

Initiatives at the European Respiratory Society on indoor air quality

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The European Respiratory Society (ERS) www.ersnet.org is a not-for profit, international medical organisation with over 8,000 members from 100 countries. It is the largest society in Europe promoting respiratory health and lung research in Europe. These objectives are accomplished by promoting basic epidemiological and clinical respiratory research, collecting and disseminating scientific information, organising congresses and conferences, producing scientific publications, supporting training and continuous education in respiratory medicine and collaborating with organisations representing patients. Its sister organisation the European Lung Foundation (ELF) www.european-lung-foundation.org was created by the ERS in 2000 with the mission of making its expertise in respiratory medicine and respiratory health more accessible to the European scientific community and the European public. The ELF is the only pan-European foundation dedicated to advancing lung health in all its aspects.

Indoor air quality is important because people spend more than 90% of their time indoors. Many biological and non-biological agents contaminate indoor air and several scientific studies have identified a number of specific air pollutants as the cause of medical problems among children and adults. Buildings tend to be constructed to be more energy efficient. To reduce the cost of heating or cooling, this energy efficiency translates into greater recirculation of air with indoor pollutants and decreased fresh air intake. A proper ventilation is critical since energy costs are driving the population into very tight unvented occupancy which leads to accumulation of pollutants. Indoor air quality has been associated with respiratory diseases such as asthma and allergies, chronic obstructive pulmonary disease, lower respiratory infections and lung cancer.

The link between indoor factors and respiratory diseases has been well elucidated and several documents provide background information of the scientific evidence. In particular, WHO documents on indoor air quality are available (<http://www.who.int/mediacentre/factsheets/fs292/en/index.html>). A comprehensive report of the European Federation of Allergy and Airways Diseases Patients'

Associations “Towards Healthy Air in Dwellings in Europe (the THADE Report) indicates the major issues in the field and presents several options for a European programme on indoor air quality

(<http://www.efanet.org/activities/documents/THADEReport.pdf>). In a position paper to be published soon, the Environment and Health Committee of the ERS highlights the sources and substances of concern for possible health effects, indicate priorities for intervention, and propose issues for policy building at EU level.

SOURCES OF INDOOR AIR POLLUTION AND SUBSTANCES OF CONCERN

The major sources of indoor air pollution are:

- Tobacco smoke, wood and coal combustion, and unvented kerosene heaters
- Building materials and furnishings
- Products for household cleaning and repair
- Central heating, cooling, air conditioning and humidifying systems
- Domestic flora and fauna, including all types of furry pets and birds

The most important non-biological substances include: respirable particles (from environmental tobacco smoke (ETS), fireplaces, wood and coal stoves, unvented kerosene heaters are the main source of respirable particles... which have been shown to be significantly associated with acute and chronic respiratory illnesses and with lung cancer (ETS). Exposure is higher in unventilated places. Large number of people are exposed to ETS and the potential harm is considerable for both children and adults. Almost 20.000 deaths per year have been estimated among non-smokers in Europe as result of passive smoking exposure at home or at work. A recent evaluation from IARC has considered emissions from coal combustion to be carcinogenic to humans (group 1) and emissions from combustion of biomass fuel (mostly wood) to be probably carcinogenic (group 2A). Gases (CO, NO_x, NO₂) (from gas stoves, pilot lights on any gas appliance, kerosene stoves and heaters, and environmental tobacco smoke) among which NO₂ is associated with increased respiratory symptoms and asthma aggravation. Formaldehyde (a volatile organic compound present in urea-formaldehyde foam insulation, glues, adhesives, fiberboard, pressed board, plywood, particle board, carpet backing, and fabrics), which in high concentration causes irritation of the eyes and throat, nausea, and difficulty breathing. There is some evidence that chronic exposures to formaldehyde are associated with lung and nasopharyngeal cancer. Volatile and semivolatile organic compounds (from household products such as paints, paint strippers, aerosol sprays, and art supplies, pesticides, fungicides, herbicides, and the combustion of wood, tobacco, and kerosene) related to irritation symptoms; and radon (derived from the radioactive decay of radium, a ubiquitous element found in rock and soil but also found in most homes at very low levels). Long term exposure may pose a substantial risk of lung cancer. The health hazards from radon are among the best-characterized of any housing-related health hazard. They have been extensively reviewed by several national and international committees and have been the focus of a European collaborative analysis of case-control studies (Darby et al, 2005). The risk estimates

suggest that around one in 20 to one in ten cases of lung cancer can be attributed to residential radon exposure. Ventilation can reduce also radon concentration indoors. The most prevalent biological agents found in indoor air include moulds, dust mites, viruses, bacteria, fungi, pollen grains, dust mites, insects and human and animal danders. Mould and dampness which encourages the growth of fungal spores may cause true allergy reactions, and mycotoxins released from moulds are thought to have independent toxicity. Dampness and mould have been linked to asthma. There is evidence for both onset of new asthma cases and increased asthma symptoms on previously sensitized individuals. Mould growth occurs when the ventilation is poor and the humidity levels are high. These conditions are not uncommon across Europe. Intervention studies have shown that increasing ventilation and reducing humidity can decrease mould. Dust mites are responsible for asthma-like symptoms and allergies both among children and adults. Endotoxins from gram negative bacteria have been found to contaminate ventilation systems and air-conditioning systems causing upper respiratory inflammation or pneumonitis. Pets including birds, dogs and cats have feathers and dander; excrete proteins in their saliva, urine, and feces that can be allergenic; and release other biologic organisms with respiration.

