Baden-Württemberg
LANDESGESUNDHEITSAMT BADEN-WÜRTTEMBERG
IM REGIERUNGSPRÄSIDIUM STUTTGART

Newsletter

WHO Collaborating Centre for Housing and Health
Baden-Württemberg State Health Office

Landes Gesundheits Amt
Baden-Württemberg

No. 5, December 2009

Editorial

Children's Environmental Health and Indoor Air

Where and by which factors is children's health most severely impaired or threatened? The answer to this question depends very much on which region of the world is being considered. In many parts of the world, indoor air pollution, due to tobacco smoke and burning of solid fuels, constitutes one of the most important environmental threats to children's health (1, 2). Thus, the Fourth Ministerial Conference on Environment and Health (Budapest, 2004) has set, among the four Regional Priority Goals: "We aim to prevent and reduce respiratory disease due to outdoor and indoor air pollution, thereby contributing to a reduction in the frequency of asthmatic attacks, in order to ensure that children can live in an environment with clean air" (3).

Children in our Central European countries spend most of their time indoors, at home, in school. If we are looking at "classical, anthropogenic" environmental factors (biological, chemical and physical hazards), we therefore must thoroughly look at indoor conditions. Moulds, asbestos, volatile organic compounds (VOCs), wood protectives as pentachlorophenol and formaldehyde, carbon monoxide and insecticides as, e.g. pyrethroids and, most importantly, environmental tobacco smoke, are being discussed. Whether in our Western and Central European countries with rather strict regulations and supervision most of these factors are of real, or only of marginal, importance remains to be discussed. One has to bear in mind that - due to official regulations, bans of certain substances and/or technical innovation - the spectrum of (potential) noxes is steadily changing. This is clearly seen with volatile organic compounds. On the other hand, sometimes long-forgotten noxes re-emerge, as carbon dioxide accumulation in classrooms due to insufficient ventilation, and as carbon monoxide. Energy saving efforts and regulations has lead to air tight constructions minimizing air exchange and ventilation and hence result in an accumulation of air born noxious substances.

In recent time, lifestyle-related problems (e.g. the indoor use of scents and fragrances) have been in the focus of interest of environmental health experts and the Public Health Service.

Without any doubt, environmental tobacco smoke is and will continue to be one of the main points where effective changes to the better can be achieved.

In some parts of Eastern Europe the situation may look different. Here, we observe a large impact of outdoor air burdened with fine dust particles, traffic exhaust, emissions from local industry and from cooking and heating with solid and liquid fuels in the homes on the quality of indoor air.

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To pinpoint relevant issues at the local, national and European level, reliable data on the children's environment are needed. Here, the German Environmental Survey of Children (GerES IV) is to be mentioned. (4) GerES IV, which is a part of the National Health Interview and Examination Survey for Children and Adolescents (German acronym KiGGs) was conducted to generate comprehensive data on exposure to environmental toxins, moulds and noise on a representative sample of 1,790 children 3 to 14 years of age from 150 locations in Germany. Detailed data on indoor air substances had also been provided by private laboratories (5).

The World Health Organisation and most national countries have set up expert commissions to evaluate data on indoor air quality and to derive guidelines for indoor air quality (6,7).

While these regulatory bodies provide a legal frame for the improvement of indoor air quality (which is extremely important), there is a need to communicate these public health efforts to the general public. Here, provision of carefully evaluated, well weighted, scientifically based data for decision makers and lay public are of great importance. We pediatricians have, during the last 5 years, established such an Internet based information service (ALLUM) (8) providing low level access to everybody. ALLUM had been adapted by Czech pediatricians, and it is on the brink of being implemented in Hungary, Poland, and Lithuania.

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[8] www.allum.de)

Housing and Children's Health: An Overview on Surveys in Germany

Here we give an overview on recent environmental health surveys in Germany addressing especially housing and health topics in children.

The German Environmental Survey on Children 2003 - 2006 (GerES IV)

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The German Environmental Surveys (GerES) of the German Federal Environment Agency (German acronym: UBA) are representative population studies; which have been repeatedly carried out since the mid-1980s to determine the exposure to environmental pollutants, to explore exposure pathways and to discover groups with higher exposure [Schulz et al. 2007]. The UBA carried out its first GerES focussed solely on children (GerES IV) from 2003-2006. GerES IV is the environment-oriented module of the "National Health Interview and Examination Survey for Children and Adolescents" (German acronym: KiGGS) of the Robert Koch Institute (RKI) [Kurth et al. 2008]. The cooperation with KiGGS allows to compare the extensive data on children's health status from that survey with the data on pollutant concentrations generated in its own survey. These data are particularly important for taking targeted decisions on environmental policies and measures.

1,790 children 3 to 14 years of age participated in GerES IV and were studied with regard to their body burden, the environment-related exposure in the household and their personal environment- and health-relevant behaviour. The basic study programme included the analysis of blood, urine, tap water and house dust. Individual interviews about participants' living environment, consumption habits, and diet round off these investigations and may provide information about exposure pathways and sources. In addition, sub-groups were studied with regard to "occurrence of mould spores, house dust mites or pet allergens in homes and allergic sensitisation", "allergies due to nickel, chromium (from, e.g., clothing, jewellery, piercing) or scents (e.g., terpenes in indoor air)", "noise, hearing capacity, stress and sleeping disturbances", "irritation of the eyes and the respiratory system due to VOC in indoor air".

