OHSI & ISES Europe Workshop 2026 · University College Dublin · 10–11 June 2026

Integrating Classical Culture and Molecular qPCR for a Comprehensive Assessment of Fungal Exposure in Primary Schools

Renata Cervantes[1,2] | Pedro Pena[1,2] | Carla Viegas[1,2]

[1] NOVA National School of Public Health, CHRC, NOVA University Lisbon, Portugal
[2] H&TRC – Health & Technology Research Center, ESSL, Instituto Politécnico de Lisboa, Portugal

Indoor Air Quality · Fungal Exposure · Children · *Aspergillus* · qPCR · Culture-based Methods · Azole Resistance · Exposure Assessment

INTRODUCTION

Children are a particularly vulnerable population to indoor fungal exposure [1].

School environments can harbour complex and dynamic microbiomes containing [1,2]:

Allergenic | **Toxigenic** | **Pathogenic**

Characterisation often relies on a single method [3,4]. This may underestimate true exposure [3,4,5]. Some species also carry azole resistance, a growing clinical concern [3,5,6]. Dual approaches capture viable and non-cultivable fractions.

Objective: To compare culture and qPCR for assessing fungal exposure in primary schools.

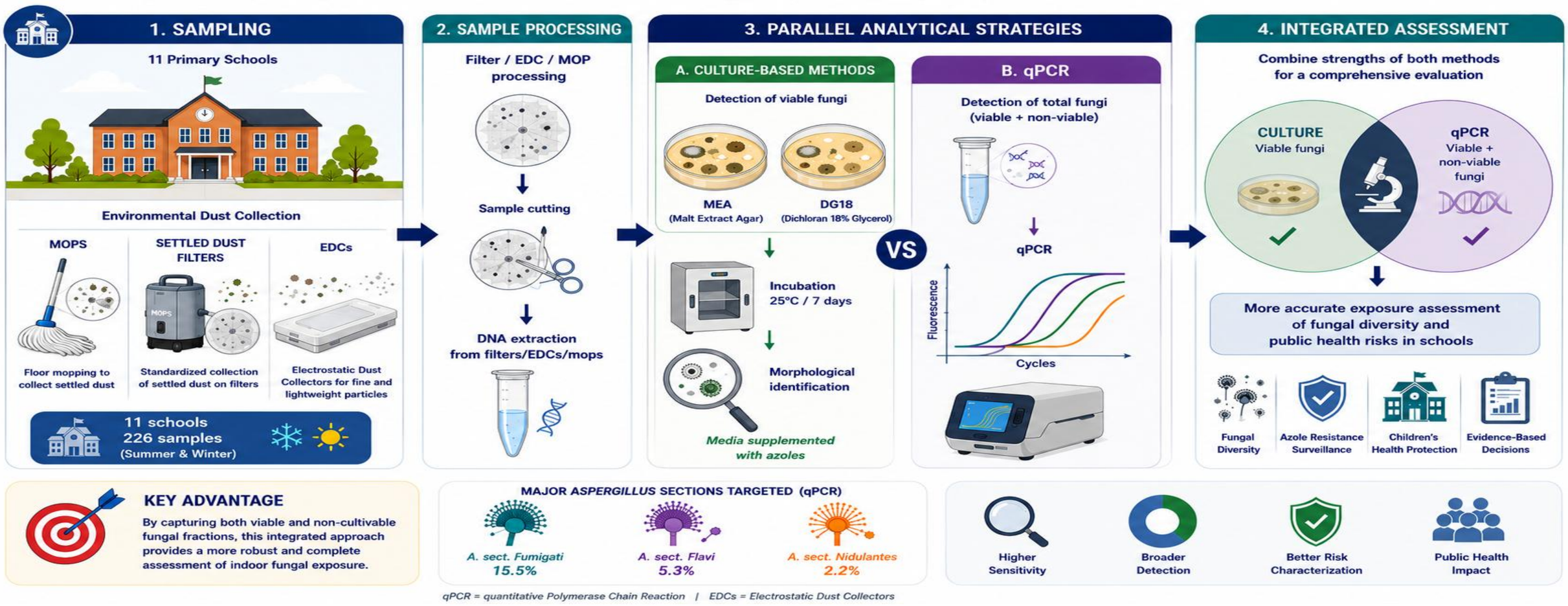
METHODOLOGICAL COMPLEMENTARITY

- Cross-validation: culture verifies viability while qPCR maximises detection and diversity capture.

