory TB-lesion. The standard TB-treatment was initiated in preparation for thorax surgery in order to prevent further bleeding from the pulmonary parenchyma. Two months later, a left upper lobectomy was performed and the resected parenchyma underwent histology.

The histological examination excluded the presence of the genus *Aspergillus*. Surprisingly, it turned out to be a hydatid cyst of *Echinococcus granulosus*.

**CONCLUSIONS** Although echinococcosis of the lung is a very rare condition in the western world it must be on the list of possible differential diagnosis in patients presenting with persisting cough, hemoptysis and chest pain. This is particularly true in young patients from a low socio-economic background. As a serological diagnosis is not always possible, a biopsy under antiparasitic coverage may help to secure the diagnosis. Further studies are needed regarding biopsy complications, treatment options and frequency of isolated pulmonary echinococcosis.

**DISCLOSURE** Nothing to disclose.

## PS2.237

## Laboratory-acquired Dengue virus infection by needle stick injury – South Korea 2014

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**BACKGROUND** Dengue fever is one of the most important vector-borne disease putting approximately 3.9 billion people at risk worldwide. While it is generally vector-borne, other routes of transmission such as needle stick injury are possible. Laboratory workers could be exposed to dengue virus transcutaneously by needle stick injury. Laboratory-acquired infection might have substantial influence not only on workers' health, but also the general population. This is the first case to our knowledge of dengue virus infection by needle stick injury in a laboratory environment. Our aim was to evaluate risk factors and related health concerns of laboratory workers exposed to dengue virus.

**METHODS** We have evaluated a 30-year-old female laboratory worker exposed to dengue virus while conducting virus filtering by needle stick injury.

**RESULTS** During the admission, she showed symptoms of fever, nausea, myalgia, and the characteristic maculopapular rash with elevated aspartate aminotransferase (AST) of 235 IU/l, and alanine aminotransferase (ALT) of 269 IU/l. She was diagnosed

by the positive nonstructural protein one (NS1) antigen (Ag) rapid test one day prior to symptom onset along with Immunoglobulin M (IgM) enzyme-linked immunosorbent assay (ELISA), and reverse transcription polymerase chain reaction (RT-PCR) conducted on the 9th day of symptom onset which were positive and negative respectively. After proper symptomatic treatment, she recovered without any sequelae. As a result of thorough epidemiologic investigation, it was found out that she tried to recap the needle during the virus filtering process and subsequent needle stick injury occurred.

**CONCLUSIONS** In the context of health promotion of laboratory workers, and prevention of disease spread to the general population, we suggest that laboratory biosafety manual be reinforced, and related primary prevention measures be implemented.

**DISCLOSURE** Nothing to disclose.

## PS2.238

## Medical travel kit: how is it used by aid workers?

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**INTRODUCTION** Up to 50% of short-stay travelers in developing countries will have health problems. Nearly 274 000 aid workers were deployed in 2010, around the world, but no data on the characteristics of the medical travel kit (TK) or its use we have.

**METHODS AND MATERIALS** A descriptive study using questionnaire designed for students of tropical medicine 2007–2014, in cooperation practices in the Oromia, Ethiopia. The questionnaire was structured into nine sections according to the item. Statistical analysis with SPSS version 21.0 software (IBM, Chicago, IL, USA) and Epiinfo seven were conducted. TK composition was analyzed, using (own or another partner) and intend to repeat in the future TK.

**RESULTS** Eight courses, 159 individuals, 140 invitations to participate with 89 (64%) completed questionnaires were performed.

**Participant analysis:** The most common age group was 30–34 years (43.8%) and female gender (76.4%). Participants were physicians ( $n = 65$ ; 73%); laboratory professionals ( $n = 17$ ; 19%) and seven nurses (7.9%). The minimum stay was 15 days (75%), 1 month ( $n = 11$ ) and 3 months ( $n = 11$ ).

**TK analysis, carried/using articles:** Sections more carried were analgesia (95.5%), prevention of bites (94.3%), dermatological compounds (94.3%) and antibiotics (93.2%). The main items used were: Analgesia, nonsteroidal antiinflammatory drugs (NSAIDs) (55.3%) and paracetamol (44%); Dermatology, protective sun cream (70.6%); Digestive, inhibitors of proton pump (PPIs) (39.6%); Respiratory, inhaled corticosteroids (44.4%); Ophthalmology, contact lens products (78.1%); Antibiotics, ciprofloxacin (23.5%); Malaria prophylaxis, atovaquone-proguanil (45%); Bite protection: repellent (74.6%); Dressing materials, below 10%.

**TK analysis, repeat on another journey:** The mean level of repetition was 87%. Only tramadol (50%), antihistaminic H2 (42.8), nasal corticosteroids (50%) and citronella (50%) get lower data. The intention of repeating is related to the fact of having carried an article on 15 items with  $P < 0.000$ , but only up seven related with the use of them.

**CONCLUSIONS** The composition of a TK of an aid worker does not differ from that of other types of travelers, except in

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some 'specialized' items such as antibiotics. Using an article on a trip is not related to the intention to bring this article in a next trip.

DISCLOSURE Nothing to disclose.

**PS2.239****Factors associated with dog rabies immunisation status in Bamako, Mali**

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We conducted a cross-sectional survey in Bamako, Mali, to determine for the first time the seroprevalence of rabies antibodies in the dog population and people's knowledge, attitudes and practices (KAP) towards the zoonosis and its control.

We visited 2956 households in 2010 and 2011 and if possible, a serum or plasma sample from adult dogs was collected. Beside an estimation of the seroprevalence of rabies antibodies, the antibody decline over time after rabies vaccination was described. Antibody detection was carried out with the fluorescent antibody virus neutralisation (FAVN) test, with a positivity threshold of 0.25 IU/ml.

Ninety percent of interviewed persons (95% CI: 85% – 91%) knew about rabies. The majority of interviewees knew that rabies is transmitted from dogs to humans, and some of the characteristic symptoms seen in rabid dogs could be listed by the majority. When asked how people behave regarding a rabid dog, killing the animal was the most frequent answer (>70%). Most were aware that vaccination of dogs can prevent rabies, but only a minority of dog-owners could answer correctly at what age the dog should get a first rabies vaccination. There was also strong consensus among dog-owners that it is better to protect their dog from becoming rabid by vaccinating it rather than needing to treat a bitten person. Forty-five percent ( $n = 306$ ; 95% CI 38–52) of dogs were reported as vaccinated against rabies at least once, but less than half of these (59/136) had a valid vaccination card. When asked for reasons for non-vaccination, cost was the most frequently cited reason at 31% (95% CI: 21% – 43%), while general negligence was mentioned by 15% (95% CI: 10% – 24%). Approximately one third of dog-owners would not pay for vaccination. To reach a threshold of 70% of vaccinated owned dogs, vaccination should not cost more than 0.2 €.

The seroprevalence of rabies antibodies in the examined dog population was low: 24% ( $n = 98$ ; 95% CI 15–36) with titres  $\geq 0.25$  IU/ml. All animals after booster vaccination had titres  $\geq 0.25$  IU/ml which was not the case in primo-vaccinated animals. For the Rabisin<sup>®</sup> vaccine, a Kaplan–Meier estimate suggested that to maintain an antibody titre of  $\geq 0.25$  IU/ml for 75% of owned dogs, re-vaccination should be carried out within 2.5 years.

This work contributes vital information towards planning an effective dog rabies control programme for the district of Bamako.

DISCLOSURE Nothing to disclose.

**PS2.240****Presentation of a novel tool for rapid rabies diagnostics in remote, low income settings**

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The high fatality and burden of rabies stands in contrast to very low rabies surveillance performance in developing countries. The resulting absence of reliable human and animal rabies incidence data ultimately result in neglect of disease control and persistence of rabies transmission despite the existence of powerful prevention tools. Rapid, easy to perform rabies diagnostic tests that need no expensive equipment or special storage conditions and can be performed by well instructed ordinary veterinary professionals, are urgently needed for developing countries. Such novel methods will help to accurately amount the worldwide rabies burden and are a necessity to monitor control and eradication.

We compared the performance of a lateral flow chromatographic immunoassay with the standard Fluorescent Antibody Test (FAT) microscopy during routine diagnostics of rabies suspected dogs at the central rabies laboratory in Ndjamena, Chad. For confirmation of the results all samples were also tested by Polymerase Chain Reaction (PCR) at the Pasteur Institute in Paris. Performance comparison was done by McNemar test and Kappa statistics.

The performance reliability of the test is comparable to the FAT under field conditions as no statistical significant difference between the two test results was found. PCR confirmed the presence of rabies virus DNA in all immunoassay positive samples. The test procedure is very straight forward and the cassettes can be stored at room temperature. The cost of the test are lower than cost for FAT diagnostics however still too high to be incurred by dog owners alone.

The presented rapid rabies diagnostic tool is very promising. Major limitations are the non-recommended use of the test for cats. Further validation has to be undertaken to prove the applicability and reliance of the test in peripheral field laboratories. **ACKNOWLEDGMENTS** We thank BioNote, Inc. and its Swiss representative Arovet for the free provision of the tests used for this study.

DISCLOSURE Nothing to disclose.

**PS2.241****Experiences with a voluntary surveillance system for early detection of diseases in Switzerland: participation of veterinary practitioners and the perceived usefulness of mobile reporting**

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**INTRODUCTION** Clinical observations reported by veterinary practitioners in real time using web- and mobile-based tools may benefit disease surveillance by improving the timeliness of outbreak detection. Equinella is a voluntary electronic reporting and information system established for the early detection of infectious equine diseases in Switzerland. During its first operational year (December 2013 to November 2014), we aimed

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to better understand motivations and barriers to sustainable participation by sentinel veterinary practitioners; and to evaluate the suitability of mobile devices to collect animal health data.

**METHODS AND MATERIALS** Registered Equinella practitioners ( $n = 67$  in November 2014) can report cases of non-notifiable diseases as well as clinical symptoms to an internet-based platform using computers or mobile devices in real-time. Non-monetary incentives to participate are offered such as regular information feedback, a free continuing professional development course per year or the use of a handy smartphone specialised for outdoor use. Based on a questionnaire including primarily open questions, telephone interviews were carried out with 11 Equinella veterinarians (six in June 2014, five in November 2014).

**RESULTS** A relatively high participation of Equinella veterinarians was found during the first year (median = 73% of registered practitioners). Receiving up-to-date information on the health status of the equine population was stated as a strong motivation to participate. Insufficient knowledge of the reporting system, concerns regarding the dissemination of information, and a perceived low relevance of the system were identified as potential challenges to sustainable reporting by practitioners. Mobile devices were sporadically used for reporting during the first year (12.8% of reports). Our suspicion that many practitioners were not aware of the advantages of mobile reporting was confirmed during the interviews. No particular problem with the mobile devices or reason for their infrequent use was found.

**CONCLUSIONS** A voluntary surveillance system based on non-monetary incentives has the potential to attract and retain practitioners. The uptake of novel reporting methods may be slow as practitioners may require time to become accustomed. Continued information feedback loops and sustained communication efforts with practitioner networks are needed to address some of the shortcomings identified and promote better understanding of the system.

**DISCLOSURE** This work is part of a PhD project included in a grant 1.12.12 'Development of a syndromic surveillance system to enhance early detection of emerging and re-emerging epizootics and zoonoses' funded by the Federal Food Safety and Veterinary Office.

## PS2.242

### Development of a bead-based Luminex assay using lipopolysaccharide specific monoclonal antibodies for the detection of bio threat *Brucella* species

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*Brucella*, a gram-negative bacterium, is classified as potential bio terrorism agent mainly due to the low infection dose needed and the ability to transmit the bacteria via aerosols. The six classical *Brucella* species are *B. melitensis*, *B. abortus*, *B. suis*, *B. canis*, *B. ovis* and *B. neotomae* preferentially infecting goats and sheep, cattle, pigs, dogs, sheep and rodents, respectively, with *B. melitensis* and *B. abortus* causing most of the human cases.

According to international bio defense regulations, immunological assays are required to complement molecular detection systems for potential bio terror agents. Our aim was to specifically detect *Brucellae* with 'smooth' lipopolysaccharides (LPS) through a highly sensitive monoclonal antibody (mAb) based immunological assay. Sets of mAbs specific for the LPS O antigen of *Brucella* spp. were generated by immunization of mice with inactivated *B. melitensis* or *B. abortus* cells. Both *B. melitensis* and *B. abortus* were recognized by most mAbs and antigen binding was not impeded by inactivation of the bacterial cells by  $\gamma$  irradiation, formalin or heat treatment. The combination of mAbs most suitable for an antigen capture assay format was identified and an immunoassay using the Luminex xMAP technology was developed recognizing all tested *Brucella* species with 'smooth' LPS with detection limits of  $2 \times 10^2$  to  $8 \times 10^4$  cells/ml depending on the tested species. Furthermore, *Brucella* spp. cells were identified successfully within spiked milk samples using the Luminex assay. In addition a simultaneous, rapid and precise detection of *Brucella* spp., *Bacillus anthracis*, *Francisella tularensis* and *Yersinia pestis* within a single sample could be allowed by integrating the bead-based immunoassay into a multiplex format. Overall, the developed robust Luminex assay should allow for the detection of *Brucella* spp. both in natural outbreak and in bio threat situations.

**DISCLOSURE** Nothing to disclose.

## PS2.243

### Hygiene and microbial contamination along the pork value chain in Vietnam

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In Vietnam, pork accounts for 75% of total meat consumed daily at households. However, pork may contain high levels of microbial contamination such as *Salmonella* and *Escherichia coli* which might cause harm to consumers. To determine microbial contamination along the pork value chain, we collected 216 samples from 72 pig farms (floor swab, drinking and waste water), 545 from 49 slaughterhouses (carcass swab, lymph node, rectal feces, floor swab and washing water) and 514 from 220 pork shops in the informal markets (pork cuts, ground pork and cutting board swab) in two provinces of Vietnam (Hung Yen and Nghe An). Samples were analyzed to detect qualitatively and quantitatively *Salmonella* and *E. coli*. Overall prevalence of *Salmonella* combined from all types of above mentioned samples at pig farms, slaughterhouses and pork shops were 35%, 30% and 37%, respectively. *Salmonella* contamination in the final product (pork at market) was 45% and an average concentration of 9 MPN/g was recorded. *E. coli* average load along different points of the chain was  $5.3 \pm 1.4$  (farm floor swabs),  $2.9 \pm 0.9$  (carcass swabs),  $3.1 \pm 1.0$  (slaughterhouse floor swabs), and  $3.3 \pm 1.1$  (market shop cutting board swabs) logCFU/cm<sup>2</sup>, whereas pork from the market had  $3.4 \pm 0.9$  logCFU/g. Demonstrated high levels of *Salmonella* in the final product (pork at market) induces the potential health risks for the consumers. High values for *E. coli* indicates general poor hygiene along the chain. Appropriate hygiene practices and management are required to achieve better pork quality and reduce the risk for the consumer. These data will serve as inputs for health risk assessments related to pork consumption.

**DISCLOSURE** Nothing to disclose.

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## PS2.244

**Risk pathways and prevalence in slaughtered pig blood of *Streptococcus suis* in Vietnam**

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*Streptococcus suis* is a leading cause of bacterial meningitis in Vietnamese adults, and the major risk factors have been identified as consumption of raw pig blood (Tiet canh), and occupational exposure to pigs. Previous studies of *S. suis* prevalence in pigs sampled from southern Vietnam have indicated very high levels of commensal infection in tonsil specimens, however there is relatively little data on prevalence rates of systemic infections in pigs (as indicated by detection from fresh blood), and prevalence rates from northern and central Vietnam have yet to be described. To address these data gaps, we sampled blood from 147 slaughtered pigs in two provinces Hung Yen (North) and Nghe An (Center) and analyzed for *S. suis* using PCR (16S-*S. suis* and *S. suis* serotype 2). In addition, we surveyed 406 heads of household and 51 slaughterhouse workers in these areas to understand behaviors and attitudes toward consumption of raw pig blood. A total of 33.3% of 147 pig blood samples tested positive with *S. suis*, but only 1.4% (2/147) were positive to *S. suis* serotype 2, the serotype most frequently associated with severe human infections. Fifteen of 406 people interviewed (3.4%) reported eating 'Tiet canh', whereas this rate was significantly higher at 43.1% (21 of 51) for slaughterhouse workers. These findings will be discussed in the context of the growing body of literature on *S. suis* epidemiology, culinary practices involving raw or undercooked pig products, and risk mitigation strategies to minimize disease transmission.

DISCLOSURE Nothing to disclose.

## PS2.245

**Epidemiological study of zoonotic schistosomiasis among water buffaloes in different endemic areas in the Philippines**

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**INTRODUCTION** The contribution of animals in the transmission of zoonotic schistosomiasis caused by *Schistosoma japonicum* has been established in several studies. Among these animals, water buffaloes are perceived to be the most important as they are continuously and constantly exposed to the parasites in the transmission sites.

**MATERIALS AND METHODS** This was a cross-sectional study among water buffaloes in endemic areas in the Philippines. Study sites included municipalities with varying degrees of endemicity of schistosomiasis: near elimination areas (Talibon & Trinidad), moderately (New Corella & Gonzaga) and highly endemic areas

(Calatrava & Catarman). Samples were tested using microscopy, stool PCR, SEA-ELISA, SjTPx-1 ELISA and Sj1TR ELISA.

**RESULTS** Results showed significant positivities for schistosome infection in all the municipalities, with the highest prevalences of 45.7% in Catarman and 40.5% in Gonzaga. Water buffaloes also tested positive in near elimination areas of Talibon (15.7%) and Trinidad (20.6%). This proves that high prevalence in water buffaloes does not reflect human prevalence, but represents the threat of human transmission.

**CONCLUSION** Water buffaloes are good indices for human transmission of *S. japonicum* parasite and should therefore be considered when formulating elimination guidelines to prevent emergence and re-emergence of zoonotic schistosomiasis.

DISCLOSURE Nothing to disclose.

## PS2.246

**A systemic approach to understand neglected diseases at the human-animal-ecology interface**

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**BACKGROUND** There is a history of co-occurrence of human schistosomiasis and livestock fascioliasis in Côte d'Ivoire. The trematode parasites causing these two diseases share crucial aspects in their life cycles, such as the dependency on aquatic snails as intermediate hosts and the final-host infection at the host-water interface. The lives of humans and livestock are closely linked and both often share the same habitats, including water contact sites. Furthermore, different human population groups have different access to water and other resources. It follows that, next to classical parasitological approaches, the dynamics between different populations and their livestock need to be considered in a social-ecological context.

**METHODS** School-aged children from 38 randomly selected schools in northern Côte d'Ivoire were screened for micro-haematuria and antibodies in urine. Sedentary and semi-mobile populations were screened for schistosomiasis and fascioliasis infections. Water contact patterns of the population were assessed using a mixed methods approach, consisting of questionnaire interviews, direct observations and participatory mapping. Water sources in close proximity to the villages were characterised and the occurrence of intermediate host snails for fascioliasis and schistosomiasis was assessed. Remotely sensed environmental data was obtained for all study sites.

**RESULTS** Although safe water sources were available to all sedentary populations, people still need to access and use unimproved water for various reasons. We could show, however, that the semi-mobile Peulh population differs largely from the sedentary population in their contact with animals and the availability of water and other resources and have thus a different exposure to water borne-diseases. Animals and human populations share the same water sources, which harbour intermediate host snails for schistosomiasis and fascioliasis. This increases the potential for the spread of schistosomiasis and



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fascioliasis within and between the various populations of humans and animals.

**CONCLUSION** Our study provides new insight into two neglected diseases at the human-animal-ecology interface. There is a need for a more comprehensive, systemic approach in the fight against neglected diseases, taking into account, not only traditional parasitological and epidemiological data, but also the often neglected interplay between different social groups and their livestock in the same ecological setting.

**DISCLOSURE** Nothing to disclose.

**PS2.247****Health of Syrian refugees role of brucellosis in febrile diseases among the refugee population**

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This study aims at estimating the role of Brucellosis among fever patients in Syrian refugee camps to guide physicians in their differential diagnosis and treatment choices. The Middle East has traditionally been an endemic area and Syria is one of the countries with the highest incidence. Brucellosis is a bacterial infection, which spreads to humans by consuming infected animal milk or via direct contact with infected animals. It is a costly disease due to its chronic nature and the reduction of livestock production due to abortions, causing a major economic burden. Over 10 million people have been displaced in and out of Syria as because of the ongoing armed conflicts. According to the United Nations there are 6.5 million internally displaced people and almost 4 million Syrian refugees in the surrounding countries. We hypothesize that up to 5% of fever patients have acute brucellosis. Brucella infection may spilled over from Syria due to mass displacement. Alternatively the disease transmission might have collapsed as result of reduced commercial productivity. Approach: The study will take place in refugee camps along the Syrian border. A cross sectional case series of 300 fever patients will be clinically examined and tested for Brucellosis using the Rose Bengal test and a secondary serology test. The sample size assumes a standard error of 1% and a z-value of 1.96. An estimate of the health centre based acute brucellosis incidence will be made using an estimate the total number of population in the range of the health centre. We will compare local data on brucellosis in the host countries before and after the Syrian crises, in order to understand the health situation, the movement of the disease after the collapse of control and changes in the health priorities in the region to be able to give a quality assessment of the actuality of the disease and draw future control and elimination plan in collaboration with regional public and animal health authorities. To test further our secondary hypotheses we will compare observed incidences with disease data from Syria and host countries. This study will provide high quality data on the actual situation and the role of brucella infection in febrile cases among the Syrian refugees. The study results will be a starting point for further regional and more inclusive study to draw an updated brucellosis map of the Middle-East, to plan future elimination and control guide lines and working plans.

**DISCLOSURE** Nothing to disclose.

**PS2.248****Multiscale dynamics of dog rabies elimination**

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The aim of this study is to elucidate the contributions of population vaccination coverage and the vaccine immunity of individual dogs on the interruption of dog rabies transmission; determine the role of population density of dogs in the transmission of rabies; and identify the optimal frequency and coverage of vaccination campaigns. The results help define the most cost-effective dog mass vaccination strategies for rabies elimination in Africa and Asia. Rabies is a zoonotic disease that is responsible for substantial human mortality in Asia and Africa, but recent studies have suggested that elimination is possible. We hypothesize that the population level aspects of vaccination coverage contribute more to the dynamics of dog rabies elimination than the kinetics of protective antibodies within individual dogs. In 2012 and 2013 we vaccinated 18 200 and 22 300 dogs in N'Djaména, Chad, reaching both times a population coverage of more than 70%. Dog rabies incidence dropped from one rabid dog per week prior to the mass vaccination to less than one rabid dog 8 months afterwar the start of the campaign. Because of the multiple scales (between dogs and within dogs) in rabies transmission and immune dynamics, this unique data set will be used for comparative mathematical modeling approaches with individual based (contact networks and machine learning) and population-based models. Preliminary results have been obtained using coupled differential equations assuming a homogenous dog population. Results show that the respective contributions of the population dynamics and immunity loss are dynamic. The contribution of the population dynamics by birth and death processes is to the susceptible population is two to five times higher than the immunity loss of the immunized population between two vaccination campaigns. This project will generate new knowledge on dog rabies transmission dynamics and potential for elimination; provide advice on optimal vaccination strategies; and identify the most realistic and parsimonious models for the follow-up of forthcoming dog mass vaccination campaigns in Africa and Asia in the framework of the Global Alliance for Rabies Control (GARC).

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**DISCLOSURE** Nothing to disclose.

**PS2.249****Evaluating milk handling processes in smallholder dairy farms in Rombo district, Tanzania**

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This study was conducted to evaluate milk handling processes in smallholder dairy farms in Rombo district. Four villages were selected for the study. These include Mengeni Kitasha, Shimbi Masho, Keryo and Mbomai. After getting the informed consent,

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a total of 40 smallholder dairy farmers were randomly selected for data collection. Structured questionnaire was used to collect information on gender with respect to interviewee role, age, education, main occupation; herd size per household and cow breed; factors affecting hygienic quality of milk, routine mastitis control practices; knowledge on health risks associated with consumption of milk; measures to control zoonotic diseases and overall management of the milking cow. During farm visits, housing and housing equipment, milking environment, milking equipment and manure disposal were verified through direct observation. 81 milking cows were ear tagged from a sampling frame consisting all cows in the selected villages basing on health status as explained by the owner. Tuberculin test was carried out by the single comparative intradermal tuberculin test using avian and bovine purified protein derivatives. California Mastitis Test (CMT) was carried by mixing equal amounts of milk from each of the udder teats and CMT reagent into the four cups of the CMT paddle. Four milk samples each 50 ml were aseptically drawn from all four quarters of the udder of each sampled cow using clean sterile falcon tubes; for this reason 324 samples of milk were collected from 81 dairy cows. Also, 81 samples of blood were drawn from jugular veins of those cows using clean sterile vacutainer tubes. The collected Milk and blood samples were examined for brucellosis in the laboratory. All cows (100%,  $n = 81$ ) tested negative for TB and also all milk ( $n = 324$ ) and blood ( $n = 81$ ) samples tested negative for brucellosis. 14.8% of the teats were positive for subclinical mastitis and 0.3% clinical mastitis was diagnosed. Managerial factors related to poor milking hygiene and lack of training on milk handling were influencing ( $P < 0.05$ ) prevalence of mastitis. Improvements in animal husbandry practices and training of farmers to increase their awareness on management of dairy cows and hygienic production and commercialization of milk are recommended. Also, placement of milk collection centres will influence appropriate milking and milk handling practices. **KEYWORDS** milk handling; health risks; smallholders; dairy cattle.

**DISCLOSURE** We declare that we have no conflict of interest.

**PS2.250****Assessing Ugandan pork butchers' practices and their perception of customers' preferences: a best-worst approach**M. Heilmann<sup>1,2</sup>, N. Mtmet<sup>3</sup>, K. Roesel<sup>1,2</sup> and D. Grace<sup>3</sup><sup>1</sup>Institute for Parasitology and Tropical Veterinary Medicine, Freie Universität Berlin, Berlin, Germany; <sup>2</sup>International Livestock Research Institute, Kampala, Uganda; <sup>3</sup>International Livestock Research Institute, Nairobi, Kenya

Food-borne diseases are a major concern of developing countries. Among the drivers, rapidly increasing pork consumption deserves increased attention. Yet there is little documentation in Uganda on the context in which pork is produced, marketed and consumed and the implications this may have on public health. This study attempts to assess the current knowledge, attitudes and practices and looks more into butchers' beliefs about customer preferences.

Sixty pork butcherries out of 179 mapped in Kampala were randomly selected. In July 2014 on-site observations were undertaken and butchers were interviewed what they think is the most and the least important attributes to their clients when buying pork meat. Best-worst method with a set of previously identified thirteen attributes was used.

Half of the pork purchased by the butchers came from pigs slaughtered in backyards or non-gazetted abattoirs. Raw pork accounted for half of the total pork sold by pork butcherries. The other half was served as cooked pork and usually consumed on-site accompanied by raw vegetables. The majority of butchers use a wooden stump as a cutting surface. Pest animals are present in most butcherries including rodents, birds and flies.

Best-worst scores showed that among the attributes butchers revealed as the most important for their customers were: 'Meat from the same day', 'Cleanliness in the butchery' and 'Trust in butcher' while 'Presence of flies in butchery', 'Age of the animal', 'Pest animals in butchery' and 'Fat layer of meat' were the least significant qualities. Others varied in-between such as 'Price', 'Colour of meat', 'Bony meat', 'Butcher wearing coat', 'Type of building structure' and 'Butchery close to main road'.

The results indicate the need to improve food hygiene in order to mitigate food contamination risks but they also show sellers' beliefs which need to be taken into account and addressed. Bringing this research into use will allow targeted interventions and empower butchers to improve the conditions in their shops, strengthen their businesses, and therefore contribute to healthier clients and public health.

The research was carried out with the financial support of the Federal Ministry for Economic Cooperation and Development (BMZ), Germany, and the CGIAR Research Programs on Agriculture for Nutrition and Health, and on Policies, Institutions and Markets led by the International Food Policy Research Institute, through the Safe Food, Fair Food project at ILRI.

**DISCLOSURE** Nothing to disclose.

**PS2.252****Study of *Toxoplasma gondii* infection in free-range chickens, caged chickens and turkey by bioassay and serologic methods in Hamadan, West of Iran 2013**M. Fallah<sup>1</sup>, M. Hamzekhani<sup>1</sup>, A. Maghsood<sup>2</sup> and M. Hajilooei<sup>3</sup><sup>1</sup>Parasitology and Mycology, Hamadan University of Medical Sciences, Hamadan, Iran; <sup>2</sup>Hamadan University of Medical Sciences, Hamadan, Iran; <sup>3</sup>Immunology, Hamadan University of Medical Sciences, Hamadan, Iran

**INTRODUCTION AND OBJECTIVES** Toxoplasmosis is a widely prevalent zoonotic disease, caused by *Toxoplasma gondii*. Free-range chickens are considered as one of the most important hosts in the epidemiology of *T. gondii* infection because they are an important source of infection for both cats and humans. *T. gondii*-infected poultry is consumed widely in many countries, including Iran, and could be an important source of infection for humans. There was no information regarding *T. gondii* infection in chickens in this area of Iran, therefore, this investigation carried out to determine the prevalence of *T. gondii* infections in poultry in Hamadan.

**MATERIALS AND METHODS** A total of 203 birds including 162 free-range, 41 caged commercial chickens and two turkeys were studied from Hamadan city and suburb in the west of Iran, from January to July 2014. Blood samples were collected by venipuncture and transported to Research Laboratory of Department of Parasitology. Data regarding these birds (type, age, gender and raising place) were also recorded.

The head of birds also used for testing brain tissue, regarding to *T. gondii* tissue cysts. Brain of each bird ground and suspension were made by normal saline and inoculated to peritoneal cavity of five mice. Peritoneal aspirates examined for tachyzoites of *T. gondii* after 5–10 days. The serums tested by indirect hemagglutination test (IHA) for *T. gondii* antibodies.

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**RESULTS** Tissue cyst of *T. gondii* was detected by bioassay in the brain of three out of the 203 associated samples (one FR and one caged chicken) by peritoneal inoculation (1%). Seropositivity for *T. gondii* antibody was 6.1% (12/196). Positive cases were as follow: 6 FR hens, one caged chicken and five roosters. No positive cases were found in the examined turkeys.

**CONCLUSION** This study indicates that, both free-range and caged chickens may have similar risk of infection of *T. gondii* and can transmit the parasite to humans.

**KEYWORD** *Toxoplasma gondii*, prevalence, brain, IHA, mice, chicken, turkey.

**DISCLOSURE** Nothing to disclose.

## PS2.253

### Seroprevalence of toxoplasmosis in blood donors of Hamadan Transfusion Center in 2013

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**INTRODUCTION AND OBJECTIVE** Toxoplasmosis is worldwide in distribution and this parasitic infection is one of the most common opportunistic infections in the immunodeficient patients that caused abortion and congenital complications if pregnant women infected to acute infection. The main route of infection is contact with an infected cat or consuming under-cooked meat. Because the presence of parasite in the all body fluids, it is probable that transfusion during acute infection could transmit the parasite. The aim of this study was determining the IgM and IgG antibodies' titer in the Hamadan blood donors and its relation to some epidemiological risk factors.

**METHODS** In a cross-sectional study, a total of 540 blood specimens were taken randomly from healthy blood donors in the Hamadan Blood Transfusion Center. All samples examined by ELISA method for IgG and IgM antibodies. The results analyzed in relation to epidemiological factors such as age, gender, occupation and some *Toxoplasma* infection risk factors. **RESULTS** About 518 participants in this study was male, others were female. 294 (54.4%) were positive for IgG antibody and 10 (1.9%) were positive for IgM antibody. There was no significant relationship between seropositivity and *Toxoplasma* infection's risk factor.

