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Lesson's learned from the SINPHONIE project:
Children's health and indoor pollution:
main outcomes of multi-country projects

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Health and Environment TA - REC in the H&E process

- Supporting cooperation between environmental/health and other sectors (energy, transport, education) by policy integration on international and national level in CEE, SEE regions and beyond
- Strengthening the role of the precautionary principle in public health and environment protection
- Implementation of the EU E&H Strategy and the Parma/Ostrava Declaration of WHO Europe by active involvement in the European processes and ***multi-stakeholder cooperation***
- Regional participation in implementation of the WHO Europe Children's Environment and Health Action Plan on Transport, Health and Environment, and and Air quality and health)
- Active participation in climate change adaptation and mitigation to health
- Support to the SEE region in sectoral cooperation Transboundary Air Pollution, Protocol on Water&Health, chemicals and health
- Contribution to the Environment for Europe process – air quality, health risk assessment



Commitment to Act (ministerial level): Parma (2010), Ostrava Declaration, Annex 1 (2017) on Environment and Health

- Preventing disease through improved outdoor and indoor air quality
 - by appropriate cross-sectoral policies and regulations capable of making a strategic difference in order to reduce indoor pollution
 - By providing each child with a healthy indoor environment in child care facilities, kindergartens, schools and public recreational settings, implementing WHO's indoor air quality guidelines

Contribution to the UN 2030 Agenda for SD (3.9., 4.a)



Multi-country projects: contribution to Parma/Ostrava commitments

SINPHONIE: School Indoor Pollution and Health Observatory Network in Europe. www.sinphonie.eu

- a complex research project covering the areas of **health, environment, transport & climate change**
- aims at improving **air quality in schools and kindergartens**
- the project was implemented under a European Commission service contract (DG Sanco), 36 E&H institutions/25 countries

SEARCH: School Environmental and Respirator Health of Children. www.search.rec.org

- Implementing the EU Environment and Health Action Plan and the CEHAPE of the WHO Europe in air quality and health by development of efficient instruments/tools for multi-stakeholder cooperation (**AirPack**, E&H assessment) in 10 countries.



Objectives of the SINPHONIE project

- To **review previous research** on IAQ and its impact on health in schools, and to assess the policy relevance of the research objectives and conclusions.
- To **assess the outdoor/indoor school environment and its impact on health.**
- To **manage health risk of children and develop guidelines/recommendations for schools.**
- To **disseminate these guidelines/recommendations to relevant stakeholders.**

Partners involved: 38 environmental and health institutions

from 25 countries

- REC
- IDMEC-FEUP
- NIEH
- JRC
- IPH-ALB
- IPH-BH
- UBA-A
- VITO
- LABOREX
- LGH
- CSGL
- NPFI-CZ
- HPI
- THL
- CSTB
- UBA
- UOWM
- NKUA
- UMIL
- USiena
- CNRPalermo
- KTU
- UMalta
- IOMEH
- UAVR
- UBB
- TNO
- HVDGM
- NILU
- PHA-SK
- IV
- UCL
- REC Hungary
- Albania, B&H, Serbia



25 countries



- **Cluster 1: Northern Europe**
 - Cold climate, cold winters
 - Large differences old vs new buildings ; Well insulated rooms, ventilation systems (Norway, Sweden, Finland)
- **Cluster 2: Western Europe**
 - Moderate climate, moderately cold winters
 - Differences old vs new buildings (ventilation, insulation, passive and low energy construction)
- **Cluster 3: Central and Eastern Europe**
 - Colder climate, cold winters
 - Moderate to low insulation no ventilation systems
- **Cluster 4: Southern Europe**
 - Warm , warmer winters Mediterranean climate
 - Moderate to low insulation
 - Ventilation

Sinphonie's ultimate goal:

to define/create a “Healthy school environment”

1. by studying pupil's HEALTH versus school INDOOR environment

2. by studying school INDOOR environment vs. SOURCES/INFLUENCES

by IAQ policy and guidelines, tackling relevant sources!

www.sinphonie.eu



1st step: Characterization of the school buildings (WP3.1)

- Selection of schools (5 primary schools per country, which one is a kindergarten)
- Selection of classrooms (3 class per school)
- School and classroom checklists to be used during the inspection and characterization of the school buildings and classrooms
- Teachers and cleaning staff classroom checklist to be completed by the teacher and cleaning staff during the week of the field campaign, for the schools and kindergarten.

> **Protocol on school characterisation**

2nd Step: Environmental sampling/measurements (WP3.2 & WP 3.3)

Main study (18 physico-chemical parameters + biological agents)

- Formaldehyde
- Benzene, trichloroethylene, tetrachloroethylene
- Pinene, limonene
- NO₂, O₃
- PAH (BaP and naphthalene)
- Radon
- CO, CO₂
- PM10/PM2.5
- RH, Temperature
- Ventilation rate
- Endotoxin, ergosterol
- Specific fungal and bacterial groups
- Allergens
- 120 schools
- Per 5 primary schools, one kindergarten
- 3 classrooms – 1 outdoor site
- Winter season (Oct. 2011 – March 2012)

→ Protocol I/O measurements physical and chemical parameters

→ Protocol for sampling of biological contaminants

SINPHONIE WP4: Assessment of health outcomes

- **To standardize the data collection** on familial factors, lifestyle, relevant exposures in the home environment and **on health status of children by questionnaire surveys**, focusing on asthma/respiratory infections/upper respiratory tract symptoms/cough/wheeze/dyspnea/allergic rhinitis/bronchitis;
- **To standardize the data collection** on the respiratory health of children by assessment **of absenteeism** from schools (or kindergartens) due to respiratory diseases;
- **To provide protocols, procedures** of quality control and training for the measurement **of lung function** in children;
- **To provide protocols and training** for a simple test for **attention/concentration ability** to be performed in each classroom.