Selected results from GerES IV on the topic "Housing and Health

- In Germany, the 3- to 14-year-old children stayed on average 20.3 hours per day indoors and 15.5 hours at home. The mean time per day spent outdoors was 3.7 hours. Depending on the age of the child, the season, the weekday (working day versus week-end), the socioeconomic status (SES) and living surroundings the times of stay per day vary [Schulz et al. 2008, Conrad et al. 2009a].
- Tobacco smoke is without any doubt the most significant environmental contaminant to which children are exposed indoors. The parent interviews revealed that almost every other child lives in a household with one or more smokers. This has not changed for the better since GerES II in 1990/1992, which also included children. According to parent information in GerES IV, every fourth child is exposed to tobacco smoke at home daily or almost daily [Conrad et al., 2008].
- Significantly higher concentrations of, e.g., benzene and toluene were quantified in rooms of children who suffered from nasal irritation at least once in their life. In multivariate logistic regressions, e.g., indoor TVOC concentrations higher than > 0.3 mg/m^3 (OR = 4.3) and living on a busy road (OR = 2.9) were significantly associated with the occurrence of frequent irritational symptoms [Conrad et al., 2009b].
- 16.5% of the houses where children lived were located on busy roads or major trunk roads. The percentage was higher (27.8%) for children from lower socioeconomic status (SES) compared to 10% of high SES children. Approximately half of the children (47.7%) had their bedroom facing the street. This percentage was higher (61%) for children whose homes were on busy streets [Babisch et al., 2009].
- GerES IV also showed that 6% of the children are sensitised to at least one of the indoor mould fungi (*Walemia sebi, Eurotium spec., Aspergillus versicolor, Aspergillus fumigatus, Penicillium chrysogenum*) and 8.3% if *Cladosporium herbarum* is included. 40% of these children did not show a sensitisation against other allergens that are part of commercial allergen test kits. The allergy screening test for indoor moulds should become an integral part of commercial allergy tests [Federal Environment Agency, 2007, Szewzyk et al., 2009].
- Taking the representative questionnaire data from GerES IV as a basis visible mould was present in 15% of the homes and damp walls in 13% of the homes. On the other hand the mould measurements of the embedded case-control study showed that in 17% to 27% of the examined children's rooms a source of mould was probable. Damp walls were detected during the inspection in 33 % of the homes [Szewzyk et al., 2009].
- The parent interview in GerES IV also comprised questions on the use of various household products and pesticides, focusing on products which not only pollute the environment but also harbour health risks. Fabric softeners head the list. They are used by 82% of the low SES families, but only by half as many families with high SES (43%). An opposite social gradient was found for the use of various chemical pest control products in the home. Products to protect textiles (e.g. against moths) and stored foods (e.g. against ants and cockroaches) are used by about twice as many families with high SES (about 20%) than families with low SES [Seiwert et al., 2009].
- House dust analysis showed a contamination (HCB, DDT, lindane and PCBs) on a low level with a high proportion of samples with values below the limits of quantification. SES was a relevant factor with higher levels in house dust from families with a higher SES. DDE in blood and DDT in house dust showed a weak but significant correlation (r_K=0.22). For the PCBs (138,153,180) correlations were also significant but not clear without ambiguity. The results show that even decades after the ban of

the analysed organochlorines, children are still exposed to these substances. Although exposure is comparably low some relevant exposure pathways are still detectable [Becker et al., 2007].

Public use file

To offer other scientists the opportunity to perform additional evaluations of the GerES IV data, a public use file with pollutant concentrations and questionnaire data of all participants is available. More information about the public use file is given on the following website (in German): http://www.uba.de/gesundheit/survey/frage/.

Acknowledgements

We thank all children and parents who have participated in this study. The financial support of the Federal Ministries for the Environment, Nature Conservation and Nuclear Safety and of Education and Research is gratefully acknowledged. GerES IV field work was carried out by the RKI.

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Becker K, Conrad A, Schulz C, Seiwert M, Kolossa-Gehring M, Angerer J, Walker G (2007) German Environmental Survey on children (GerES IV): Organochlorine compounds in blood and house dust. 17th Annual Conference of the International Society of Exposure Analysis. October 14-18, Durham/Research Trinagle Park, North Carolina, USA. Abstract 107,77

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Federal Environment Agency (2007) How pollutants and noise affect our children's health. First results from the German Environmental Survey for Children (GerES IV). Press background paper, 28 August 2007.

Kurth B-M, Kamtsiuris P, Hölling H, Schlaud M, Dölle R, Ellert U, Kahl H, Knopf H, Lange M, Mensink GBM, Neuhauser H, Schaffrath Rosario A, Scheidt-Nave C, Schenk L, Schlack R, Stolzenberg H, Thamm M, Thierfelder W, Wolf U (2008). The challenge of comprehensively mapping children's health in a nation-wide health survey: Design of the German KiGGS-Study. BMC Public Health, 8 (1):196.

Schulz C, Conrad A, Becker K, Kolossa-Gehring M, Seiwert M, Seifert B (2007). 20 years of German Environmental Survey (GerES). Human biomonitoring – temporal and spatial (West Germany/East Germany) differences in population exposure. Int. J. Hyg. Environ. Health, 201:271–297.

Schulz C, Seiwert M, Becker K, Conrad A, Hünken A, Müssig-Zufika M, Kolossa-Gehring M (2007) Kinder-Umwelt-Survey (KUS) – Aufenthaltszeiten und -orte der Kinder in Deutschland. 1. Jahrestagung der Gesellschaft für Hygiene, Umweltmedizin und Präventivmedizin. 22.-24. November, Bielefeld. Abstract in Umweltmed Forsch Prax 12 (5), 266

Seiwert M, Kolossa-Gehring M, Becker K, Conrad A, Schulz C (2009) German Environmental Survey for Children (GerES IV): socioeconomic status and exposure pollutants. Contribution to the WHO/EH inequities data report.

Szewzyk R, Becker K, Hünken A, Schulz C, Seiwert M, Kolossa-Gehring M (2009) German Environmental Survey for Children (GerES IV): Fungi in homes and sensitisation of children in Germany.

21st Annual Conference of the International Society for Environmental Epidemiology ISEA, Dublin, Poster, 25-29 August, Abstract Book PS2.1.111.

Further information
http://www.umweltbundesamt.de/gesundheit-e/survey/us03/uprog.htm

Housing and health as topic within the Bavarian Health Monitoring Units

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In 2004, health monitoring units (GME) were established in three rural and three urban regions of the federal state Bavaria, Germany. The GME's aim is to gain current and relevant health data especially of children and to evaluate health promotion strategies [1]. One thematic focus is housing and health comprising the following environmental issues:

- characteristics of the built environment such as type of building, overcrowding, distance to a main street, parental perception of traffic-related dangers for children, accessible playgrounds,
- perceived environmental quality in terms of degree of disturbance due to air pollution, noise, and lack of accessible green spaces,
- exposure to indoor and outdoor air pollution,
- exposure to noise of several sources,
- socioeconomic disparities in housing conditions and environmental exposures (environmental justice) in relation to children's health:
- overall health status,
- respiratory health,
- sleep disturbances,
- obesity,
- unintentional injuries,
- behavioural problems.