**CONCLUSION** Because the screening dose not perform on the blood donors in Hamadan; according to results of this study, *Toxoplasma* infection in blood donors of Hamadan is relatively high and, the rate of IgM antibody could considered for screening of this population.

**KEYWORDS** Toxoplasmosis, blood donors, ELISA, IgG, IgM.

**DISCLOSURE** Nothing to disclose.

## PS2.254

### Evaluation of *Toxoplasma gondii* soluble, whole and excretory/secretory antigens for detection of toxoplasmosis by ELISA test

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Tehran University of Medical Sciences, Tehran, Iran

**INTRODUCTION** The present study performed to compare the soluble, whole and excretory/secretory antigens of *Toxoplasma gondii* (RH strain) in diagnosis of toxoplasmosis by ELISA method.

**METHODS** Tachyzoites of *Toxoplasma* were injected in intra-peritoneal cavity of BALB/c mice, and after 4 days tachyzoites were harvested by peritoneal washing of the mice. For soluble antigen, exudates centrifuged and sediment sonicated and then centrifuged at 4°C, 1 h, supernatant collected and density of protein determined by Bradford method. For whole antigen after collecting, washing and centrifuging of peritoneal fluid, the tachyzoites sediment was counted. In excretory/secretory antigen 1.5 × tachyzoites were transferred in 1 ml tube of saline and incubated under mild agitation and after centrifuging supernatant was collected and protein density determined by Bradford method. Afterwards, the checker board method was performed for prepared antigens and then 176 human serum samples were evaluated for *T. gondii* IgG antibody with prepared antigens, and finally serum samples were evaluated by commercial kit (Trinity,USA) which was considered as gold standard method.

**RESULTS** In this study sensitivity and specificity of prepared antigens was compared with those of commercial kits in ELISA. Sensitivity and specificity of soluble antigen were 91.4% and 74.5%, in whole antigen these parameters were 77.1% and 77.3% and in excretory/secretory antigen, 28.5% and 74.5%.

**CONCLUSION** Soluble antigen has a high level of sensitivity and specificity for ELISA and the results were close to those of commercial kits (Trinity,USA).

**DISCLOSURE** Nothing to disclose.

## PS2.255

### Applications and limitations of Centers for Disease Control and Prevention miniature light traps for measuring biting densities of African malaria vector populations: a pooled analysis of 13 comparisons with human landing catches

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**INTRODUCTION** Measurement of densities of host seeking malaria vectors is important for estimating levels of disease transmission, for appropriately allocating interventions, and for quantifying their impact. The gold standard for estimating mosquito – human contact rates is the human landing catch (HLC), where human volunteers catch mosquitoes that land on their exposed body parts. This approach necessitates exposure to potentially infectious mosquitoes, and is very labour intensive. There are several safer and less labour-intensive methods, with

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Centers for Disease Control light traps (LT) placed indoors near occupied bed nets being the most widely used.

**METHODS** This paper presents analyses of 13 studies when paired mosquito collections of LT and HLC were used to evaluate these methods for their consistency in sampling indoor-feeding mosquitoes belonging to the two major taxa of malaria vectors across Africa, the *Anopheles gambiae sensu lato* complex and the *Anopheles funestus sensu lato* group. Both overall and study-specific sampling efficiencies of LT compared with HLC were computed, and regression methods that allow for the substantial variations in mosquito counts made by either method were used to test whether the sampling efficacy varies with mosquito density.

**RESULTS** Generally, LT were able to collect similar numbers of mosquitoes to the HLC indoors, though the relative sampling efficacy, measured by the ratio of LT:HLC varied considerably between studies. The overall best estimate for *An. gambiae* s.l. was 1.06 [95% credible interval: 0.68–1.64] and for *An. funestus* s.l. was 1.37 [0.70–2.68]. Local calibration exercises are not reproducible, since only in a few studies did LT sample proportionally to HLC, and there was no geographical pattern or consistent trend with average density in the tendency for LT to either under-sample or over-sample.

**CONCLUSIONS** LT are thus a crude tool at best, but are relatively easy to deploy on a large scale. Spatial and temporal variation in mosquito densities and human malaria transmission exposure span several orders of magnitude, compared to which the inconsistencies of LT are relatively small. LTs therefore remain an invaluable and safe alternative to HLC for measuring indoor malaria transmission exposure in Africa.

**DISCLOSURE** Nothing to disclose.

## PS2.256

### The impact of an odor-baited mosquito control device, mosquito landing box, in reducing outdoor malaria transmission

A. S. Mmbando<sup>1</sup>, N. S. Matowo<sup>1,2</sup>, E. W. Kaindo<sup>1</sup>, F. O. Okumu<sup>1,2</sup> and D. W. Lwetoijera<sup>1,3</sup>

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**BACKGROUND** Outdoor malaria transmission recently has significantly increased up to 20–30%, even in the places where Long Lasting Indoor Treated Nets (LLINs) and Indoor Residual Spraying (IRS) are widely used. This is due to change in vector biting patterns on people in early evening while outdoor, and differential effects of indoor insecticidal interventions on anthropophilic and endophilic mosquitoes. In this study we assessed the impact of mosquito landing box (MLB), a recently developed odor-baited device in reducing outdoor malaria transmission, specifically, the densities and daily survival rates of outdoor of host seeking mosquitoes.

**METHODS** Experiments were conducted inside a semi-field system (SFS) in south-eastern Tanzania for 40 nights. The MLB were baited with human-worn nylon socks together with CO<sub>2</sub> gas produced from yeast-molasses fermentation. The MLB were dusted with 10% pyriproxyfen and entomopathogenic fungi (*M. anisopliae* IP46) to mark all the mosquitoes that made contact with the MLB during the night. 400 laboratory reared female *An. arabiensis* mosquitoes were released in two SFS chambers with and without (a control) a treated MLB. We assessed

proportion of host seeking *An. arabiensis* mosquitoes visiting the MLB. A reduction in daily survival rates was determined by exposing *An. arabiensis* to 5% pirimiphos methyl formulated in oil based paint, then recapturing individual mosquitoes and monitoring each of them daily until they were dead. All experiments were conducted in the presence of human-volunteers.

**RESULTS** Significantly more mosquitoes were contaminated in the chambers with the MLB than in the control chambers ( $P < 0.05$ ). Over 60% (119/199) and 43% (92/210) of mosquitoes recovered on human volunteer legs and inside a tent and in SFS walls in the treatment chamber were contaminated with pyriproxyfen and *M. anisopliae* IP46 fungal spores respectively, compared to 6% (12/200) and 0% (0/164) of its respective controls, suggesting the effective contamination power of the MLB. Similarly, daily survival of exposed mosquitoes to 5% pirimiphos methyl was reduced, approximately two times lower [HR = 1.7 (1.55–1.75)], compared to a control group.

**CONCLUSION** High contamination rates in the exposed mosquitoes even in the presence of humans, demonstrates high a preference of host seeking mosquito for the MLB and its potential for controlling outdoor malaria transmission, either by reducing vector survival or by killing them.

**DISCLOSURE** The authors declared that they have no competing interest.

## PS2.257

### Permethrin-treated clothing as protection against the dengue vector, *Aedes aegypti*: extent and duration of protection

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**BACKGROUND** 3900 million people globally are at risk of dengue fever infection, with its distribution increasing rapidly over the past 50 years. Since the primary vector, *Aedes aegypti*, is exophilic and most active during the day, personal protection technologies, such as insecticide treated clothing, could provide significant protection from mosquito bites.

**METHODS** World Health Organisation Pesticide Evaluation Scheme (WHOPES) cone and arm-in-cage assays were used to assess protection, knockdown and mortality against factory, home-dipped and microencapsulated permethrin-treated fabrics using *Ae. aegypti* mosquitoes. Factory-treated clothing was then analysed further to investigate the effects of insecticide resistance, clothing coverage, washing, Ultra-violet light and ironing.

**RESULTS** Factory-treated clothing showed the greatest protective effect (1 h KD 96.5% and 24 h mortality 97.1%), landing protection (59% (95% CI = 49.2–66.9) and bite protection (100%). Landing and biting protection reduced significantly from 58.9% to 18.5% and 28.6% to 11.1% after 10 washes for simulated hand washing. Resistance to permethrin had no effect on the efficacy of the clothing, with coverage playing an important role. Full coverage provided the highest protection (79.4% landing protection, 100% biting protection). Free flight room assays showed no difference in landing



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protection between the two coverage types but bite protection was significantly greater (>90%) with full coverage. HPLC confirmed ironing reduced permethrin content after 1 week simulated use, with a 96.7% decrease after 3 months. UV exposure was shown to have no effect.

**CONCLUSION** Insecticide treated clothing can provide significant biting and landing protection, even in a resistant strain. However, our findings also suggest that clothing may provide only short-term protection due to the effect of washing and ironing, highlighting the need for improved clothing treatment techniques.

**DISCLOSURE** Nothing to disclose.

## PS2.258

**A cross-over study to evaluate the diversion of malaria vectors in a community with incomplete coverage of spatial repellents in the Kilombero Valley, Tanzania**

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Malaria elimination is unlikely to occur if vector control campaigns rely entirely on treated bed-nets and indoor residual spraying. There is a need for vector control tools that address vectors that bite outside sleeping hours. Spatial repellents may be able to fill this gap. However it is unclear if malaria vectors will be diverted from households that use spatial repellents to those that do not.

The present study was performed for a period of 24 weeks in rural Tanzania. A total of 90 households were recruited and a cross-over design was used to measure the density of resting and blood-engorged mosquitoes in three coverage scenarios using 0.03% transfluthrin coils:

1. No coverage;
2. Complete coverage and;
3. Incomplete coverage.

Human blood index of each malaria vector species was calculated for each scenario. Human landing collections were performed and vector biting times were recorded.

The main vectors were found to be *Anopheles arabiensis* and *Anopheles funestus* s.s. Both species fed outdoors, outside sleeping hours and on humans as well as animals. Data from human landing catches showed that the repellent coils reduced the number of *An. arabiensis* by 80% but did not reduce the number of host seeking *An. funestus*, this may be due to potential development of pyrethroid resistance which has been documented in the area. The repellent coils did not reduce indoor and outdoor resting densities of Anophelines nor cause a shift in the human blood index. No diversion of malaria vectors was measured. On the other hand, the spatial repellent coils reduced the household densities of *Culex* spp. by 26%, and contributed to 19% diversion of *Culex* spp. to non-repellent users.

There is strong evidence that large proportion of malaria exposure is not controlled by the current vector control strategy in the Kilombero Valley. The use of 0.03% transfluthrin coils in this area is unlikely to result in malaria reduction since much biting occurred in the morning after coils had gone out. The behavioural responses of pyrethroid resistant mosquitoes and *Anopheles funestus* to spatial repellents needs to be further investigated given the increasing importance of this vector in the area.

**DISCLOSURE** Nothing to disclose.

## PS2.259

**Impact, interactions and limitations of larviciding, window screening, bed nets and human behaviour for preventing malaria in an African city with readily available artemisinin-based combination therapy and rapid diagnostic tests**

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In the city of Dar es Salaam, Tanzania programmatic distribution of insecticide-treated nets and application of mosquito larvicides, as well as provision of artemisinin-based combination therapy and rapid diagnostic tests, have been complemented by commercial sale of window screening. After a decade of progressively improving coverage with all these interventions, vector populations which remained pyrethroid-susceptible became sparse and lower malaria infection risk became evenly distributed across all ages but stable transmission persisted. High estimated proportion of potential vector exposure occurring indoors ( $\pi_{h,i}$ ) was protective against malaria among the majority of residents (85.8%) living in houses with window screens (OR [95% CI] = 0.73 [0.60, 0.90],  $P = 0.0040$  and 0.64 [0.49, 0.83],  $P = 0.00094$  for highest and middle versus lowest tertiles, respectively) but not in unscreened houses ( $P \geq 0.51$ ). Residents of houses with window screening who spent most night hours indoors (middle and high tertiles of  $\pi_{h,i}$ ) were protected against malaria infection (OR [95% CI] = 0.71 [0.59, 0.85],  $P = 0.00013$ ) but not those spending even a few hours outdoors in the evening and early morning ( $P = 0.433$ ). Malaria risk among residents with unscreened houses (14.2%) increased with vector density ( $P = 0.0093$ ) and was reduced by larvicide application (OR [95% CI] = 0.42 [0.23, 0.74],  $P = 0.0033$ ), but was unaffected by either factor among residents with screened houses ( $P = 0.23$  and 0.19, respectively). Only small fractions of persisting malaria infections could be attributed to houses lacking window screens (4.1%), spending time outside screened houses (5.8%), or gaps in larviciding coverage, (15.8%), respectively. Despite high coverage of effective nets, screening and larviciding in this urban context with very sparse populations of pyrethroid-susceptible vectors, malaria transmission persists and further improving coverage and adherence of these interventions are therefore only likely to prevent a minority of remaining cases. New or improved transmission control measures are required to enable elimination of malaria from Dar es Salaam.

**DISCLOSURE** Nothing to disclose.

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## PS2.260

**Attracting and instantly killing outdoor-biting malaria vectors using odour-baited mosquito landing boxes (MLB) equipped with low-cost electrocuting grids**N. Matowo<sup>1,2</sup>, S. Moore<sup>1,3</sup>, L. Koekemoer<sup>4</sup>, S. Mapua<sup>1</sup>, M. Coetzee<sup>4</sup> and F. Okumu<sup>1,3,5</sup><sup>1</sup>Environmental Health and Ecological Sciences Thematic Group, Ifakara Health Institute, Morogoro, Tanzania; <sup>2</sup>Faculty of Health Sciences, Wits Research Institute for Malaria, University of the Witwatersrand, Johannesburg, South Africa; <sup>3</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland; <sup>4</sup>Faculty of Health Sciences/Wits Research Institute for Malaria, Johannesburg, South Africa; <sup>5</sup>Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

**BACKGROUND** Ongoing residual malaria transmission is increasingly mediated by outdoor-biting mosquito populations, especially in communities where insecticidal interventions like indoor residual insecticides (IRS) and long-lasting insecticide treated nets (LLINs), are used. Often, the vectors are also physiologically resistant to the insecticides, making this a major obstacle against malaria elimination.

**METHODS** A recently developed odour-baited device, the mosquito landing box (MLB), was improved by fitting it with low-cost electrocuting grids to instantly kill attracted mosquitoes. An automated water-proof light sensor was also added to switch the attractant-dispensing and mosquito-killing systems on and off at dusk and dawn respectively, thus conserving energy, improving safety and removing need for frequent human-handling. MLBs fitted with one, two or three electrocuting grids, were then compared in a malaria endemic village, in south-eastern Tanzania, where vector populations are increasingly resistant to insecticides.

**RESULTS** Significantly more mosquitoes were killed when the MLBs had two or three grids, relative to one grid ( $P < 0.05$ ), regardless of season. During the wet season, MLBs with two or three grids killed more *Anopheles arabiensis* ( $P < 0.001$ ), but equal numbers of *An. funestus* ( $P > 0.05$ ) compared to MLB with one grid. In the dry season, MLB with three grids killed more *An. arabiensis* ( $P < 0.001$ ), but equal numbers of *An. funestus* ( $P = 0.515$ ) as one grid, while MLB with two grids killed more of both *An. arabiensis* and *An. funestus* ( $P < 0.001$ ).

**CONCLUSION** Odour-baited MLBs fitted with low-cost electrocuting grids and automated on/off switches can effectively kill outdoor-biting disease transmitting mosquitoes, including major malaria vectors, even in areas where the mosquitoes are behaviourally or physiologically resistant, and cannot be fully controlled by the current interventions like LLINs and IRS. The method is insecticides-free, hence it also has great potential for resistance bursting. These devices could have potential either for surveillance or as complementary control tools, to accelerate malaria elimination efforts, particularly in communities where outdoor-transmission is increasingly important.

**DISCLOSURE** Nothing to disclose.

## PS2.261

**Biocontrol activity of the entomopathogenic fungus *Aspergillus niger* against *Anopheles stephensi*, vector of malaria**S. J. Hashemi Hezave<sup>1</sup>, H. Basseri<sup>1</sup>, M. Velashgerdifarahani<sup>2</sup>, A. N. Omran<sup>3</sup> and M. Berenji<sup>4</sup><sup>1</sup>Tehran University of Medical Sciences, Tehran, Iran; <sup>2</sup>Hamedan University of Medical Sciences, Hamedan, Iran; <sup>3</sup>Islamic Azad University/ Tonekabon Branch, Tonekabon, Iran; <sup>4</sup>Tehran University of Medical Sciences, School of Health, Tehran, Iran

**INTRODUCTION** Malaria disease is one the most important diseases caused by parasites in all over the world. 'Mosquito control' is the control of mosquito-borne diseases through the interruption of disease transmission by killing or preventing mosquitoes from biting humans. The aim was assessment of biocontrol activity of the *Aspergillus niger* against larvae and adult stages of *Anopheles stephensi*.

**MATERIALS AND METHODS** The spores of *A. niger* was released in rearing water at three dosages of  $5 \times 10^5$ ,  $10 \times 10^5$  and  $15 \times 10^5$  spores and we assessed the application methods including topical application of spores on sucrose solution, free exposure to infected culture media and a combination of both. Fungi invasion both in larvae and adults stages was assessed using a three dimensional microscope and taking high resolution photos of them as well as preparation of 10% KOH wet mount from dead bodies followed preparation of tissue sections and staining with hematoxylin and eosin (H&E).

**RESULTS** Three dosages of  $5 \times 10^5$ ,  $10 \times 10^5$  and  $15 \times 10^5$  spores respectively yielded 16.0%, 24.0% and 24.0% mortalities compared to 3% mortality in the control group; the differences were significant ( $P < 0.05$ ). Adult emergence was 82.0%, 65.0% and 22.0% respectively at the above dosages compared to 97.0% of adult emergence in control group ( $P > 0.05$ ). The survival rate of treated blood-fed mosquitoes was 10.0% in comparison of 66.0% in control group ( $P > 0.05$ ).

**CONCLUSION** Based on significant larvae mortality or reduction of adult longevity it is highly recommended to isolate the metabolites from local strain of *A. niger* which originated of *A. dthali* caught from south of Iran by Hashemi et al. during 2011. The efficacy of such metabolites should be determined against malaria vectors at laboratory and field conditions.

**DISCLOSURE** Nothing to disclose.

## PS2.262

**Seasonal patterns of *Anopheles gambiae* susceptibility to *Plasmodium falciparum* infection, in the light of asexual forms occurrence in rural Burkina Faso**A. Gnémé<sup>1</sup>, W. M. Guelbéogo<sup>2</sup>, M. M. Riehle<sup>3</sup>, G. B. Kabré<sup>1</sup>, N. Sagnon<sup>2</sup> and K. D. Vernick<sup>3,4,5</sup><sup>1</sup>Université de Ouagadougou, Ouagadougou, Burkina Faso; <sup>2</sup>Centre National de Recherche et de Formation sur le Paludisme, Ouagadougou, Burkina Faso; <sup>3</sup>Department of Microbiology, University of Minnesota, Minnesota, MN, USA; <sup>4</sup>Unit of Insect Vector Genetics and Genomics, Department of Parasites and Insect Vectors, Institut Pasteur, Paris, France; <sup>5</sup>CNRS Unit of Hosts, Vectors and Pathogens (URA3012), Paris, France

**INTRODUCTION** Transmission reduction is a key component of global efforts to control and eliminate malaria. A wide range of novel transmission-reducing drugs and vaccines are currently under development. Human to mosquito transmission is influenced by many factors. Actually, it is unclear how the densities of parasites stages or season influence infection rate and

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intensity. Here, we describe the importance of the parasites stages seasonal pattern in infections success.

**METHODS** Parasitological data were obtained by blood slide processing from child volunteers with parental consent. Gametocytes carriers' infectiousness to mosquitoes was determined at the peak/end of transmission season and dry season via membrane feeding assay. Larvae were sampled from natural pools, reared to adulthood before experiment. Infection prevalence and intensity were determined 1 week after feeding.

**RESULTS** Asexual parasite prevalence was higher at the peak of the wet season (69.1%, 329/476) than the dry (56.8%, 50/88) and the end of the wet season (60.5%, 161/266). Of gametocyte positive slides ( $N = 189$ ), 86.2% had asexual parasites.

Gametocyte prevalence did not significantly vary between seasons. Asexual form median density was 993 (IQR: 317–3759) with a significant difference between seasons ( $P = 0.0004$ ). However gametocyte median density 40 (IQR: 16–78) did not show any seasonal variation ( $P = 0.1$ ). For feeding, around 28 062 mosquitoes were offered blood meal and 29.6% fed and survived until dissection. The average number of dissected mosquitoes 75 (range 18–207) was quite the same according to the assays period. In 71.8% (79/110) of feeding experiments, at least one mosquito was infected. The median percentage of infected mosquitoes per infectious experiment was 15.7% (IQR: 0.73–89.2%) with a median oocyst number of 2 (range 1–101). The prevalence of infected blood meal was similar across seasons (70.0%, 72.7% to 70.1% at the dry, the peak, and the end of the wet season). Mosquitoes' infection rate also did not show any significant variation within season. The infection success was higher for asexual parasites carriers (91%) than non carriers (9%). However, mosquitoes' infection rate and oocyst load did not significantly vary according the asexual forms carriage.

**CONCLUSION** This highlights the need to carefully interpret evaluations regarding asexual parasites and transmission season for malaria control program.

**DISCLOSURE** Nothing to disclose.

## PS2.263

**Protective efficacy of a Transfluthrin-based spatial repellent in combination with long lasting insecticide treated nets insecticide**

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Increased urbanization and rural electrification programs allow people to stay awake longer and are likely to expose the community to more early evening biting. Here we intend to evaluate a low cost passive SR product containing transfluthrin, in combination with LLINs, for its ability in offering added protection against clinical and sub-clinical malaria in children than LLINs alone and placebo. Transfluthrin is a World Health Organization and Tropical Pesticides Research Institute approved pesticide which prevents mosquitoes from biting individuals sitting within active range of the source of the volatile pyrethroid for a period of several weeks.

Initial evaluations of the effects of the insecticide on mosquito deterrence, survival and blood feeding inhibition will be done in semi field systems. Insecticide susceptibility of local malaria vectors against the pyrethroid based insecticide will be evaluated in households in the study villages. Thereafter a prospective, cluster-randomized, double blinded, placebo controlled trial will be

carried out, each household within the cluster will receive double sized Olyset LLINs per sleeping space and in addition, half will receive transfluthrin-impregnated SR products, while the other half will receive identical blank SR products. A total of 2800 children aged between 6–59 months old will be enrolled into the study cohort. Baseline estimates of malaria infection among study participants will be obtained prior to the 24 months of followup.

These ongoing preliminary findings which will be finished by June of 2015, will allow us to evaluate the susceptibility of mosquitoes in the proposed study area towards transfluthrin. Thereafter allow us to demonstrate and quantifying the protective efficacy of Transfluthrin passive spatial repellent product in reducing the number of clinical malaria cases among all users in the community.

**DISCLOSURE** Nothing to disclose.

## PS2.264

**Spatial correlations between household occupancy and malaria vector biting risk in rural Tanzania: implications for targeting of control interventions**

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**INTRODUCTION** Disease-transmitting mosquitoes identify their hosts by detecting the host odors in the environment then following these cues, their dispersal paths being partly determined by locations and densities of the hosts. Here, we demonstrate strong spatial correlations between household occupancy and indoor malaria vector densities in three contiguous villages in rural south-eastern Tanzania, and derive theoretical hypotheses for using regular human population census data for generating baseline information on potential hotspots for *Anopheles* mosquito biting risk.

**METHOD** Monthly mosquito collections were conducted in 96 randomly selected households in three rural Tanzanian villages using CDC light traps between March 2012 and November 2013. The total number of people sleeping in the house, and also in the specific trapping room was assessed as proxies of human biomass, but other household and environmental characteristics were also observed. ArcGIS 10 (ESRI, USA) spatial analyst tool, Gi\* Ord Statistic was used to analyze and visualize clustering of vector densities and relationships with biomass in the study area. Separately, a controlled 4 × 4 Latin square experiment, replicated four times was conducted in a neighboring village, in which 0, 1, 3, or 6 volunteers slept inside specially designed experimental huts, and mosquitoes entering these huts were caught using exit interception traps fitted on the eave spaces, to empirically verify statistical correlation between human biomass and mosquito house- entry in these villages.

**RESULTS** Geographical clustering of *An. arabiensis* and *An. funestus* mosquitoes were strongly and clearly associated with clustering of household occupancy in the study area. There were more *An. arabiensis* (RR = 1.5 (1.2–1.7),  $P < 0.001$ ), more *An. funestus* (RR = 1.2 (1.2–1.3),  $P < 0.001$ ) and more *Culex* mosquitoes (RR = 1.3 (1.3–1.4),  $P < 0.001$ ) in houses with more than two occupants, compared to houses with two or fewer occupants. In the controlled experiments, there were clear and consistent increases in densities of all mosquito genera in huts with 1, 3 or 6 people sleeping, relative to huts with no sleepers ( $P < 0.001$ ).

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**CONCLUSION** Overall household malaria vectors densities and clustering of indoor high indoor catches of major malaria-transmitting mosquitoes are significantly associated with household biomass and its spatial distribution within the villages.

**DISCLOSURE** Nothing to disclose.

**PS2.265****Preliminary study on the development of an anti-mosquito vaccine**

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**INTRODUCTION** Different attempts to develop a vaccine against mosquito were performed in the past, with alternating results but without any concrete outcome. A mosquito vaccine could be an excellent way for decreasing transmission of mosquito-borne diseases, acting directly on blood fed insects. In this preliminary work, we tested the immunogenic capacity of the mosquito Malpighian tubules (MT) on mice. Since MT play the prominent excretory and osmoregulatory role in insect, we hypothesized that mouse antibody against these organs, ingested by blood meal, are able to affect mosquito lifespan.

**METHODS AND MATERIALS** Five mice were treated intraperitoneally twice, at 2 weeks of interval, with ground MT from six tiger mosquitoes (*Aedes albopictus*). After 3 weeks about 30 host-seeking tiger mosquitoes, laboratory reared, were put in a single cage with every treated mouse; the same was done for the five control mice. A maximum of 12 engorged mosquitoes were collected for every treated and control mouse, and were placed, in groups of 3, in glass jars with a water container for oviposition, daily provided with sucrose solution by a cotton wool, and kept in controlled conditions ( $25 \pm 1^\circ\text{C}$ ,  $70 \pm 5\%$  R.H., 14 h of light per day). Jars were daily monitored to check died mosquitoes and estimate mosquito lifespan.

**RESULTS** A total of 108 mosquitoes were included (54 fed on treated mice and 54 on controls). Mosquitoes fed on treated had an average life of 48.7 days and an average hazard of 0.021; mosquitoes fed on the controls had an average life of 58.4 days and an average hazard of 0.017. The difference between the survival probabilities, resumed by the Kaplan Meier curve, was evaluated by the log-rank test and was statistically significant ( $P < 0.05$ ).

**CONCLUSIONS** The result of this preliminary work is encouraging and proves that MT of mosquitoes have an immunogenic activity on mice, and that produced antibodies are able to affect lifespan of mosquitoes, with a decreasing of more than 16% in the average life of treated mosquitoes. Further experiments are needed to confirm obtained results; the next step could be the identification and characterization of the mosquito protein, or proteins, involved in this antigenic response and its engineering and testing in other trials. If the decreasing in the mosquito lifespan will be confirmed, this finding may lead to the development of an anti-mosquito vaccine, which would help in the control of several mosquito-borne diseases.

**DISCLOSURE** Nothing to disclose.

**PS2.266****Biosynthesis of silver nanoparticles using the *Argemone mexicana* for the toxicity on *Aedes aegypti* mosquito and their antibacterial activity**

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Silver nanoparticles are explored in recent years as an alternative approach to effectively kill mosquito vector and drug resistant pathogenic microorganisms. In the present study, an eco-friendly process for the synthesis of nanoparticle, using a plant (*Argemone mexicana*) has been attempted. The plant crude extract was used for the biosynthesis of Ag-NPs. The aqueous silver ions ( $\text{Ag}^+$ ) were reduced to silver metal nanoparticles (Ag m-NPs), when treated with the plant extract. After 24 h of treatment, silver nanoparticles (Ag-NPs) were obtained. These Ag-NPs were characterized by UV-Vis, Scanning Electron Microscopy (SEM) with Energy Dispersive Spectroscopy (EDS) and X-ray Diffraction (XRD) were used to identify these NPs. The nanoparticles exhibited maximum absorbance peak at 420 nm in UV-Vis spectroscopy. The NPs surface morphology revealed from SEM images shows formation of well-dispersed Ag-NPs of 50 nm, and the presence of silver was confirmed by EDX and Fourier transform infrared spectroscopy (FTIR) analysis. The efficacy of mycosynthesized AgNPs tested concentrations of 5, 10, 15, 20 and 25 ppm against L1 to L4 instar larvae and pupae of *Aedes aegypti*; LC50 (LC90) values are 7.29 (13.29); 6.54 (14.28); 5.47 (13.89); 4.93 (15.93) and 4.43 (20.23) in larvae and LC50 (LC90) values was 4.64 (19.45) in pupae, respectively. The mortality rates were positively correlated with the concentration of AgNPs. The microbes selected for the present study for the antibacterial activity were *E. coli*, *P. aeruginosa*, *B. cereus*, *Enterococci*, *E. aerogens*. We conclude that the nanoparticle synthesized from the plant source has great potential mosquito larvicidal agents as well as antimicrobial compound against pathogenic microorganisms.

**DISCLOSURE** Nothing to disclose.

**PS2.267****Evaluation of insecticidal paints applied to ovitraps for control of *Aedes albopictus* in Nice, France**

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**INTRODUCTION** *Aedes albopictus* is a major nuisance species in the south of France and the vector of sporadic autochthonous cases of dengue and chikungunya. Current methods of control appear ineffective so there is an urgent need for new and innovative approaches. We report exploratory studies on the efficacy of three residual formulations of Inesfly marketed as microencapsulated insecticidal paints and coatings, and two experimental formulations of microencapsulated insecticidal coatings.

**METHODS** We used standard WHO cone-tests to assess the effect of residual treatments on different surfaces (porous and non-porous) and their persistence after 1 year. We also compared the 24-h mortality of mosquitoes in two 16 m<sup>2</sup> rooms: four oviposition jars containing a small amount of hay infusion were set out in each room. The inner surface of the jars in one room was coated with formulation while those in the other room served as an untreated control.



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**RESULTS** 24 h-mortality by the WHO tests was 100% for all five formulations after 30 min of tarsal exposure. In the room tests, there was 100% mortality with a paint and a (resin) coating with Chlorpyrifos (1.5%) + diazinon (1.5%) + pyriproxyfen (0.063%) as active ingredients but none with a paint containing Bendiocarb. Two other (resins) coatings, one containing Deltamethrin (0.5%) + pyriproxyfen (0.063%), the other alphacypermethrin (0.7%) + d-allethrin (1.0%) + pyriproxyfen (0.063%) were less effective, perhaps due to repellence by the pyrethroids.

**CONCLUSIONS** The formulations tested are intended for of malaria control by Indoor Residual application. In many settings this strategy may prove too intrusive for the control of the exophilic *Aedes albopictus* but treatment of selected sites, particularly in outdoor resting sites, deserves consideration.