Aspect	Culture	qPCR
Viability detection	✓	✗
Non-viable fungi	✗	✓
Resistance markers	**Limited**	✓
Sensitivity (Aspergillus)	**Variable**	**Higher**
Diversity capture	**Morphology-limited**	**Broader**

INTEGRATED WORKFLOW: CULTURE + qPCR FOR COMPREHENSIVE FUNGAL EXPOSURE ASSESSMENT

Capturing both viable and non-cultivable fungi for a more complete picture of school indoor environments



KEY ADVANTAGE

By capturing both viable and non-cultivable fungal fractions, this integrated approach provides a more robust and complete assessment of indoor fungal exposure.

MAJOR *ASPERGILLUS* SECTIONS TARGETED (qPCR)

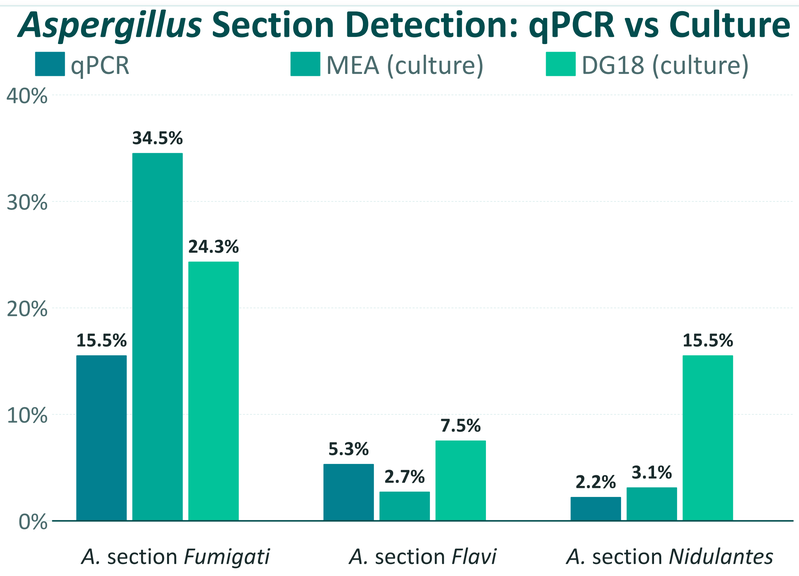
- *A. sect. Fumigati* 15.5%
- *A. sect. Flavi* 5.3%
- *A. sect. Nidulantes* 2.2%

Higher Sensitivity | Broader Detection | Better Risk Characterization | Public Health Impact

qPCR = quantitative Polymerase Chain Reaction | EDCs = Electrostatic Dust Collectors

RESULTS

Aspergillus Section Detection: qPCR vs Culture



KEY STATISTICS

23% of samples positive for *Aspergillus* sp. by qPCR

qPCR — *Aspergillus* Sections Detected

Aspergillus* section *Fumigati
15.5%

Aspergillus* section *Flavi
5.3%

Aspergillus* section *Nidulantes
2.2%

Culture-Based Methods — *Aspergillus* Detection

Aspergillus Section	MEA (%)	DG18 (%)
A. section *Fumigati*	**34.5%**	**24.3%**
A. section *Flavi*	**2.7%**	**7.5%**
A. section *Nidulantes*	**3.1%**	**15.5%**

KEY FINDING

Only 1.3% of qPCR-positive *Aspergillus* samples were culture-positive. Molecular methods are essential for exposure assessment.

CONCLUSIONS

01 qPCR detected *Aspergillus* in 23% of samples, far above culture.

02 Only 1.3% of qPCR-positive samples were culture-positive.

03 Two methods, two fractions: viable plus non-cultivable.

04 *Aspergillus* targets detected; resistance surveillance ongoing.

05 Integrated dual methods enable accurate, evidence-based decisions.

Additional data will be presented at the OHSI & ISES Europe Workshop 2026

Acknowledge

The authors gratefully acknowledge FCT/MCTES UIDP/05608/2020 (https://doi.org/10.54499/UIDP/05608/2020) and UIDB/05608/2020 (https://doi.org/10.54499/UIDB/05608/2020. This work is also supported by national funds through FCT/MCTES/FSE/UE, 2023.01366.BD (https://doi.org/10.54499/2023.01366.BD), and 2025.02613.BD. This project was funded by the European Union (grant agreement: 101056883). Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Health and Digital Executive Agency (HaDEA). Neither the European Union nor the granting authority can be held responsible for them. InChildHealth is also receiving funding from the Swiss State Secretariat for Education, Research and Innovation (SERI grant agreement 22.00324), from the United Kingdom Research and Innovation (UKRI grant agreement 10040524), and from the Australian National Health & Medical Research Council (NHMRC grant agreements APP2017786 and APP2008813).

The InchildHealth Project | References | LinkTree

* Corresponding author: Renata Cervantes | renata.cervantes@estesl.ipl.pt | H&TRC – ESTeSL, Instituto Politécnico de Lisboa, Portugal