Up to now, three cross-sectional studies of children aged 5 to 7 years have been performed:

- Survey 2004/2005: 6350 participants (48% girls), response rate 78%
- Survey 2005/2006: 6206 participants (48% girls), response rate 73%
- Survey 2006/2007: 6483 participants (46% girls), response rate 75%

Data were collected by self-administered parental questionnaires. In addition, data on demographic and socioeconomic characteristics of the residential area were retrieved from routine statistics for the study region Munich. In the third survey 2006/2007, family's address was obtained to exactly allocate data on road traffic noise exposure from the noise map of Munich to the child's address.

Selected results from the GME surveys on the topic "housing and health"

- Socioeconomic inequalities in environmental conditions: In both urban and rural settings, children living in poverty were more likely to be exposed to air pollution and noise and to live in a crowded flat without accessible green space. [2]
- In the total study population, parental perception of noise exposure, indicated by annoyance especially due to traffic, was associated with sleep disturbances of their children. [3]
- In the study region Munich, road traffic noise exposure of families was high both during day and night time. Objective data of traffic noise exposure were in accordance with parental perception of noise: Parents with a high noise exposure significantly indicated higher annoyance due to noise. Adverse housing conditions and low socioeconomic position were associated with higher noise exposure and annoyance. [4]
- Environmental tobacco smoke (ETS) is one of the most important indoor exposures of children. Overall, 32% of children were exposed to ETS at home. Daily smoking occurred in 18% of the households. Low parental education, unemployment, low household equivalent income, non-German nationality, single-parent family and family size were independently associated with children's ETS exposure at home and in cars. Though a considerable proportion of parents strived to protect their chil-

dren from ETS exposure at home, family's home smoking policy differed substantially by socioeconomic position. [5]

- Characteristics of the built environment are suggested to play a major role in physical activity. In rural as well as in urban study regions, an adverse built environment was more common among families with a low socioeconomic position. The association between the built environment and children's physical activity differed according to kind of physical activity: There was a positive dose-response relationship between adverse built environment and physical activity due to mode of travel to kindergarten and a negative/inverse dose-response relationship between adverse built environment and physical activity due to mode of travel to friends/relatives as well as physical activity during leisure time. [6]

Next steps

Currently, a follow-up study of children at the age 10 years is performed to assess the impact of the built environment on children's physical activity, nutrition, and health. A further activity is the multilevel analysis of the interplay of individual and neighbourhood socioeconomic factors in regard to the built environment and children's environmental health.

Acknowledgements

We thank all families who participated in the GME surveys.

GME-Study Group of the surveys 2004-2007

Bavarian Health and Food Safety Authority, Oberschleissheim (Gabriele Bolte, Hermann Fromme, Annette Heißenhuber, Lana Hendrowarsito, Martina Kohlhuber, Christine Mitschek, Gabriele Morlock, Michael Mosetter, Uta Nennstiel-Ratzel, Dorothee Twardella, Manfred Wildner); Health Authority of the District Office of Bamberg (Wiltrud Doerk, Rosemarie Sittig, Winfried Strauch, Heidi Thamm); Health Authority of the District Office of Guenzburg (Tatjana Friess-Hesse, Dagmar Rudolph, Roland Schmid, Gudrun Winter); Health Authority of the City Ingolstadt (Christine Gampenrieder, Margot Motzet, Elisabeth Schneider, Traudl Tontsch, Gerlinde Woelk); Department of Health and Environment, City of Munich (Sylvia Kranebitter, Heidi Mayrhofer, Gertraud Rohrhirsch, Brigitte Weise); Health Authority of the District Office of Schwandorf (Kornelia Baranek, Gitte Koch-Singer, Maximilian Kuehnel); Institute of Social Pediatrics and Adolescent Medicine, Ludwig-Maximilian-University Munich (Ruediger von Kries, Ladan Baghi); Bavarian State Ministry of the Environment, Public Health and Consumer Protection (Bernhard Liebl).

Further information

http://www.lgl.bayern.de/gesundheit/umweltmedizin/gme.htm
http://www.lgl.bayern.de/gesundheit/umweltmedizin/projekt_gme_folgebefragung.htm

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The Baden-Württemberg Environmental Health Surveys (BW-EHS) as an instrument for housing and health studies

In 1992, in the German Federal State of Baden-Württemberg, an environmental health surveillance system has been established in 10-year-old children. Initially, the major aim of the surveys was to monitor the body burden of persistent environmental pollutants in the children's organism together with a questionnaire on the frequency and severity of respiratory and allergic diseases. Participants of the surveys were fourth-graders of schools from four structurally different regions. From 1992 to 1995, the surveys were carried out every year as repeated cross-sectional investigations, from 1996/67 to 2004/05 every second year (Zöllner et al., 2005; Link et al, 2005; Link et al., 2007).

Housing factors (e.g. age of the dwelling, distance to heavily trafficked roads, heating system, ETS, damp and mould) were asked in the questionnaire primarily as possible confounding factors for the body burden of the examined pollutants (lead, mercury, persistent organochlorine compounds) or diseases. In many of these surveys, but not consistently, mould and damp was more frequently noted for children with respiratory or allergic problems.

In the late 1990th, the occurrence of indoor biological agents like mould, mite and pet allergens got to the focus of a special survey. The study showed that the measured allergen concentration in indoor air or in house dust is not directly associated with the frequency of allergies or atopic sensitisations in children (Jovanovic et al., 2003; Jovanovic et al., 2004).

A further study connected to the BW-EHS dealt with particulate matter indoors and outdoors of the children's dwellings, demonstrating the strong influence of ETS on indoor $PM_{2.5}$. Furthermore, the study showed that cooking and frying are relevant sources for ultra fine particles (UFP) in dwellings (Link et al., 2004).

In 2007, a more detailed questionnaire with specific questions on housing and health was developed. The questions relate to the structure, equipment and location of the dwelling, the living area and number of residents, impairments by damp, mould, noise and air pollution, home accidents, behaviour of the residents (ETS, time spent for TV and computer games, pets in the household). These questions can be analysed together with the questions on health outcomes (allergies, respiratory diseases, body mass index) and socioeconomic data. This questionnaire was applied in two surveys (2007/08: 2100 children; 2008/09: 1700 children) and is subject of a present survey (2009/10) with probably 2000 children. The data analyses of the two finalised surveys are in progress.

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Literature

In this section we will provide a collection of recent housing and health publications from a variety of backgrounds. Literature published in German or French, respectively, is indicated with the German flag or the French flag.
If you have suggestions for interesting journals that we should screen for the literature collection, please let us know!