**ACKNOWLEDGMENT** This research was funded by the European Union 7th Framework Programme through 'DengueTools' (www.denguetools.net). Inesfly Corporation S.L supplied the insecticidal products and technical support.

**DISCLOSURE** Nothing to disclose.

## PS2.268

### Functional annotation of salivary gland proteins of *Anopheles culicifacies* refractory and sensitive sibling species

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*Anopheles culicifacies* is considered as one of major malaria vector in rural India comprised of five sibling species viz A, B, C, D and E. Among these, sibling species B is considered to be as a poor vector of malaria. With regards to human malaria parasites *P. falciparum* and *P. vivax*, *An. culicifacies* sibling species B tend to be refractory, implying a relatively high degree of specificity in relationship between malaria parasites and mosquito vectors. This implied that the variation of certain genetic factors/proteins in *An. culicifacies* species B that influence the vector competence which ultimately affects the ability of parasite to establish or to develop in the mosquito. Salivary proteins are directly involved in human-vector contact during biting and play a key role in pathogen transmission. Therefore, study of salivary gland proteins is essential first step towards understanding the refractory mechanisms and host-parasite relationships. Here we have identified and characterized the differentially expressed salivary proteins that are already present naturally in refractory *An. culicifacies* mosquito that may responsible for the mechanism of refractoriness or may block the development of parasite.

In this study, we have examined the upregulated and downregulated proteins in susceptible and refractory *An. culicifacies* species B using TMT labeling method coupled with LC/MS/MS. We found seven upregulated and 20 downregulated proteins in refractory *An. culicifacies* sub species B. TRIO salivary gland protein, Serine-type endopeptidase, Glutathione-S-transferase and 5' nucleotidase are some important upregulated proteins in refractory sub species and we hypothesized that these proteins may have crucial role in imparting the refractoriness to the mosquito either by parasite killing or effecting its transmission. This comparative study and further investigation of these identified proteins will provide valuable insight to depict the vectorial capacity of the mosquito and perhaps suggest novel targets for control of malaria transmission blocking strategies.

**DISCLOSURE** Nothing to disclose.

## PS2.269

### Scouts and ticks: which environmental conditions favor the contact

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Just as forest workers or people practicing outdoor recreational activities, scouts are at high risk of tick bites and tick-borne infections. The risk of tick bite is shaped by environmental and climatic factors but also by land management. The aim of this study was to assess which environmental conditions favour scout-tick contacts, and thus to understand better how these factors and their interactions influence the two components of risk: hazard (related to vector and host ecology) and exposure of humans to disease vectors. A survey was conducted in the summer of 2009 on the incidence of tick bites in scout camps taking place in southern Belgium. Joint effects of landscape composition and configuration, weather, climate, forest and wildlife management were examined using multiple gamma regression with a log link. The landscape was characterized in various sizes of buffers around camps using a detailed land use map, climate and weather variables. Landscape composition and configuration had a significant influence on scout-tick contacts: the risk was high when the camp was surrounded by a low proportion of arable land and situated in a complex and fragmented landscape. The distance to the nearest forest patch, the composition of the forest ecotone and weather and climatic factors all were significantly associated with scout-tick contacts. Both hazard- and exposure-related variables contributed significantly to the frequency of scout-tick contact. Our results show that environmental conditions favour scout-tick contacts. For example, we emphasize the impact of accessibility of environments suitable for ticks on the risk of contact. We also highlight the significant effect of both hazard and exposure. Our results are consistent with the current knowledge, but further investigations on the effect of forest management, e.g. through its impact on forest structure, on the tick-host-pathogen system, and on humans exposure, is required.

**DISCLOSURE** Nothing to disclose.

## PS2.270

### Molecular eco-epidemiology of *Triatoma brasiliensis*, the most important Chagas disease vector in Brazil: detection of vector foci highly infected by *Trypanosoma cruzi* and associated with the reservoir *Kerodon rupestris* (Rodentia: Caviidae)

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A molecular-based multi-source approach over small geographic scale in Caicó city, Rio Grande do Norte, Brazil was conducted to assess the epidemiological importance of *Triatoma brasiliensis*, the most important Chagas disease vector in Brazil. First, we explored the vector genetic structure of 297 bugs collected in distinct sites and ecotopes by using both cytochrome b (cytb) and microsatellite markers. Second, we determined the *Trypanosoma*

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*cruzi* natural infection prevalence and parasite diversity in bugs by amplification a mini-exon gene from triatomine gut content; and third, we identified *T. brasiliensis* natural feeding sources in distinct ecotopes and sites by using the blood meal content, via vertebrate cytb analysis. Potential reservoirs were inferred by detecting the feeding sources and natural *T. cruzi* infection in the same insect population. Microsatellite markers detected foci for infestations in peridomestic and sylvatic environments. What is of concern, high *T. cruzi* infection rates (53–71%) and two co-occurring strains were found for the sylvatic foci with the highest (71%) *T. cruzi* natural infection, where of the 28 feeding sources detected, 19 bugs (68%) had fed on *Kerodon rupestris* (Rodentia: Caviidae), suggesting it is a potential reservoir. Most of peridomestic bugs fed on domesticated animals, such as goats, chicken, cats, but also on the synanthropic *Galea spixii* (Rodentia: Caviidae), likely linking sylvatic and domiciliary *T. cruzi* cycles. We provided specific recommendation to local people, such as, taking care while manipulating raw meat of hunted rodents and avoiding creating shelters for the *G. spixii* in peridomestic areas.

DISCLOSURE Nothing to disclose.

## PS2.271

**Entomological indicators applied to *Triatoma brasiliensis* alert for the risk for the re-emergence of hyperendemic Chagas disease foci in semi-arid zones of Brazil**

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Thanks to an intensive and expensive Chagas disease control program established in Brazil in 1975 and coordinated with PAHO/WHO (Pan American Health Organization/World Health Organization) the once leading invasive vector, *T. infestans*, has been functionally eliminated, and as a consequence, also are the hyperendemic foci. However, the near eradication of this species resulted in a reduction of entomological surveillance and control programs. Several native triatomine species of epidemiological importance are now emerging in Brazil. *Triatoma brasiliensis* is currently of major concern in the Northeast because it readily infests human dwellings, even after all traditional control efforts. Searches for this vector were conducted in five rural municipalities (Cajazeiras-PB [CJ], Santa Terezinha-PB [ST], S.J. Espinharas-PB [SJ], Caicó-RN [CI] and Currais Novos-RN [CN]) in northeastern Brazil in distinct ecotopes. Distance between municipalities range from 65 to 236 km, and all municipalities are within 06°08'–07°01'S and 36°30'–38°33'W. We inspected 93 domiciliary units, and of these, 31 were positive for the presence of *T. brasiliensis* ( $N = 1221$  insects captured). Searches were also performed in the nearest sylvatic environments around houses, comprising a total of 814 collected insects in rocky outcrops. The rate of domiciles infested was high (>30%) for all municipalities, and infestation did not vary much among them. Natural infection rates by *Trypanosoma cruzi* in sylvatic and domiciliary environments were low (all <9%) for CJ, ST, and SJ; however, the sylvatic triatomine populations in CI and CN had rates >70%, and with 50% of infected insects for domestic ecotopes in CN. The density of triatomines collected in CN was also high (mean = 135 bugs collected per domicile;  $N = 9$  domiciles). The combination of high *T. cruzi* natural infection in bugs with high triatomine domiciliary infestation threatens efforts to avoid vector *T. cruzi* transmission. Considering that acute Chagas disease is

frequently asymptomatic or oligosymptomatic and that the last large serological survey was conducted in Brazil roughly 7 years ago, results herein highlight the need to evaluate the risk of re-emergence of hyperendemic Chagas disease foci in semi-arid zones of Brazil.

DISCLOSURE Nothing to disclose.

## PS2.272

***Rhodnius pictipes*: importance in Brazilian Amazon areas with acute Chagas disease transmission**

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**INTRODUCTION** In the Brazilian Amazon five of 16 species of triatomine bugs yield potential risk for *Trypanosoma cruzi* transmission: *Rhodnius pictipes*, *R. robustus*, *Panstrongylus geniculatus*, *P. herrerii* and *Triatoma maculata*. Although most research on Acute Chagas Disease outbreaks involves triatomines, there is a need for standardized and institutionalized methodologies for field research and entomological surveillance. The aim of this study was to investigate the blood meal, house infestation rates and natural infection of triatomine bugs found in urban, rural and island environments of Abaetetuba municipality, Pará state.

**METHODS AND MATERIALS** Capture methods tested: triatomines search at households (person-hour technique), installation of Noireau traps and Shannon traps, and dissection of palm trees. Selected households were those where people declared fever history in the last thirty-day period and/or contact with triatomines. The collected triatomines were examined for *T. cruzi* infection and for food source by using the precipitin test for several antisera.

**RESULTS** Only two capture techniques were productive: the Noireau trap placed on palm trees and this ecotope dissection (species *Maximiliana maripa*, Inajá). *R. pictipes* was identified in 85.2% ( $n = 213$ ) followed by *P. geniculatus*, 14.8% ( $n = 37$ ). Out of 11.3% ( $n = 24$ ) of *R. pictipes* specimens were infected with *T. cruzi*. There was no significant difference for the *R. pictipes* infectivity rate from rural and island areas compared to the urban area; it was 11/107 (11.28%) e 13/106 (12.26%), respectively. Regarding the food source, 64.0% of triatomines fed from the same source and in 17.8% ( $n = 38$ ) more than one source was identified. Bird blood predominated with 41.6% ( $n = 89$ ).

**CONCLUSIONS** *R. pictipes*, the most abundant species in wild ecotopes in the studied areas, showed a high ornithophily. Its presence (without domiciliation) and abundance suggest its importance as potential vector in the local dynamics for Chagas Disease transmission.

DISCLOSURE Nothing to disclose.

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## PS2.273

**Chikungunya virus infection in wild caught *Aedes aegypti* mosquitoes in Haiti**

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**BACKGROUND** Chikungunya (CHIK) is a mosquito-borne viral infection that has become endemic in more than 60 countries. In May 2014 the virus appeared in Haiti, initiating the first CHIKV outbreak in the country, infecting more than 200 000 people according to MSSP records. In this article we present the first detection of CHIKV in the mosquito vector in the Island of Hispaniola during the 2014 outbreak.

**METHOD** Mosquitoes were collected using Biogents (BG) sentinel traps and aspirators from homes of suspected cases for the viral infection. Mosquitoes were later on identified and pooled by date, species, sex and household and stored at –20 pending further analysis. An rRT-PCR specific for CHIKV envelope protein was conducted on all pools to determine viral presence. RNA extracts that showed positive results were stored in –70°C and transferred to UF for viral sequencing.

**RESULTS** 2249 mosquitoes were captured from 61 households within the Gressier/Leogane area in Haiti, of which 350 were tested for RT-PCR forming 125 pools of *Aedes aegypti* and 24 pools for *Aedes albopictus*. The study found 9% (11/125) positivity for viral RNA among *Ae. Aegypti* species while no viral RNA was detected in *Ae. Albopictus*. *Ae. aegypti* species were more dominant in urban and suburban communities compared to *Ae. Albopictus*.

**CONCLUSIONS** This is the first study to identify CHIKV in mosquito population in the Island of Hispaniola, further surveillance and genetic analysis of the disease in the future is needed for future evaluation of disease prevalence.

**DISCLOSURE** Nothing to disclose.

## PS2.274

**A pilot exercise to assess population vulnerability to diseases transmitted by the tiger mosquito in Rome**

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The 2007 epidemics outbreak of Chikungunya virus (CHIK) transmitted by the tiger mosquito (*Aedes albopictus*) in Italy has raised concern about the awareness of population to individual measures that can be taken to limit the spread of mosquitoes and about the adequacy of the health surveillance system to cope and identify eventual outbreaks at an early stage. Here we use some elements of the holistic conceptual risk and vulnerability framework to derive social vulnerability estimates to epidemics in several zones of Rome. The data used in the spatial modelling exercise were collected through a combination of 6-month quantitative surveys by means of sticky traps of *Ae. albopictus* in 24 sampling stations and ad-hoc designed surveys of knowledge, attitude and practice (KAP) of general practitioners specific for CHIK and the general population (including sensitive sub-

groups) specific for *Aedes* related nuisance, knowledge, practices and attitudes. Entomological results show a high spatial heterogeneity of *Ae. albopictus* density throughout the city, with peaks of 175 individuals/1 week of collection in the peripheral suburbs. Population KAP surveys (sample size: 1182 responders) indicated the large nuisance caused by mosquito bites (59% of responders) and low levels of knowledge (60% of responders) and incorrect attitudes and practices (51% of responders). Interestingly, only <10% of responders had concern about mosquito borne diseases. General practitioner KAP survey indicates a very poor knowledge about CHIK and capacity to correctly identify a CHIK case (<10% of responders). We conclude that the social vulnerability of the system to the unlikely event of the arrival of a viremic traveller in Rome during peak biting season of *Ae. albopictus*, warrants the implementation of preventive measures targeted at both general practitioners and population.

**DISCLOSURE** Nothing to disclose.

## PS2.275

**The spatiotemporal trajectory of a dengue epidemic**

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**INTRODUCTION** Understanding the dynamics of transmission of infectious diseases is important to public health because this knowledge can contribute to improving control strategies. In relation to dengue, ‘arbovirus’ of highest incidence in the world nowadays, there are still some gaps about the process of transmission in epidemics affecting urban centers. In this perspective, this study aimed to investigate the spatio-temporal trajectory of a dengue epidemic that occurred in a medium-sized city in northeastern Brazil, in 2009.

**METHODS AND MATERIALS** An ecological study of spatial and temporal aggregate was carried out from cases of dengue geo-referenced by epidemiological week of occurrence and residence address. The evolution of the spatial patterns of dengue was assessed by the Kernel density estimates and the spatio-temporal interaction by statistical Knox. This evolution was also analyzed by visual inspection, using a technique of animated projection.

**RESULTS** The incidence of dengue was 6918.7/100 000; the peak of the epidemic occurred in epidemiological week 9 (828.7/100 000). Dengue cases were recorded in all areas of the city and was identified space-time interaction. It was observed that three hotspots were responsible for spreading the disease, outlining a pattern of expansion and relocation.

**CONCLUSION** The formation of hotspots in the course of this epidemic, possibly, is one of the feature of the transmission dynamics of dengue epidemics in urban centers, since this finding also has been observed in other studies. Insofar, as current geo-referencing technologies make it possible to the identification of these hotspots in real time, it is understood that health services can make use of such a tool aimed at increasing, in a timely control actions more focused these hotspots in perspective reducing the magnitude of dengue epidemics.

**DISCLOSURE** Nothing to disclose.

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**PS2.276****Behavioral response of house fly, *Musca domestica* L. (Diptera: Muscidae) to natural products**S. Oopakut<sup>1,2</sup>, K. L. Sukontason<sup>1</sup>, N. Bunchu<sup>3</sup>, R. M. Pereira<sup>4</sup> and K. Sukontason<sup>1</sup><sup>1</sup>Department of Parasitology, Faculty of Medicine, Chiang Mai University, Muang Chiang Mai, Thailand; <sup>2</sup>School of Medical Sciences, University of Payao, Payao, Thailand; <sup>3</sup>Department of Microbiology and Parasitology, Faculty of Medical Sciences, Naresuan University, Muang, Thailand; <sup>4</sup>Entomology and Nematology Department, University of Florida, Gainesville, FL, USA

**INTRODUCTION** The house fly *Musca domestica* L. (Diptera: Muscidae) is a medically important insect worldwide, because adults are mechanical carriers of various pathogens whereas the larvae cause myiasis in humans and animals. Information on most suitable baits is essential for development of fly control strategies.

**METHOD** We investigated the behavioral response of this fly species using a dual-choice wind tunnel referred to as 'T-box'. **RESULT** The correlation between wind speed and fly response showed that the wind speed set at 0.4 m/s was the optimal speed for wind-tunnel testing with this species. Of the 42 natural products tested in preliminary experiments, only 12 attracted >50% of the tested flies in a 5-min observation period, with the fresh beef viscera being the most attractive for both sexes (>74%). All those 12 natural products were then assessed for their attractiveness in the dual-choice wind tunnel using a wind speed of 0.4 m/s. The result indicated that the fresh beef viscera was still the most attractive product to lure flies. Finally, we compared the three most attractive products for house fly (1st – fresh beef viscera, 2nd – ripe banana, 3rd – fresh beef liver) against each other. The fresh beef viscera was also found to be the most attractive product in direct comparison with the other two products.

**CONCLUSION** These results provided information in luring and trapping adult house fly that can be used in the development of a suitable attractant bait to be used in fly population control programs.

**DISCLOSURE** Nothing to disclose.

**PS2.278****Bullous skin deviations: a symptom of Chikungunya infection in infants**

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**BACKGROUND** Chikungunya is a viral infection transmitted by *Aedes* mosquitoes. Chikungunya can cause epidemics with severe illnesses especially in young infants. A wide range of symptoms has been documented, with the leading symptoms in infants of fever, agitation and skin rash. Severe manifestations as encephalitis and meningitis are also seen.

**CASE REPORTS** We present four cases of bullae in Chikungunya infected children admitted to the paediatric ward of St. Elisabeth Hospital in Willemstad, Curacao during a Chikungunya epidemic from August 2014 till January 2015. All four cases showed fever and skin rash. In three cases the bullae arose within 48 till 96 h and in one case later in the disease course. In three cases multiple vesicles spread over the lower extremities were seen. In one case one bullae surrounded with a group of vesicles was seen on the upper right leg. The vesicles and bullae disappeared spontaneously after 2 to 4 day, without any visible scarring.

**CONCLUSION** In this report we describe four cases of infants with bullous skin deviations resulting from an active Chikungunya infection. Though the aetiology of these bullae is unknown, we observed that they disappeared without any remaining skin abnormalities. Chikungunya should be considered when vesicles or bullae are seen in infants within a Chikungunya epidemic area.

**DISCLOSURE** Nothing to disclose.

**PS2.279****Mosquito borne West Nile virus infection as a major threat**

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West Nile virus (WNV) is a mosquito-borne arbovirus belonging to the genus *Flavivirus* in the family *Flaviviridae*. The virus is found in temperate and tropical regions worldwide, but was first identified in the West Nile sub-region in the East African nation of Uganda in 1937. Prior to the mid-1990s WNV infection was sporadically and considered a minor risk for humans, until an outbreak in Algeria in 1994, with cases of WNV-caused encephalitis, and the first large outbreak in Romania in 1996, with a high number of cases with neuro invasive disease. WNV has now spread globally to Europe beyond the Mediterranean Basin and the United States, is now considered to be an endemic pathogen in worldwide especially in Africa.

The WNV transmission is mainly by various mosquitoes species, also ticks were incriminated. The birds especially passerines are the most commonly infected animal and serving as the prime reservoir host.

In Egypt more than 110 mosquito species and subspecies and more than 32 genera of ticks were identified. Besides, no fewer than 150 species of migratory birds visit Egypt annually in addition to 350 resident ones.

Training on WNV and other viral hemorrhagic fevers was given over ten sessions to a group of Primary care physician and Staff Nurses, as they are at the front line dealing with patients and are susceptible to infection unless they are well trained about these deadly diseases and stick to infection control measures. The program succeeded in enhancing their knowledge, awareness, responsibility, and obligations toward patients with WNV and other Viral Hemorrhagic Fevers.

The results showed a significant impact of training sessions illuminated in the follow-up test on the knowledge score of primary care physician nurses in all types of diseases and statistical significance varied in some diseases in the study when comparing pre-test and post-test.

This study provided an overview of the current understanding VHF mainly WNFV. Primary care physicians and senior nurses should be able to include disaster diseases in differential diagnosis of various clinical conditions.

**KEYWORDS** Egypt, West Nile fever, mosquitoes, birds, animals, human.

**DISCLOSURE** Nothing to disclose.



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## PS2.280

**Chronic Chagas disease: application of a diagnostic algorithm in serodiscordant patients from two non-endemic countries**

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**INTRODUCTION** Chagas disease (CD) is a protozoan infection caused by *Trypanosoma cruzi*. According to WHO, chronic CD diagnosis is based on detection of anti-*T. cruzi* antibodies by two different serological techniques. When the results are not concordant, a third test is required. Unfortunately, a confirmatory 'gold-standard' method is not universally available, particularly in non-endemic areas. We present the experience of two reference Centres for Chagas disease in applying the WHO diagnosis algorithm and using the TESAcruzi-blot (TESA) as a confirmatory technique to resolve serologic discrepancies. **MATERIALS AND METHODS** A retrospective observational study was conducted at HUVH and CTD between 2010 and 2014. Latin-American migrants who underwent serologic test for CD were enrolled. Serum samples were tested by means of two EIA techniques based on a recombinant antigen (r-ELISA: Bioelisa Chagas, Biokit, in both laboratories) and a lysate antigen (n-ELISA: ORTHO *T. cruzi* ELISA, Johnson and Johnson at HUVH and Test ELISA Chagas III, BiosChile at CTD) simultaneously. To establish a definitive diagnosis both techniques should give concordant result. In case of discordances, both techniques were repeated 4–6 months apart, when possible. If sero-discordance remained, a commercial Western-Blot test (TESAcruzi-blot, Biomérieux) was performed. **RESULTS** A total of 4950 patients were screened for CD in the study period. Among these, 23% (1124/4950) resulted sero-positive, 73.5% (3650/4950) negative, and 3.5% (176/4950) equivocal. Serology was repeated in 85/176 equivocal cases and 57 remained discordant. A total of 104 equivocal serum samples were tested by TESA. Fifty-eight (56%) of them resulted positive, 45 (43%) negative, and one was considered doubtful (1%).

In 71 out of 104 sera (68%) there was concordance between n-ELISA and TESA.

**CONCLUSIONS** During the study period, we detected a not negligible prevalence of inconclusive results in serological diagnosis of chronic CD. Many patients did not obtain a definitive diagnosis, despite of repeated serology and needed a confirmatory test.

TESA has been identified by WHO for this purpose and may be a good and straight-forward tool. It is noteworthy that more than a half of such cases are reclassified as CD using TESA. Unfortunately, missing CE mark and a limited commercial access to TESA represent big obstacles to a correct classification of discordant cases.

**DISCLOSURE** Nothing to disclose.

## PS2.281

**Dissecting the origin of the 2014 dengue outbreak in Japan**

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**INTRODUCTION** Endemic in at least 100 countries, dengue is currently regarded as world's most important mosquito borne viral disease. While most of the disease burden is limited to areas with tropical and sub-tropical climates, evidence suggests that temperate areas may be increasingly at risk as the geographic distribution of relevant vectors expands. Japan, a country with a temperate climate, reported the first major dengue outbreak in 2014. We examined the factors that may have facilitated the dengue outbreak in Tokyo during 2014. **METHODS** Multiple sequence alignment of the dengue virus 1 (DENV1) sequence from the 2014 dengue outbreak in Tokyo was carried out using a fast Fourier transformation method in MAFFT v6.940b. We collected the Japan National Tourism Organization's data on inbound travelers between January and September 2014 from dengue endemic countries in Asia to Japan. Daily observations of temperature (minimum, maximum, and mean) and precipitation were obtained from the MIDAS dataset for Tokyo. We calculated the relative vectorial capacity (rVc) for *Aedes* vectors to quantify the dengue epidemic potential based on temperature dependent parameters, by applying a modified Ross-McDonald model.

**FINDINGS** Tourist arrivals into Japan in 2014 coincided by 70% with its warm summer months suitable for dengue transmission. The phylogenetic similarity of DENV-1 isolated from the 2014 outbreak in Japan with viruses from China, Indonesia, Singapore, and Vietnam renders any of these four countries a likely source of importation. Several conducive climate factors converged preceding and during the time of the dengue outbreak in Tokyo, August until October 2014. Climate conditions, in particular mean temperature and precipitation, were favorable for the amplification of *Aedes* vectors. Furthermore, the ability for the vector to transmit dengue, as measured by the relative vectorial capacity, was highest at the time of the 2014 outbreak.

**CONCLUSIONS** Taking into account the travel volume into Japan, China appears the most probable source of dengue virus introduction that triggered Tokyo's outbreak. Despite Japan's temperate climate, dengue epidemic potential already exists. Under scenarios of changing climate and increasing regional travel, Japan will likely face more dengue outbreaks in the future.

**ACKNOWLEDGEMENTS** The study was financially supported by the European Union's Seventh Framework Programme-DengueTools ([www.denguetools.net](http://www.denguetools.net)).

**DISCLOSURE** Nothing to disclose.

## PS2.282

**Madeira's dengue outbreak in 2012: could it happen again in the near future?**

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**INTRODUCTION** A dengue outbreak in 2012 having 2000 + reported cases, followed vector introduction to the Portuguese island of Madeira in 2005. We describe contributing factors for

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the 2012 outbreak through modeling of temperature dependent vectorial capacity, meteorological observations of environmental factors pertinent to vector lifecycle, and dynamics of travellers arriving from dengue endemic areas. In combination with reported vector and human surveillance, the temporal onset of the 2012 outbreak and factors setting 2012 apart from other years were used to generate a predictive model for potential re-emergence of dengue in Madeira.

**METHODS** Relative Vectorial capacity (rVC) was calculated with previously published methods for Madeira (Island) and Funchal (City) from 2005 to 2014 based on both remotely sensed satellite data and observation stations. We also estimated potentially imported dengue infections using previously published methods. Epidemiological features of the 2012 outbreak combined with generated data to inform a predictive model. Projected travel and seasonal weather forecasting inputs for the predictive model described the dengue importation-driven transmission likelihood for Madeira in 2015.

**RESULTS** Longitudinal comparisons of available data were displayed simultaneously to show periods of greatest potential for dengue emergence in Madeira, historically. The modeled outputs especially during the months before the outbreak provide more precise quantification and visualization of the temporal coincidence, which may have primed Madeira for emergence of dengue in late summer 2012. When seasonal forecast information is applied to the historically informed model for spring and summer 2015, potential for local dengue transmission in Madeira was determined.

**CONCLUSIONS** Local transmission of dengue in Madeira may re occur given the environmental envelope and continuous importation of the dengue virus via travelers, even with strengthened vector control efforts; however, the severity of the 2012 outbreak will hopefully remain the highest. Our results clearly display the coalescence of multiple factors necessary for initial emergence of a dengue epidemic in a naïve population. Descriptive modeling of a known outbreak can better inform the development of predictive modeling of dengue emergence in Madeira and other areas of Europe.

**ACKNOWLEDGMENT** European Union 7th Framework Programme through DengueTools ([www.denguetools.net](http://www.denguetools.net)) funded this research.

**DISCLOSURE** Nothing to disclose.

**PS2.283****The potential impact of implementing blood safety measures during an outbreak on transfusion-transmitted CHIKV infection risk**

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**INTRODUCTION** To date, there is no standard guideline for maintaining a safe blood supply during a chikungunya fever (CHIKF) outbreak nor has a study been done on the efficacy of blood safety measures. Experience from the 2009 Thai epidemic of CHIKF with a proportion of asymptomatic cases of 10%, suggested the potential impact of implementing various blood safety measures during an outbreak on transfusion risk reduction. Whether these safety intervention strategies could be apply in another outbreak with a larger proportion of asymptomatic cases was questionable.

This study compared the efficacy of various intervention strategies on transfusion CHIKF risk at the various prevalences of asymptomatic chikungunya virus (CHIKV) infected rates.

**STUDY AND DESIGN** A web-based tool named the 'European Up-Front Risk Assessment Tool' (EUFRAAT; <http://eufraatool.ecdc.europa.eu>) was used to access the transfusion-transmitted CHIKV risk reduction using data inputs from the 2009 CHIKF epidemic in Thailand.

**RESULTS** Considering the risk reduction rates, screening for donors at risk in combination with either clinical symptoms observation or screening for CHIKV RNA detection would be expected to be an effective and practical preventive measures-based strategy at the various prevalences of asymptomatic CHIKV infection rates varying from 3 to 47% which have frequently been cited in the literature, in general, all the indicated strategies would have been effective up to 47%. For instance, predonation screening for donors at risk and follow up for CHIKV RNA detection was estimated to be 100% effective in reducing this transfusion risk compared to 83.3% (95% confidence interval (CI); 79.6–88.8) to 90.6 (95% CI; 89.0–92.3) by predonation screening for donors at risk of CHIKV infection alone.

**CONCLUSION** This study suggested that the prompt blood screening measures can reduce the transfusion-transmitted CHIKV and maintain a safe blood supply during an outbreak when a proportion of asymptomatic rates may up to 47%.

**DISCLOSURE** Nothing to disclose.

**PS2.284****Entomological survey of dengue vector breeding sites in Colombo, Sri Lanka**

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**INTRODUCTION** In Sri Lanka, the number of dengue cases has steadily increased in recent years. Prevention through disease and vector surveillance is an important strategy in dengue control. The aim of the study was to assess *Aedes* mosquito breeding sites and the prevention practices of community members in one heavily urbanized area of Colombo.

**METHODS** A cross-sectional entomological survey was conducted from April to June 2013 in 1469 premises located in a sub-district of Colombo Municipality. Types of breeding sites and infestation with larvae or pupae were recorded and a questionnaire was administered to occupants to assess knowledge and practises concerning dengue vector control.

**RESULTS** The surveyed premises included 1341 households (91%), 99 work or public sites and 11 schools. 126 premises were positive for *Aedes* larvae or pupae. 12 672 potential breeding sites susceptible to host larvae or pupae were recorded, of which 21% contained water. Among these, 6% were positive for larvae and 13% for pupae. For schools the percentage rose to 40% and 67%, respectively. The main productive breeding sites were: discarded items, water tanks, ornamental plants, ponds and flowerpots, and non-specified containers. The majority was located on outdoor ground areas. Compared to households, the odds ratio for non-household premises of being infested with larvae was 2.29 ( $P = 0.005$ , 95% CI: 1.278–4.129)

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and with pupae 5.76 ( $P < 0.001$ , 95% CI: 2.660–12.497). Occupants of 82% of the premises reported using preventive measures. The main practices were coverage of containers and elimination of mosquito-breeding places. 45% of schools and 19% of households took no preventive measures. There was a significant correlation between the occurrence of preventative measures taken and the type of premise involved ( $P = 0.002$ ). **CONCLUSION** Residential buildings had the lowest relative number of potential breeding sites, and household members reported a high use of vector control measures. Schools and working sites, however, were identified as being at highest risk for productive breeding sites combined with shortcomings in preventive measures. Hence, this study suggests that while it is important to maintain vector control and prevention practices at the household level, schools and working sites should actively be targeted to better combat dengue.

**ACKNOWLEDGEMENTS** This research was funded by 'DengueTools' of the 7th Framework Programme of the European Community.

**DISCLOSURE** Nothing to disclose.

**PS2.285****Surveillance and control of invasive mosquito species in Switzerland**

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Over the last 11 years, three invasive mosquito species have appeared in Switzerland; *Aedes albopictus*, *A. japonicus* and, very recently, *A. koreicus*. Due to its public health importance as a vector of several viral diseases, the main focus in Switzerland is on the surveillance and control of *A. albopictus*, particularly in the Canton of Ticino in the south of the country where this mosquito has firmly established. The continued spread of *A. albopictus* in Ticino raises the questions as to how effective the current control efforts are and whether the mosquito will eventually make it across the Alps. Here, invasive mosquitoes were monitored with ovitraps and BG sentinel traps placed in sylvatic and forested areas across the Swiss-Italian border, five districts in Ticino and level along major traffic routes across Switzerland. Mosquito specimens caught were identified morphologically and proteomically by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. In addition, the susceptibility of *A. albopictus* to current and other insecticides was assessed. In our presentation we will give a summary of the seasonal and spatial abundance of the invasive mosquitoes in Switzerland and their susceptibility to current the control programme and discuss the latest results in the context of emerging mosquito-borne disease in Europe.

