Preliminary Assessment of Microbial Contamination in Urban and Rural Homes of Elementary School Children

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InChildHealth

Preliminary Findings from the InChildHealth Project

- Preliminary data collected within the EU-funded InChildHealth project
- Same data being collected and processed across all partner countries
- Results will include an international comparative analysis

Introduction and Background

Rising Concern

Microbial contamination in indoor environments poses significant health risks for children, who spend up to 90% of their time indoors.

Immune Development

Children are particularly susceptible to microbial exposure due to their developing immune systems.

Environmental Differences

Higher pollution and denser indoor spaces in urban areas may lead to different microbial growth than in rural settings with surrounding vegetation

Key Patterns

Children's primary microbial exposure occurs at home or school, underscoring the need to assess residential contamination to prevent harmful exposure.

Study Design and Methods

Sample Collection

14 homes studied: **9** rural, **5** urban with children aged 6-10 years.

Air Sampling

MAS-100 sampler collected 200L at 100L/min.

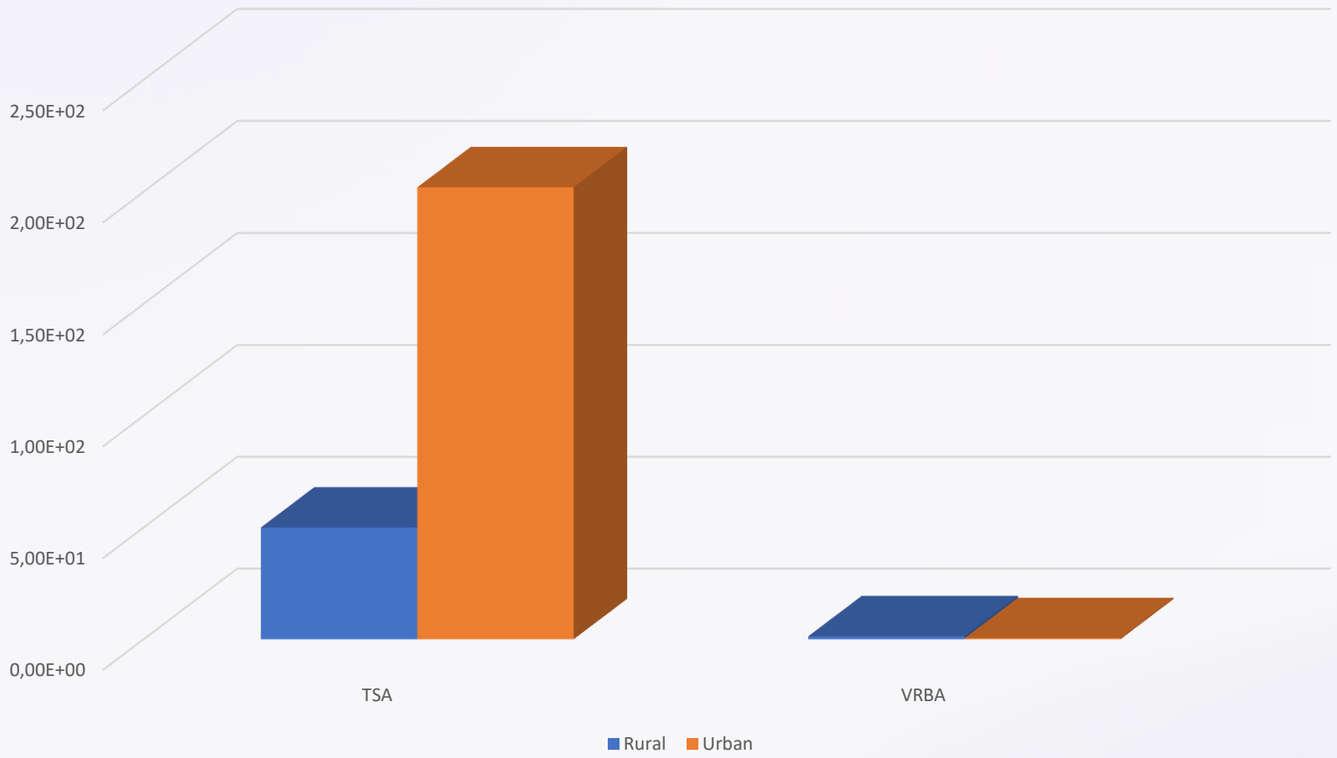
Microbial assessment

- TSA for total bacterial assessment
- VRBA for Gram-negative bacteria
- MEA and DG18 for fungal contamination

Analysis

- Bacterial and fungal quantification performed after incubation
- Fungal identification based on macroscopic and microscopic characteristics

Bacterial Findings



Significantly higher contamination in urban areas: Total bacterial load (TSA) in urban settings reached **202 CFU/m³ — ~4× higher** than rural areas (~50 CFU/m³), suggesting higher bacterial exposure in cities.