Table of Topics

Allergies and Respiratory Diseases

Sensitization to house-dust mite and mite fauna in selected children's homes in Kütahya, Turkey.
Akdemir C, Yilmaz S.
Turk J Pediatr. 2009 May-Jun;51(3):232-7.

Identification and initial characterization of prominent air pollution sources and respiratory health at secondary schools in Ibadan, Nigeria.
Ana GR, Shendell DG, Odeshi TA, Sridhar MK.
J Asthma. 2009 Sep; 46(7):670-6.

Climate change and respiratory disease: European Respiratory Society position statement
Ayres JG, Forsberg B, Annesi-Maesano I, Dey R, Ebi KL, Helms PJ, Medina-Ramón M, Windt M, Forastiere F on behalf of the Environment and Health Committee of the European Respiratory Society
Eur Respir J 2009 34: 295-302.

Climate change will affect individuals with pre-existing respiratory disease, but the extent of the effect remains unclear. The impact of climate change on individuals with respiratory disease will vary depending on the degree to which ambient temperatures rise relative to current levels, changes in short-term transboundary long-range air pollutants, the risk of heatwaves, and the risk of flooding and excessive rainfall, as well as the impact of these changes on other health-relevant factors, such as air pollution, allergens and moulds. Increased temperatures in more northerly latitudes will permit the spread of certain plant species to larger areas, thus exposing new populations to, for them, novel allergens and levels of recognised outdoor moulds (Alternaria and Cladosporium) may also increase. To what extent this will result in more individuals with respiratory allergies is conjectural, but any in-

crease in allergen load in conjunction with rising ozone levels will result in more exacerbations of asthma and allergic rhinitis as ozone potentiates the effects of allergen exposure, and exposure to higher concentrations of dust mite allergen in households is associated with an increased incidence of asthma. It is likely that, with climate change, there will be an increase in thunderstorms, which are known to be associated with outbreaks of asthma mediated through allergen exposure, notably pollens and wet-air fungal spora. In view of the complexity and magnitude of the challenge, there is a general misconception that climate change can only be addressed at a national or supranational level. Immediate governmental action is indeed required, but action by healthcare professionals at an individual level may bring about significant incremental effects, not least in protecting the health of their patients.

Household airborne Penicillium associated with peak expiratory flow variability in asthmatic children.
Bundy KW, Gent JF, Beckett W, Bracken MB, Belanger K, Triche E, Leaderer BP.
Ann Allergy Asthma Immunol. 2009 Jul;103(1):26-30.

Environmental factors and symptoms in infants at high risk of allergy.
Burr ML, Miskelly FG, Butland BK, Merrett TG, Vaughan-Williams E.
J Epidemiol Community Health. 1989 Jun; 43(2):125-32.

The importance of nurse-led home visits in the assessment of children with problematic asthma.
Bracken M, Fleming L, Hall P, Van Stiphout N, Bossley C, Biggart E, Wilson NM, Bush A.
Arch Dis Child. 2009 Oct;94(10):780-4.

The efficacy of sublingual immunotherapie for house dust mites respiratory allergy: results of a GA^{2}LEN meta-analysis
Compalati E, Passalacqua G, Bonini M, Canonica GW.
Allergy 2009 Oct; 64(11): 1570-1579.

Asthma and respiratory symptoms in hospital workers related to dampness and biological contaminants.
Cox-Ganser JM, Rao CY, Park JH, Schumpert JC, Kreiss K.
Indoor Air. 2009 Aug;19(4):280-90.

Association of pediatric asthma severity with exposure to common household dust allergens.
Gent JF, Belanger K, Triche EW, Bracken MB, Beckett WS, Leaderer BP.
Environ Res. 2009 Aug;109(6):768-74.

Low home ventilation rate in combination with moldy odor from the building structure increase the risk for allergic symptoms in children.
Hägerhed-Engman L, Sigsgaard T, Samuelson I, Sundell J, Janson S, Bornehag CG.
Indoor Air. 2009 Jun;19(3):184-92.

Confirmed moisture damage at home, respiratory symptoms and atopy in early life: a birth-cohort study.
Karvonen AM, Hyvärinen A, Roponen M, Hoffmann M, Korppi M, Remes S, von Mutius E, Nevalainen A, Pekkanen J.
Pediatrics. 2009 Aug;124(2):e329-38.

Effects of pets on asthma development up to 8 years of age: the PIAMA study.
Kerkhof M, Wijga AH, Brunekreef B, Smit HA, de Jongste JC, Aalberse RC, Hoekstra MO, Gerritsen J, Postma DS.
Allergy. 2009 Aug;64(8):1202-8.

Asthma morbidity in adult Chicago public housing residents.
Lambertino A, Turyk ME, Curtis L, Persky VW.
J Asthma. 2009 Mar;46(2):202-6.

Relationship between indoor environment and asthma and wheeze severity among rural children and adolescents.
Lawson JA, Dosman JA, Rennie DC, Beach J, Newman SC, Senthilselvan A.
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Diffusive sampling and measurement of microbial volatile organic compounds in indoor air.
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Indoor Air. 2009 Oct;19(5):421-32.

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Cai GH, Bröms K, Mälarstig B, Zhao ZH, Kim JL, Svärdsudd K, Janson C, Norbäck D.
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Human exposure to polybrominated diphenyl ethers (PBDE), as evidenced by data from a duplicate diet study, indoor air, house dust, and biomonitoring in Germany.
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Assessment of human exposure to Bisphenol-A, Triclosan and Tetrabromobisphenol-A through indoor dust intake in Belgium.
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Sick building syndrome: An overview to raise awareness
Guiseppe Ryan Passarelli
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Formaldehyde and volatile organic compounds in Hong Kong homes: concentrations and impact factors.
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Indoor Air. 2009 Jun;19(3):206-17.

Polychlorinated biphenyls in domestic dust from Canada, New Zealand, United Kingdom and United States: implications for human exposure.
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Prevalence of Chlamydophila psittaci infections in a human population in contact with domestic and companion birds.
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Biocide exposure in museum collections and risk mitigation measures
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Indoor air pollution by dibasic esters (DBE)
Heinzow B.
UMID 2009 Sept; 2: 16 - 19.

Integrating human indoor air pollutant exposure within Life Cycle Impact Assessment.
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Environ Sci Technol. 2009 Mar 15;43(6):1670-9. Review.