**DISCLOSURE** Nothing to disclose.

**PS2.286****A novel immunochromatographic test applied to a serological survey of Japanese encephalitis virus on pig farms in Korea**

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**INTRODUCTION** Among vertebrate species, pigs are a major amplifying host of Japanese encephalitis virus (JEV), and measuring their seroconversion is a reliable indicator of virus activity. Traditionally, the hemagglutination inhibition test has been used for serological testing in pigs; however, it has several limitations and, thus, a more efficient and reliable replacement test is required.

**METHODS AND MATERIALS** We developed a new immunochromatographic test for detecting antibodies to JEV in pig serum within 15 min. Specifically, the domain III region of the JEV envelope protein was successfully expressed in soluble form and used for developing the immunochromatographic test. The test was then applied for the surveillance of Japanese encephalitis in Korea.

**RESULTS** We found that our immunochromatographic test had good sensitivity (84.8%) and specificity (97.7%) when compared with an immunofluorescence assay used as a reference test.

During the surveillance of JE in 2012, the new immunochromatographic test was used to test the sera of 1926 slaughtered pigs from eight provinces, and 228 pigs (11.8%) were found to be JEV-positive. Based on these results, we also produced an activity map of JEV, which marked the locations of pig farms in Korea that tested positive for the virus.

**CONCLUSIONS** Thus, the immunochromatographic test reported here provides a convenient and effective tool for real-time monitoring of JEV activity in pigs.

**DISCLOSURE** Nothing to disclose.

**PS2.287****Molecular detection of *Rickettsia africae* in ticks from Cameroon**

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**INTRODUCTION** Tick-borne rickettsioses are emerging zoonotic infections in many African countries. *R. africae* is the most frequent rickettsial species with human pathogenic potential in Africa. It belongs to the spotted fever group rickettsiae and transmission is caused by *Amblyomma* ticks. Human pathogens of the order Rickettsiales have been detected in blood samples of patients with acute febrile illness and tick samples in the South of Cameroon. Serological studies carried out in humans from different areas in Cameroon have demonstrated previous infections with *Rickettsia* spp.. However, the geographical distribution and the prevalence of *R. africae* in their tick vectors from the North region of Cameroon are unknown.

**METHODS AND MATERIALS** Tick samples were collected from cattle slaughtered in the municipal abattoir of Ngaoundere, Adamawa region, in north Cameroon. 47.1% of adult ticks were identified as *Amblyomma variegatum*, which is a known vector that can transmit rickettsiae to humans on the African continent. *Rhipicephalus* spp., *Hyalomma* spp. and *Boophilus* spp. were

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also identified. The presence of rickettsial DNA was investigated in *Amblyomma variegatum* ticks using both real-time and conventional PCR assays for the rickettsial ompB gene.

**RESULTS** From 149 *Amblyomma variegatum* ticks tested, 85 (57%) were positive for rickettsial DNA. *OmpB* sequencing showed a high degree of conservation and homology with deposited sequences of *R. africae*, which were previously detected in ticks from other regions of Cameroon.

**CONCLUSION** *R. africae* are present in *Amblyomma* ticks from the Adamawa region of Cameroon. *Amblyomma variegatum* is a potential vector of spotted fevers in Cameroon. *R. africae* should be considered by physicians in patients with febrile illness and typical skin rashes.

**DISCLOSURE** Nothing to disclose.

**PS2.288****Exploring entomological factors associated with high dengue incidence in Thai schools**

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**INTRODUCTION** Dengue infection is a leading cause of child hospitalization in Thailand and schools may represent an important site of infection. Because high variations in the number of dengue cases were observed among schools, the aim of this study was to explore what entomological factors were associated with high dengue incidence in selected schools located in Chacheongsao Province, Thailand.

**METHODS** Students from ten schools were enrolled; blood was taken at baseline (June 2012) and at the end of the school term (Nov. 2012). New dengue infections during this period were determined by dengue IgG conversion or a > 4-fold higher dengue IgG compared to baseline. Location of the homes and schools of infected students were mapped using GIS. Through monthly surveys from May 2013 to June 2014, potential breeding sites were identified, infestation with *Aedes* larvae and pupae recorded, and adult mosquitoes collected using portable aspirators. Logistic regression was used for statistical analysis.

**RESULTS** A total of 1825 students were included in the study. They were distributed among 88 classrooms within the 10 schools. 55 confirmed dengue cases were detected in seven of the 10 schools. 67% of the cases occurred in 13 (15%) of the 88 classrooms, with at least 2 (and as many as 6) cases occurring per classroom. The remaining 18 cases were detected as single cases per classroom. No two cases occurred in the same households and eight cases occurred in households distant 100 meters or less from each other. There was no direct association between high and low incidence schools in relation to the number of breeding sites, mosquitoes, or mosquito control methods used. Of the 2399 potential breeding sites recorded, 484 (20%) were positive for *Aedes* larvae or pupae. Among the productive sites, the most common were water and cement tanks (30%) and car tires (9%). Mosquito control was used for 11% of breeding sites, with temephos (32%), fish (24%) and covers (30%) being the most common measures taken.

**CONCLUSION** The study provides information on the main breeding sites for larvae and pupae and the commonly used mosquito control methods around schools. Although there was no significant association found between entomological factors and dengue cases at school levels, the study suggests that transmission may be clustered at classroom level rather than at household level.

**DISCLOSURE** This research was funded by the European Union 7th Framework Programme through 'DengueTools'.

**PS2.289****Chikungunya fever in Feira de Santana City, 2013–2014**

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**INTRODUCTION** Chikungunya, arbovirus (CHIKV) transmitted by mosquitoes *Aedes*, is an emerging disease which has occurred in form of epidemics. In 2004, chikungunya virus (Asian genotype) reached the Reunion Islands in the Indian Ocean, where it caused thousands of cases. At the end of 2013 occurred an epidemic caused by this virus in several countries of the Caribbean, and in 2014 it reached South America. This study describes the first Chikungunya epidemic in Brazil, laboratory-confirmed, caused by the East Central South African/ECSA genotype.

**METHODS AND MATERIAL** Cross-sectional study using as data source the Epidemiological Bulletin of the Municipal Health Department of Feira de Santana/Bahia/Brazil (FSA).

**RESULTS** The first cases of Chikungunya in FSA were reported in July 2014. Until epidemiological week/EW 10/2015 were reported 1725 cases and 64.3% of these were confirmed (incidence 195.74/100.000 inhab. in this period); 148 cases were hospitalized and there were no deaths. Two neighborhoods accounted for 49.9% of cases. The peak of the epidemic occurred in EW 39/2014 (201 cases). Since then the number of cases began to decrease until the last week of 2014 (six cases). In 2015, the disease returned to intensify peaking in EW 9/2015 reaching mainly two other neighborhoods (60 cases). In both years, women (383.04/100.000 inhab.) and age group 20–49 years (342.57/100.000 inhab.) were the most affected.

**CONCLUSION** The magnitude of the chikungunya epidemic in FSA did not reach an incidence as high as that reported in Reunion and Caribbean countries, where the attack rate was over 30%. Maybe this difference is due to lower density of *Aedes* infestation and/or for being caused by different CHIKV genotypes. As FSA is the second largest city of Bahia and the most important road junction of North-Northeast of Brazil, even with lower incidence, it is a spreader pole of chikungunya to other cities of this country.

**DISCLOSURE** Nothing to disclose.



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## PS2.290

**Clinical pathology and histopathology in hookworm-related cutaneous larva migrans in Manaus, Brazil**A. M. Schuster<sup>1</sup>, H. Lesshaft<sup>1</sup>, F. Reichert<sup>1</sup>, S. Talhari<sup>2</sup>, S. Guedes de Oliveira<sup>2</sup>, R. Ignatius<sup>3</sup> and H. Feldmeier<sup>1</sup><sup>1</sup>Institute of Microbiology and Hygiene, Charité University Medicine, Berlin, Germany; <sup>2</sup>Foundation for Tropical Medicine in Amazonia (FMT-AM), Manaus, Brazil; <sup>3</sup>Laboratory Prof. G. Enders MVZ GbR, Stuttgart, Germany

Hookworm-related cutaneous larva migrans (HrCLM) is a common but neglected tropical skin disease caused by the migration of animal hookworm larvae in the epidermis. The disease is associated with considerable morbidity and clinical pathology that reflects a particular type of immune activation. The histopathology of HrCLM has never been studied systematically.

38 HrCLM patients from seven resource-poor communities in Manaus were included in the study. In all patients symptoms, number and localisation of the tracks were determined, a skin biopsy was taken and a differential white blood cell count performed. The severity of clinical pathology and of histopathological inflammation were measured using semi quantitative scores.

The patients had between 1 and 17 larval tracks. The median duration of HrCLM was 14 days (IQR: 7–30). The clinical median severity score was four out of 10 points (IQR-2 to 6). The blood eosinophilia was in median 675/ $\mu$ l (IQR: 565–1215). 61.5% of all biopsied lesions were complex presenting excoriations, crusts, bacterial superinfection and/or bullae (39.5%, 23.6% 7.9% and 2.6% respectively). In the epidermis hyperplasia and parakeratosis were the most common findings, in the dermis oedema was present in 44.7% of all cases. In the epidermis an intense inflammatory response was present in 31.6% of the biopsies which consisted mainly of eosinophils and neutrophils. In the dermis the predominant pattern was the infiltration of eosinophils with only scattered lymphocytes and neutrophils. Eosinophils were located in clusters around blood vessels and adnexa. In the hypodermis the infiltration with eosinophils or with eosinophils and lymphocytes was predominant. The histopathological severity score was positively correlated with the severity of clinical pathology but it was inversely proportional with the duration of the disease.

In an endemic area HrCLM is associated with an important clinical and histopathological alteration. Eosinophilia and infiltration of eosinophils in the dermis and hypodermis were almost constant. Although animal hookworm larvae are confined to the epidermis a particular inflammatory response is visible in the dermis and hypodermis. This indicates a systemic inflammatory reaction.

DISCLOSURE Nothing to disclose.

## PS2.291

**Surveillance of *Aedes aegypti* breeding in different economic groups of Delhi**K. Vikram<sup>1</sup>, B. N. Nagpal<sup>1</sup>, V. Pande<sup>2</sup>, A. Srivastava<sup>1</sup>, S. K. Gupta<sup>1</sup> and N. Valecha<sup>3</sup><sup>1</sup>GIS/Taxonomy, National Institute of Malaria Research, New Delhi, India; <sup>2</sup>Biotechnology, Kumaun University, Nainital, India; <sup>3</sup>National Institute of Malaria Research, New Delhi, India

**INTRODUCTION** An entomological survey was conducted in selected localities of Delhi, categorized in different income groups, with the objective to determine the larval diversity, density and breeding site preferences of *Aedes aegypti* mosquitoes, during transmission and non-transmission seasons.

Vector surveillance is an important aspect of dengue disease control, so as to warn the community before the disease spreads in their area.

**METHODS** During June, 2013 to May, 2014, an intensive larval survey was carried out in 18 localities of Delhi, categorized as Low, Medium and High income group (six localities each). Immature stages of *Aedes* mosquitoes were collected by using WHO standard protocols, to find out the *Aedes* breeding in all types of water filled containers. House index (HI), Container index (CI), Breteau index (BI) and Pupal index (PI) were calculated as per WHO procedure.

**RESULTS** During transmission season, solid waste was the most preferred breeding site followed by curing tanks, plastic containers, OHTs, coolers and bird pots. During non-transmission season, OHTs and curing tanks were the most preferred breeding containers followed by coolers, plastic containers. In LIG localities water storage containers (plastic) forms highest positive breeding containers (29%) for *Aedes* mosquitoes but in MIG localities solid waste (27%) and plastic containers (26%) were the most preferred for breeding. In HIG localities solid waste (27%) and curing tanks (21%) were the most preferred breeding containers and contributing maximum for the breeding of *Aedes aegypti*. The house index was higher in the transmission months August and September in LIG, June–July in MIG and June in HIG colony. The BI in MIG colonies was below critical level (i.e. 20) while it was observed to be higher in HIG & LIG colony during month of September i.e. 22.45 & 25.22 respectively. The value of CI was higher in the month of September for HIG, MIG & LIG i.e. 8.35, 7.5 & 13.49 respectively.

**CONCLUSION** Containers found in low income groups are contributing more to *Ae. aegypti* breeding than MIG and HIG localities. Overhead tanks and curing tanks are the key breeding sites in non transmission season, whereas solid waste and plastic containers are amongst preferred breeding sites in transmission season. The targeted intervention in the non transmission season can hence help to control the sudden upsurge of dengue in a densely populated city like Delhi.

DISCLOSURE Nothing to disclose.

## PS2.292

**Influence of age on the clinical outcome of dengue**C. R. Vicente<sup>1</sup>, K.-H. Herberinger<sup>1</sup>, G. Froeschl<sup>1</sup> and C. Cerutti Junior<sup>2</sup><sup>1</sup>Center for International Health, Ludwig-Maximilians-Universität, Munich, Germany; <sup>2</sup>Social Medicine, Federal University of Espírito Santo, Vitória, Brazil

**INTRODUCTION** Dengue presents a wide clinical spectrum, varying from asymptomatic to severe forms, with increased vascular permeability, disorder in homeostasis and organ impairment. Host characteristics could influence the disease evolution. The present study evaluated the influence of age in dengue clinical outcome.

**METHODS AND MATERIALS** The study presented a cross-sectional design including data of 6631 dengue cases which occurred in Vitória, Espírito Santo, Brazil, between 2007 and 2013, confirmed by specific laboratory tests, obtained from the Information System for Notifiable Diseases. Sex, age, clinical presentation, dengue classification and death were included in the analysis. Cases were grouped by age as children (1–9 years old), adolescents (10 to 19 years old), adults (20 to 59 years old) and elderly (60 or more than 60 years old) and clinically classified as dengue fever and severe dengue.

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**RESULTS** Most cases occurred in women (56.7%). The median age was 32 years old. Severe dengue affected 11.2% of cases, 8.7% ( $n = 38$ ) of children, 12.4% ( $n = 186$ ) of adolescents, 10.4% ( $n = 426$ ) of adults and 15.5% ( $n = 94$ ) of elderly. Age was significantly higher ( $P$ -value = 0.03) in the severe dengue group than in the non-severe dengue group. Severe dengue was significantly more frequent in elderly patients ( $P$ -value <0.05). Considering severe cases, hemorrhagic manifestations were significantly more frequent in children ( $P$ -value <0.01), and plasma leakage was more frequent in children ( $P$ -value = 0.02) and adolescents ( $P$ -value <0.01). Despite elderly patients presenting a low frequency of hemorrhagic manifestations, hematuria was more frequent in this group ( $P$ -value <0.01). Nine severe cases resulted in the death of five adults and four elders. Lethality by severe dengue for adults was 11.8/1000 and for elderly was 42.5/1000. Elderly with severe dengue presented a significant risk to evolve to death ( $P$ -value <0.05).

**CONCLUSION** Elderly and children were the groups with worst outcomes of dengue. Differences in severe manifestations in age groups points out the necessity of specific and appropriate management protocols for each age group, in order to diminish morbidity and mortality.

**ACKNOWLEDGMENTS** Coordination for the Improvement of Higher Education Personnel (CAPES – Brazil), National Counsel of Technological and Scientific Development (CNPq – Brazil), Excellence Centers for Exchange and Development (Exceed – Germany).

**DISCLOSURE** Nothing to disclose.

**PS2.293****A new age in epidemiology – a thermodynamic paradigm for studying disease vector's habitats and life cycles using NASA's remote sensing data**

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A thermodynamic paradigm for studying disease vector's habitats & life cycles using NASA's remote sensing data is being proposed. NASA's current and planned satellite missions provide measurements of the critical environmental measures environmental state functions important to vector and disease life cycles such as precipitation, soil moisture, temperature, vapor pressure deficits, wet/dry edges, and solar radiation. Satellite data provide landscape scale process functions represented by land use/cover mapping and actual measurements of ecological functions/structure: canopy cover, species, phenology, and aquatic plant coverage. These measurements are taken in a spatial context and provide a time series of data to track changes in time.

Global public health is entering a new informational age through the use of spatial models of disease vector/host ecologies driven by the use of remotely sensed data to measure environmental and structural factors critical in determining disease vector habitats, distributions, life cycles, and host interactions. The vector habitat microclimates can be quantified in terms of the surface energy budget measured by satellites. The epidemiological equations (processes) can be adapted and modified to explicitly incorporate environmental factors and interfaces required by a specific disease and its vector/host cycle. Remote sensing can be used to measure or evaluate or estimate both environment (*state functions*) and interface (*process functions*). It is critical that the products of remote sensing must be expressed in a way they can be integrated directly into the epidemiological equations.

**DISCLOSURE** Nothing to disclose.

**PS2.294****Active surveillance system for *Aedes aegypti* larva at a university campus in Thailand**

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**INTRODUCTION** Suranaree University of Technology located in the north-eastern part of Thailand and covers an area of 7000 rai. The surrounding environment of the university consists of both forests and housing. Approximately 14 000 people live on this university campus including staff, personnel and students. Many of them travel and then meet at the university. There is the potential to have an epidemic of Dengue hemorrhagic fever (DHF). This study aims to develop a surveillance system for the mosquito larva of *Aedes aegypti*, to alert people and guide control interventions on this university campus.

**METHODS AND MATERIALS** Surveillance was systematically conducted on the university campus starting in 2013. Situation analysis of the year 2011–2013 was done to identify the incidence of DHF and control measures in those years. This information was distributed to stakeholders at all levels to raise awareness and they were invited to participate in the processes of planning, intervention, monitoring and evaluation. Interventions were comprised of health education, training, sampling survey and control measures of the mosquito larva of *Aedes aegypti*.

**RESULTS** The incidences of DHF cases on this campus were 141, 250 and 391 cases per 100 000 people in the year 2011, 2012 and 2013 respectively. After active surveillance and prompt control interventions were implemented in 2013, the incidence of DHF cases has dramatically decreased (41 per 100 000 people in 2014). A sampling survey for the mosquito larva of *Aedes aegypti* in containers both indoors and outdoors found that the container index had declined to less than 10% in 2014. Student volunteers from the university campus, involved in the surveillance system, reported both happiness and satisfaction with the participatory processes. Key success factors were the spiritedness and willingness of student volunteers who were doing regular sampling surveys for the mosquito larva and initiating prompt control actions.

**CONCLUSIONS** Surveillance for *Aedes aegypti* larva and prompt control interventions remain an important means to prevent DHF. Approaching and involving people in the community is a key factor for success to sustain an efficient surveillance system.

**DISCLOSURE** Nothing to disclose.

**PS2.295****Morphology and development of flesh flies, *Boettcherisca nathani* and *Lioproctia pattoni* (Diptera: Sarcophagidae): application in forensic entomology**

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**INTRODUCTION** The flesh flies are medically-important because the larvae found in the human corpses can be used as the entomological evidence in forensic investigations. To be used in this purpose, identification of larvae into species and their developmental rate are the mandatory steps.

**METHOD** For help in their identification, we studied the larval morphology of *Boettcherisca nathani* Lopes 1961 and *Lioproctia*

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*pattoni* (Senior-White 1924), the hemisynanthropic species in Palaearctic and Oriental regions. Particular attention was paid to the third instar, with focus on the characteristics of the anterior spiracle, intersegmental spines between the prothorax and mesothorax, and the posterior spiracle. For developmental rate, we measured larval development every 12 h at ambient temperature ( $30.0 \pm 1.7^\circ\text{C}$ ), relative humidity ( $63 \pm 9\%$ ) and a natural light/dark photoperiod (12:12 h).

**RESULT** The anterior spiracle of *B. nathani* has two irregular rows of 21–27 papillae, while *L. pattoni* has a single irregular row of 20–28 papillae. *B. nathani* spines are serrated and triangular; whereas *L. pattoni* spines have a moderately triangular upper part and serrated lower part. The posterior spiracles of *B. nathani* and *L. pattoni* were similar, but the inner arc in *L. pattoni* is clearly protruded. For development, the newly hatched larvae of *B. nathani* developed to second instar in 24 h, remaining in this stage for 24–36 h, before molting into the third instar at 36–48 h (with average 17.55 mm in length). The larvae fed for 48–168 h became pupating. Adults emerged 15 days after the larvae had hatched. For *L. pattoni*, the larvae turned into second instar in 12 h, remained in this stage for 12–24 h, became third instars at 24–60 h (with average 18.75 mm in length) and fed for 60–312 h. Adults emerged in 21 days.

**CONCLUSION** These results are useful in species identification and estimation of age of larvae found associated with corpses.

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**DISCLOSURE** Nothing to disclose.

## PS2.296

## Denguenaweb: a new strategy for dengue epidemiological surveillance in real time

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**INTRODUCTION** The explosive nature of dengue epidemics that have occurred in Brazil and many other countries points to the need for models of active surveillance with a view to issuing a warning sign for health services and triggering control actions timely.

**OBJECTIVE** To present a new strategy of surveillance, complementary to traditional information system of notifiable diseases (SINAN), able to detect pre-epidemic situations not detected by traditional system.

**METHODS** A website with interactive features was developed, in order to receive systematic information from users who indicate the occurrence of signs and symptoms of dengue. Strategies of communication and information were adopted in order to attract and keep the population's adherence to the site. In order to compare *denguenaweb* incidence with the one obtained from the data from SINAN, the non-parametric Spearman correlation coefficient was calculated and the randomization test was applied to check if the data of both systems present a time pattern.

**RESULTS** The proof of concept of this surveillance system, conducted in Salvador-Bahia, showed that it is able to identify early cases of dengue in just the first 3 days of illness. In 24 (twenty-four) months of operation, the site received 967 706 visits, and has 803 users. Having been registered 116 suspected dengue cases, distributed in different neighborhoods of the city.

We obtained a high rate of participation between the visitors and it was possible to capture suspected dengue cases. Statistical analysis revealed a temporal correlation between suspected cases recorded on *denguenaweb* and on the formal reporting system ( $P$ -value 0.0012).

**CONCLUSION** The small number of cases registered was possibly due to the fact that in the last 2 years there was no dengue epidemic in Salvador. It is possible that during a dengue epidemic the website *denguenaweb* can complement the traditional surveillance Information System, anticipating the official records.

**DISCLOSURE** Nothing to disclose.

## PS2.297

## Analysis of spread patterns of dengue epidemic caused by the introduction of DENV 3 in Salvador Bahia

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**INTRODUCTION** Diffusion studies of transmissible diseases have been identified as an important epidemiologic referential because enable understanding of the factors that contribute to the spatial distribution of the disease in time in order to understand associations between the occurrence of the disease and the elements that constitute the inhabited space. This study analyses the spread pattern of the dengue epidemic in Salvador/Bahia/Brazil, 2002, year of introduction of the virus DENV3 in this city, considering that its population had no immunity to this serotype.

**METHODS AND MATERIAL** The 19 355 cases of dengue recorded in Sistema de Informação de Agravos de Notificação/SINAN were georeferenced according to census tract of the city (spatial units) and epidemiological weeks (temporal unit). Kernel density estimation was used to identify the pattern of spatial diffusion using the R-Project computer software.

**RESULTS** In 2002, 88.23% of 2006 census tracts reported cases of dengue. At the end of this year, the most of the city had been hit by the virus, with higher concentration of cases occurring in the western region, as observed in the year of the first epidemic (1995). This region is composed of census tracts with high population density and predominantly horizontal residences while the eastern region of the city there is a predominance of vertical residential buildings. The diffusion pattern differs from that described in 1995, since in the first weeks of notification productive outbreaks were already observed in four distinct areas. However, the intense dissemination speed makes it maintain the characteristics of a process of diffusion through contact, common in infectious diseases that spread from person to person, or as in dengue, due to the rapid spread of *Aedes aegypti*.

**CONCLUSION** The results point to the need for immediate preventive action when the first cases are identified, especially around the areas where the first cases are reported, preventing the proliferation of the transmitting agent and therefore dengue. If there were a more rapid control instrument capable of rapidly reducing the vector population within a few days or of raising the group immunity of the population by mean of a vaccine, it would theoretically be possible to adopt control actions around the epicenter of the epidemic and consequently reduce the incidence of the disease in the city.

**DISCLOSURE** Nothing to disclose.

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## PS2.298

## With NMR towards new diagnostic methods for dengue

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Dengue is a viral disease that is quite common in tropical countries. The diagnosis of Dengue is done by eliminating other possible causes of the observed symptoms, a direct antibody diagnosis becomes possible only after several days into the disease. Hence, for the first days, a patient is either not treated (not strong enough symptoms) or treated 'on suspicion'. A method for early identification of dengue is desired.

The blood is the main means of transport inside the human body, not only for proteins (like antibodies), but also for small molecules. Due to changes in their metabolism, infected cells could be producing different secondary metabolites, which will show up in the blood plasma. These changes should appear quickly, faster than antibodies. Blood plasma has been extensively studied by Nuclear Magnetic Resonance (NMR) and many small molecules can be associated to certain NMR signals.

In our study we analyzed blood plasma from healthy and infected subjects using proton NMR. The samples were all filtered with 3 kDa filters, freeze-dried and resuspended in D<sub>2</sub>O. The resulting 1D NOE spectra were then subjected to an extensive Principal Components Analysis (PCA), in order to obtain a differentiation. Signal ranges that showed significant changes within the same group were excluded for the PCA, as were glucose signals.

Our PCA model was then applied to the classification of additional samples. With the exception of one all samples were correctly classified; the wrong one was actually marked as being 'out of the model', meaning that a proper classification was impossible. It turns out that Principal Component 2 (PC2) is the most important component for the differentiation between healthy and infected subjects, whereas PC1, PC3 and PC4 do not contribute to the differentiation. From the PCA model we can identify the most important regions responsible for that result, mainly around 1.92 ppm and 3.38 ppm, and then verify within the NMR spectra the responsible peaks.

According to assignments published in the literature for blood plasma we can associate the varying signals to a series of compounds: proline, lysine, arginine, acetate, treonine,  $\beta$ -glucose, pyruvate, citrulline, glutamine, isoleucine and other smaller ones. Currently we are trying to establish a connection between the observed signal changes and known body reactions.

DISCLOSURE Nothing to disclose.

## PS2.299

## Triatomines (Hemiptera, Reduviidae) in urban residences of Sobral, Ceara State, 2010–2014: a continuing risk of Chagas disease in Northeastern Brazil

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INTRODUCTION Sobral is one of the most important cities of Ceara State, Northeastern Brazil. In some districts of its urban area, native triatomine bugs are found in intradomiciles, often carrying high levels of infection of *Trypanosoma cruzi*, the etiological agent of Chagas disease. This work aims to analyze the spread and natural infection of triatomine species caught within the urban area of Sobral in recent years.

MATERIALS AND METHODS The study includes all available data from the routine surveillance at the Zoonosis Control Center (ZCC), from 2010 to 2014. We analyzed the site of capture, the number of triatomine individuals, and the species (data from Triatomine Information Stations – PITs – installed in primary health care units). The triatomine natural *T. cruzi* infection was verified by abdominal compression and fresh examination of the insect feces by optical microscopy (160X). We calculate overall index of natural infection by the ratio between the number of infected and the number of examined triatomines. The sites of triatomine captures were georeferenced through Google Earth and database geoprocesed with ArcGIS software (version 10.3).

RESULTS From 2010 to 2014, 191 triatomines were analyzed: 82.2% *Triatoma pseudomaculata*, 7.9% *Rhodnius nasutus*, 5.8% *T. brasiliensis*, 3.7% *Panstrongylus lutzi*, and 0.5% *P. megistus*. The overall index of natural infection was 17.8%. Larger infestations occurred in the Dom José (36.2%), Padre Palhano (24.7%) and Alto Cristo (10.6%) districts. Most of the insects (185/96.9%) were captured inside houses (only six in peridomiciles). Among those found in intradomiciles, 18.4% ( $n = 34$ ) had *T. cruzi* infection: 28 *T. pseudomaculata*, one *T. brasiliensis*, two *R. nasutus*, two *P. lutzi* and one *P. megistus*. Adult insects (males and females) represented 74.9% of the captured insects, while nymphs represented 25.1%, indicating household colonization. Of the 48 nymphs, six were infected with *T. cruzi*.

CONCLUSION *T. pseudomaculata* shows a clear evidence of intradomiciliar colonization within the urban areas of Sobral. In addition, the high natural infection rate indicates an active *T. cruzi* circulation in these areas, increasing the risk of Chagas disease vector transmission. These data suggest the need for strengthening the epidemiological surveillance with integration of control actions targeting triatomines, *T. cruzi* reservoirs, and human populations, identifying the real Chagas disease transmission hazard in urban areas of Sobral.

DISCLOSURE Nothing to disclose.



## Abstracts of the 9th European Congress on Tropical Medicine and International Health

## PS2.300

**Assessment of severity among adult dengue patients in Colombo district, Sri Lanka**

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**INTRODUCTION** Dengue is a major acute febrile illness in Sri Lanka and reported in epidemic proportions. From 2009 to 2013 an average of 35 000 cases were reported annually with over 60% above 15 years of age. Clinical case classification of dengue was originally based on paediatric patients. Here we assess severity of dengue illness among adults according to both WHO classical and TDR classifications.

**METHODS** A study was conducted in 100 adult patients presenting to ID Hospital, Colombo with fever <7 days, in 2013. All were tested for dengue ELISA NS1/IgM and RT-PCR. Of them 88 were confirmed as having dengue, and were classified into two WHO classifications. Type of care received was categorized into three levels as:

- Category 1 – general ward,
- Category 2 – special dengue unit,
- Category 3 – intensive care unit.

**RESULTS** According to classical classification, 47 (53.4%) were Dengue Fever (DF) patients. Of them 31 and 16 received Category 1 and 2 care respectively. None received Category 3 care. 41 (46.6%) Dengue Haemorrhagic Fever (DHF) patients. Of them 14 received category 1 care while 25 and two received Category 2 and Category 3 care respectively. Classical classification and level of care sensitivity was 62.8% (CI 48–78) while specificity was 68.9% (CI 55–82). According to TDR classification 29 (32.9%) were Dengue patients without warning signs. Of them 22 and 07 received Category 1 and 2 level of care respectively and none went into category 3. 48 (55%) were Dengue with warning signs and 11 (13%) severe dengue patients. Of them 18 received Category 1 care while 39 and two received category 2 and category 3 care respectively. TDR classification and level of care sensitivity was 85.4% (CI 75–95) Specificity 55% (CI 39–70).

**CONCLUSIONS** WHO TDR classification captures more patients who need closer observation in Category 2 and three levels of care than classical classification. This may warrant additional hospital resources in developing country settings.

**DISCLOSURE** This research was funded by the European Union 7th Framework Programme through 'DengueTools'.

## PS2.301

**Prevalence of HIV, HBV and HCV positive serology in blood donors in a rural general hospital in Ethiopia**

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**BACKGROUND** Blood transfusion is common practice in tropical countries to treat endemic diseases as malaria. Screening for blood-borne viral infections is crucial to prevent its transmission, and to diagnose and treat infected individuals.

**METHODS** All different blood donors older than 15 years attending a General Hospital in Gambo, Ethiopia, from 2007 to 2012 were reviewed. Blood antibodies for HIV and HCV, and S antigen for HBV were determined by corresponding rapid tests in all instances.