For Gram-negative bacteria (cultured on VRBA), **rural areas recorded 1.33 CFU/m³** — a relatively low concentration— while **urban levels were lower,** at approximately 0.5 CFU/m³.

Microbial Load Type	Urban (CFU/m³)	Rural (CFU/m³)
Total Bacterial Load (TSA)	2.02×10^2 (202)	Lower (e.g., ~50)
Gram-negative Bacteria (VRBA)	Lower (e.g., ~0.5)	1.33×10^0 (1.33)

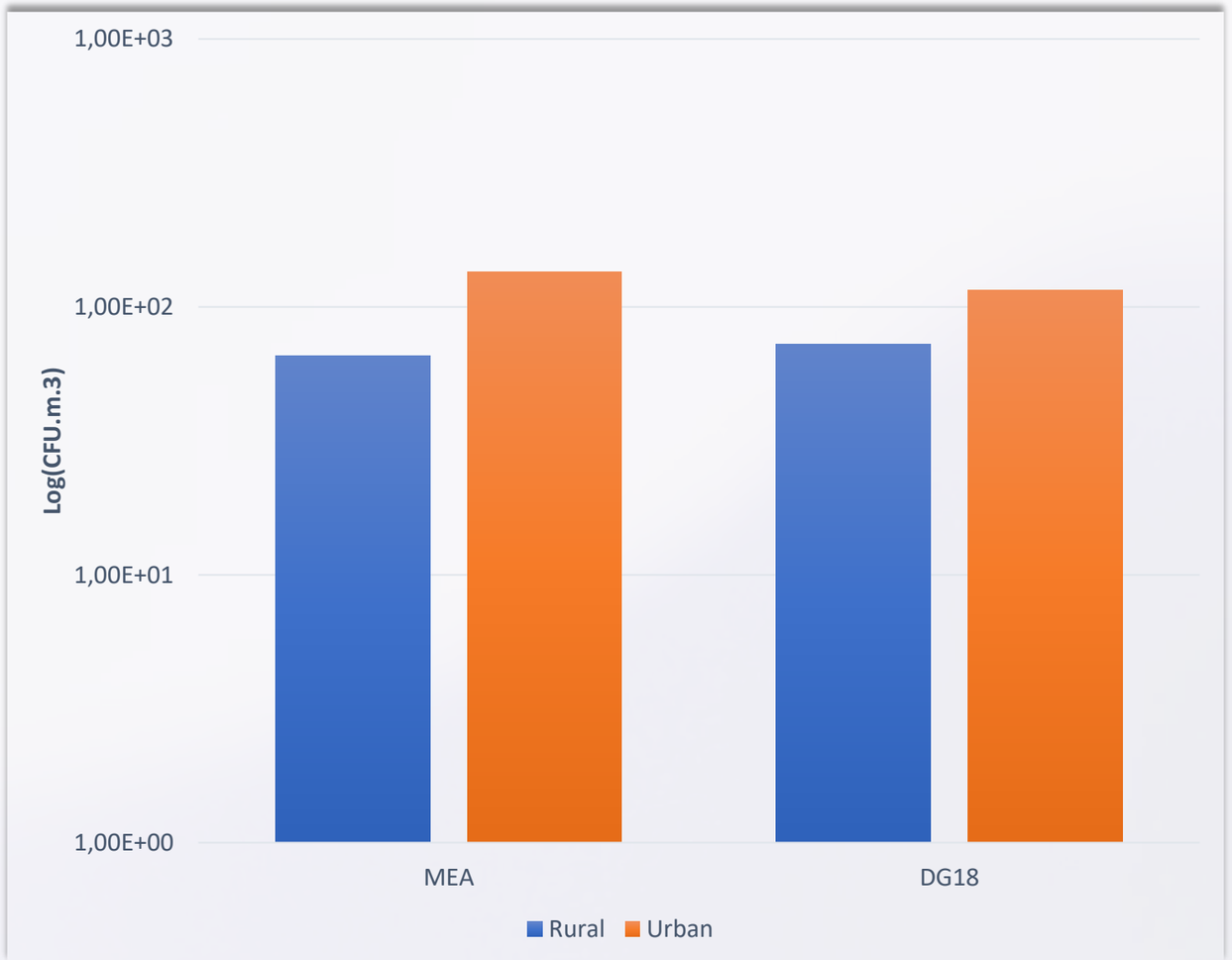
Fungal Findings

Fungal contamination was assessed using both MEA and DG18

- Across both media, fungal loads were consistently higher in rural environments compared to urban ones:

MEA: Higher CFU/m³ in rural homes

DG18: Higher CFU/m³ in rural homes



- The consistently higher fungal loads in rural homes suggest a genuine difference in fungal burden linked to location-specific factors, such as higher humidity, organic matter, or agricultural proximity

Fungal Diversity

- Most prevalent genus: *Cladosporium* sp. in both environments

  Rural: MEA 71%, DG18 77.2%

  Urban: MEA 46.4%, DG18 50.9%

- *Aspergillus* sections more prevalent in rural homes:

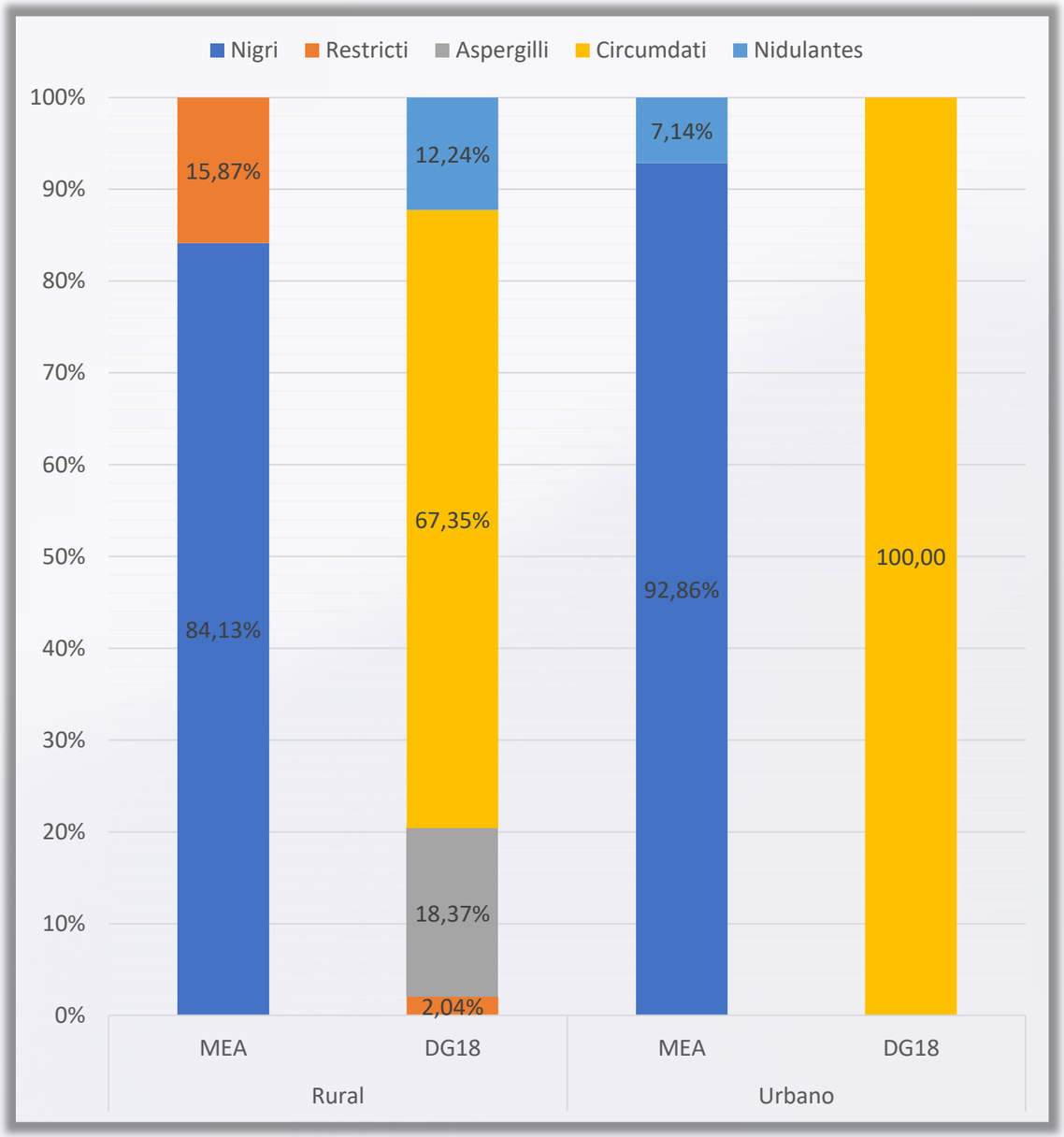
  Rural (MEA): 84% *Nigri*, 16% *Restricti*