Impact of WHO 2005 revised toxic equivalency factors for dioxins on the TEQs in serum, household dust and soil.
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Regional differences in residential environments and the association of dwellings and residential factors with the sick house syndrome: a nationwide cross-sectional questionnaire study in Japan.
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Indoor air pollution levels in public buildings in Thailand and exposure assessment.
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An assessment of sources and pathways of human exposure to polybrominated diphenyl ethers in the United States.
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Biomass-fueled intervention stoves in the developing world: potential and challenges.
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The influence of chemical interactions at the human surface on breathing zone levels of reactants and products.
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Factors influencing concentrations of polybrominated diphenyl ethers (PBDEs) in students from Antwerp, Belgium.
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Environ Sci Technol. 2009 May 15;43(10):3535-41.

Improved biomass stove intervention in rural Mexico: impact on the respiratory health of women.
Romieu I, Riojas-Rodríguez H, Marrón-Mares AT, Schilmann A, Perez-Padilla R, Masera O.
Am J Respir Crit Care Med. 2009 Oct 1;180(7):649-56.

Measurement of personal exposure to volatile organic compounds and particle associated PAH in three UK regions.
Saborit JM, Aquilina NJ, Meddings C, Baker S, Vardoulakis S, Harrison RM.
Environ Sci Technol. 2009 Jun 15;43(12):4582-8.

Indoor environment in dwellings, asthma, allergies, and sick building syndrome in the Swedish population: a longitudinal cohort study from 1989 to 1997
Sahlberg B, Mi Y-H & Norbäck D.
Int Arch Occup Environ Health 2009 July; 82: 1211-1218.

PBDEs in US and German clothes dryer lint: a potential source of indoor contamination and exposure.
Schecter A, Shah N, Colacino JA, Brummitt SI, Ramakrishnan V, Robert Harris T, Päpke O.
Chemosphere. 2009 May;75(5):623-8.

Dermatophytes, related keratinophilic and opportunistic fungi in indoor dust of houses and hospitals.
Singh I, Mishra A, Kushwaha R.
Indian J Med Microbiol. 2009 Jul-Sep;27(3):242-6.

Effect of reducing indoor air pollution on women's respiratory symptoms and lung function: the RESPIRE Randomized Trial, Guatemala.
Smith-Sivertsen T, Díaz E, Pope D, Lie RT, Díaz A, McCracken J, Bakke P, Arana B, Smith KR, Bruce N.
Am J Epidemiol. 2009 Jul 15;170(2):211-20.

Detection and molecular characterization of filamentous actinobacteria and thermoactinomycetes present in water-damaged building materials.
Suihko ML, Priha O, Alakomi HL, Thompson P, Mälarstig B, Stott R, Richardson M.
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Indoor Air. 2009 Apr;19(2):91-2.

A longitudinal study of environmental risk factors for subjective symptoms associated with sick building syndrome in new dwellings.
Takigawa T, Wang BL, Sakano N, Wang DH, Ogino K, Kishi R.
Sci Total Environ. 2009 Sep 15;407(19):5223-8.

Relationship between indoor chemical concentrations and subjective symptoms associated with sick building syndrome in newly built houses in Japan.
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Int Arch Occup Environ Health. 2009 Nov 10.

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Concentrations of polybrominated diphenyl ethers (PBDEs) in matched samples of human milk, dust and indoor air.
Toms LM, Hearn L, Kennedy K, Harden F, Bartkow M, Temme C, Mueller JF.
Environ Int. 2009 Aug;35(6):864-9.

Radon in öffentlichen Gebäuden
Schulz H, Sperrhacke A:
Strahlenschutzpraxis 2009 Apr: 58-63.

Field investigation of surface-deposited radon progeny as a possible predictor of the airborne radon progeny dose rate.
Sun K, Steck DJ, Field RW.
Health Phys. 2009 Aug;97(2):132-44.

WHO calls for tighter standards on indoor radon

A new WHO handbook on indoor radon published in September 2009, indicates that radon exposure is a major and growing public health threat in homes and recommends that countries adopt reference levels of the gas of 100 Bq/m^3. If this level cannot be implemented under the prevailing country-specific conditions, WHO recommends that the reference level should not exceed 300 Bq/m^3.

New studies in Europe, North America and China - summarized in the new WHO handbook - have confirmed that low and medium level exposures to radon in homes contributes substantially to the occurrence of lung cancers world-wide. Radon is the second most important cause of lung cancer after smoking in many countries and the primary cause of lung cancer among people who have never smoked.

Radon levels in indoor air can be lowered in a number of ways very effectively and with relatively inexpensive techniques such as sealing cracks in floors and walls and increasing the ventilation rate of the building, as well as other techniques described in the handbook. It is the first comprehensive international compilation of information and recommendations on radon and its public health effects.

WHO | Radon
WHO handbook on indoor radon - a public health perspective.

Radon: Indoor reference level

German Federal Office for Radiation Protection - among 100 experts from more than 30 countries involved in the Radon Project (WHO-IRP) as producers of the handbook - has been recommending an indoor reference level of 100 Bq/m³ since 2004, despite there is no generally accepted federal regulation in Germany by now.

Bundesamt für Strahlenschutz-Pressemitteilung 31/09 vom 22.09.2009

Bundesamt für Umwelt, Naturschutz und Reaktorsicherheit: Pressemitteilung 317/09 vom 22.09.2009

Mould and Dampness

Confirmed moisture damage at home, respiratory symptoms and atopy in early life: a birth-cohort study.
Karvonen AM, Hyvärinen A, Roponen M, Hoffmann M, Korppi M, Remes S, von Mutius E, Nevalainen A, Pekkanen J.
Pediatrics. 2009 Aug;124(2):e329-38.

Dampness in dorm rooms and its associations with allergy and airways infections among college students in China: a cross-sectional study.
Sun Y, Zhang Y, Sundell J, Fan Z, Bao L.
Indoor Air. 2009 Aug;19(4):348-56.

Surface hydrophobin prevents immune recognition of airborne fungal spores
Aimanianda V, Bayry J, Bozza S, Kniemeyer O, Perruccio K, Ramulu Elluru S, Clavaud C, Paris S, Brakhag AA, Kaveri SV, Romani L , Latgé J-P
Nature 2009 Aug 27; (460): 1117-1121.

Smoking / Environmental Tabacco Smoke

Smoking and Environmental Tabacco Smoke play an important role in housing and health topics. However, it would go beyond the scope of this newsletter to present here all relevant literature on ETS. We therefore decided to list only especially selected publications. For further information, we wish to refer you to the *WHO Collaborating Centre on Tobacco Control*: www.tabakkontrolle.de.