**RESULTS** A total of 2789 patients had their blood tested before donation; mean age was 30 ± 10 years-old and 80.65% were male. A total of 19, 138 and 44 patients had positive HIV, HBV or HCV serology respectively. Overall prevalences were 0.73% (95% CI, 0.45–1.16) for HIV, 6.45% (95% CI, 5.46–7.59) for HBV and 1.98% (95% CI, 1.46–2.67) for HCV. Only HBV infection was more common among men as compared to women (7.01 vs. 4.33%,  $P = 0.04$ ). The proportion of HIV patients with HBV and HCV positive serology was 21.05 and 5.26%.

**CONCLUSIONS** Screening of blood products before donation should be mandatory to prevent transmission of HIV, HBV and HCV. The high prevalence of HBV infection, particularly among otherwise healthy men and HIV patients, recommends better implementation of HBV vaccination programs and workup of viral and liver test to indicate anti-HBV therapy.

**DISCLOSURE** Nothing to disclose.

## PS2.302

**Clinical manifestations and treatment outcomes of scrub typhus in Umphang Hospital, Thailand**

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Scrub typhus is an acute febrile illness that affects a large population in rural Asia. The district of Umphang in northwestern Thailand is a prototype environment for this disease. This study aimed to identify and describe the clinical manifestations and the outcomes of patients infected with *Orientia tsutsugamushi* in this area.

**METHODS** Patients presenting with scrub typhus between January 2011 and December 2014 were analysed in this retrospective study. Diagnosis was based on clinical symptoms in conjunction with a positive rapid test, or a pathognomonic eschar lesion.

**RESULTS** 877 patients were included in the study, of whom 488 were adults and 369 children. The majority (728; 85%) was included with positive serology on rapid test, 86 patients (10%) had eschar only, and 43 patients (5%) had both positive serology and presence of eschar. The most common symptom was fever (94%) followed by headache (48%) and cough (33%). Eschars were reported in 129 patients with a significantly higher percentage in children than adults ( $P < 0.001$ ), and a different anatomical distribution was found between adults and children. Common complications were elevated transaminases, acute kidney injury and pneumonia. Most of the patients recovered from the disease, with around 1% mortality.

**CONCLUSION** Umphang district has a high incidence of scrub typhus. Clinicians have to be vigilant as patients can present with a variety of clinical symptoms, regardless of the presence of fever. If diagnosed early, the treatment is effective and a favourable outcome can be expected.

**DISCLOSURE** Nothing to disclose.

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## PS2.303

## Causes of fever without source in Ghana

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**BACKGROUND** In many sub-Saharan countries the identification of pathogens causing febrile illness in children is challenged by the absence of appropriate diagnostic facilities. Thus, the spectrum and relevance of infections other than malaria and malaria co-infections remains unclear. In this study we aim to investigate the causes of severe febrile illness among hospitalised children from rural Ghana.

**METHODS** Children aged  $\leq 15$  years with fever  $\geq 38.0^\circ\text{C}$  were recruited when admitted to the children's ward of the Agogo Presbyterian Hospital in the Ashanti region, Ghana. A blood culture was taken, malaria parasitaemia and liver enzymes measured, urine collected and a pharyngeal swab taken. Further investigations and sampling were based on a predefined algorithm. Patients were medically treated according to hospital guidelines. To obtain information on the course of infection, the patient was seen at two occasions after discharge and short medical history and blood samples obtained.

**RESULTS** After 12 months of recruitment 872 children were included into the study. Median age at hospital attendance was 3 years (interquartile range: 1–5) and proportion of females 45.1%. A systemic bacterial infection was found in 9.3% of the children and malaria in 54.0%, gastroenteritis in 17.5%, urinary tract infection in 5.9%, skin or soft tissue infection in 6.2%, and meningitis in 0.9%.

**CONCLUSION** First results of this ongoing study suggest that only half of all severe febrile infections could be explained by malaria. Hence, laboratory capacities must further be strengthened to guide treatment decisions and support disease surveillance.

**DISCLOSURE** The study is funded by the German Center for Infection Research (Deutsches Zentrum für Infektionsforschung, DZIF).

## PS2.304

## Capacity of health facilities to manage hypertension in Mukono and Buikwe districts in Uganda: challenges and recommendations

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**BACKGROUND** The burden of chronic diseases is on the rise. However, healthcare systems in low-income countries are inadequately equipped to deal with the growing disease burden, which requires chronic care for patients. The aim of this study was to assess the capacity of health facilities to manage hypertension in two districts in Uganda.

**METHODS** In a cross-sectional study, we surveyed 126 health facilities (six hospitals, four HCIV, 23 HCIII, 41 HCII and 52 private clinics/dispensaries) in Mukono and Buikwe districts in

Uganda and assessed service provision for hypertension, supplies, training, and knowledge. Quantitative data were analyzed using SPSS and the outcomes were compared using contingency tables and joint probabilities. Significance testing was conducted using chi-square with alpha set at 0.05. Open-ended questions were quantitized using a coding framework and merged.

**RESULTS** Of the 126 facilities, 92.9% reported managing patients with hypertension and most (80.2%) were run by non-physician health workers. Less than a half (46%) had hypertension guidelines (exclusively UCG) with significant differences observed across levels ( $P < 0.001$ ). All facilities (except one) never calibrated their BP devices. Proportions of available anti-hypertensive (all-levels) were 42.9% for thiazide-diuretics, 59% for beta-blockers, 1.6% for alpha-blockers, 5.6% for mixed-alpha and beta-blockers, 48.4% for calcium-channel blockers, 22.2% ACEs, 15.9% for angiotensin-II receptor antagonists, and 16.6% for alpha-2 agonists. None of the hospitals and HCIVs stocked alpha-blockers and mixed-alpha & beta-blockers. More than 90% of HCIIIs did not stock anti-hypertensive. Significant proportions of private clinics/dispensaries stocked beta-blockers (97.6%) and calcium channel blockers (80.8%), ( $P < 0.001$ ). All health workers (except 5, 1.9%) indicated the need for additional training in hypertension. The joint-probability (Jp) for facilities to fully manage hypertension were highest at the hospital level (Jp = 0.587) and lowest at the HCII (Jp = 0.272).

**CONCLUSIONS** Health facilities in this setting are inadequately equipped to provide services for management of hypertension. Diagnostic equipment, anti-hypertensive drugs and personnel present great challenges. Measures are needed to substantially strengthen the health system in this setting to manage hypertension and other chronic diseases.

**DISCLOSURE** Nothing to disclose.

## PS2.305

## Impact of changed fever case management practice on patients' self-reported treatment experience

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**INTRODUCTION** The Papua New Guinea (PNG) National Department of Health implemented a new national malaria treatment protocol (NMTP) in late 2011. The new protocol stipulates routine testing of malaria infection by rapid diagnostic test (RDT) or microscopy, anti-malarial prescription to test positive cases only, and the administration of artemether-lumefantrine (AL) as the first-line anti-malarial. This represents a substantial change from the previous practice of presumptively treating all febrile patients with sulphadoxine-pyrimethamine and either chloroquine or amodiaquine. This presentation examines the relationship between the changes in febrile case management practice that occurred as a result of the revised NMTP and patients' self-reported treatment experience.

**METHODS** Data were collected via a repeat, countrywide cross-sectional survey of randomly selected primary health care facilities in 2010, 2011, 2012 and 2014. Collectively, a total of 302 health facilities were surveyed across this time period, the case management of 2182 febrile patients observed and exit interviews completed with 2046. All data were collected using structured survey instruments.

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**RESULTS** The full dataset was in the final stages of preparation at the time of abstract submission. However, preliminary analyses indicate that a substantial change in febrile case management practice occurred within 12-months of introducing the revised NMTP and that patients' self-reported treatment experience showed greater variation following this change.

**CONCLUSION** The sudden and dramatic change in febrile case management practice observed after introduction of the revised NMTP in PNG has seemingly improved the self-reported treatment experience of many febrile patients, but not all. While conclusions cannot be drawn until the full dataset has been analysed, it appears that the group reporting the least positive treatment experience are febrile patients who do not receive antimalarial medication and for whom a clear diagnosis is not provided. This tentative conclusion further highlights the need to support health workers better manage non-malaria febrile illness in the face of a declining malaria burden such as PNG is currently experiencing.

**DISCLOSURE** Nothing to disclose.

**PS2.306****An analysis of hematological parameters as a diagnostic test for malaria in patients with acute febrile illness: a limited resources institutional experience**

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**INTRODUCTION** Malaria is an important cause of febrile illness in developing countries such as India. The presentation is nonspecific, similar to other commonly occurring febrile illnesses. This impairs diagnostic specificity and often promotes the indiscriminate use of antimalarials. Hematological abnormalities, considered a hallmark of malaria, may lead to an increased clinical suspicion, thus initiating a prompt institution of antimalarial therapy even in the absence of a positive smear report. A statistical evaluation of the hematological changes in malaria and also in patients with acute febrile illnesses and whether these could guide the physician to institute specific antimalarial treatment is assessed in the present study.

**METHODS AND MATERIALS** The study evaluated a total of 723 patients presenting with acute febrile illness at our hospital over a 1 year period. A complete blood count and malarial parasite microscopy were performed for each patient.

**RESULTS** 172 out of 723 patients (24%) were diagnosed with malaria by positive smear report. Statistically significant reduction in hemoglobin ( $P < 0.005$ ), platelet count ( $P < 0.001$ ) and total leukocyte count ( $P < 0.001$ ) levels in patients with malaria compared to those without the disease was seen. Likelihood ratios for a positive result of platelets (6.2) and total leukocyte count (3.4) was relevant as compared to hemoglobin (1.61) and Red cell distribution width (1.79). The negative predictive values for hemoglobin (79%), total leukocyte count (86%), platelets (94%) and Red cell distribution width (93%) were significant. Red cell distribution width values were higher in patients with malaria than in patients without malaria ( $P < 0.001$ ).

**CONCLUSIONS** Routinely used laboratory findings such as hemoglobin, leukocytes, platelet counts and red cell distribution width values, showed a statistically significant correlation with malarial infection thus providing a diagnostic clue in patients with acute febrile illness in endemic areas, which led to a prompt initiation of treatment. Limitation of resources and

trained health personnel in much of the malaria infested areas, a presumptive clinical diagnosis seems a relevant option.

**DISCLOSURE** Nothing to disclose.

**PS2.307****Measuring outcome and impact of MPH education programs using 360 degree interviewing as an innovative tool**

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**INTRODUCTION** The need for health systems improvement, coupled with the health workforce crisis, has highlighted the urgency of increasing numbers of more competent health professionals; this has led to a growing interest in health professional education. Recently it was questioned whether training of higher level cadres in public health prepared graduates with competencies to strengthen health systems in low- and middle-income countries. Impact evaluation of education programs is notably problematic because of the complexity of attribution. The innovative use of 360 degree interviewing was chosen to enrich understanding of the impact of Master of Public Health programs.

**METHODS AND MATERIALS** A qualitative study was conducted using in-depth interviews focused on the outcomes and impact of a distance MPH program delivered from South Africa to African countries, and a residential MPH program in the Netherlands for students working in low and middle income countries. Per school, data were collected from ten graduates and their peers and supervisors.

**RESULTS** The program impact, reported elsewhere, indicated that almost all graduates were promoted or applied successfully for higher level jobs after the MPH. Considerable effects on workplace, such as contributing to workplace effectiveness, were reported by graduates, peers and supervisors. The role of graduates increased in coordinating, mentoring, leadership and management. Using data from three different sources, as in human resources performance appraisal, was innovative and effective in the context of impact evaluation and extended data scope. The professional roles played by the three data providers brought diverse priorities and perspectives on the issue of impact. Some evidence was corroborated, while divergence in what was identified as 'impact' enriched the findings and was revealing of the nature of the qualitative research stance; differentiated valuing of MPH program impacts provided a wider understanding of how Public Health courses might be modified.

**LIMITATIONS** Health service recipients were not interviewed, the peers and supervisor interviewees were selected by graduates, while some graduates could not be traced.

**CONCLUSIONS** Graduates were able to contribute to their workplaces and often had influence at national level. The tool of 360 degree feedback provided valuable and multidimensional insight into the outcome and impact of MPH graduates on workplace and health systems.

**DISCLOSURE** Nothing to disclose.

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## PS2.308

**Successes and challenges of a systematic approach to strengthen PhD programmes in Africa**

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**INTRODUCTION** In order to improve health in low- and middle-income countries, it is necessary to improve the local research capacity. Building doctoral training is a well-recognised way to do this so the Malaria Capacity Development Consortium has supported African universities, PhD students and postdocs to strengthen malaria research capacity in Africa.

A team of researchers visited the five African MCDC partner universities in 2009 to assess their capacity for PhD programmes. An extensive literature search was undertaken to develop a comprehensive benchmark which included all the policies, processes and facilities needed to run doctoral programmes.

**METHODS** Capacity of the institutions was compared against the benchmark and recommendations provided to the institutions which they used to develop action plans to address the gaps and proactively manage institutional capacity strengthening. Follow up site visits to assess progress and update the recommendations were carried out in 2012. In 2014, in-depth phone/Skype interviews with key stakeholders within each institution were conducted. Information was obtained about progress made since 2012, the processes which had enabled or prevented this progress to be made and the sustainability of any progress, as well as an evaluation of the methods utilised by the research team in guiding capacity strengthening.

**RESULTS** All the universities demonstrably built capacity in some areas, especially in the development of the PhD Handbook, IT/library access and development of student supervision. Least progress was made in establishing a PhD programme evaluation processes. Stakeholders felt that the evaluation process complemented and enhanced their own efforts in strengthening their doctoral programmes. Progress slowed down over time possibly because the easiest gaps to address were tackled first and because of infrequent formal reviews of progress.

**CONCLUSIONS** In such complex programmes it is likely that some aspects will work better than others. By learning about what does not work well and why in research capacity strengthening programmes, and by focussing particularly on the areas which are hard to achieve, we can make such programmes more effective. The process for actively managing research capacity strengthening was highly effective and could be transferred to other contexts. However regular review, possibly in collaboration with external agencies, is likely to help to retain momentum.

**DISCLOSURE** Nothing to disclose.

## PS2.309

**Assessing laboratory capacity to support the control of neglected tropical diseases**L. Dean<sup>1</sup>, C. Mulamba<sup>1</sup>, P. Mbabazi<sup>2</sup> and I. Bates<sup>1</sup>

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**INTRODUCTION** Information about the distribution and expertise of neglected tropical disease (NTD) regional reference laboratories is not readily available. Currently, there are no functional networks to link regional NTD laboratories to

facilitate quality assurance and sharing of expertise. We have identified and described potential NTD regional reference laboratories in five of the six WHO regions. Having an understanding of current laboratories' capacities will identify gaps in their systems that need strengthening to contribute to meeting the targets set out in the NTD Roadmap.

**METHODS** Between October 2013 and January 2014, we conducted a survey to understand the distribution and characteristics of potential NTD regional reference laboratories in the Eastern Mediterranean, South East-Asia, Americas, Western Pacific and European WHO regions. Respondents were identified through systematic searches and snowball sampling from key informants.

**RESULTS** In total, 19% ( $n = 32$ ) of the 167 laboratories contacted responded to the survey. The majority (69%) of the laboratories were based within academic institutions and their greatest strengths lay in research. Most of laboratories (53%,  $n = 17$ ) had a geographical scope that covered a national level. Only four laboratories stated they adhered to international standards and had relatively strong quality management systems. Despite the majority (91%) of laboratories believing they have the capacity to carry out the role of a reference laboratory only 14% ( $n = 3$ ) fulfilled the identified pre-determined criteria.

**CONCLUSION** Laboratory quality management remains the weakest aspect of laboratories supporting NTD control. This study has laid the groundwork for the next steps which would include strategically selecting and supporting a small number of laboratories in each region to achieve accreditation and integrating them into a regional NTD laboratory networks. In this way all laboratories with NTD expertise will be linked together in a global network and it will be clear which laboratories to access for specialist, high quality services to support the various and diverse needs of national and international NTD programmes.

**DISCLOSURE** Nothing to disclose.

## PS2.310

**Teaching medical students in English in a non-English speaking country: evaluation of a global health elective for US residents in Turkey**N. S. Bertelsen<sup>1,2</sup>, P. Cocks<sup>3</sup> and M. Demirhan<sup>1</sup>

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**INTRODUCTION** The trend toward increasingly multicultural patient populations and global societies is bringing more medical education in English to learners from non-English speaking backgrounds (NESB), and global health electives allow U.S. residents to improve skills in cross-cultural communication. Here we report a global health elective, in English, for U.S. resident physicians in internal medicine (IM) to teach medicine in Turkey.

**METHODS** The official language of instruction at Koc University School of Medicine (KUSOM) is English. Since 2012, KUSOM has hosted IM residents from New York University School of Medicine (NYUSOM) annually for a 4-week global health elective in Istanbul, Turkey. Over a 10-week period in 2014, 95 KUSOM students from the third, fourth and fifth years (in a 6-year M.D. program) participated with a team of one IM resident (4 weeks), one medical student (8 weeks) and one IM attending physician (10 weeks) from NYUSOM. Activities included daily oral presentations, five physical exam skill simulations, eight morning report case discussions, and two



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evidence-based medicine review sessions, in both large and small groups for 1 h each. Lessons were derived from Bates Guide to Physical Examination, Bates Visual Guide videos, and New England Journal of Medicine's Case Records.

**RESULTS** Before participating, although all students reported English proficiency, many (24–34%) were not comfortable speaking with patients, discussing patients, writing clinical notes, or reviewing the medical literature in English. Afterward, 90% of students felt these activities helped them identify strengths and weaknesses, taught them something new, and were an experience they would like to have again. Students reported improved skills in communication, history-taking, physical exam, making assessments and writing plans. In return, all NYUSOM residents reported improving their cross-cultural communication skills.

**CONCLUSION** While English language skills are outstanding upon admission to KUSOM, students require ongoing participation in oral and written patient-centered learning activities to achieve competency in medical English. This NYUSOM resident global health elective was able to offer an additional resource for KUSOM students to achieve this goal. Faculty at both institutions also learned from each other. As a result, this KUSOM teaching elective in English will be expanded to include more visiting residents from IM and other clinical departments.

**DISCLOSURE** Nothing to disclose.

**PS2.311**

**Systematic monitoring and evaluation of laboratory system capacity strengthening for neglected tropical diseases: experiences and recommendations from sub-Saharan Africa and South Asia**

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Laboratory capacity is a major bottleneck to implementing and monitoring Neglected Tropical Diseases (NTDs) elimination interventions. Systematic approaches to laboratory capacity strengthening are scarce and little is known about how to measure its impact in real-time. The UK Department for International Development funded Centre for Neglected Tropical Diseases requested support from the Capacity Research Unit (CRU) at the Liverpool School of Tropical Medicine to design, monitor and evaluate the capacity development of selected NTD laboratories in Ghana, Kenya, Malawi and Sri Lanka. This paper discusses how CRU's approach to systematically tracking and measuring capacity development was applied to the NTD laboratories. It also presents common achievements and challenges of laboratory capacity development across the four partner countries and discusses strategies for sustainability.

**METHODS** Both qualitative and quantitative methods were used to monitor and evaluate NTD laboratory strengthening activities across the different NTD laboratories. Specific methods included in-depth interviews and focus group discussions with all stakeholders, participant observation, and questionnaires.

**RESULTS** The number of staff trained to perform the real-time polymerase chain reaction (RT-PCR) significantly expanded, allowing improved parasite detection. Furthermore, the introduction of international laboratory standards (ISO 15189) resulted in greater understanding and focus on laboratory quality management. Common challenges across the four laboratories included a lack of External Quality Assessment (EQA) of laboratory results and limited funding to improve quality.

Laboratories increased their commitment towards establishing measures for sustainability including developing grant proposals and business plans. Two of the laboratories will start to participate in EQA for selected NTD laboratory tests.

**CONCLUSION** CRU's approach to monitoring and evaluation of laboratory capacity strengthening could be adapted for use in other geographical and laboratory contexts. The rigorous and systematic approach provides focus and structure in evaluating capacity gaps, and continuous monitoring provides ongoing support to partners in achieving agreed objectives.

**DISCLOSURE** Nothing to disclose.

**PS2.312**

**Developing a benchmarking tool to assess the capacity of four African universities to manage and generate research of international quality**

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**INTRODUCTION** Strengthening research capacity of individuals and institutions is essential to generate evidence for context specific policies. The importance of providing researchers with a conducive environment has led to recent efforts to boost the capacity of low and middle income country universities in research governance and management.

**METHODS AND MATERIALS** We developed a framework to guide a comprehensive search of global published and grey literature concerning elements of university academic, administrative and financial research support systems. All elements identified were incorporated into a master list of criteria and grouped into themes. These informed the development of data collection tools (interview guides, document reviews and observation guides for research facilities).

Across the four universities, 76 interviews were conducted, 65 documents/resources were reviewed and facilities including libraries, research laboratories and offices were visited. Preliminary framework analysis of findings informed debriefing meetings in which the universities' research stakeholders reviewed the draft report and provided their feedback and comments.

**RESULTS** The key gaps in research systems identified in at least three of the four universities included no accessible research strategy and a lack of central tracking of research activities.

There were generally no quality assurance or signing off processes for submissions or contracts, leaving institutions at potential risk of contractual or intellectual property challenges. Some institutions had a single research support office to coordinate the multi-disciplinary inputs required for developing proposals and running projects, but few had sufficient resources to perform all the required functions effectively. The lack of systems for tracking financial spend against budget also led to risks of under- or over-spend. Researchers spent a substantial proportion of time on administrative, procurement and other issues that could be more effectively taken on by non-academic staff. There were several good examples of engagement and influence of researchers in national and international policy making, showcasing institutional research successes.

**CONCLUSIONS** This review provides a single benchmark document which details all the support systems needed in a university to underpin the management and generation of research of international quality.

**DISCLOSURE** Nothing to disclose.

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**PS2.313****The experience of mini-clinical evaluation exercise (mini-CEX) of nursing education for clinical preceptors**S.-Y. Huang*Chi Mei Medical Center, Tainan, Taiwan*

**BACKGROUND** The mini-Clinical Evaluation Exercise (mini-CEX) is a combined teaching and assessment tool that includes seven items of interaction between nurses and the patient. It is predominately used to assess nurses' medical interview skills, physical examination skills, procedural skills, counseling skills, clinical judgment, organizational efficiency, and humanistic qualities/professionalism, then feedback to the nurse is given by the clinical preceptors.

**STUDY OBJECTIVES** The purpose of this study is to describe the experiences of mini-CEX of nursing education for clinical preceptors to elevate performance for training and learning.

**METHODS** This paper shows that the process involved development of mini-CEX check list, the training consistent internally of clinical preceptors. The workshops included an introduction presentation, a mock test using same video exercise, application of Interactive Response System for discussions, a pilot study was started after the clinical preceptors had become familiar with how mini-CEX works.

**RESULTS** The teaching method included teaching goals, content, strategies, and evaluation. Findings support the efficacy of improving nursing competency using teaching courses infused with core nursing values and enhanced through mini-CEX based teaching.

**CONCLUSION** The mini-CEX teaching and evaluation tool can help clinical preceptors to apply technical knowledge, increase clinical preceptors confidence, and ensure consistency in the performance of the technique.

**DISCLOSURE** Nothing to disclose.

**PS2.314****Gap analysis of the Palestinian University Health Colleges curriculum: scientific research methodology SRM course**M. Al-Khaldi*Health System Support, Swiss Tropical and Public Health Institute, Basel, Switzerland*

**INTRODUCTION** Health is promoting through the education and development. Scientific research methodology (SRM) course in the academic is considered one of the basic components. It should be designed and managed properly to promote the students' knowledge and practice. The university is the main nucleus which produces educated health workforce and a good opportunity for health investment. It is crucial to advance their educational and career goals to be research-oriented more than job-oriented, to be able in detecting problems and finding evidences.

**BACKGROUND** Palestine has a compound conditions reflected on all the important sectors, mostly health and education, which are not functioning properly. Around 20 different health colleges providing different specializations like public health, medicine and nursing, but still experiencing a lack of its curriculum, SRM in particular. In light of knowledge scarcity, this first national study seeks to investigate challenges hindering the curriculum development within these colleges respect to SRM, to generate efficient and effective solutions for improvement.

**DESIGN AND METHODS** The design is cross-sectional, qualitative approach beside reviewing different literature and

desk review of college's documents, curriculum and syllabus plan. Eight in-depth interviews with academicians were carried out, they were selected purposively, whereas five health colleges as follow: (undergraduate 2 medicine, 2 nursing and postgraduate 1 public health school) within the Palestinian universities have been targeted. The information were analysed qualitatively by using Open Coded Thematic Analysis OCTA technique.

**RESULTS** The overall perception reported that the health college's SRM curriculum is reasonable; undergraduate medicine programs are still experiencing a significant weakness specifically; it reported that the average achievement level in this course among students in these programs was moderately respectable. SRM in nursing programs was relatively fair, whereas its student's achievement level was almost 73%, while in postgraduate programs was about 85%, it most likely well-developed being it characterized as a research-oriented program. SRM course needs an urgent review to be well-built because it is unlikely performed properly. The majority of all programs devoted only 3 Credit Points from overall syllabus plan to SRM course. It is revealed that there is a lack of regulated policies; however the problem of the SRM course lies mainly in the curriculum structure, teaching staff abilities and audience (students) attitudes and skills. The most priorities for improvement are institutional stewardship, quality of curriculum, allocated resources for practice, and capacity building and culture promotion. There is a consensus from the interviewees on a college's capacities and resources fragility. Curriculum standardization precisely to SRM is mostly debatable. The challenges at the institutional level were stewardship and management concern, policies, lack of resources and capacities, development and implementation aspects, and situation instability, but individually lack of culture, skills, support and motivation.

**CONCLUSION** There is a gap in curriculum mainly in SRM course quality and weakness of the academic concern. The solution represented in effective resources allocation and capacities improvements; promote the culture and motivation on SRM, support the cooperation and collaboration among relevant stakeholders. A need for regular comprehensive curricula reviews consider desperately the SRM and its theory and practice aspects. The priority to Institutionalize the approach of evidence/knowledge-based practice and more focus on student job-research-oriented. Set a regulated and agreed national policy and advisory committee for integrated curriculum development.

**DISCLOSURE** Nothing to disclose.

**PS2.315****Global health education for future health professionals: an innovative interdisciplinary and integrated approach**C. Valois<sup>1,2</sup>

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**INTRODUCTION** Globalization is transforming education for health professionals who need to develop responsiveness to global health issues. Activities in global health offered by many programs are frequently discipline-based, 'vertical' and directed towards students with a strong interest. To be coherent with the values of Global Health (GH), we believe that there is a need for an interdisciplinary approach integrated in the different curriculums which targets all students.

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**METHODS** In Spring 2013, a 3-year initiative was launched at *Université de Sherbrooke* to develop a collaborative and interdisciplinary project to enrich medicine, nursing sciences, physical and occupational therapy programs regarding global health. Funds were secured for 3 years. The leading coordinating committee works with a larger interdisciplinary working group composed of a designated GH leader in each program, GH experts, education experts, leading teachers and student representatives. Project goals and development and implementation milestones were defined.

**RESULTS** Results already attained include: Support by the faculty authorities; a comprehensive competency framework based on CanMEDs roles; confirmation of a mandatory basic profile for all students and an optional advanced profile for those with stronger interests towards global health; identification of project leaders; confirmation of programs buy-in; collaboration with other faculties; an evaluation plan; strategies for development and implementation; dissemination activities. Actions included customized activities specific to each discipline and interdisciplinary ones.

**CONCLUSION** The interdisciplinary and integrated approach is a major challenge. It is coherent with our Faculty values and global health values. Collaborative leadership was essential to envision and move this project forward.

**DISCLOSURE** Nothing to disclose.

## PS2.316

**Genetic characteristics of *Plasmodium falciparum* found in subjects randomized to discontinuation versus continuation of cotrimoxazole prophylaxis**

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**INTRODUCTION** WHO recommends cotrimoxazole (CTX) prophylaxis for HIV-1 infected individuals in regions with high prevalence of infectious diseases. However, with scale-up of antiretroviral therapy (ART), the usefulness of CTX is not well defined especially since its usage might increase risk of developing cross-resistance to closely related drugs such as sulfadoxine-pyrimethamine (SP).

**MATERIALS AND METHODS** We conducted a non-blinded non-inferiority randomized controlled trial in Homabay, western Kenya to assess CTX prophylaxis discontinuation (DIS) vs. continuation (CON) among HIV-1 infected adults. The subjects had to be on ART for >18 months with CD4 > 350 cells/mm<sup>3</sup>. 500 subjects were enrolled; 250 in DIS arm and 250 in CON arm. Blood samples were collected every 3 months, in months 0, 3, 6, 9 and 12 (time-points). Malaria prevalence and mutations associated with SP resistance in *pfdhfr* and *pfdhps* genes were assessed by direct sequencing.

**RESULTS** The overall prevalence of *Plasmodium* was 3.8%, with 3.2% in DIS and 0.6% in CON. The prevalence of mutant haplotype for each arm at each time-point was calculated and compared. *Pfdhfr* 511/59R/108N haplotype was present in the DIS arm in all the five time-points (prevalence 16.7% – 66.7%) whereas in CON arm, it was present only in month 9. *Pfdhfr* 511/108N/164L was present in months 0, 9 and 12 in both DIS and CON arms. In *pfdhps* gene, 437G/540E haplotype appeared in both arms at all time-points whereas 437G/540E/581G was present only in month 6 in DIS arm only. Combined 511/59R/108N/437G/540E appeared only in DIS arm in all time-points (prevalence 16.7–50%) whereas N511/C59R/108N/437G/540E appeared only in CON arm in month 9 (prevalence 33.3%).

Homabay has a malaria prevalence of over 40%. In this study, both arms had an overall malaria prevalence of less than 4%, with CON arm having less than 1%.

**CONCLUSION** Our data does not show evidence of selection of mutations associated with SP resistance. Given the high mortality and morbidity caused by malaria, CTX demonstrates usefulness and eliminates the need for use of SP as an intermittent preventive treatment in pregnant women and infants.

**DISCLOSURE** Nothing to disclose.

## PS2.317

**Age-dependent carriage of alleles and haplotypes of *Plasmodium falciparum* sera5, eba-175, and csp malaria vaccine antigens in a region of intense malaria transmission in Uganda**

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The development of malaria vaccines is constrained by genetic polymorphisms exhibited by *Plasmodium falciparum* antigens. We investigated the age-dependent distribution of alleles or haplotypes of three *P. falciparum* malaria vaccine candidates, circumsporozoite protein (csp), erythrocyte binding antigen 175 (eba-175) and serine repeat antigen 5 (sera5) in a region of intense malaria transmission in Uganda. A cross-sectional study was carried out between August and November 2009. Blood samples were collected after informed consent from 250 individuals below 5 years, 5–10 years and above 10 years olds. *P. falciparum* DNA was extracted from all samples. Alleles of sera5 and eba-175 were determined by polymerase chain reaction (PCR) amplification followed by resolution of PCR products by agarose gel electrophoresis and allele calling using photographs of ethidium bromide-stained gels. Haplotypes of CSP were identified by sequencing 63 PCR products and using *P. falciparum* 7G8 strain sequence as a reference. Both eba-175 FCR3 (48/178) and CAMP (16/178) alleles were observed with the FCR3 (24/67) allele being predominant among children aged below 5 years old while the CAMP (12/67) allele was predominant among older individuals. Both sera5 alleles ORI (6/204) and ORII (103/204) were observed in the population but ORII was more prevalent. SERA5 ORII allele was significantly associated with age (*P* values <0.0001), parasite density (*P* value <0.0001) and clinical outcomes (*P* value = 0.018). There was marked CSP diversity in the Th2/Th3 region. Out of 63 sequences, 16 conformed to the reference strain and one (1/16) was similar with a West African haplotype and the majority (14/16) of the haplotypes were unique to this study region. There was an age-dependent distribution of CSP haplotypes with more haplotypes being harbored by <5 year-olds, (10/16) compared to adults (2/16). Interestingly, the CSP haplotype corresponding to 3D7 whose prototypical sequence is identical to the sequence of the leading malaria vaccine candidate RTS, S was not observed. Our data suggest that eba-175 FCR3 allele, sera5 ORII allele, and CSP haplotypes are targets of host immunity and under immune selection pressure in Apac District.

