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Turning research into action
Recommendations for a healthy school environment in Europe
The SINPHONIE (Schools Indoor Pollution and Health: Observatory Network in Europe) project, supported by the European Parliament and coordinated by the European Commission’s Directorate General for Health and Consumers (EC DG SANCO), is the first pilot project to monitor the school environment in 25 European countries in parallel. A wider understanding of children’s exposure to particular indoor air pollutants, and evaluating the associated health risks, are prerequisites for providing policy recommendations. Research of this nature involves assessing indoor environments; undertaking the toxicological assessment of chemical hazards; and monitoring health impacts related to the indoor environment.

The dissemination of outcomes is ensured by activities throughout the project involving students, teachers, school staff and parents, thus cultivating a proactive attitude towards achieving better indoor air quality (IAQ) in schools and, hopefully, by extension at home.

In order to continue the unique partnership between environment and health research, the SINPHONIE partners are committed to following up the project in order to gain greater research experience on IAQ and children’s health in Europe. The results of the SINPHONIE project have raised new research questions on healthy school building materials, children’s comfort and school ventilation. The project partners will apply for EU funding to complete the IAQ research and provide a greater body of evidence to contribute to the development of school health policy.

**SINPHONIE in action**

SINPHONIE is a complex research project focused on the relationship between environment and health, with the primary aim of improving air quality in schools and kindergartens.

The SINPHONIE project was designed to run for two years and the consortium comprised 38 partners from 25 countries, with one associated partner from Belgium. All partners have scientific expertise and an ability to disseminate project outcomes to stakeholders, including policy makers, building designers, builders, building managers and building users, especially teachers and students. The project is implemented under an EC service contract (DG SANCO).

With its special focus on schools and childcare settings, the project aims to capitalise on existing knowledge and to extend the range of information available, covering old and new EU member states and some accession countries using a standardised procedure in order to be able to produce a set of policies, guidelines and good practices that ensure the best indoor environment for children in schools within Europe.
Risk assessment

**SOURCES OF POLLUTION**

In Europe, students, teachers and other school staff use school buildings for a large part of the day. Students are at risk from indoor air pollution as a result of various pollution sources, including activities. The SINFONIE project has indicated frequent IAQ problems in European schools due to polluted outdoor air, poor building construction and maintenance, poor cleaning and poor ventilation.

The quality of the indoor air is affected by various pollution sources and can be improved by controlling those sources and effective ventilation. Major sources of indoor air pollution are building construction and decoration materials, furnishings, and the activities of building occupants (e.g. smoking, cleaning products, paints, glues and other consumer products, and generating humidity and CO₂). Other major outdoor contributing factors include traffic-related and industrial pollution, as well as the type of ground on which the school is built.

**HEALTH IMPACTS**

Common indoor pollutants in schools are particulate matter, nitrogen dioxide, volatile organic compounds (VOCs), formaldehyde, biological agents such as indoor allergens (from mites, cats, dogs, cockroaches and fungi), moulds, viruses and bacteria. These air pollutants can be found in classrooms, sometimes in elevated concentrations, often higher than outdoors.

As a result, poor IAQ in schools can lead to discomfort, irritation and various short- and long-term health problems; aggravate existing health problems, including asthma and allergies; spread airborne infectious diseases; reduce teacher, staff and student productivity; and increase absenteeism.

Children are at particular risk of IAQ-related problems, especially those already suffering from allergies, asthma or airway hyper-reactivity.

Risk management

**SCHOOL ENVIRONMENT**

Poor IAQ may have an impact on the respiratory and general health of pupils and school staff, and may affect their general wellbeing.

An increased prevalence of bronchial asthma has been documented in recent decades in the industrialised world, including Europe. Asthmatic children are known to be exceptionally sensitive to the effects of poor air quality. Schools are a critical setting for susceptible segments of the population, due both to the amount of time spent there and the general lack of care given to indoor and outdoor conditions. This should help to explain a large amount of evidence on the potentially harmful health impacts of a variety of indoor pollutants found in school environments.

**INDICATORS**

In order to gain a better understanding of the impact of measures to improve general environmental conditions (including hygiene) in schools, and to estimate the costs involved, four criteria have been established:

- **Effectiveness** — analysing the potential and expected changes in terms of risks and impacts.
- **Proportionality** — carrying out a cost-benefit analysis in terms of health gain, allowing national and local authorities to evaluate measures and more accurately judge their economic feasibility.
- **Practicality** — assessing the extent to which guidelines and recommendations can be implemented, enforced and managed.
- **Monitorability** — looking at the direct and indirect impacts of policy measures undertaken and generating an overview of the costs of monitoring.

By allowing greater insight into the costs and benefits of possible measures, these criteria will also support the prioritisation of potential measures in European countries. A roadmap of the necessary changes and financial coverage for them should be discussed with the school staff and owners.
General policy recommendations

Based on the review of national guidelines and recommendations, there are five suggested categories of measures for achieving a safe and clean indoor environment in European schools:

**AWARENESS RAISING**
Indoor hygiene can be improved enormously by educating school staff, cleaning staff, parents and pupils. This requires structured awareness raising — that is, a mechanism that is routinely repeated over a certain period of time rather than individual events. Education on cleaning, good hygiene practices and the characteristics of particular building products can influence behaviour and lead to improvements in health. Smoking produces several harmful chemical compounds. Where smoking still takes place in schools, bans should be reinforced.

**CLEANING PROCEDURES AND FREQUENCY**
It is expected that basic cleaning, while involving the least expenditure, will make the biggest contribution to preventing the spread of infectious diseases. Care must be taken with regard to cleaning products used and timing — not before classes!

**USE OF PRODUCTS AND MATERIALS**
By knowing which building materials, furnishings and other products contain and emit certain pollutants, knowledge-based decisions can be made to avoid the use of some products and replace them with others that do not lead to poor IAQ and that reduce health risks.

**VENTILATION**
Good ventilation in classrooms has been shown to lower concentrations of CO$_2$ in the indoor air, improving children’s ability to focus and learn. Concentrations of indoor air pollutants are also lower where good ventilation is ensured (either by opening windows or by a mechanical system).

**TECHNICAL INTERVENTIONS**
New school buildings can be designed, or (parts of) existing buildings can be renovated, with specific attention to indoor hygiene and proper ventilation solutions.

Tips for schools

The experts involved in the SINPHONIE project have come up with a list of practical tips that can help school staff, teachers and children to create a healthier school environment:

**CLEANING**
- Choose less-polluting cleaning products (marked with an eco-label).
- Organise cleaning in each location in the school at the end of each teaching day, rather than just before the start of the teaching day.

**REDUCING SOURCES OF POLLUTION**
- Choose appropriate materials before starting renovation or maintenance work. Try to limit exposure to building materials that contain substances linked to asthma or other respiratory diseases.
- Check whether low-emission emulsion paint (e.g. water-based paint) can be used instead of varnish. If using varnishes, try to use low-pollutant varieties.
- Following renovation, increased levels of VOCs can generally be temporarily measured in the indoor air. This pollution can be reduced beforehand by using appropriate building materials and increasing ventilation.

**VENTILATION**
- Open the windows wide before the start of the teaching day and throughout each break.
- If opening the windows does not ensure sufficient ventilation, an auxiliary mechanical system might be necessary to assure better IAQ.
- Effective ventilation is key to ensuring comfort on warm days, preventing mould build-up, and reducing concentrations of polluting contaminants indoors, such as particulate matter, VOCs, CO$_2$, etc.

Further information about project activities can be found on the project website (www.sinphonie.eu).