Smoking bans in public places: current epidemiological evidence of cardiovascular health impacts at the population level
Bolte G, Kuhn J, Twardella D, Fromme H.
Gesundheitswesen. 2009 Mar;71(3):140-51.

Environmental tobacco smoke (ETS) and respiratory health in children
Cheraghi M, Salvi S.
Eur J Pediatr. 2009 Aug; 168(8):897-905.

Impaired postnatal growth of infants prenatally exposed to cigarette smoking.
Fenercioglu AK, Tamer I, Karatekin G, Nuhoglu A.
Tohoku J Exp Med. 2009 Jul;218(3):221-8.

Environmental tobacco smoke exposure as a risk factor for infections in infancy.
Ladomenou F, Kafatos A, Galanakis E.
Acta Paediatr. 2009 Jul;98(7):1137-41.

NAD(P)H: Quinone oxidoreductase 1, glutathione S-transferase M1, environmental tobacco smoke exposure, and childhood asthma.
Li YF, Tseng PJ, Lin CC, Hung CL, Lin SC, Su WC, Huang YL, Sung FC, Tai CK.
Mutat Res. 2009 Aug;678(1):53-8.

Smoking gain? Secondhand smoke exposure influences body weight, lipid profiles in offspring.
McGovern V.
Environ Health Perspect. 2009 Jul;117(7):A310. No abstract available.

Cardiovascular effect of bans on smoking in public places: a systematic review and meta-analysis.
Meyers DG, Neuberger JS, He J.
J Am Coll Cardiol. 2009 Sep 29;54(14):1249-55.

Environmental tobacco smoke and cardiometabolic risk in young children: results from a survey in south-west Germany.
Nagel G, Arnold FJ, Wilhelm M, Link B, Zoellner I, Koenig W.
Eur Heart J. 2009 Aug;30(15):1885-93.

Maternal exposure to secondhand cigarette smoke primes the lung for induction of phosphodiesterase-4D5 isozyme and exacerbated Th2 responses: rolipram attenuates the airway hyperreactivity and muscarinic receptor expression but not lung inflammation and atopy.
Singh SP, Mishra NC, Rir-Sima-Ah J, Campen M, Kurup V, Razani-Boroujerdi S, Sopori ML.
J Immunol. 2009 Aug 1;183(3):2115-21.

Secondhand smoke and particulate matter exposure in the home.
Van Deusen A, Hyland A, Travers MJ, Wang C, Higbee C, King BA, Alford T, Cummings KM.
Nicotine Tob Res. 2009 Jun;11(6):635-41

Association of passive exposure of pregnant women to environmental tobacco smoke with asthma symptoms in children.
Xepapadaki P, Manios Y, Liarigkovinos T, Grammatikaki E, Douladiris N, Kortsalioudaki C, Papadopoulos NG.
Pediatr Allergy Immunol. 2009 Aug;20(5):423-9.

Home Safety

Correlates of local safety-related concerns in a Swedish Community: a cross-sectional study.
Kullberg A, Karlsson N, Timpka T, Lindqvist K.
BMC Public Health. 2009 Jul 8;9:221.

Recurrent and injurious falls in the year following hip fracture: a prospective study of incidence and risk factors from the Sarcopenia and Hip Fracture study.
Lloyd BD, Williamson DA, Singh NA, Hansen RD, Diamond TH, Finnegan TP, Allen BJ, Grady JN, Stavrinos TM, Smith EU, Diwan AD, Fiatarone Singh MA.
J Gerontol A Biol Sci Med Sci. 2009 May;64(5):599-609.

Targeting burn prevention in the paediatric population : a prospective study of children's burns in the Lausanne area.
Natterer J, de Buys Roessingh A, Reinberg O, Hohlfeld J.
Swiss Med Wkly 2009 Sep 19;139(37-38):535-9.

Housing and Ageing Society

Perceived neighborhood safety and incident mobility disability among elders: the hazards of poverty.
Clark CR, Kawachi I, Ryan L, Ertel K, Fay ME, Berkman LF
BMC Public Health. 2009 May 28;9:162.

Home environmental problems and physical function in Taiwanese older adults.
Lan TY, Wu SC, Chang WC, Chen CY.
Arch Gerontol Geriatr. 2009 Nov-Dec;49(3):335-8.

Neighborhood characteristics and change in depressive symptoms among older residents of New York City.
Beard JR, Cerdá M, Blaney S, Ahern J, Vlahov D, Galea S.
Am J Public Health. 2009 Jul;99(7):1308-14.

Falls in very old people: the population-based Umeå 85+ study in Sweden.
von Heideken Wågert P, Gustafson Y, Kallin K, Jensen J, Lundin-Olsson L.
Arch Gerontol Geriatr. 2009 Nov-Dec;49(3):390-6.

Prevalence and related factors of falls among the elderly in an urban community of Beijing.
Yu PL, Qin ZH, Shi J, Zhang J, Xin MZ, Wu ZL, Sun ZQ.
Biomed Environ Sci. 2009 Jun;22(3):179-87.

The characteristics of elderly burns in Shanghai.
Yin Z, Qin Z, Xin W, Gomez M, Zhenjiang L.
ScienceDirect 2009 Oct 12. [Epub ahead of print]

Housing Conditions / Built Environment

Flooded homes, broken bonds, the meaning of home, psychological processes and their impact on psychological health in a disaster.
Carroll B, Morbey H, Balogh R, Araoz G.
Health Place. 2009 Jun;15(2):540-7.

Effects of diesel vehicle emissions of polycyclic aromatic hydrocarbons on the surrounding environment and residents.
Chang SH, Hsieh MY, Yang HJ, Chen MC, Kuo CY.
J Environ Sci Health C Environ Carcinog Ecotoxicol Rev. 2009 Jul;27(3):141-54.

The effects of human activities on exposure to particulate matter and bioaerosols in residential homes.
Chen Q, Hildemann LM.
Environ Sci Technol. 2009 Jul 1;43(13):4641-6.

Residential exposure to urban air pollution, ankle-brachial index, and peripheral arterial disease.
Hoffmann B, Moebus S, Kröger K, Stang A, Möhlenkamp S, Dragano N, Schmermund A, Memmesheimer M, Erbel R, Jöckel KH.
Environ Health Perspect. 2009 Aug; 117(8):1302-8.