**DISCLOSURE** Nothing to disclose.

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## PS2.318

**Population genetics of *Plasmodium falciparum* surviving artemisinin based combination therapy in children taking part in an efficacy clinical trial in Kisumu County, Western Kenya**

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**INTRODUCTION** In 2006, artemether-lumefantrine (AL) became the first-line treatment of uncomplicated malaria in Kenya due to widespread Sulphadoxine-Pyrimethamine resistance. AL remains highly efficacious but there are heightened concerns because Artemisinin combination therapies (ACTs) resistance is now well documented in Southeast Asia (SEA). SNPs in K13-propeller gene have been identified as the determinants of ACTs resistance in SEA though they are not present in Kenyan parasites.

Genetically determined artemisinin resistance in *Plasmodium falciparum* has been described in SEA in association with slow parasite clearance rates (CRs). This study attempted to elucidate whether parasite genetics can provide basis for discovering genetic markers associated with ACTs resistance in Kenya. **MATERIALS AND METHODS** A randomized open labeled trial was conducted to evaluate whether genetic factors play a role in CRs in patients treated with ACTs from western Kenya. In addition, the genetic profiles of these parasites were compared to those collected before the introduction of AL (pre-ACTs).

118 subjects were enrolled in the study and randomized to receive either AL or Artesunate Mefloquine.

A panel of 12 microsatellites (MS) and 91 single nucleotide polymorphisms (SNPs) distributed across the *P. falciparum* genome were genotyped. Parasite CRs were calculated using the worldwide antimalarial resistance network online parasite clearance estimator tool.

**RESULTS** All subjects achieved parasite clearance within 42 h of treatment with a median clearance half-life of 2.55 h (1.19–5.05). The 12 MS showed high polymorphism with post-ACTs parasites being significantly more diverse compared to pre-ACTs ( $P < 0.0001$ ). Based on SNP analysis, 15 of 90 post-ACTs parasites successfully analyzed were single-clone infections. Analysis revealed three SNPs in chromosome 12 and 14 were significantly associated with delayed parasite CRs and might be useful in tracking artemisinin resistance in Kenya. Further, genetic analysis using Bayesian tree revealed parasites with similar parasite clearance as more closely related.

**CONCLUSION** For the first time, we have described parasites with genetically determined response to artemisinin treatment among African parasites which can provide basis for discovering genetic markers associated with ACTs resistance in Kenya.

**DISCLOSURE** Nothing to disclose.

## PS2.319

**A common metalloproteinase-9 (MMP-9) polymorphism (1562 C>T) protects against placental malaria**A. S. Thittayil<sup>1</sup>, P. B. Phanithi<sup>1</sup>, S. Meese<sup>2</sup>, P. P. Gai<sup>2</sup>, G. Bedu-Addo<sup>3</sup> and F. P. Mockenhaupt<sup>2</sup>

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**INTRODUCTION** Matrix metalloproteinases (MMPs) are zinc dependent endopeptidases, which are essential in extracellular

matrix disruption and tissue remodelling. MMPs also play an important role in initiating immune responses to diverse pathogens by the regulation of pro-inflammatory cytokines and chemokines. Phagocytosis of malaria pigment (haemozoin) induces increased MMP-9 activity in monocytes. In the present study, we examined whether a common functional MMP-9 promoter polymorphism (rs3918242, C-1562T) affects *Plasmodium falciparum* infection and its manifestation in 304 primiparous pregnant women from Ghana.

**METHODS** The MMP-9 C-1562T allele was genotyped by PCR-RFLP, and *P. falciparum* infection was diagnosed in placental blood samples by microscopy and PCR assays. Present or past infection was defined as the detection of parasitaemia or haemozoin by microscopy, or a positive PCR result. Low birth weight was defined as birth weight <2500 g, and preterm delivery as gestational age <37 weeks.

**RESULTS** 17.9% of the women carried the minor T allele. 68% of the women had present or past *P. falciparum* infection. Placental hemozoin was observed in 42.4%, and PCR assays on placental samples were positive in 64.9%. Women with the minor T allele had a significantly lower prevalence of present or past placental *P. falciparum* infection (OR, 0.52; 95% CI, 0.27–0.99), placental hemozoin (OR, 0.37; 95% CI, 0.18–0.75), placental parasitemia (OR, 0.47; 95% CI, 0.24–0.92) and peripheral blood parasitemia (OR, 0.29; 95% CI, 0.10–0.79).

**CONCLUSIONS** These data suggest that a common functional MMP-9 polymorphism is associated with a reduced risk of placental malaria, and thereby indicate that the MMP-9 pathway is involved in susceptibility to *P. falciparum*.

**DISCLOSURE** This study was financially supported by grant GRK1673 from the German Research Foundation.

## PS2.320

**TLR1 602 S allele – increased risk of malaria in Indian population**P. P. Gai<sup>1</sup>, S. Meese<sup>1</sup>, K. Thangaraj<sup>2</sup>, P. B. Gai<sup>3</sup>, V. P. Thirumalaisamy<sup>4</sup> and F. P. Mockenhaupt<sup>1</sup>

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**INTRODUCTION** Polymorphisms of Toll-like receptors (TLRs) modify innate immune responses and susceptibility to various infectious agents including malaria parasites. For the Indian subcontinent and *Plasmodium vivax*, the role of TLR polymorphisms is largely obscure. TLR 1 or TLR6 form heterodimer with TLR2 and recognize wide variety of ligands. We examined the role of polymorphisms in two central TLRs, namely, TLR1 I602S (rs5743618) and TLR6 S249P (rs5743810) in a case-control study among 473 individuals in India.

**METHODS** *P. falciparum* and *P. vivax* infections were diagnosed by microscopy, and TLR1 I602S and TLR6 S249P were genotyped by PCR-RFLP. Associations of genotypes with *P. falciparum* and *P. vivax* infection were identified by  $\chi^2$ -test, and odds ratios (ORs) and 95% confidence intervals (95% CIs) calculated.

**RESULTS** The TLR-1 602S variant (IS and SS) was present in 2.6% of controls, in 7.6% of vivax malaria patients, in 9.6% of falciparum malaria cases, and in 13.6% of patients with severe malaria. Individuals with the TLR-1 602S variant had a four-fold increased odds of malaria (odds ratio, 3.8; 95% CI, 1.2–



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19.9;  $P = 0.02$ ). TLR6 S249P was present in overall 1.3% only and not associated with malaria.

**CONCLUSION** The TLR1 602S allele is associated with an increased risk of malaria in India, the effect appearing to be more pronounced for severe falciparum as compared to vivax malaria.

**DISCLOSURE** This study was financially supported by grant GRK1673 from the German Research Foundation.

**PS2.321****Molecular characterization of *Plasmodium falciparum* 6-cys protein P38**

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**INTRODUCTION** Malaria remains a public health problem of enormous magnitude particularly in the developing world. The *Plasmodium falciparum* genome encodes nine members of the six cysteine protein which are expressed in different stages of the parasite life cycle. The 6-cys proteins play an important role in the sporozoite and gametocyte stages of the *Plasmodium* life cycle. The asexual blood stage of the parasite encodes distinct 6-cys proteins whose functions are not well characterized. Here we performed molecular characterization of *Plasmodium falciparum* 6-cys protein P38 in the asexual blood stage of the parasite.

**METHODS AND MATERIALS** We cloned and expressed P38 gene in pET28b expression vector and recombinant P38 was used to raise antisera in mice and rabbit. We performed immunopulldown experiments using P38 antibodies in schizont extract followed by LC-MS/MS analysis to find the interacting partners. We further performed glycerol density gradient centrifugation, ELISA based interaction studies and dot blot assay to confirm these interactions. Erythrocyte binding assay and invasion inhibition assay was performed.

**RESULTS** This study identified GLURP (Glutamate rich protein) and other 6-cys proteins as major interacting partner of P38 through immunopulldown studies. The association between these proteins is further evident from cofractionation on glycerol gradient, in ELISA based binding assays and in immunofluorescence studies. Recombinant P38 protein also shows erythrocyte receptor binding activity and antibodies against P38 show moderate invasion inhibition.

**CONCLUSION** These results suggest that P38 forms a complex with GLURP and other 6-cys proteins on the parasite surface and targeting this complex may have a potential role in future vaccine development.

**ACKNOWLEDGEMENT** This study was supported by DBT (Grant no- BT/01/CEIB/11/V/08). We thank rotary blood bank for providing O+ve blood.

**DISCLOSURE** Nothing to disclose.

**PS2.322****Proteomic informed by transcriptomic towards the selection of vaccine candidate against vector-borne diseases**

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Ticks along with mosquitos are recognized as the main arthropod vectors of disease agents to humans and animals being

spread all over the world. Tick-borne diseases remain a rising risk for human population in Europe where 50 000 cases of Lyme borreliosis, between other diseases, are reported each year.

Tick control measures based on acaricides have shown severe limitations making vaccines an alternative option, by-passing acaricide resistance ticks and being environmentally friendly. Current vaccines have shown restricted achievement due to deficient antigen selection which may be surpassed by 'omics' approach.

Taking as main target the selection and evaluation of new antigens aimed at vaccine trial, we performed RNA sequencing and compared the transcriptome and proteome of different tick species tacking in account parasite infection. After mass spectrometry, proteins were identified using the proteomic informed by transcriptomic method which combines deep sequencing transcriptomics and MS/MS allowing protein identification in the absence of a reference proteome. Proteomic results validated transcriptomic analysis and, the combination of these two approaches, provided strong support for the identification of relevant pathways in ticks. Based on these achievements we were able to select several genes for functional analysis which provided more information regarding the identification of antigens. Vaccination trials with recombinant antigens were conducted in cattle. The results showed both reduced tick infestation and parasite infection, strongly suggesting the involvement of selected proteins in vector-pathogen interactions, recommending its inclusion in a vaccine targeting both arthropods from diverse locations and multiple pathogens.

By developing new vaccine-based control measures it will be possible, having the 'OneHealth' concept in mind, to decrease not only the incidence of tick animal diseases, but also reduce tick diseases in humans.

**DISCLOSURE** Nothing to disclose.

**PS2.323****High pressure liquid chromatography analysis of potential antiparasitic agent thymol from essential oil of *Thymus vulgaris* and *Nigella sativa***

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**INTRODUCTION** Parasitic diseases are among the most common health problems in the world and neglected for many reasons. Drugs used for the treatment of parasitic diseases are limited and they have significant side effects and resistance problem. Since currently no effective vaccine for parasites exists, chemotherapy is still quite important for treatment. Therefore there is a need for new antiparasitic agents for the treatment and effective control of parasites. Thymol, isolated from *Thymus vulgaris* and other plants such as *Nigella sativa*, has antimicrobial, anti-inflammatory, fungicidal and antiparasitic activities. The aim of the present study was to analyse potential antiparasitic agent thymol from essential oil of *T. vulgaris* and *N. sativa* by High-Pressure Liquid Chromatography (HPLC).

**METHODS AND MATERIALS** Essential oils of *T. vulgaris* and *N. sativa* were purchased from ŞİFA®Kimya, Turkey and ALVIN, Turkey and standard thymol from Sigma-Aldrich, USA, respectively. The HPLC system (The Agilent Technologies 1260 Infinity) consists of ACE C (18) column and an isocratic acetonitrile:water (50:50) as the mobile phase which was kept at a flow rate of 1 ml/min. UV spectra were collected across the

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range of 200–900 nm, extracting 274 nm for chromatograms. The method was analyzed for selectivity, linearity, and recovery. RESULTS The method was analyzed for selectivity, linearity ( $r^2 > 0.0997$ ), recovery (74%, 78%), retention time (15.232, 14.667) minutes and concentration ( $3.71 \pm 0.02$  mg/ml,  $0.95 \pm 0.01$  mg/ml) for thymol from essential oil of *T. vulgaris* and *N. sativa*, respectively.

CONCLUSIONS Thymol was detected in a total rate of 12.5% and 5%, respectively, from essential oil of *T. vulgaris* and *N. sativa*. Literature rates of thymol values (42.5%, 2.4%) were not compatible with commercial essential oil of *T. vulgaris* and *N. sativa*. Therefore, antiparasitic effect may vary depending on the dosage. For this reason we suggest that researchers should use pure thymol instead of commercially available essential oils of *T. vulgaris* and *N. sativa*.

DISCLOSURE Nothing to disclose.

## PS2.324

## New strategies for research and development

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INTRODUCTION Research and development (R&D) also known as research and technical development (RTD), is a general term for activities related to the enterprise of corporate or governmental innovation. R&D is essential for the long-term growth of technology enterprises, but it can be expensive and is often associated with risk. This risk can be reduced by directing R & D spend towards the best opportunities and putting in place an R&D strategy.

METHODOLOGY R&D New alliances and approaches to research and development in the pharmaceutical and biotech sectors are accelerating the production of life-saving medicines. Its new strategy is to collaborate with small, innovative firms at the cutting edge of scientific thought and laboratory research to reduce the multi-billion-dollar price tag of taking a medicine from bench to bedside. This is an exciting opportunity to collaborate with the NHS and others, working in partnership on projects that will help patients to live longer, happier and healthier lives. To set the scene, it is useful to consider some of the drivers (Higher product integrity, Affordable customization, Sustainability through the full product lifecycle, Faster return on investment, Fewer market failures), enablers (Open innovation supporting IP exchange, Better connected consumers, supply chain partners, regulators etc.), More computing power enabling new development methodologies, Digital prototyping and 3D printing, Innovative business models, Open source movement and More agile product development processes) and challenges (increasing global competition, faster pace of innovation, Learning to collaborate effectively, growing volume of inputs and ideas to digest) that are shaping the future of R & D.

RESULTS In recent years, there has been a lot of new thinking on how to get a better return on investment from R&D and some interesting approaches are currently being pioneered which are likely to become mainstream within 10 years.

CONCLUSION In short, by the 2020s, the likelihood is that R&D will become more challenging yet more exciting than ever. New levels of computing power will enable more intelligent design automation. For example, evolutionary and generative design techniques can deliver optimal solutions to many tough problems. Attitudes to intellectual property will become more

polarised and this will be reflected in the approach of leading organisations.

DISCLOSURE The authors declare no conflict of interest.

## PS2.325

## Integrated health solutions for the most vulnerable: the 'Merck Serono Global Health' approach

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Launched in 2014 to address key unmet medical needs for children from developing countries suffering from tropical diseases, Merck Serono's Global Health unit is an R&D platform focusing primarily on malaria and schistosomiasis (also known as Bilharzia). Under its 'One Merck for Children' concept. The goals are to develop innovative, affordable, implementable and integrated health solutions including new pediatric medicines, tailored diagnostics and associated delivery and eHealth technologies through leveraging Merck's cross competencies (Merck Millipore) and in partnership with leading Global Health institutions and organizations in both developed and developing countries.

To address the need of new antimalarial to continue fighting against emergence of resistance, Merck Serono Global Health aims at building a small sustainable portfolio of molecules on selected key existing gaps in the current fight against malaria: long lasting, liver and gametocyte acting compounds. Also, in collaboration with Merck Millipore, a new malaria diagnostic assay is being developed to measure levels of parasitemia as well as identification of the infectious type in very small amount of blood to address pediatric sample limitations. This assay will be compatible with an existing point of care compact flow cytometry platform (MUSE) that has already demonstrated its capacity to measure with very high sensitivity and specificity counts and % of CD4T cells during its clinical trials in African countries. The development of the additional malaria assay will later lead on to the development of a co-diagnostic HIV/Malaria device.

For schistosomiasis, there is a pressing need to treat preschool children (under 6 years old) and the current Pediatric Praziquantel Consortium is actively developing a suitable formulation of the L-enantiomer of PZQ. Beyond closing treatment gaps by developing a new pediatric PZQ formulation, the PZQ usage to tackle other helminthic diseases is also considered by building a small drug discovery portfolio to complement PZQ as a single drug. It also aims at identifying options to co-develop diagnostic tools, addressing the impact on co-infections, on female/male genital schistosomiasis (as a risk factor for HIV) and contributing to strengthen the Merck Praziquantel Donation Program (MPDP) by enhancing the R&D competence at Merck in the area of human schistosomiasis.

DISCLOSURE Nothing to disclose.

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## PS2.326

**Promoting sustainable research partnerships: a case study of a UK-Africa capacity strengthening award scheme**L. Dean<sup>1</sup>, H. Smith<sup>2</sup>, J. Njelesani<sup>3</sup> and I. Bates<sup>4</sup><sup>1</sup>Department of International Public Health, Liverpool School of Tropical Medicine, Liverpool, UK; <sup>2</sup>Centre for Global Women's Health, University of Manchester, Manchester, UK; <sup>3</sup>University of Toronto, Toronto, ON, Canada; <sup>4</sup>Capacity Research Unit, Department of International Public Health, Liverpool School of Tropical Medicine, Liverpool, UK

**INTRODUCTION** Health research capacity strengthening is critical to ensure that lower or middle income countries (LMICs) can conduct high-quality context relevant health research. Research partnerships between institutions in higher income countries (HICs) and LMICs are a leading model in the implementation of research capacity strengthening activities. Numerous guiding principles for effective research partnerships exist but few include the perspective of the LMIC partner. Through the evaluation of a research capacity strengthening Partnership Award scheme, we sought to draw out lessons for establishing and maintaining successful research collaborations from the perspectives of all stakeholders.

**METHODS** Using a retrospective evaluation approach, we first administered a cross-sectional survey to Award holders focusing on partnership outputs and continuation. Secondly, we purposively selected 50 individuals to participate in semi-structured interviews or focus group discussions, from 12 institutions linked to the Award. Both qualitative and quantitative data collection explored critical elements of research partnerships such as research outputs, partnership formation, future plans and research capacity. Quantitative data was analysed descriptively and qualitative data was analysed using an iterative framework approach.

**RESULTS** Both UK Award holders (77.8%,  $n = 7$ ) and African Award holders (78.6%,  $n = 11$ ) stated they would like to pursue future collaborations together. Aspects within partnerships that influenced potential sustainability were: perceived benefits of the partnership at the individual and institutional level; ability to influence 'research culture' and instigate critical thinking among mid-career researchers; previous working relationships; equity within partnerships linked to partnership formation and UK partner experience within LMICs. Some factors hindering long term partnerships development were identified as financial control or differing expectations of partners.

**CONCLUSIONS** We have provided evidence of what encourages international health research partnerships for capacity strengthening to continue past award tenure. Specifically, we provide practical examples of key principles that can contribute to successful health research partnerships including – establishment of mentorship schemes, identification of benefits to HIC partners, strengthening of financial systems and promotion of collaborative research outputs.

**DISCLOSURE** Nothing to disclose.

## PS2.327

**Phenotypic screening and multivariate data analysis to identify anti-malarial compounds**S. S. Canan<sup>1</sup>, D. S. Mortensen<sup>2</sup>, M. Delgado<sup>2</sup>, P. Willis<sup>3</sup>, M. Wyvratt<sup>3</sup>, J. Garfinkle<sup>3</sup>, N. Hawryluk<sup>1</sup>, S. Shahi<sup>4</sup>, V. Khetani<sup>5</sup> and J. B. Zeldis<sup>6</sup><sup>1</sup>Discovery and Development, Celgene Global Health, San Diego, CA, USA; <sup>2</sup>Department of Chemistry, Celgene Corporation, San Diego, CA, USA; <sup>3</sup>Medicines for Malaria Venture, Geneva, Switzerland; <sup>4</sup>Syngene International, Bangalore, India; <sup>5</sup>Drug Development, Summit, NJ, USA; <sup>6</sup>Celgene Global Health, Summit, NJ, USA

Celgene Global Health is actively applying modern drug discovery efforts against neglected diseases such as malaria, Chagas, Human African Trypanosomiasis, filariasis, and leishmaniasis. The world-wide disease burden for malaria is enormous, with more than half the world at risk and the ever present threat of resistance to existing therapies. Malaria kills >600 000 people every year, the majority of whom are children under the age of five. In collaboration with MMV, we have discovered a novel class of anti-malarial compounds from an erythrocyte whole cell phenotypic screen against *Plasmodium falciparum*. The direct measure of cell activity from this blood-stage phenotypic screen has allowed us to simultaneously optimize potency and physico-chemical properties. Our malaria drug discovery efforts are currently focused on identifying a proof-of-concept compound from this novel chemical series, profiling the chemical series against various strains of malaria, and assessing the toxicity profile of the lead compounds. This presentation will discuss the challenges and advantages of phenotypic drug discovery, describe our medicinal chemistry approach, and our progress toward identifying anti-malarial compounds.

**DISCLOSURE** Nothing to disclose.

## PS2.328

**Patent landscape analysis of product development partnerships for neglected diseases**

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Since the end of the nineties, there has been a significant expansion of public-private partnerships that address the health problems of low- and middle-income countries<sup>1,2</sup>. *Product development partnerships* (PDPs) have been established to focus on the research and development of new technologies to address priority health needs in poor countries. Bridging the gap between product development and end users, PDPs have been formed in response to insufficient development and supply of new health products for those diseases prevalent in developing countries, due to a lack of financial incentives and abundance of commercial risks for companies<sup>3</sup>. The PDPs manage a portfolio of projects, and through this mechanism have been able to form strong partnerships with private companies that are governed by formal agreements dealing with issues, including intellectual property, regulatory pathways, markets, manufacture, and price<sup>4</sup>. These agreements facilitate to establish rules of collaboration that can meet the differing and complementary goals of the partners.

In this context, intellectual property (IP) management is of great concern as there are public and private perspectives as well as investments involved. The PDPs are risk averse, as funding depends on the development of new and accessible health technologies. The private sector also bears the commercial risk of investing capital and other resources in this process and this means that the private sector is holding and exercising IP rights

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over new technologies, thus creating constraints on public access to new technologies. This study aimed to review the patent portfolios of PDPs, considering that this information is crucial for understanding how PDPs are protecting (or not) the results of their R&D activities.

**METHODS AND MATERIALS** The research compiled worldwide patent information from 23 PDPs that work in the field of neglected diseases, using different patent databases (public and private). Hybrid searches included keywords, patent classification codes and PDPs names.

**RESULTS** The study presents the analysis of the patent pipeline for 23 PDPs, detecting patterns of patent activity, innovation and collaboration in the areas of vaccine research and pharmaceuticals. It also focuses on geographical markets, main fields of technology covered (vaccines, pharmaceuticals or diagnostics), amount of patenting, patent families, top assignees, top inventors, patent expiration date, and claims analyses.

**DISCLOSURE** Nothing to disclose.

**PS2.329****Antimalarial market complexity and diversity across eight sub-Saharan African countries one decade after the introduction of artemisinin combination therapy**

M. Littrell and T. A. Group

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Despite recent gains, malaria persists as a major cause of severe disease and death in sub-Saharan Africa (SSA). Malaria control programs tasked with ensuring effective treatment responded to non-artemisinin therapy (nAT) resistance by adopting artemisinin combination therapies (ACT) as first-line treatments between 2002 and 2005. Full course treatment with quality-assured (QA) ACT is critical to ensure parasite clearance and to protect artemisinin efficacy. We examine contemporary challenges to ensuring malaria treatment with QA ACT using national antimalarial market survey trend data collected by the ACTwatch project.

Repeat cross-sectional malaria medicine outlet surveys were conducted between 2009 and 2014 in Benin, the DRC, Kenya, Madagascar, Nigeria, Tanzania, Uganda and Zambia. A census of public and private outlets with potential to distribute antimalarials was conducted among a representative sample of administrative units. A drug audit documented product information, retail price and amount distributed to consumers in the past week for all antimalarials in stock.

While the relative antimalarial market share for the public versus private sector varies across countries, relative public/private market share remained stable over time within countries. QA ACT availability increased significantly in recent years with the exception of persistent low availability in the DRC. Increases in QA ACT market share relative to nAT varied widely across countries. Availability and distribution of non-QA ACT has emerged in recent years to varying degrees across countries. In all contexts, the vast majority of antimalarial-stocking private sector outlets including pharmacies, drug shops, and retailers continue to stock and distribute the nAT sulfadoxine-pyrimethamine (SP) available from numerous manufacturers. Private sector QA ACT price remains higher than SP, although price differentials vary across countries despite exposure to similar large-scale ACT subsidy schemes.

One decade after shifts in national malaria treatment guidelines to ACT across SSA, challenges to QA ACT uptake persist. These include recent emergence of numerous non-QA ACTs; availability and widespread use of SP for case management; and

the relatively high cost of QA ACT treatment despite implementation of large-scale subsidies. The presence and extent of each of these challenges varies across national contexts highlighting the importance of national assessments and tailored strategies.

**DISCLOSURE** Nothing to disclose.

**PS2.330****Characterization and isolation of severe fever with thrombocytopenia syndrome viruses (SFTSV) from patients in Korea, 2014**

S.-W. Park, E.-B. Wang, W.-Y. Choi, M.-G. Han and W.-J. Lee

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**INTRODUCTION** Severe fever with thrombocytopenia syndrome (SFTS) is a new emerging infectious disease in China. It is caused by SFTS virus (SFTSV), in the genus of Phlebovirus (family Bunyaviridae). The major clinical symptoms and laboratory parameters of SFTS are fever, thrombocytopenia, leukopenia, and elevated serum hepatic enzymes, and SFTS patients usually die due to multiple organ failure. SFTSV was presumably transmitted by ticks, because it has been detected in *Haemaphysalis longicornis* ticks.

**METHODS AND MATERIALS** Total RNA extracted from serum was amplified with one-step reverse-transcriptase polymerase chain reaction (RT-PCR), designed to detect a portion of the viral N and Gc protein gene using specific primers for S or M segment. After analyzing aligned nucleotide sequences, we constructed the phylogenetic tree based on partial S or M segment sequences. We tried to isolate viruses from patient by infection VeroE6 cells with the sera.

**RESULTS** We conducted RT-PCR with total RNA which is extracted from the patient sera. Among the 513 samples, fifty samples are resulted in positive. The nucleotide sequences were assembled by the SeqMan program implemented in DNASTAR software (version 5.06; Madison, WI, USA) to determine the consensus sequences. Nucleotide sequence of the Korean strains showed 93 to 98% homology to Chinese and Japanese strains. We also isolated 25 SFTSVs among the virus-detected 50 samples.

**CONCLUSION** We examined the clinical specimen from the suspected case of SFTS in Korea. We detected 50 SFTSVs of 513 patient sera by RT-PCR, and isolated 25 viruses among them. Nucleotide sequences of positive samples were not only included in SFTSV by the phylogenetic analysis but also formed the Korean strain group.

**DISCLOSURE** Nothing to disclose.

**PS2.331****Micro-spatial analysis of Chikungunya incidences in association with rubber plantations during an outbreak in Eastern Thailand**

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**INTRODUCTION** Chikungunya is one of the important vector-borne diseases in Thailand and other countries in both tropical and temperate zones. In recent years, there has been an increase in rubber plantation areas in Thailand. *Aedes albopictus*, one of



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the mosquito vectors, were found abundantly in rubber plantations and caused an increase in Chikungunya risk. However, no study has been conducted on the spatial relationship between Chikungunya incidences and rubber plantations at the village scale over time.

**MATERIALS AND METHODS** Wang Chan District, Rayong Province, in eastern Thailand was selected as the study site. The record of Chikungunya patients admitted to Wang Chan Hospital during the 2009 outbreak was used for this study. Thaichote Satellite images were used for characterizing rubber plantations in this District. Spatial maps of Chikungunya incidences located in each village of Wang Chan District were overlaid with the areas of rubber plantations.

**RESULTS AND CONCLUSIONS** Spatial maps created by using the Geographic Information System (GIS) showed that Chikungunya cases in six villages were high and clustered in the central area of Wang Chan District where rubber plantations were concentrated. In contrast, Chikungunya cases in other six villages were low and scattered in the District with low number of rubber plantations. The average of Chikungunya cases in high and low village groups were  $34.17 \pm 8.01$  (range = 22–46) and  $1.83 \pm 2.04$  cases (range = 0–4) respectively. Results obtained could be used for planning effective Chikungunya prevention and control programs in rubber plantation areas.

**DISCLOSURE** Nothing to disclose.

**PS2.332**

**INDEPTH training and research centres of excellence (INTREC): building research capacity in social determinants of health in low- and middle-income countries**

**R. Preet** and INTREC Consortium: Umeå University, Sweden; Universitätsklinikum Heidelberg, Germany; INDEPTH Network, Ghana; Gadjah Mada University, Indonesia; Universiteit Van Amsterdam, Netherlands; Harvard Centre for Population and Development Studies, USA  
*Epidemiology and Global Health, Umeå University, Umeå, Sweden*

The major causes of poor health are rooted in society. Achieving health equity requires a global action in support of building the limited evidence on health and its determinants from low- and middle-income countries (LMICs). This intentionally demands building capacity for mobilizing research in these countries. The INDEPTH Training and Research Centres of Excellence (INTREC), an EU FP7 project was established with the aim of undertaking capacity-building activities to facilitate research on the social determinants of health (SDH) in LMICs. Therefore, a six members' consortium initiated this coordination action project in Jan 2012, which is due to conclude in June 2015.

INTREC activities covered recruiting a social scientist from each participating country of INDEPTH network, three from Africa (Tanzania, Ghana, South Africa) and four from Asia (Bangladesh, India, Vietnam, and Indonesia) who were trained to produce a standardized-format country needs assessment. These reports provided the basis for the subsequent development of the INTREC training curriculum, including five individual training blocks developed to cover qualitative and quantitative research methods. These were delivered sequentially in five educational blocks over a 12 month period during 2014. The first block was an online course of video lectures and assignments. The second block was a two-week methods workshop, held in both Indonesia (16 students) and Ghana (15 students). A one-week data analysis workshop held at Harvard University comprised the third block, translating research findings to policy and practice comprised Block 4 and the final block had the students share their papers on the course website.

The main result of the INTREC action is the development of a conceptual framework detailing how to build a sustainable capacity for research on SDH in LMICs; currently being developed using documentation produced. Furthermore, a total of 31 young researchers are now trained in SDH, and they themselves constitute a network that is promising to develop into the future.

The findings indicate a pressing need for mentors who are available to support young researchers in these countries. Also, such a research capacity development has the potential for identifying critical areas requiring policy attention; contributing to health equity in the future.

**ACKNOWLEDGMENTS** The research has received funding from European Union's FP7 under the grant agreement INTREC 282605.

**DISCLOSURE** Nothing to disclose.

**PS2.333**

**The Kombewa Health and Demographic Surveillance Systems (Kombewa HDSS): platform for research, disease surveillance and public health activities**

**P. M. Sifuna**

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**INTRODUCTION** A Health and Demographic Surveillance System (HDSS) follows geographically defined population over time. The Kombewa Health and Demographic Surveillance System (HDSS) grew out of the Kombewa Clinical Research Centre in 2007 and has since established itself as a platform for the conduct of regulated clinical trials, nested studies and local disease surveillance.

**METHODS** The core of the HDSS consists of bi-annual household visits to register new or out-going residents and record any vital demographic changes (births, deaths or pregnancies) that have occurred in the interim. A standard verbal autopsy technique is applied by the program to determine probable cause of deaths. A short questionnaire on illnesses and health-seeking behavior in the 2 weeks before the study enumeration visit is included in the HDSS surveys to obtain data on prevalence of syndromes at household level. The program is currently developing capability to link hospital data with the HDSS so that clustering of various diseases presenting to hospital (inpatient or outpatient) can be better identified.

