

**ORAL COMMUNICATIONS III** 

### CHARACTERIZATION OF MICROBIOLOGICAL CONTAMINATION IN PORTUGUESE ELEMENTARY SCHOOLS

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Identification of body burdens resulting from multipollutant (real-life scenario) indoor exposures and associated health effects, with specific focus on vulnerable population groups and sensitive life stages.

InChildHealth addresses the call HORIZON-HLTH-2021-ENVHLTH-02-02: Indoor air quality and health

Bolsa de Investigação: Ref.ª: IPL/2022/InChildhealth/BI/12M





CHARACTERIZATION OF MICROBIOLOGICAL CONTAMINATION IN PORTUGUESE ELEMENTARY SCHOOLS

- > 90 % of children time is spent in indoor environment<sup>[1]</sup>
- Most school-age children's exposure occurs in schools, at home<sup>[2]</sup>, in sports halls, and in commuting









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CHARACTERIZATION OF MICROBIOLOGICAL CONTAMINATION IN PORTUGUESE ELEMENTARY SCHOOLS



> IAQ is an important determinant of human health, especially for children<sup>[3]</sup>

Impact the school occupants 'health and well-being<sup>[4]</sup>



Impact learning conditions<sup>[4]</sup>



More efficiency, more sustainability (at all levels)<sup>[4]</sup>



Good IAQ, optimal ventilation, healthy buildings, healthy environment<sup>[4]</sup>





**PROJECT GOALS** 



- Characterization of air quality in children's environments
- Identification of emission sources and influencing factors affecting children's exposure
- Estimation about associated health effects resulting from exposures
- Development of novel technologies to improve indoor environmental quality to reduce health effects
- Engaging school children, educational experts, and policymakers in the scientific process.
- Preparation of quality standards and guidelines regarding IAQ





Quality standards and guidelines, policy briefs and training material, conference, FAIR datasets

**INCHILDHEALTH PROPOSAL** 

#### Indoor environments to be assessed:

- 5 elementary schools (1 classroom, 1 outdoor, 1 sports/hall)
- 5 houses

### Sampling methods:

- Settled dust (composite sample)
- EDC

#### Assays:

- Fungi qPCR
- Metabarcoding of bacteria and fungi
- Detection of mycotoxins and endotoxins

Schools Sports Halls Homes Outdoor	WP2 - Sources and routes of exposure Micro-environments assessment approach	<ul> <li>WP4 – Technology development and mitigation strategies, interventions</li> <li>Monitoring devices: LAMP, miniAero, Aero-S3DP, AMR-S3DP and AirSensis.</li> <li>Personal monitoring approach with wearable and silent personal monitoring system (PM10, PM2.5, CO2, VOC- Transport contribution)</li> <li>Image: A stransport contribution</li> <li>Image: A stransport co</li></ul>
Physical parameters and chemical pollutants	Microbial contamination	
Online measurements tested against conventional methods Temperature, humidity, PM, VOCs, CO <sub>2</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , NH <sub>3</sub> , H <sub>3</sub> S, CH <sub>4</sub> , O <sub>3</sub> ,	Active sampling Impinger and Impaction Microbial assessment by culture-dependent and	
Radon, BC, nanoparticles emerging pollutants	independent methods, microbial resistance profile, mycotoxins and endotoxins	strategies, hygiene strategy
WP3 – Epidemiological studies and controlled interventions Health effects of airborne exposures on respiratory symptoms and infections Absenteeism, cognition, fatigue, headache	WP5 – Exposure assessment and health risk characterization Integrated Risk Assessment tool for 7 European cities exposure $t_i = \sum_{i=1}^{n} C_i t_{ij}$	WP6 - Citizen engagment / science Co-creation of training material ar participation in research activities Impact assessment framework
Cytotoxicity pipeline	<i>j</i> -1	1

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CHARACTERIZATION OF MICROBIOLOGICAL CONTAMINATION IN PORTUGUESE ELEMENTARY SCHOOLS - PROPOSAL

#### Indoor environments to be assessed:

- 6 elementary schools (1 classroom, 1 cantine, 1 library, 1 sports/hall, locker rooms, 1 outdoor)
- 5 Houses

### Sampling methods:

- Air sampling (MAS, Andersen, Coriolis)
- Settled dust (composite sample)
- EDC (including on T-shirts)
- Swabs
- Mops

#### Assays:

- Culture based-methods (Fungi and bacteria)
- Azole resistance screening
- Aspergillus section Fumigati sequencing and mutations detection

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- Mucorales order resistance screening and sequencing
- MRSA
- Fungi qPCR
- Metabarcoding of bacteria and fungi
- Detection of mycotoxins and endotoxins
- Cytotoxicity (A549 lung)



**METHODOLOGY FOR EXPOSURE ASSESSMENT** 





### Active Sampling

Air sampling:

MAS

Andersen

Coriolis

**Passive Sampling** 

- Settled dust
- EDC
- Swabs
- Mops

#### Culture-based methods (fungi and bacteria)

Microbial Resistance screening

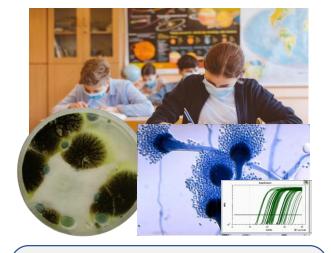
Toxigenic fungi detection through qPCR

Detection of mycotoxins and endotoxins

Cytotoxicity assessment



**OUTCOMES** 



Characterization of microbial exposure in schools indoors

Guidance material for exposure assessors in IAQ assessments

Health promotion and disease prevention in the school community and beyond



Awareness of the decision-makers

Guidelines and policy briefs for EU policies and recommendations



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**R**EFERENCES



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[3] Vanos, J. K. (2015). Children's health and vulnerability in outdoor microclimates: A comprehensive review. Environment International, 76, 1–15. https://doi.org/10.1016/j.envint.2014.11.016

[4] UN. THE 17 GOALS | Sustainable Development [Internet]. 2015 [cited 2022 Mar 30]. Available from: <u>https://sdgs.un.org/goals</u>



**ENVIRONMENTAL HEALTH TEAM** 









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