RESEARCH NEEDS AND PRIORITY SETTING

There is no formal assessment of priorities for intervention in EU as inventory of the indoor environment has not been completed, data on prevalence of the exposures are not uniformly collected and the overall health impact has not been estimated. However, it is proposed that ETS, indoor biomass combustion, dampness and moulds, and radon are the most critical exposures requiring public health attention. The health effects of ETS have been well elucidated in a document produced by the European Respiratory Society (ERS, Lifting the smokescreen, 2006, www.ersnet.org).

PROPOSAL FOR POLICY BUILDING AT EU LEVEL

The THADE Report referenced above has suggested several actions and measures at EU level for a better indoor quality.

The following actions have been recommended:

- Improve ventilation.
- Improve cleaning methods and housing hygiene.
- Avoid wall-to-wall carpeting.
- Moisture control to prevent accumulation of mould.
- Control the sources of pollution, e.g. tobacco smoke and emissions from building and consumer products.

And the following measures have been recommended to implement these actions:

- Prohibition and avoidance of smoking indoors.

- Labelling systems to control emissions from building and consumer products.
- Better building codes and guidelines for ventilation and moisture control.
- Education and information campaigns.

Following these suggestions, the Environmental and Health Committee of the ERS has stated that some areas deserve priorities.

Environmental Tobacco Smoke

The simplest and most effective measure to reduce indoor air pollution would be to implement comprehensive smoking bans in work and public places. There is mounting evidence that smoking bans are effective in reducing ETS exposure, chronic respiratory symptoms, and cardiovascular disease. Although these trends are encouraging, it should be recognized that the children, as they are most vulnerable to the effects of ETS exposure, are not being adequately protected by current legislative efforts. Children are primarily exposed to tobacco smoke in the home, where legal restrictions do not apply. All the current measures to implement cessation programs and towards prohibiting smoking in public places are therefore important priorities. However, the emerging issue is now to consider the individual homes as an area for active preventive efforts.

Gas heaters and cooking

Open-flame unvented combustion indoors is a health risk, and should be avoided. Policy and technology to promote the use of non-polluting appliances and energy sources should be developed. Develop programmes to make healthier cooking and heating systems and safer fuel available to households, providing the population with access to improved stoves and cleaner fuels (kerosene, liquid petroleum gas).

Dampness and mould

Technical standards and guidelines to control moisture in residential and non-residential buildings from the health standpoint (dust mites, mould and other harmful effects of excess moisture) should be developed. This requires co-operation on several levels. Various working groups of the World Health Organisation and the International Council for Building Research Studies and Documentation (CIB) have done groundbreaking work, but their recommendations should be implemented through European directives and standards, changes in national building codes, and guidelines developed by professional societies that include training of professionals.

Control of harmful emissions from building materials and consumer products

European action should be taken to develop guidelines and procedures to measure emissions from building materials and consumer products. Guidelines should include the criteria for low polluting materials and products, and a labeling system. The Construction Products Directive 'Hygiene, health and the environment' (89/195/EEC; Official Journal of the European Commission 11 February 1989) states that 'The construction work must be designed and built in such a way that it will not be a threat to the hygiene or health of the occupants or neighbors.' The control of harmful

emissions from building materials would be a step towards implementation of the principles of the directive.

The control of exposure to radon gas relies on monitoring programs in radon-prone areas, coupled with education/information initiatives. Exposure to radon in dwellings is also the subject of Commission Recommendation of 21 February 1990 on the protection of the public against indoor exposure to radon (90/143/Euratom). However, there is currently no regulation at the European level. Important public health objectives would therefore be to establish radon levels guidelines and actions which could be coupled with national housing stock objectives and/or specific public health goals.

Energy efficiency is one of the driving forces of indoor air quality. To reduce the cost of heating or cooling, this energy efficiency translates into greater recirculation of air with indoor pollutants and decreased fresh air intake. Proper ventilation is critical since energy costs are driving the population into very tight unvented occupancy which leads to accumulation of pollutants. Health equity in indoor policy is a crucial issue.

RESEARCH NEEDS

Research constitutes a key aspect that is required in working towards the reduction of the health burden from indoor air pollution. Inventory of the indoor environment has to be completed, data on prevalence of the exposures have to be uniformly collected and the overall health impact has to be estimated. There is a need to investigate which interventions are effective and how they can be implemented in a successful and sustainable way. COPD has to be considered too. Lastly, evaluation of socioeconomic differences in health effects should be added.

SUMMARY OF ERS INITIATIVES ON INDOOR AIR AT THE EUROPEAN LEVEL

DG Sanco

1. Expert working group on indoor air
2. Working party on Environment and Health
3. Responses to the following Commission documents:
 - a) Public consultation on the SCHER preliminary report on Risk assessment on indoor air quality
 - b) Green Paper on smoke free environments

DG Environment

1. Consultative Forum on environment and Health: set up to monitor and advise on the implementation of the Action Plan on Environment and Health.
2. Vienna Intergovernmental Conference to agree a set of recommendations and draft a declaration.

ECDC

1. ECDC workshop on infectious diseases and environmental change, 28-30 March.

DG Research

1. After two years of campaigning by the ERS, chronic respiratory diseases were finally included in the FP7 Health theme (Cooperation Programme) under Translational Health - Major Diseases - and "Other Chronic Diseases" (final decision - 18 December 2006)
2. First FP7 calls were published 22 December 2006. The ERS organised a call for "expressions of interest" to its members with the intention to offer broad support, e.g. for activities related to dissemination and training.
3. ERS responded to the EC public consultation (1 May) on the Green Paper on the European Research Area.
http://ec.europa.eu/research/era/questionnaire_en.html