**RESULTS** The Kombewa HDSS has successfully supported recruitment and retention activities for several research studies nested within it including the concluded phase three randomized, controlled trial of RTS,S/AS01 malaria vaccine. Published results have shown that the vaccine reduces episodes of both clinical and severe malaria in children 5 to 17 months of age by approximately 50%. Using the household morbidity data, we have estimated the prevalence of malaria in the study area at 184/1000 residents/year and prevalence of convulsions among children under the age of 5 years at 15/1,000 children under the age of five/year.

**DISCUSSION AND CONCLUSION** The HDSS program provides an ideal platform for surveillance (establishing baseline disease burdens, detecting outbreaks and emergence of new diseases, and monitoring impact of interventions). The Longitudinal nature and defined population provides a platform for otherwise challenging studies and public health activities such as Pharmacovigilance/post-marketing surveillance. The Kombewa HDSS favors sharing of data under approved collaborations for ethically approved activities.

**DISCLOSURE** Nothing to disclose.

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**PS2.334****Analysis of verbal autopsy reports of malaria deaths in 2014 in Bangladesh**

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**INTRODUCTION** Bangladesh endures a burden of malaria in 13 of 64 districts with 13.25 million people at risk. About 80% of malaria cases are reported from three Chittagong Hill Tract (CHT) districts, a geographical area with difficult communication, poor infrastructure and a remote hilly and forested border with India and Myanmar with intense perennial transmission of malaria. NGOs and community service providers diagnose and treat malaria patients at doorsteps, and thus reduce severity of malaria and mortality.

**OBJECTIVE** To identify the factors behind the cause of death and find out the gaps and lapses in the program to take remedial measures to reduce the number of deaths.

**METHODS** Verbal autopsies were done of all reported deaths due to malaria using a structured questionnaire within a month of every death in 2014. Field staff interviewed the family members of a deceased patient who knew the events leading to death.

**RESULT** Total 45 deaths were reported in 2014, where 44% deaths occurred in July and 20% in August. All deaths reported were coming from the Chittagong region. 40% deaths were coming from the age group of 5–15 years, whereas 31% from the age group of >15–45 years. Male and female ratio for death was almost same. First point of contact after the appearance of a sign/symptom of malaria was a noncertified health care provider such as a village doctor, traditional healer or drug seller for 49%, and an NGO health care providers who provides malaria services for 15% in malaria endemic areas. 59% were first diagnosed as malaria by government health facilities and 25% by NGO service providers.

One of the factors behind malaria deaths was waning vigilance among the community and the health care providers due to reduction of malaria, and another one was the availability and acceptability of non-certified health care providers at community level. These factors caused delay in diagnosis, leading to complications and ultimately death.

**CONCLUSION** Integrated and intensive efforts need to be made in the malaria programme to ensure Early Diagnosis and Prompt Treatment (EDPT), and to create awareness and acceptability of the NGOs' female health workers in the community. Village doctors are also required be brought into the integrated framework of malaria programme.

**KEYWORDS** EDPT, Community service providers, Malaria.

**DISCLOSURE** The abstract is written using the findings of programme activities (verbal autopsy). BRAC malaria control programme has given permission to publish the findings of verbal autopsy.

**PS2.335****Public-private partnerships to strengthen human resources for health through training and eLearning: a case study from Tanzania**S. K. Pemba<sup>1</sup>, M. Tanner<sup>2</sup>, K. Barnes<sup>3</sup> and B. Vander Plaetse<sup>3</sup><sup>1</sup>*International Health, Tanzanian Training Centre for International Health, Morogoro, Tanzania;* <sup>2</sup>*Swiss Tropical & Public Health Institute, Basel, Switzerland;* <sup>3</sup>*Novartis AG, Basel, Switzerland, Basel, Switzerland*

**INTRODUCTION** Tanzania's health system is confronted with a significant human resources gap. Currently, the number of health workers in the public sector is 35 202 against a gap of 90 722 [1]. In response, the government recommends educating large numbers of additional middle level health care workers. The Tanzanian Training Centre for International Health (TTCIH), formerly a Clinical Officers Training Centre, was upgraded in 2005 under a public-private partnership between the Ministry of Health and Social Welfare, Novartis Foundation and the Swiss Tropical and Public Health Institute to address this human resources challenge.

**METHODS** Through a duly signed tripartite agreement, the partners agreed to transform TTCIH's into a sustainable, innovative and financially self-reliant institution by renovating its infrastructure and providing an initial start-up investment to set up an income-generating business unit. In addition, TTCIH's capacity was bolstered through technical support in management, staff training, marketing, and course development including e-learning.

**RESULTS** Through public and private funding, TTCIH has transformed into a social enterprise supporting the national health policy to develop Human Resources for Health (HRH). TTCIH has trained over 300 Assistant Medical Officers and attracted on average 400 local and international students yearly. TTCIH is now a pioneer in e-learning in Tanzania. TTCIH has managed to self-finance over 75% of its running costs.

**CONCLUSIONS** Using public-private partnerships to drive social enterprise development, it is possible to sustainably increase available financial resources in low resource settings. By adding innovative training approaches such as e-learning, TTCIH has solidified its revenue base thus paving way to becoming a financially self-reliant and lead institution in Human Resources for Health development in Tanzania and beyond.

**DISCLOSURE** The Novartis Foundation provides funding and in-kind support to the Tanzanian Training Centre for International Health (TTCIH).

**PS2.336****Feasibility of using mobile phones for nutrition counseling through existing health workers in rural Bangladesh**

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**INTRODUCTION** High penetration of mobile phones in Bangladesh and strong policy and political commitment of Bangladesh Government has created a possibility for using Information Communication Technology (ICT) such as mobile phones integrating nutrition counseling into existing health systems. Use of ICTs can compliment gaps of poor infrastructure and personnel shortages. However, it is important to explore the capacity for using ICTs and feasibility and acceptability of delivering nutrition messages through ICTs to design an effective intervention for the health systems.

**METHODS AND MATERIALS** A qualitative study was conducted in rural areas of Mirzapur and Chakaria, Bangladesh

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from February–April 2014. We conducted 24 in-depth interviews with mothers of small children, eight focus group discussions (FGDs) with fathers (4) and grandmothers (4), and 13 key informant interviews with government community health workers (CHWs). We also observed four facilities and shadowed two health workers. The data were manually analyzed using pre existing themes. Data triangulation and peer debriefing was done to validate findings. All participants gave written consent and ethical clearance for the study was obtained from ICDDR,B Ethical Review Committee.

**RESULTS** All mothers and community health workers owned or had access to mobile phones. Voice calls were used and lack of capacity for retrieving SMS and illiteracy were barriers of using SMS. CHWs did not feel that nutrition counseling was part of their job as the topics were not included in basic training and job description. Their routine work left very little time for them to counsel mothers. Mothers did not feel that they can seek advice about infant feeding or general nutrition from the CHW and relied on their families for information and support. CHWs felt that nutrition counseling through mobile phone can help them to incorporate nutrition in their existing work by reducing travel time and creating opportunities for timely referral. Mothers' recommendations included: voice messages using a female voice during early morning or evening, messages sent from a specific number which can be stored in their phones and inclusion of family decision makers in the intervention.

**CONCLUSIONS** The mHealth intervention for nutrition counseling through existing CHWs is feasible but CHW workload has to be considered. The intervention should be designed with consideration for family dynamics and culture.

**DISCLOSURE** Nothing to disclose.

**PS2.337****Constructing a conceptual framework to address accountability and equity considerations within eHealth initiatives in Bangladesh**

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**INTRODUCTION** There has been a rapid proliferation of mobile phone ownership in Bangladesh in recent years. The Government of Bangladesh also has a political mandate to improve health care with application of information, communication, technology (ICT) through integration of technology within the health systems, creating awareness about eHealth services, improving the service quality and capacity building. A scoping study conducted recently showed rapid growth of mobile technology based eHealth interventions in Bangladesh. However, there were gaps in terms of evaluating the interventions, effective information sharing among the actors, technical expertise, and capacity building in this field. With the lack of capacity among developers, health implementers and policy makers it is important that an equity and accountability framework is created for the use of those using ICTs for health so that these considerations can be incorporated within all e and mHealth initiatives.

**METHODS AND MATERIALS** We used literature review and stakeholder consultations to create the framework. For literature review we searched PubMed and Google Scholar and organizational websites with specific key words and found 33 documents from health (22) and non-health sector (11). We

collated the main governance and accountability principles from the reviewed literature and created a matrix. We identified 11 concepts after collapsing and re-synthesizing similar themes. We consulted six groups of stakeholders (policy maker, NGO and private implementers, academia, researchers, telecom companies and consumer group) to understand their perspectives of equity and accountability. The insights from the stakeholder consultation were mapped against the themes.

**RESULTS** The themes identified from the review were: strategic vision, participation, transparency, responsiveness, equity, ethics, intelligence and information, rule of law, performance, accountability, sustainability. Each of the themes had several sub-themes. Stakeholders mentioned all the themes but financial performance.

**CONCLUSIONS** The need for incorporating equity and accountability within existing e and mHealth projects were felt among the various stakeholders. A unified framework may help build capacity for incorporating these considerations in future interventions.

**DISCLOSURE** Nothing to disclose.

**PS2.338****The effectiveness of interactive checklists within an individual case-based eRegistry for maternal and child health: a cluster randomized trial protocol**

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**OBJECTIVES** A lack of better informed policy for Reproductive, Maternal, Newborn and Child Health (RMNCH) is an area of concern in addressing MDGs 4 and 5. One of the key challenges, subsequently, is to secure the implementation of consistent health care provision with proven international practice guidelines for maternal and child health. Checklists with decision support derived from evidence-based interventions in RMNCH consist of vital elements of existing guidelines in a user-friendly format of actionable items. Checklist-based programs in primary healthcare are considered potential tools in translating evidence into high quality clinical practices, but suffer from a lack of evidence base to inform their use.

**METHODS** This ERC funded study is a two-armed cluster randomized trial conducted in primary healthcare centers in the West Bank of Palestine. It aims at a comparative assessment of structured electronic checklists of care in RMNCH against paper-based case notes. The intervention tool is the *eRegistries for maternal and child health* implemented within the DHIS2 Tracker software, developed in collaboration with the University of Oslo. eRegistries consists of an adaptable electronic platform of a series of indicators and core data based on the WHO's Essential Interventions, Commodities and Guidelines for RMNCH. Checklists for antenatal, postnatal care and care at birth within the eRegistry will be customized for Palestine, thereby serving the dual purpose of patient management and data capture.

**RESULTS** The framework of research is embedded within the US Institute of Medicine's domains of quality of care, namely; safety, effectiveness, patient-centeredness, timeliness, efficiency and equity. The expected outcomes include appropriate uptake and coverage indicators of RMNCH assessed against this framework.

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**CONCLUSION** Customized validated electronic checklists with decision support for care in RMNCH, although widely recommended, are in need of strong research-based evidence to inform policy and implementation, and to realize the undeniable need to accelerate progress in MDGs 4 and 5.

**DISCLOSURE** Nothing to disclose.

**PS2.339****Pneumonia assessment using mHealth IMCI tools for community health workers**

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**INTRODUCTION** Community health workers (CHWs) directly benefit from mHealth tools when assessing children with a cough. Electronic versions of Integrated Management of Childhood Illnesses (IMCI) guidelines can support CHWs in identifying patients at risk and improve adherence to protocols [1]. Mobile phone apps can provide a more objective measurement of vital signs such as for respiratory rate [2]. In this study we aimed to investigate the need and acceptance for a mHealth IMCI job aid for CHWs in the Western Cape of South Africa.

**METHODS AND MATERIALS** An interactive IMCI mHealth app [3] with an integrated interface to vitals sign measurement apps was presented to 10 CHW working at two rural townships in Paarl and Worcester. In a simulated scenario, the CHWs assessed a patient with suspected pneumonia using the app. Structured interviews and a Computer System Usability Questionnaire (CSUQ) [4] were used to conduct a workspace analysis and to assess user satisfaction.

**RESULTS** The weekly workload of the CHWs in the investigated setting was divided into 1/3 travel, 1/3 care, and 1/3 administration. The travel method consisted exclusively of walking. Care consisted mainly of adult chronic disease management and IMCI was not frequently performed. Administrative tasks were paper based. None of the CHWs had used a personal computer, but all were mobile phone users, of which 50% had access to smartphones. The mHealth app was perceived useful in guiding through the IMCI assessment. CSUQ analysis scored 2.96 out of three, revealing a high degree of satisfaction with the app.

**CONCLUSIONS** The use of mHealth tools is supported by CHWs and can be useful for logging repetitive job tasks to reduce administrative workload, as well as in providing guidance for less frequently performed assessment protocols such as ICMI.

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**DISCLOSURE**

This work has been supported by Grand Challenges Canada.

**PS2.340****A software application for malaria surveillance data integration**

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**INTRODUCTION** Data that could be used for global disease surveillance are divided across diseases, countries, and organizations. The integration of this data requires substantial effort and malaria surveillance is an example of how data fragmentation can hinder evidence-based decision-making. In order to achieve allocative efficiency in malaria control programming, access to timely and accurate malaria surveillance data across a variety sources is necessary. The Scalable Data Integration for Disease Surveillance (SDIDS) is a software application designed to enable the integration and analysis of data across multiple scales to support global health decision-making.

**METHODS AND MATERIALS** We present a prototype of SDIDS and show how it can be used to integrate malaria surveillance data collected by multiple organizations in Uganda. SDIDS is a web-based, ontology-driven software platform that automates the integration of heterogeneous data from multiple sources, and supports visualization, analysis, and sharing of these data.

**RESULTS** SDIDS presents a uniform data representation framework to integrate data from over eleven administrative and clinical sources describing factors such as clinical care, interventions, and demography. The system automatically computes numerous health indicators from malaria-related data and provides multiple stratification options. External applications can connect directly to SDIDS to request data for further processing or to request the results of analyses applied to the integrated data. Three such applications have been developed to demonstrate the functionality of this interface in SDIDS.

**CONCLUSIONS** A central characteristic of SDIDS is its ability to scale-up and integrate data from other geographical regions and for other priority diseases. This scalability means that a wide range of data sources can be mapped once to SDIDS and then accessed and analyzed repeatedly by a wide range of global health users and applications.

**DISCLOSURE** Nothing to disclose.

**PS2.341****Multiple ethical review in North-South collaborative research in an emergency context: the experience of the Ebola\_Tx trial**

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**INTRODUCTION** Compliance with appropriate ethical standards is a moral imperative in emergency research. It is operationally



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translated into the process of multiple ethical review, where a protocol is submitted to the Ethics Committees (ECs) in the countries of the study and of key-research partners. Flexible approaches are needed to ensure that ECs reviews are simultaneous and their outcomes are discussed with each other (WHO Background Document on Potential Ebola Therapies and Vaccines 2014).

**METHODS** We analyzed the experience of the Ebola\_tx trial, to assess strengths and weaknesses of multiple ethical review in emergency and to draw recommendations for future outbreaks. The trial (ClinTrials.gov NCT02342171), sponsored by the Institute of Tropical Medicine and carried out at the Médecins Sans Frontières (MSF) Ebola Treatment Center in Donka, Guinea, evaluates convalescent plasma added to standardized supportive care.

**RESULTS** The protocol was submitted to the Guinea National Ethics Committee, the EC of Antwerp University Hospital, the EC of London School of Health Tropical Medicine, the MSF Ethical Review Board and the WHO Ethical Research Committee. Most adopted a fast-track review. It took 7 weeks and 4 days to get the initial protocol approved. The study was comprehensively assessed from various perspectives. Some aspects were considered by at least three ECs, e.g. the informed consent, the ethical implications of study design and exclusion criteria, the criteria for prioritizing access to the intervention in case of scarcity of plasma. Other issues were limited to one EC, e.g. long-term storage of biological samples, benefit-sharing measures, capacity building for local researchers. But the submission forms and procedures greatly varied across the ECs: this increased the paperwork and prolonged the timelines, negatively counterbalancing the effect of fast-track review. Also, some comments were conflictive. These are common features in multiple review, but their impact is bigger in emergency research.

**CONCLUSIONS** Our experience was content wise positive: the complementarity of the reviews raised the quality of the research and the protection of participants and community. However, much more should be done to harmonize the review process in emergency research, by fostering direct dialogue among ECs. Joint ethical review would be greatly beneficial but it will only be feasible if *ad hoc* mechanisms are planned before the emergence of the next outbreak.

**DISCLOSURE** This Ebola\_tx trial is funded from the European Union's Horizon 2020 research and innovation programme under grant agreement number 666094. The Funder has not been involved in the present assessment of the multiple ethical review.

**PS2.342****The challenges of research informed consent in socio-economically vulnerable populations: a viewpoint from the Democratic Republic of Congo**

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**INTRODUCTION** Clinical trials must be conducted according to appropriate ethical standards. Ethical principles are translated into processes and procedures, for instance the principle of respect for person is translated in the informed consent process. However, procedures should take into account local challenges.

**METHODS** We analysed the challenges experienced in the Quinact trial (A Randomized Clinical Trial to measure the impact of retreatment with an artemisinin-based combination on malaria incidence and its potential selection of resistant strains), conducted in the Democratic Republic of Congo. They are related to the definition of acceptable representative in paediatric trials, the role of the independent witness and the impact of socio-economic vulnerability on the decision to consent.

**FINDINGS** To ensure children's protection, consent for their enrolment may only be given by the parents or, in their absence, by a legally acceptable representative, who should get the mandate from a tribunal. In our research setting, in practice children's responsibility is often entrusted permanently or temporarily to relatives or friends without a tribunal mandate. Hence, a notion of 'culturally acceptable representative' under supervision of the local Ethics Committee may be more suitable.

To ensure protection of illiterate subjects, an independent witness is required to attend the interview and confirm the consent was freely given. However, in a low literacy context, potential witness likely don't have any relationship with patient and there may be power-unbalance in their relationship with the patient, rather than genuine dialogue.

In a context of sociocultural and socioeconomic vulnerability, trial participation may be seen as an opportunity to secure access to healthcare. A tentative to shift respiratory symptoms on a child enrolled in the trial so that the concomitant medication provided free of charge would help a family member in need, was illustrative. Poverty may also lead 'competition' to access the research-related benefits, with a risk of disturbance at societal or household level.

**CONCLUSION** A debate should open for adjusting processes and procedures to sociocultural and socioeconomic realities, so that they ensure the fulfillment ethical requirements. This requires a collaborative dialogue between researchers, regulators and ethics committees.

**DISCLOSURE** Nothing to disclose.

**PS2.343****Clinical research data management: solutions for low-resource settings**

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**BACKGROUND** Utilization of electronic data capture (EDC) systems in clinical trials has been increasing since the 1990's. Although these new technologies can expedite clinical trial data processing and sharing, finding regulatory compliant systems for use in low-resource settings with infrastructure, financial and human resource constraints remains a challenge. The aim of this project was to identify what clinical research data management systems are suitable for low-resource settings and comply with the US and EU federal regulatory requirements.

**METHODS** The literature was reviewed to identify the regulatory requirements for clinical data management. A market review was performed to identify compliant electronic data capture (EDC) systems. In addition, user experiences with data management in low-resource settings were explored through qualitative semi-structured interviews. Based on the qualitative results, a beta version of an assessment tool for implementing data management in low-resource settings will be developed.

**RESULTS** The most important regulations for data management are the US Food and Drug Administration's *Code of Federal*

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*Regulations, Title 21, Part 11; the European Commission's Good Manufacturing Practice, Medicinal Products for Human and Veterinary Use, Annex 11; and the International Conference on Harmonisation's (ICH), E6 Good Clinical Practice guidelines.* Qualitative interviews revealed two main themes and 10 sub-themes: (i) Challenges- Human Resources, Infrastructure and the Querying Process and (ii) Data Management Considerations- System Features, Implementation, Site Assessment, Cost Considerations, Evolving Technology, Regulatory Compliance and International Collaboration. Out of 81 systems evaluated, only 19 compliant EDC systems were selected for further review. Of these, five systems provide offline capabilities which are preferable in rural areas where the internet or power connections are unreliable. Only two truly open-source systems were identified.

**CONCLUSION** Successful implementation of an EDC system requires careful assessment and planning in regards to the human resource capacity and working processes, as well as infrastructure. Low-cost, regulatory compliant EDC systems are available for use for clinical trials in low-resource settings.

**DISCLOSURE** Nothing to disclose.

**PS2.344****Safety evaluation of fixed-dose dihydroartemisinin-piperaquine combination in different ecological settings in Ghana**

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**BACKGROUND** Uncommon and rare reactions with delayed onset may not be detected before new medicinal products are licensed. *Post-licensure surveillances* are carried out to expand the evidence base of the new products for which marketing authorization were granted. Using the recently established INDEPTH-network safety monitoring platform the study evaluated safety of fixed-dose dihydroartemisinin-piperaquine as an additional first-line treatment for malaria across three ecological settings in Ghana. Key questions answered were the safety of the drug when used under usual conditions and assessment of the occurrence of adverse events and the administration of concomitant medications.

**STUDY DESIGN** The study was conducted across three Health and Demographic Surveillance sites of Navrongo, Kintampo and Dodowa research centres located in the northern, middle and coastal belts of Ghana. From September 2013 to June 2014 a prospective, observational, open-label, non-comparative study was carried out. Participants included both sexes, aged >6 months, weighing ≥5 kg, ability to take oral medications, acute febrile illness and informed consent. Detailed clinical enquiry was conducted and all significant conditions documented. Data *analysis* involved descriptive characteristics and adverse events coded using MedDRA<sup>®</sup> System Organ Class (SOC) classification. The protocol received approval from the Ghana Health Service Ethics Review Committee, Ghana Food and Drugs Authority and was registered with Clinicaltrials.gov (NCT02199951).

**FINDINGS** We included approximately 95.5% (4563/4777) patients comprising 52% females, 48% children <6 years of age and average age (years), weight (kg) and height (cm) 10.9 (SD = 13.6), 26.1 (SD = 18.7) and 117.4 (SD = 31.3) respectively. Overall 347 adverse events were documented with incidence rate of 76/10 000 population. Baseline characteristics

associated with adverse effects were body mass index and parasite density. The commonest events according the System Organ Classification (MedDRA<sup>®</sup> Coding) per 10 000 population were infestations (465), gastrointestinal disorder (103), respiratory, general disorders and administrative site conditions (46), thoracic and meditational disorders (44), nervous system disorders (26) and skin and subcutaneous tissue disorders (26). **CONCLUSION** Fixed-dose dihydroartemisinin-piperaquine combination is very safe in black African population with uncomplicated malaria in real life settings.

**DISCLOSURE** Nothing to disclose.

**PS2.345****The Dihydroartemisinin/Piperaquine (Eurartesim) safety registry**

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The Dihydroartemisinin/Piperaquine (Eurartesim) Safety Registry is a monitoring programme designed to improve knowledge on the utilization of Eurartesim<sup>®</sup> for the treatment of uncomplicated *P. falciparum* malaria.

**INTRODUCTION** The safety registry is an active, prospective, multicenter, voluntary surveillance programme. It has been approved by the European Medicines Agency (EMA) and the relevant competent authorities.

**MATERIAL AND METHODS** The sites were recruited in seven European countries. Participation in this safety registry will help to identify further safety information regarding exposure to Eurartesim<sup>®</sup> for the treatment of uncomplicated *P. falciparum* malaria. A scientific advisory board (SAB), constituted of key opinion leaders from European countries, has the responsibility of monitoring all safety aspects and the enrollment rate. This safety registry is including patients diagnosed with uncomplicated *P. falciparum* and who agreed to participate in this registry, by signing the relevant informed consent form.

The registry is collecting the information including age, gender, ethnicity, lifestyle data, relevant medical history, comorbidities and safety data (laboratory and ECG recording). These data will be used to monitor the effects of several factors (food intake, smoking/alcohol consumption, use of co-medications) on safety parameters.

**RESULTS** Among the 18 initiated sites, 13 are active sites: four in Spain, two in France, two in Belgium, two in Germany, two in Italy and one in UK. A total of 90 patients have been registered up to the end of March 2015.

An interim analysis was performed in June 2014 after 9 months of recruitment. Regarding this low recruitment rate, it must be considered that malaria has a very small incidence in Europe. In order to have a higher number of active HCPs, measures adopted consisted in increasing follow-up calls with HCPs and newsletters, and soliciting the members of the SAB to motivate the participating HCPs. The safety profile was evaluated, after 15 days of treatment with Eurartesim<sup>®</sup>, in a total of 17 patients. It is worth noting that, before Eurartesim<sup>®</sup> administration, one of these patients (with history of cardiac and vascular disorders) prolonged QTcB and QTcF values, and another had a borderline QTcB value. After Eurartesim<sup>®</sup> administration, all available QTcB and QTcF values were normal, including those of the patient with prolonged QTc values before Eurartesim<sup>®</sup> administration. Only one patient had experienced SAEs (nausea, vomiting and hepatitis of moderate intensity). In addition, no

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treatment-emergent AESI were reported. The new interim analysis will be performed in June 2015. Results will be presented and discussed in the poster.

DISCLOSURE Nothing to disclose.

## PS2.346

**Observational study comparing the use of commercial metronidazole against compounding metronidazole prepared in the pharmacy service in a rural district hospital in Southern Ethiopia**

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In low-income countries is difficult to find some frequently required drugs (problems in dispensing and delivering). One possibility to resolve that problem is to make up the drugs in the laboratory of the hospital pharmacy from powders.

The aim of this study was to analyze the effectiveness of commercial metronidazole against metronidazole made locally.

**MATERIAL AND METHODS** This is an observational study performed in Gambo General Rural Hospital (West Arsi, Ethiopia). From 1 July to 18 of July, patients with giardiasis were treated with commercial metronidazole (Metazol<sup>®</sup> or Camezol<sup>®</sup>) (Group A). So on, from 19 of July to 6 of August 2015 patients were treated with in hand-made metronidazole from powdery substance (Fagrom<sup>®</sup>) packed in capsules (Group B). Giardiasis was diagnosis by presence of cystic or trophozoites of *G. lamblia* in a fresh sample of feces.

**RESULTS** During period of study 36 patients from 6 to 20 years) were included. Nine of 12 (75%) patients of group A were cured (negative stool for *G. lamblia* at 10 days of star treatment). And all of 24 patients of Group B cured (100%). This differences were statistically significant (Fisher Exact Probability Test: T,  $P = 0.03$ ).

DISCLOSURE Nothing to disclose.

## PS2.347

**Health impact assessment: an erstwhile tool envisaging sustainable development with a pragmatic approach**

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**INTRODUCTION** Narmada Basin is one of these basins in central India which is harnessed for its resources via 30 multipurpose hydro electric power plants. These projects have altered entire topography and human health of the basin inviting multiple challenges to its management and cooperation among various stakeholders. A retrospective study entitled 'Health Impact Assessment on Indira Sagar Dam and Resettlement and Rehabilitation Colonies (RR) in Sardar Sarovar Project (SSP)' was therefore initiated in January, 2004 as per CWC guidelines. The project had been funded by Narmada Valley Development Authority, Bhopal (NVDA). In India, this HIA project was the first longitudinal project which is operational for >5 years and is a remarkable foresightedness of NVDA. NVDA has extended the funding for all dams to carry out HIA studies for the new project entitled Health Impact Assessment of Narmada Basin Dams and RR Colonies in MP.

**METHOD** Narmada Nagar study centre is responsible for ten dams and also has a base laboratory and insectory to analyse and store the collected data. Entomological and epidemiological data are being generated quarterly by each centre as per WHO standards for suggesting situation specific mitigation measures and analysis of impact at later stages.

**RESULTS** Since April 2011 to Dec 2014 Narmada Nagar unit covered 326 villages which were incorporated phase wise in subsequent years of study. A total of 8312 blood slides were prepared during active surveillance and 241 *Pf* and 301 *Pv* cases were detected and treated on the spot. The health authorities are intimated about the situation of disease prevalence in their respective areas and follow up is being done by them. Towards attaining sustainable development ASHAs (Accredited Social Health Activists) are also being involved for synergising the surveillance system and timely reporting and treatment of malaria cases. Due to implementation of these mitigation measures the density of vectors of malaria, dengue, chikungunya, filariasis and JE has shown a remarkable reduction.

**CONCLUSION** All HIAs mostly aim for minimizing the pitfalls of a project, plan or policy and maximizing their health benefits for a long term sustainable development. A guideline on health impact assessment to be incorporated in all the health policies would hence provide a sustainable growth profile for forthcoming generations.

DISCLOSURE Nothing to disclose.

## PS2.348

**Evaluation of a community based programme for hypertension control in Ghana**

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**INTRODUCTION** Ghana faces an increasing burden of non-communicable disease with rates of hypertension estimated as high as 36%. Despite these high rates, hypertension control remains very poor in Ghana (4%). A private-public partnership aims to implement and evaluate a community based programme to raise awareness to improve treatment and control of hypertensive clients over a 24-month period in the Eastern Region of Ghana.

**METHODS** The programme includes community-based hypertension screening, monthly monitoring by community cardiovascular nurses, blood pressure measurement and prescription refill at licensed chemical sellers. A cloud-based health records system linked to SMS/voice messaging for treatment adherence, reminders, and health messaging will empower the client. The intervention will be in the Lower Manya Krobo district, with Akuapim South Municipality as a comparator receiving the standard of care – medication at the pharmacy and consultation at the facility.

To evaluate the programme we will conduct a controlled before-after study with two components:

1. Population based surveys in the intervention and the control district before and after the programme; and
2. A prospective cohort study to evaluate the clients diagnosed with hypertension.

The primary outcomes are hypertension awareness, treatment and control. Secondary outcomes include hypertension preva-

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lence, changes in systolic blood pressure and knowledge of risk factors for hypertension. In addition, process evaluation will be conducted.

For the cross sectional studies we estimate that a survey of 800 respondents (in each district) would have 80% power (two sided alpha = 5%) to detect a difference in hypertension control from 4% to 20% in the intervention district, and from 4% to 10% in the comparison district. We estimate that the cohort component of the study will include 1200 participants with hypertension and will have 90% power (two sided alpha = 5%) to detect a decrease in systolic blood pressure of at least 4 mm of mercury. Surveys will be done using Open Data Kit app, an android-based technology that collects and shares data in real time. Data will be analyzed in STATA Version 11.

**CONCLUSIONS** The protocol designed for this evaluation could be used to measure control of hypertension interventions in other contexts, whether the interventions are at the community level, facility level, or a combination of the two.

**DISCLOSURE** Nothing to disclose.

### PS2.349

#### The pregnancy registry for Dihydroartemisinin/Piperaquine (Eurartesim)

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This pregnancy registry is a monitoring programme designed to identify women taking Eurartesim® for the treatment of malaria during pregnancy.

**INTRODUCTION** Registry is a study that collects health information from people with a particular illness (disease registry) or taking a particular medication (drug registry). These studies can also help to improve the information that is provided on medication labels. Participation in this pregnancy registry will help to identify the relevant safety information about exposure to Eurartesim® for the treatment of malaria. The information collected from this pregnancy registry will be analysed and will inform healthcare professionals on administering Eurartesim®. These data may be used to update the safety section of the Summary of Product Characteristics for Eurartesim®, as appropriate. Registry has been approved by the European Medicines Agency (EMA) and the competent authorities as required by local regulation active in Belgium, France, Germany, Italy, The Netherlands, Spain, UK, Portugal and Ireland.