Influence of prenatal lead exposure on genomic methylation of cord blood DNA.
Pilsner JR, Hu H, Ettinger A, Sánchez BN, Wright RO, Cantonwine D, Lazarus A, Lamadrid-Figueroa H, Mercado-García A, Téllez-Rojo MM, Hernández-Avila M.
Environ Health Perspect. 2009 Sep;117(9):1466-71.

Housing and Mental Health

Frequent change of residence and risk of attempted and completed suicide among children and adolescents.
Qin P, Mortensen PB, Pedersen CB.
Arch Gen Psychiatry. 2009 Jun;66(6):628-32.

The relation of the perceived environment to fear, physical activity, and health in public housing developments: evidence from Chicago.
Roman CG, Knight CR, Chalfin A, Popkin SJ.
J Public Health Policy. 2009;30 Suppl 1:S286-308.

The Health Impacts of Housing Improvement: A Systematic Review of Intervention Studies From 1887 to 2007
Thomson H, Thomas S, Sellstrom E, Petticrew M.
Am J Public Health 2009;99(S3):S681-692.

Thermal Comfort / Energy

Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission.
Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, Friel S, Groce N, Johnson A, Kett M, Lee M, Levy C, Maslin M, McCoy D, McGuire B, Montgomery H, Napier D, Pagel C, Patel J, de Oliveira JA, Redclift N, Rees H, Rogger D, Scott J, Stephenson J, Twigg J, Wolff J, Patterson C.
Lancet. 2009 May 16;373(9676):1693-733. No abstract available. Erratum in: Lancet. 2009 Jun 27;373(9682):2200.

Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers
Haines A, McMichael AJ, Smith KR, Roberts I, Woodcock J, Markandya A, Armstrong BG, Campbell-Lendrum D, Dangour AD, Davies M, Bruce N, Tonne C, Barrett M, Wilkinson P
www.thelancet.com, published online Nov. 25, 2009: 1-11.

Quantification of the heat wave effect on cause-specific mortality in Essen, Germany.
Hertel S, Le Tertre A, Jöckel KH, Hoffmann B.
Eur J Epidemiol. 2009;24(8):407-14.

Indoor thermal factors and symptoms in office workers: findings from the US EPA BASE study.
Mendell MJ, Mirer AG.
Indoor Air. 2009 Aug;19(4):291-302.

Public health benefits of strategies to reduce greenhouse-gas emissions: household energy
Wilkinson P, Smith KR, Davies M, Adair H, Armstrong BG, Barrett M, Bruce N, Haines A, Hamilton I, Oreszczyn T, Ridley I, Tonne C, Chalabi Z
The Lancet 2009 Nov; 374(9705): 1917-1929.

Urban Planning / Built Environment

Leisure time physical activity differences among older adults from diverse socioeconomic neighborhoods.
Annear MJ, Cushman G, Gidlow B.
Health Place. 2009 Jun;15(2):482-90.

Understanding the Relationship between Activity and Neighbourhoods (URBAN) Study: research design and methodology.
Badland HM, Schofield GM, Witten K, Schluter PJ, Mavoa S, Kearns RA, Hinckson EA, Oliver M, Kaiwai H, Jensen VG, Ergler C, McGrath L, McPhee J.
BMC Public Health. 2009 Jul 10;9:224.

Mixed land use and walkability: Variations in land use measures and relationships with BMI, overweight, and obesity.
Brown BB, Yamada I, Smith KR, Zick CD, Kowaleski-Jones L, Fan JX.
Health Place. 2009 Dec;15(4):1130-41.

Prospective study of urban form and physical activity in the Black Women's Health Study.
Coogan PF, White LF, Adler TJ, Hathaway KM, Palmer JR, Rosenberg L.
Am J Epidemiol. 2009 Nov 1;170(9):1105-17.

The built environment: designing communities to promote physical activity in children.
Committee on Environmental Health, Tester JM.
Pediatrics. 2009 Jun;123(6):1591-8.

Underserved communities have the highest need for built environment interventions targeting obesity.
Escaron AL.
Am J Public Health. 2009 Jul;99(7):1159-60. No abstract available.

Ambient monitoring of asbestos in selected Italian living areas.
Gualtieri AF, Mangano D, Gualtieri ML, Ricchi A, Foresti E, Lesci G, Roveri N, Mariotti M, Pecchini G.
J Environ Manage. 2009 Aug;90(11):3540-52.

Public health, the APHA, and urban renewal.
Lopez RP.
Am J Public Health. 2009 Sep; 99(9):1603-11.

Effect of innovative building design on physical activity.
Nicoll G, Zimring C.
J Public Health Policy. 2009;30 Suppl 1:S111-23.

Neighborhood environments and physical activity among adults in 11 countries.
Sallis JF, Bowles HR, Bauman A, Ainsworth BE, Bull FC, Craig CL, Sjöström M, De Bourdeaudhuij I, Lefevre J, Matsudo V, Matsudo S, Macfarlane DJ, Gomez LF, Inoue S, Murase N, Volbekiene V, McLean G, Carr H, Heggebo LK, Tomten H, Bergman P.
Am J Prev Med. 2009 Jun; 36(6):484-90.

Perceptions of the built environment in relation to physical activity in Portuguese adolescents.
Santos MP, Page AS, Cooper AR, Ribeiro JC, Mota J.
Health Place. 2009 Jun; 15(2):548-52.

Regional differences in walking frequency and BMI: what role does the built environment play for Blacks and Whites?
Scott MM, Dubowitz T, Cohen DA.
Health Place. 2009 Sep; 15(3):882-7.

The influence of neighborhood environment on treatment continuity and rehospitalization in dually diagnosed patients discharged from acute inpatient care.
Stahler GJ, Mennis J, Cotlar R, Baron DA.
Am J Psychiatry. 2009 Nov;166(11):1258-68.

Einfluss von Holzfeuerungen auf die Luftqualität in Wohngebieten
Arbeitsgruppe Luftreinhaltung der Universität Stuttgart
22. ALS-Kolloquium und 7. Stuttgarter Holzfeuerungskolloquium.