SINPHONIE WP4

Assessment of health outcomes

Clinical field survey (WP4.1)

Clinical tests and noninvasive biomarkers (WP4.2)

Task 1 - Questionnaires

- Questionnaires to be completed by the children/parents/teachers

Task 2 - School absenteeism

- Protocol to measure absenteeism from schools (or kindergartens) due to respiratory diseases

Task 3 - School performance

- Protocol for attention/concentration tests

Task 4 - Lung function

- Protocol for lung function measurements, including criteria for quality control

Main results

There are three final publications of the SINPHONIE project on the European Commission's JRC Publications Repository website and the SINPHONIE project website, www.sinphonie.eu

- The SINPHONIE Guidelines Report in three languages (EN, DE and FR) (<http://publications.jrc.ec.europa.eu/repository/handle/JRC87071> and www.sinphonie.eu/publications)

Guidelines for healthy environments within European schools in 22 languages

- The SINPHONIE Final Report (in English) (<http://publications.jrc.ec.europa.eu/repository/handle/JRC91160> and www.sinphonie.eu/publications)
- The SINPHONIE Executive Summary of the Final Report in three languages (EN, DE and FR) (<http://publications.jrc.ec.europa.eu/repository/handle/JRC91163> and www.sinphonie.eu/publications)

Main health outcomes associated to environmental exposure

- Up to 1.5% of schoolchildren had **asthma attacks** in school, 100.000 cases in schools.
- The **prevalence of diagnosed asthma**, nasal allergies and eczema among schoolchildren was 8%, 9% and 17% respectively.
- Children in schools with elevated levels of chemical air pollutants are at **higher risk** of suffering from recent symptoms **related to several respiratory illnesses**.
- Many of the **teachers had respiratory problems** and almost 17% suffered from coughing or phlegm, 27% had suffered from a nasal allergy in their life and 9% had **asthma diagnosed by a doctor**.
- In 5% of schools, smoking is still permitted indoors, even if within a specific smoking area.

Main health outcomes associated to environmental exposure 2

- In terms of **occupation density**, 8% of the classrooms provide less than 1.5 m²/child, and 20% provide less than 2 m²/child, which represents a high potential for quite low ventilation rates per capita affecting children's health and **learning performance**.
- With respect to **monitored indoor bio-contaminants**, 50% of children and teachers were exposed to high levels of endotoxins and microbes in the current study.
- 67% of the **SINPHONIE schools were located near to traffic routes and 45% near to industrial areas**. In these schools, there was higher exposure to **particulate matter, NO₂ and benzene**, according to the current study.

See more on the website www.sinphonie.eu/publications



Main conclusions

There is a need for further research and policy on

- School building ventilation (CO₂, IAQ, health)
- Building sites for schools (NO₂, benzene, PM_{2.5})
- Protection of schools in more “aggressive” outdoor environment
- Construction strategies (radon, formaldehyde); verification of effectiveness
- Building materials and consumer products

There is a need for local action on energy savings and better comfort in schools and office buildings

- Insulation and modernisation

SINPHONIE Guidelines, recommendations

- Implementing a tier-based tool kit for a healthy school environment in Europe (indicators, st. questionnaires, protocols, clinical tests, the auditing of school buildings, assessing health in the school environment (PILOT IA MONIT))
- Establishing a European medical surveillance system for screening the health of children/school staff.
- Guidance on implementing a national programme for a sustainable school environment in European countries.
- Adequate management of outdoor air pollution (traffic, industrial activities) near to the schools to meet the target values (EU legislation in line with the WHO guidelines)

Lessons learned

- SINPHONIE Final Report and SINPHONIE Guidelines
- **International/multi-county project based cooperation in IAQ**
- The need of **national legal framework for better IAQ**
- **Standards** for monitoring and assessment of IAQ
- **Further research in IAQ/outdoor AQ on health effect (risk) of mixture of pollutants**
- **Support and Technical assistance of WHO and EC**

Reference: *SINPHONIE Final Report*

- Éva Csobod, Isabella Annesi-Maesano, Paolo Carrer, Stylianos Kephelopoulos, Joana Madureira, Peter Rudnai, Eduardo de Oliveira Fernandes, Josefa Barrero-Moreno, Tímea Beregszászi, Anne Hyvärinen, Hans Moshhammer, Dan Norback, Anna Páldy, Tamás Pándics, Piersante Sestini, Marianne Stranger, Martin Täubel, Mihály J. Varró, Eva Vaskovi, Gabriela Ventura and Giovanni Viegi. *Co-published by the European Commission's Directorates General for Health and Consumers and Joint Research Centre, Luxembourg, 2014. www.sinphonie.eu*



Further research area/ future projects

- USE the results of SINPHONIE and SEARCH on national level
- Mobility and health (across Europe)
- Water and health (CEE, SEE)
- Consumption patterns and health (across Europe)
- Climate change and health (WHO, WG)
- Health, wellbeing and use of natural resources
- Health, social vulnerability and energy poverty
- *Focus on cities (example: **ClairCity**, www.claircity.eu).*

Thanks for your attention. 😊

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