A pregnancy registry is a study that collects health information from women who take medicines whilst they are pregnant. Information is also collected on the baby.

**METHODS AND MATERIALS** Participation in this pregnancy registry will help to identify the relevant information about exposure to Eurartesim® for the treatment of uncomplicated falciparum malaria during pregnancy. A Scientific Advisory Board (AB), constituted of Key Opinion Leaders has the responsibility of monitoring all safety aspects and the enrollment rate. Personal data will not be disclosed, all of the medical information collected for this pregnancy registry will be protected by the data protection law. Registry is an active, prospective, voluntary surveillance programme, the data collected from this pregnancy registry will be analysed and will be used to monitor exposure to Eurartesim® during pregnancy. **Inclusion criteria:** Women who receive Eurartesim® for malaria whilst pregnant, within one (1) month before or at any time after conception. Women whose partner (the biological

father) has received any formulation of Eurartesim® for malaria within one (1) month prior to conception. Women who have been informed and agree to participate in this registry, by signing the relevant informed consent form.

**RESULTS** Actually 47 sites have been selected in the study from which 30 are initiated, five in Belgium, five in France, five in Germany, five in Spain, four in Italy, four in The Netherlands and two in UK. No patients included so far.

**DISCLOSURE** Nothing to disclose.

### Late Breakers

#### PS2.350.LB

#### A case series of 11 uveitis in patients who recovered from Ebola in Guinea

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**INTRODUCTION** The Western Africa Ebola's outbreak was declared on March 2014 and struck Guinea where 3245 confirmed cases were reported and 1180 of them survived as of 14 June 2015. The 'Life after Ebola' Project (Postebogui) was launched on March 2015 and enrolled survivors who wished to benefit from a close medical monitoring. The investigators noticed an abnormal frequency of ophtalmologic complains that we tried to characterize.

**METHODS AND MATERIAL** An ophtalmologic consultation was proposed to survivors that report ophtalmologic troubles that began during the acute phase or after discharge from the treatment center. The consultation took place at Donka's Hospital in Conakry in June 2015 and included a measure of visual acuity and a slit lamp examination.

**RESULTS** Among the 21 patients investigated, nine suffered from ocular pathology preceding, or without link to Ebola infection, 11 displayed an uveitis and the last one bilateral corneal opacities. Among the uveitis, five were bilateral and six unilateral, four were only anterior, four posterior with active chorioretinitis (whitish lesions) or sequels of it (pigmented scars) and two panuveitis. Visual fonction were below 5/10 for five patients on at least one eye. We deplored two cases of legal blindness. For four patients the ophtalmologic symptoms started during Ebola acute's phase and for six other patients, 3–4 weeks after discharge from the treatment center.

Three patients who benefited from oral and local corticotherapy had no visual sequels. Among three patients who receive only local steroids, two had a damage of their visual function.

**CONCLUSION** With an unknown frequency, but probably significant, Ebola virus disease induces polymorphous uveitis that occurred either during the active phase of the disease or during its early aftermaths with in some cases dramatic consequences. An ophtalmologic monitoring during the course of the infection and after clinical recovery seems recommended to all as far as therapeutic opportunities do exist (oral corticotherapy, intravitreal injection of triamcinolone, favipiravir, drops) and that visual recovery is not systematic.

Complementary studies are needed to investigate the potential recurrences and lifespan of the virus in the human aqueous humor and vitritis are concerned.

**DISCLOSURE** Nothing to disclose.



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**PS2.352.LB****Is gestational diabetes mellitus significantly adding to the burden of managing pregnancies in developing countries? – A descriptive study from an Indian tertiary care hospital**

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**INTRODUCTION** Gestational diabetes mellitus (GDM) is a condition in which women without previously diagnosed diabetes exhibit high blood glucose levels during pregnancy. GDM affects 3–10% of pregnancies & 13–20% of hospital population. Babies born to mothers with untreated GDM are at increased risk of complications including type 2 diabetes mellitus (DM) later in life. The present study aimed to assess the presence of GDM among mothers in a tertiary care hospital in Kerala state of India.

**METHODS AND MATERIALS** Study design – Descriptive study.

Participants – Patients admitted in the Antenatal and postnatal wards in Government medical College Kozhikode, Kerala, India.

Sample size –  $n = 109$  (51 antenatal & 58 postnatal mothers).

Data collection – Interview with participants & review of their case records.

**RESULTS** 26.6% ( $n = 29$ ) of the study sample had GDM. Most GDM cases (55%) were detected during the third trimester.

13.8% of them have previous history of DM, and 65.5% have family history of DM. GDM was more prevalent among older mothers ( $P = 0.036$ ). Birth weight was more for babies of GDM mothers ( $P = 0.031$ ). Nearly half of the GDM cases (48%) were being managed with dietary modification alone, and 45% was on Insulin treatment. None had access to a dietician & received dietary advice only from their physicians.

**CONCLUSIONS** India has a considerable disease burden due to DM. GDM is adding to the health care costs of managing pregnancy. GDM management requires a team approach involving doctors, nurses, dieticians etc which is lacking in public sector hospitals. Detection of GDM provides a window of opportunity to predict, prevent & detect DM in the mothers and their children in the future. Linking NCD control with Maternal and Child health care programme is recommended as a policy change.

**DISCLOSURE** Nothing to disclose.

**PS2.353.LB****Combining a process-based and correlative approach to predict the impacts of climate change on schistosomiasis in eastern Africa**A.-S. Stensgaard<sup>1</sup>, M. Booth<sup>2</sup>, G. Nikulin<sup>3</sup> and N. McCreesh<sup>4</sup>

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Currently, two broad types of approaches for predicting the impact of climate change on vector-borne diseases can be distinguished; a) empirical-statistical (correlative) approaches that use statistical models of relationships between vector and/or pathogen presence and environmental factors, and b) process-based (mechanistic) approaches that seek to simulate detailed biological or epidemiological processes that explicitly describe system behavior. Both have advantages and disadvantages, but it is

generally acknowledged that both approaches have value in assessing the response of species in general to climate change. Here, we compare and combine a previously developed dynamic, temperature-driven model (agent-based) of the temperature-sensitive stages of the *Schistosoma mansoni* and intermediate host snail lifecycles, with a statistical model of snail habitat suitability for eastern Africa. Baseline model output compared to empirical prevalence data suggests that the combined model performs better than a temperature driven model alone, and highlights the importance of including snail habitat suitability when modeling schistosomiasis risk. There was general agreement among models in predicting changes in risk, with 24–36% of the eastern Africa region predicted to experience an increase in risk with up-to 20% over the next 50 years. Vice versa the models predicted a general decrease in risk in 30–37% of the study area. We discuss the implications of the differences in the model assumptions and outputs for predicting the changes in risk as a result of increasing temperatures over the next 50 years. Finally, as the snail habitat suitability models suggest that anthropogenically altered habitat, such as dam developments, play a vital role for the current distribution of the intermediate snail host; we stress the importance of accounting for land use changes in models of climate change impact on schistosomiasis.

**DISCLOSURE** Nothing to disclose.

**PS2.354.LB****Outcomes of and lessons on helminth control in preschool-age children in a province in the Philippines**V. Belizario<sup>1</sup>, J. Ng<sup>2</sup>, M. L. Amarillo<sup>3</sup>, J. P. C. delos Trinos<sup>1</sup>, M. Reyes<sup>1</sup> and N. T. D. S. Group

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Control of soil-transmitted helminth (STH) infections remains a priority worldwide. In the Philippines, preschool-age children (PSAC) are dewormed biannually through Garantisadong Pam-bata (GP) Program although data on its outcomes remain limited. Thus, this study was conducted to provide baseline parasitological and hemoglobin assessment on PSAC from selected municipalities in Masbate, a province with one of the lowest human development index (HDI).

A total of 1224 PSAC from 39 barangays in four selected municipalities were included in this cross-sectional study which involved stool examination using the Kato Katz technique and hemoglobin determination using HemoCue 201+ analyzer.

Overall cumulative STH prevalence and prevalence of moderate-heavy STH infections, which were 72% and 41%, respectively, failed to meet the targets of the Department of Health (DOH) and WHO and were comparable to the national average at baseline in 2004 prior the implementation of Integrated Helminth Control Program. Prevalence of STH co-infection was high with *Ascaris-Trichuris* co-infection being the most common at 40%. The same parameters were also high in barangays where community-led total sanitation is implemented and those declared as open defecation free. On the other hand, fifty percent of the PSAC have anemia.

The deworming coverage rates in the two municipalities with the highest burden of STH infections, at 65.91% and 66.92%, were below the WHO and DOH targets of 75% and 85%, respectively.

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These highlight gaps on helminth control in PSAC, and in poverty stricken areas, which must be addressed not only through provision of anthelmintics but by utilizing a holistic and systems approach which include looking into Water, Sanitation, and Hygiene (WASH) and the social determinants of health.

Practical solutions recommended to improve helminth control and promote equity in nutrition include increasing access to preventive chemotherapy through Day Care Center-based mass drug administration, integration of deworming activities, improvements in WASH, and multisectoral collaboration. Addressing the social determinants of health and alleviating poverty are also important considering that these are significant determinants of STH infections.

DISCLOSURE Nothing to disclose.

**PS2.355.LB****Empiric clinical profiling for individual assessment of cardiovascular disease**

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**BACKGROUND** Comprehensive molecular tests are available to elucidate an individual's genome, transcriptome or proteome. An equally complete technique to obtain the phenotype of a disease is currently lacking. Empiric clinical profiling is a method based on bedside procedures such as history taking, physical exam and point of care laboratory tests. It is available, affordable and portable. We have previously shown that this approach is effective to diagnose patients with atherosclerosis, a chronic disease that affects mid-sized and large arteries and is complicated by cardiovascular events (CVE) such as stroke, myocardial infarction or peripheral arterial occlusive disease. Here we wished to demonstrate its prognostic significance to predict CVE.

**METHODS AND RESULTS** 269 patients treated for a wide variety of reasons in a Swiss tertiary care hospital were prospectively and non-selectively included in this cohort (www.clinicaltrials.gov; NCT00863967). For each participant, an empiric clinical disease activity score (cDAS) was calculated at baseline. Follow-up visit took place 5.5±0.4 years later. During 1100 follow-up years, 39 patients developed a cardiovascular event. The cumulative 5-year incidence of CVE in patients having the lowest cDAS (1st quartile) was 4.8%, in patients in the 4th cDAS quartile it was 24% (HR 5.2 (1.5–18.2), *P* < 0.001).

**CONCLUSION** In this prospective, single-center cohort study of common in-patients we established empiric clinical profiling as an effective tool for risk stratification and disease monitoring in atherosclerosis, a common disease process. We propose that the conceptual framework of empiric clinical profiling is not limited to cardiovascular disease in Central Europe. Due to its affordability and portability, it could also be transferred to low and middle income countries, and essentially could be applied to any disease process at a global scale.

**DISCLOSURE** Barbara Biedermann owns a company (Cobedix AG) that produces a software (COBEDIAS) that supports the work with empiric clinical profiles.

**PS2.357.LB****Household sanitation and hygiene indicators of enteric pathogen transmission and childhood diarrheal exposure risk in Mirzapur, Bangladesh**

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**BRIEF INTRODUCTION** The effectiveness of water quality, sanitation and hygiene (WASH) interventions in reducing diarrheal disease can be strengthened through the identification of enteric pathogen transmission pathways. Our aim was to determine associations between significant diarrheal pathogens among rural Bangladeshi children and potential pathogen sources and household risk factors that may make up such transmission pathways.

**METHODS AND MATERIALS** Stools collected from children aged ≤59 months with moderate-to-severe diarrhea (MSD) and matched healthy controls enrolled in the Bangladeshi component of the Global Enteric Multicenter Study (GEMS) were screened for enteric pathogens. Multinomial logistic regression was used to determine associations of *Shigella flexneri*, *Cryptosporidium* spp, enterotoxigenic *Escherichia coli* (ETEC), rotavirus and *Aeromonas* outcomes with WASH measures.

**RESULTS** Children from households with improved sanitation facilities and disposed children's feces had lower *S. flexneri* and *Cryptosporidium* diarrhea risk. *Cryptosporidium* diarrhea risk was higher when cow dung was used as fuel and mothers did not wash hands before eating. Children from households with toilets and that disposed children's feces had lower ETEC infection risk when no handwashing was practiced after cleaning a child following defecation and before cooking, respectively. Rotavirus diarrhea was lower among children from households with deep tube wells when no hand washing was practiced after handling of animals. Finally, children from households with improved sanitation facilities and whose mothers washed hands before nursing had lower *Aeromonas* diarrhea.

**CONCLUSIONS** We have identified household sources and factors that are critical points in pathogen transmission pathways and children's exposure to selected enteric pathogens and shown how distinct hygiene behaviors may modify these pathways. These findings have important implications for the development of more cost-effective intervention that reduce pathogen exposure risk and overall diarrheal burden through targeted interventions that focus on critical points in pathogen-specific transmission pathways.

**DISCLOSURE** Nothing to disclose.

**PS2.358.LB****Assessing health status of Khanigaun Village Development Committee (VDC) of Nuwakot District of Nepal**

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Assessing health status is crucial to understand the level of health in the community. Maternal health, child health and behavioral practice on diseases are key issues to assess health status of a

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community in Nepal. Preliminary analysis and literature review shows that there is rapid change in the health status of Nepalese community. Thus, the aim of this study was to assess general health status of Khanigaun VDC of Nepal.

A descriptive cross-sectional study was undertaken using semi-structure questionnaire, interview and observation. Simple random sampling was done to conduct household survey, where 346 (30%) household were taken for sample population. Key informants were taken purposively.

From the survey General Fertility Rate (GFR) of the VDC was found 69.15/1000 Women. Regarding socio-economic status, literacy rate of the VDC was 71.14% and 74.92% of household depends on agriculture. Toilet coverage was 88% and only 80% of household manage their waste by making compost manure. The major health problem of the community was diarrhea followed by unknown fever and respiratory problems. However, more than 60% of respondents have Knowledge, Attitude and Practice on common diseases of Nepal. Contraceptive prevalence rate was 72% but more than two third of women have home delivery. It was found that 31% of newborn are under weight and immunization coverage was high in the community. Major need of the community was addressed through Micro Health Project conducted on health awareness through demonstration and exhibition. Moreover, other activities conducted in the community were mini-lecture on safe motherhood, group discussion on 'healthy and safe communities', environmental sanitation and school health program.

Overall health status of the community could be further enhanced through youth mobilization and community participation.

Health status, Cross-sectional study, Micro health project, Khanigaun.

DISCLOSURE Nothing to disclose.

## PS2.359.LB

## Parasitological characterisation of persistent digestive disorders in Mali: a case-control study

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**BACKGROUND** The aetiology of persistent digestive disorders in the tropics is poorly understood. Differential diagnosis is hampered by unspecific clinical findings and a lack of quality data on the epidemiology of key pathogens. The European research consortium NIDIAG pursues a multi-country study to investigate neglected tropical diseases (NTDs) that may give rise to persistent digestive disorders. Here, first results from a case-control study in Mali are presented.

**METHODS** We conducted a prospective, non-interventional case-control study in Niono, central Mali from August 2014 to May 2015. Cases were defined as patients aged >1 year presenting with persistent diarrhoea (≥14 days) and children/adolescents aged 1–18 years with persistent abdominal pain (≥14 days). Age-, sex- and location-matched controls were also enrolled. Stool and urine samples were subjected to a suite of microscopic parasitological tests for the diagnosis of helminths and intestinal protozoa (direct smear, Kato-Katz, formalin-ether

concentration, Baermann funnel, Koga agar plate, acid-fast staining and mini-FLOTAC) and rapid antigen detection tests for detection of *Cryptosporidium* spp., *Giardia intestinalis* and *Schistosoma mansoni*.

**RESULTS** Eleven different parasite species were detected upon analysis of 200 patients and 200 controls. *S. mansoni* (prevalence, 33.0%) and *G. intestinalis* (prevalence, 22.0%) were the predominant parasites; both significantly more common in symptomatic patients than in healthy controls. For the detection of *S. mansoni*, mini-FLOTAC was the test with the highest positive predictive value (89%) and highest specificity (94%). Of note, a rapid diagnostic test for *S. mansoni* identified additional infections that were missed by stool microscopy. For the detection of *G. intestinalis*, a rapid diagnostic test had the highest positive predictive value (96%) and was most specific (99%).

**CONCLUSION** NTDs account for a high proportion of persistent digestive disorders and remain a major public health problem in central Mali. The use of accurate point-of-care laboratory tests at the primary healthcare level will help to improve the clinical management of patients with persistent digestive disorders.

DISCLOSURE Nothing to disclose.

## PS2.360.LB

Acute pulmonary manifestation of schistosomiasis after praziquantel treatment for a urinary and liver *S. haematobium* chronic infection

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We report a case of pulmonary schistosomiasis manifested clinically as an acute pulmonary form with schistosoma's eggs finding in lung biopsy occurred after a treatment with praziquantel for a *S. haematobium* urinary and liver infestation. A 21-year-old Malian male moved in Italy after rapid transit in Libya; 3 months after arriving started complaining end-urination bleeding and stinging abdominal pain. He reported similar episodes in childhood. A blood test showed normal kidney function and slightly increased of bilirubin and liver enzymes. An abdomen ultrasound examination showed homogeneous splenomegaly, normal kidneys, bladder walls thickened with the presence of exophytic roundish process. Urine examination showed erythrocytes and *Schistosoma haematobium*'s eggs. He received treatment for urinary schistosomiasis with praziquantel (40 mg/kg) with no apparently immediate complications. Five days later the patient complained of rapid onset of fever and thoracic pain exacerbated by deep breath. A total body TC scan showed numerous small pulmonary nodules ranged in size from 4 to 11 mm in random distribution, no head lesions, intense contrast enhancement of the bladder wall and inhomogeneous contrast enhancement of liver and spleen parenchyma in the absence of clear focal lesions. Perfusion alterations shown by CT scan were compatible with pre-existing hepatic localization of schistosomiasis. Urine exam still shows *Schistosoma haematobium*'s eggs. Blood tests showed sharply increased eosinophils (up to 2290/μl, 36.4%) and IgE values (19 000 kU/l). Histological examination of a trans-bronchial biopsy of lung lesions described focal interstitial fibrosis, with ovoid formations with rare microcalcifications included, surrounded by thin fibrous rhyne and inflammatory histiocytic infiltrated including eosinophils; formations related to parasitic eggs. For these hepatic, urinary and pulmonary findings was decided to retreat the patient after a retreatment interval of 4 weeks from the initial treatment. Praziquantel 40 mg/kg was repeated for 3 days associated with



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steroid therapy to suppress the hypersensitivity reaction to schistosomal antigen, with a gradual reduction of thoracic pain and a slow but steady reduction of eosinophils and IgE values at the follow-up visits. Schistosomiasis still represents a challenging disease for prompt diagnosis and adequate treatment especially in non-endemic countries and in non typical presentation as in the case described.

DISCLOSURE Nothing to disclose.

**PS2.361.LB****Impact of a health-education package on soil-transmitted helminth and *Schistosoma mansoni* infections amongst school children in western Côte d'Ivoire**

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**BRIEF INTRODUCTION** Soil-transmitted helminths (STH) and *Schistosoma* spp. remain a major public health problem infecting over 2 billion people globally. The current global strategy for their control is to regularly distribute preventive chemotherapy. However, re-infection is inevitable in areas where hygiene, access to safe water, and sanitation are inadequate which is the case of most developing countries. The aim of this study was to assess the effect of a health education package on intestinal helminth infections and knowledge, attitudes, practices and beliefs (KAPB) in schoolchildren.

**METHODS AND MATERIALS** Approximately 2500 children from 25 schools in western Côte d'Ivoire were selected for this study. A baseline survey was carried out with schoolchildren undergoing parasitological examinations to assess infection status with intestinal helminths and *S. mansoni* and responding to a KAPB and socioeconomic questionnaire. In a next step, the schools were randomly assigned either to intervention (13 schools) or the control group (12 schools). The intervention with the health education package consisted of an animated cartoon and group work including discussions and drawing assignments. A follow-up survey was conducted 1 year after the baseline. Albendazole and praziquantel were administered to all participants at baseline and follow-up.

**RESULTS** At baseline, the overall prevalence of any intestinal helminth infection ranged from 10–77%. The most common helminths identified were hookworm and *S. mansoni*. The KAPB questionnaire revealed that children who were aware of potential risk of infection were less affected by any helminth infection (20.4%) than those who did not consider themselves to be at risk (26.4%) or who did not know (27.6%). Children that considered helminth infections as a serious health condition were less likely to be infected with STHs (16.5%) than those who did not consider it as serious (26.0%). Children who mentioned toilet as appropriate for defecation (12.3%) were significantly less infected than those who mentioned open defecation as correct (20.7%). Any impact on KAPB and reinfection patterns due to the health-education package at follow-up will be highlighted.

**CONCLUSIONS** The results suggest that awareness leads to change in behavior and attitude which leads to a decrease of infection. Our findings may guide to the implementation of future integrated control strategies against helminthiasis and schistosomiasis.

DISCLOSURE Nothing to disclose.

**PS2.362.LB****Laboratory diagnosis and risk factors of gastrointestinal parasites among basic school children in greater Wad Madani locality, Gezira State, Sudan**

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**INTRODUCTION** The World Health Organization (WHO) estimates that 3.5 billion people worldwide are infested with some type of intestinal parasite, and as many as 450 million of them are sick as a result. Children are most frequently infected with these parasites, it is spread in areas with poor sanitation and are most common in tropical developing countries including Sudan.

**METHODS** In 2011–2014, ten basic schools were selected randomly, five school for males and five ones for females. A questionnaire about the demographic data, behavioural risks, environmental sanitation and living condition characteristics and health conditions with history of symptoms was administered. 400 Stool samples were collected. Wet mounted physiological normal saline and iodine, Formol ether concentration and Kato – kat techniques were performed to detect intestinal parasites. **RESULTS** The results showed that formol ether concentration technique is the superior method to detect gastrointestinal parasites and STH than wet preparation. The infection rate was higher in males than females especially in the age group (9–12) years. The highest infection by worms was caused by *H. nana* where as *G. Lamblia* was the dominant protozoa. The check list demonstrated that there is a strong relation between the school environment and the prevalence of parasitic infection. According to the statistical analysis, there was relationship between behavioural risks, environmental sanitation and living condition characteristics and the rate of infection. Semi quantitative Kato – kat technique showed that the intensity of ova was not high.

**CONCLUSIONS** The study concluded that the prevalence of gastrointestinal protozoa is higher than STH. Due to the lack of health education and poor schools environment, the infection was higher in those with poor hygienic practice with prevalence in males rather than females. The study recommended the combination of wet preparation and formol ether concentration technique in the diagnosis of gastrointestinal parasites and STH.

DISCLOSURE Nothing to disclose.

**PS2.363.LB****Limitations of laboratory diagnosis of strongyloides stercoralis: an Australian perspective**

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Human strongyloidiasis is caused by a parasitic nematode, *Strongyloides stercoralis*. It is unique in that this parasite reproduces by parthenogenesis and its larval stages can autoinfect. The parasitic nematode can therefore remain with the original host for many years/decades undetected. This parasite is found mainly in indigenous communities in northern and central Australia.

Laboratory detection of *S. stercoralis* in stool specimens is the gold standard method for diagnosis of this infection. Microscopic examination of direct smears and faecal concentration methods has low sensitivity. Although faecal cultures such as the



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Baemman, Harada mori and agar plate methods are more sensitive, they rely on live active worms to migrate away from the faecal matter. The logistics of receiving these specimens with live active parasites remains difficult, because of the distance between collection sites and the laboratory. New molecular methods have been developed to overcome the need for laboratory culture methods, but they have not been shown to be as sensitive as the traditional culture methods. We investigated some of the reasons for this lack of sensitivity.

DISCLOSURE Nothing to disclose.

**PS2.364.LB****Diagnosis of visceral leishmaniasis using different serological methods in Bangladesh**

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**BACKGROUND** Visceral leishmaniasis (VL) is a fatal vector-borne disease caused by parasites of the *Leishmania donovani* complex. It ranks the 2nd in parasitic death after malaria in the world. Several serological tests have been developed to diagnose VL in endemic countries. This cross sectional study aimed to evaluate the sero-diagnostic tests such as rk39 ICT, p-ELISA and IFT in diagnosing VL in Bangladesh.

**METHODS** Sensitivities of rk39 ICT, p-ELISA and IFT were evaluated on 155 parasitologically confirmed VL cases. Specificities of the serological tests were calculated on 706 healthy blood donors (351 from endemic and 355 from relatively non-endemic areas) from Bangladesh; 91 sera from patients with febrile illness from non-endemic country Australia. Sera from patients positive for malaria ( $n = 91$ ) and Chagas disease ( $n = 91$ ) were tested by p-ELISA and IFT to verify cross reactivity with other protozoan diseases.

**RESULTS** The sensitivities of rk39 ICT, p-ELISA and IFT were 100%, 86.5% and 92.3% respectively; 82.58% pooled sensitivity was observed by all three serological methods. All control individuals were found negative by rk39 ICT. The summarized specificities of p-ELISA and IFT were 98.87% and 99.87% respectively among all control groups. The respective positive and negative predictive values of the p-ELISA were 93.71% and 97.4% and of IFT were 99.31% and 98.51%. The p-ELISA showed 36.26% cross reactivity with malaria and 28.57% with Chagas disease; IFT showed no cross reactivity.

**CONCLUSION** All three serological methods showed good performances in this study, though rk39 ICT proved overall advantages over p-ELISA and IFT. Combinations of serological methods using different antigens can be considered for confirmation of VL before initiating treatment when parasitological methods are not available or not applicable to be carried out among asymptotically infected individuals. For rapid detection and sero-surveillance of VL, rk39 ICT plays an important role in elimination program in resource poor endemic countries.

DISCLOSURE Nothing to disclose.

**PS2.365.LB****A comparison of leishmaniasis laboratorial diagnosis methods in diagnostic centers in south of Iran**

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Leishmaniasis, is one of the most important parasitic-skin disease in different of the world including in Iran. This disease, yearly, impose too much physical injury and financial damage on inhabitants of the region. Leishmaniasis is considered as a Endemic disease in south of Iran and Larestan, but; this disease has reached 549 cases in 2014 from 67 cases in 2010. The increase of sensitive and un-immune person, is considered as a factor of the outbreak. But the other point is the change of laboratorial diagnosis method of this disease in medical-hygienic centers of the city. The object of this research is the analyses the effect of this factor.

This is a qualitative study which has been done with the use of answer -sheets and oral survey at all of the diagnosis center (including 10 centers). In this study, the quality of the test and diagnosis personnel's knowledge has been considered.

The results show; one of the most important diagnosis centers in the city, has changed the method of sampling. They have done sampling from the center of sore. Personnel's taking part in retraining periods of the diagnosis and the increase of the individual knowledge are the result of this research.

Although the increase in sensitive persons due to new births is an important factor in outbreak of cutaneous Leishmaniasis, but there are some other factors that will increase the statistic of this disease. Personnel's care while watching the cases and the increase in people's knowledge and efficiency have been probably effective to increase the diagnosed cases. In other words, the lack of correct laboratorial diagnosis of the disease can increase the amount of unknown ill persons, so this persons act as a source of disease in the region. Contagious disease in the region can be controlled by retraining personnel and the improvement of the diagnostic methods.

DISCLOSURE Hello. I presented this title in one of congress in Iran.

**PS2.366.LB****Healthcare service utilization of Japanese retirees in Malaysia: results of in-depth interviews and focus group discussions**

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**BACKGROUND** There is a growing popularity among Japanese retirees in spending their retirement life in foreign countries, and Malaysia is one of the popular destination, due to a government program called Malaysia My Second Home. Although the number of Japanese retirees in Malaysia is increasing, the research about their healthcare is scarce. Especially, it is worth investigating the factors which are affecting the healthcare service utilization of Japanese retirees in Malaysia.

**METHODOLOGY** Focus group discussions were conducted to 30 Japanese retirees who live in two cities in Malaysia, Kuala Lumpur and Ipoh. Also, six in-depth interviews were conducted to government officials, travel agents as well as Japanese interpreters in the private hospitals. Combining these data from

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multiple perspective, transcripts were coded for analysis by content analysis method to identify what are the factors affecting healthcare service utilization of Japanese retirees in Malaysia. Andersen Healthcare Utilization Model was used to analyse as the conceptual framework, and emerging themes are grouped into three categories, predisposing, enabling and need factors. **RESULTS** Analysis of the data shows that, having credible source of healthcare information is important factor in determining the healthcare beliefs among Japanese retirees. Also, Word-of-mouth information is the informal and easily accessed sources of information about healthcare utilization. However, sometimes, the information may be distorted which reflect the personal opinions of information providers and also may contain exaggeration, hence, sometime not appropriate information, as it may hinder the formulation of healthcare beliefs of Japanese retirees.

**CONCLUSION** In this study, trust is the key concept to determine the decision-making process of healthcare utilization among Japanese retirees in Malaysia. Therefore, it is important to implement public health measures to maintain and improve the sense of trust of Japanese retirees towards the medical systems in Malaysia. There are various ways to gain trust, such as dissemination of information and empowerment program to educate Japanese retirees regarding healthcare systems and cultural aspects of medical care in Malaysia.

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**PS2.367.LB**

**Public private partnerships in the health sector: opportunities, risks and issues of congruence with the sustainable development goals**

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This article first maps the current forms of PPPs in the health sector by reviewing pertinent literature and reflecting on current financing arrangements of health care through traditional (ODA, science research) and non-traditional means (Philanthropy, Market intermediaries). As a second step, the author critically assesses the benefits and risks of the various forms of PPPs in the health sector from the perspective of the Sustainable Development Goals.

One of the main finding is a lack of inclusion of the civil society sector be that consumer groups, professional associations of health care providers or patient associations. This insufficient involvement and participation of civil society runs counter to the goals of the Sustainable Development Goals and particularly runs in opposition of the SDGs principles which are inclusiveness, participation and transparency.

The conclusion offers solutions to the current overemphasis of private sector- new public management approaches and suggests a more comprehensive but also a more sustainable approach consisting of an expansion of the PPP formula to a PPSP formula (Public-Private-Social-Partnership).

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**Monitoring, transparency and accountability framework within global partnerships in the global health sector: considerations for post 2015 SDGS implementation**

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The objective of this paper is to map and review the existing monitoring, transparency and accountability framework and mechanism used by the global partnerships in the global health sector. Comparative analysis will be made of the existing accountability framework and monitoring mechanism by the public-private actors of the health field and how these mechanisms are congruent or incongruent with the Post 2015 Sustainable Development Goals, especially concerning the Public Private Partnerships in the health sector.

In general, the 'non-traditional' funding organizations, GAVI, Global Fund, and MMV are based on policies consisting of accountability frameworks, transparency policies, monitoring procedures and reporting requirements as well as conflict of interest policies. A Governance system and related governance instruments generally exist to ensure fairness, coverage and access to funding at the global level, yet insufficient to mitigate potential conflicts of interest at the country level.

This main finding are not new but mirror similar challenges faced by other international organisations and some donor organisations. What is disturbing is the fact that global partnerships were set up to overcome the weak governance capacity of public administration in many developing countries. To prevent the bureaucratic complications and potential corruptions, global partnerships developed its own delivery mechanisms and processes which bypass whenever possible the national administration and corresponding processes. Implementation of the SDGs, due to its universality applicable to all countries, could potentially divert attention, if not resources, from the developing countries. Lack of organization, management and governance know-how transfer from the high performance partnership organization may point to a different organizational form for international development where imported capacity continues to substitute embedded institutional development.

**DISCLOSURE** Nothing to disclose.