  Rural (DG18): 67% *Circumdati*, 18% *Aspergilli*, 12% *Nidulantes*, 2% *Restricti*

- Urban *Aspergillus* diversity:

  Urban (MEA): 93% *Nigri*, 7% *Nidulantes*

  Urban (DG18): 100% *Circumdati*



Urban vs. Rural

Urban Environment

Total Bacterial Load:
- Higher in Urban homes (2.02×10^2 CFU/m^3)

Fungal Load:
- Lower in Urban homes on both MEA and DG18 media

Fungal Prevalence:

- *Cladosporium* sp.46.4% (MEA), 50.9% (DG18)

Aspergillus Section:
- MEA: 93% *Nigri*, 7% *Nidulantes*
- DG18: 100% *Circumdati*

Rural Environment

Total Bacterial Load:
- More Gram-negative bacteria (1.33×10^0 CFU/m^3)

Fungal Load:
- Higher in Rural homes on both MEA and DG18 media

Fungal Prevalence:

- *Cladosporium* sp. 71% (MEA), 77.2% (DG18)

Aspergillus Section:
- MEA: 84% *Nigri*, 16% *Restricti*
- DG18: 67% *Circumdati*, 18% *Aspergilli*, 12% *Nidulantes*, 2% *Restricti*

Health Implications

- **Indoor microbial exposure** can pose **health risks**, especially for children.
- ***Aspergillus*** sections, found in both urban and rural homes, are associated with **allergic reactions** and **respiratory issues**.
- **Distinct fungal profiles** between environments may influence health outcomes differently.
- **Ongoing exposure** to bacterial and fungal contaminants can **affect** children's **immune and respiratory health**.

Key findings and Conclusions

Key Findings

Urban homes had **higher bacterial loads**, while **rural** homes showed **greater fungal diversity**

Health Impact

The presence of potentially **pathogenic fungi**, such as *Aspergillus* sp.,in **both environments**, raising concern for children's health.

Gap

Need for further comparison with **school environments** to identify **key exposure sources** and guide preventive strategies.

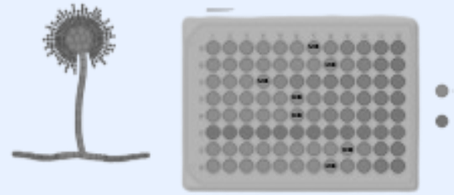
Innovative Approach and Next Steps

The InChildHealth project stands out for its integrated and comprehensive approach.

Objective: to support evidence-based decision-making for healthier school environments.

Mycotoxins

Endotoxins.

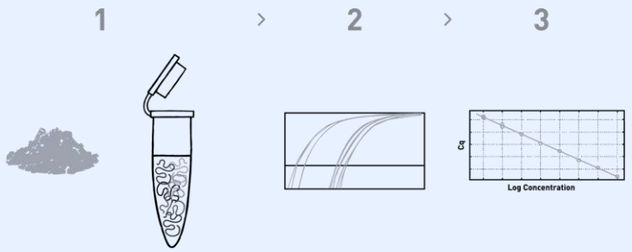


Azol resistance Screening

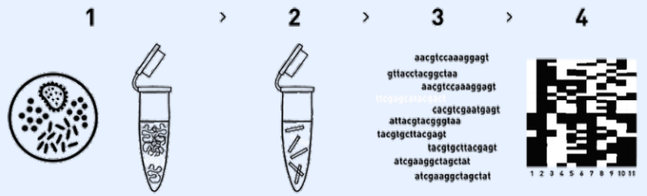
Cytotoxicity

Human A549 adenocarcinoma cells

Swine kidney cell line



Detection of the targeted fungal sections



Metabarcoding

Thank you

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