"Strategies and concepts for urban planning to mitigate the adverse impacts of climate extremes on human comfort and public health in cities" (KLIMES): Greening of urban areas lowers adverse health effects of heat waves

Within the framework of the KLIMES project, German researches from the universities of Mainz, Kassel and Freiburg analysed possible urban planning concepts to decrease urban heat stress. Scientists from the Environmental Modelling Group (EMG) at the University of Mainz have improved their microclimate model ENVI-met so that it is possible to analyse the impacts of small scale architectural changes on the urban microclimate. The computer simulations show, that it is possible to mitigate the negative impacts of global warming through an adopted urban planning, using elements such as green structures or sun sails. This lowers health risks, especially for older people and children. The results of KLIMES were presented on the final conference of the „klimazwei“ initiative in Berlin. A practical guideline for climate change adopted planning and architecture is in preparation.
http://www.klimes-bmbf.de/index-3_eng.html
http://www.envi-met.com
http://www.uni-mainz.de/presse/29363.php

Ensuring quality of life in Europe's cities and towns

The European Environment Agency (EEA) published a substantial report on the subject of “Ensuring quality of life in Europe’s cities and towns. This work has been done in cooperation of several European city networks and other contributors. The report examines different approaches to tackle environmental challenges driven by urbanisation and global change across European countries. As key constituents for urban quality of life it defines for example accessible, well-maintained green spaces and playgrounds, modern transport systems and safe, walkable neighbourhoods. It stresses the challenges ahead to ensure quality of life in the long run for all social groups, and the crucial importance of sustainability and the environment as our life supporting system. It aims to identify barriers for more efficient policy-making and describes ideas and good practice examples of integrated action.
http://www.eea.europa.eu/publications/quality-of-life-in-Europes-cities-and-towns
EEA Report No 5/2009

Noise

A method for time-varying annoyance rating of aircraft noise.
Dickson C.
J Acoust Soc Am. 2009 Jul;126(1):1-3.

Predictors of noise annoyance in noisy and quiet urban streets.
Paunović K, Jakovljević B, Belojević G.
Sci Total Environ. 2009 Jun 1;407(12):3707-11.

Annoyance from environmental noise across the lifespan.
Van Gerven PW, Vos H, Van Boxtel MP, Janssen SA, Miedema HM.
J Acoust Soc Am. 2009 Jul;126(1):187-94.

Reduction of road traffic noise and mental health: an intervention study.
Stansfeld SA, Haines MM, Berry B, Burr M., Noise Health. 2009 Jul-Sep;11(44):169-75.

Noise annoyance

Annoyance due to aircraft noise has increased over the years-Results of the HYENA study.
Babisch W, Houthuijs D, Pershagen G, Cadum E, Katsouyanni K, Velonakis M, Dudley ML, Marohn HD, Swart W, Breugelmans O, Bluhm G, Selander J, Vigna-Taglianti F, Pisani S, Haralabidis A, Dimakopoulou K, Zachos I, Järup L; HYENA Consortium.
Environ Int. 2009 Aug 20.

Traffic noise (road noise, railway noise, aircraft noise, noise of parking cars), is the most dominant source of annoyance in the living environment. This is followed by neighborhood noise (neighboring apartments, staircase and noise within the apartment). The subjective experience of noise stress can, through central nervous processes, lead to an inadequate neuro-endocrine reaction and finally lead to regulatory diseases.

In the HYENA study (HYpertension and Exposure to Noise near Airports) noise annoyances due to aircraft and road traffic noise were assessed in subjects that lived in the vicinity of 6 major European airports. Pooled data analyses (2535 man and 2576 woman) showed clear exposure-response relationships between the noise level and the noise annoyance for both exposures. The study indicates that greater proportions of highly annoyed people are found at aircraft noise levels than previously assumed in European Community. The percentage of highly annoyed people can be up to 15% at levels below 55 dB Lden (noise during day/evening/night).
For more detailed information please see:

Night Noise Guidelines for Europe

The WHO Regional Office for Europe launches the "Night Noise Guidelines for Europe". The book provides ground-breaking evidence on how exposure to night noise can damage people's health, and recommends guideline levels to protect health. The new limit is an annual average night exposure not exceeding 40 decibels (dB). Sleepers that are exposed to higher levels over the year, corresponding to the sound from a quiet street in a residential area, can suffer mild health effects, such as sleep disturbance and insomnia. Long-term average exposure to levels above 55 dB, similar to the noise from a busy street, can trigger elevated blood pressure and heart attacks. One in five Europeans is regularly exposed to such noise levels.
The PDF file of the book is available on http://www.euro.who.int/Document/E92845.pdf.
The Regional Office web site offers further information on noise and health:
(http://www.euro.who.int/noise).

Event Announcements

In this section we will inform you about upcoming events with relevance to housing and health. If you know of any international event, please let us know!

DEUBAU 2010 - International trade fair for construction
Date: January 16 - 20, 2010
Venue: Essen, Germany
Further Information: Messe Essen

KLIMAHOUSE 2010 - 5th International fair on Energy Efficient Construction
Date: January 21 - 24, 2010
Venue: Bolzano, Italy
Further Information: Messe Bozen AG

5th International Conference on Children's Health and the Environment
Organized by: International Network on Children's Health Environment and Safety (INCHES) and H.P. Foundation, Bangalore
Date: February 1-3, 2010
Venue: Bangalore, India
Further Information: INCHES

bautec 2010 - International trade fair for building and construction technology
Date: February 16 -20, 2010
Venue: Berlin, Germany
Further Information: Neue Messe Berlin

Fifth Ministerial Conference on Environment and Health
Date: March 10 - 13, 2010,
Venue: Parma, Italy
Further Information: WHO/Europe - Fifth Ministerial Co... - Home

Climate Change - Global Risks, Challenges and Decisions
Date: March10 - 12, 2010
Venue: Copenhagen, Denmark
Further Information: Climate Change Congress – University of Copenhagen

Sustainable City 2010 - Sixth International Conference on Urban Regeneration and Sustainability
Date: April 14 - 16, 2010
Venue: La Coruña, Spain
Further Information: The Sustainable City 2010 | 10 Conferences

Environmental Toxicology 2010 - Third International Conference on Environmental Toxicology
Date: May 4 - 6, 2010
Venue: Cyprus
Further Information: Environmental Toxicology 2010 | 10 Conferences

Urban Transport 2010 - 16th International Conference on Urban Transport and the Environment
Date: May 5 - 7, 2010
Venue: Cyprus
Further Information: Urban Transport 2010 | 10 Conferences

CIB (INTERNATIONAL COUNCIL FOR RESEARCH AND INNOVATION IN BUILDING AND CONSTRUCTION) World Congress 2010
Date: May 10 - 13, 2010
Venue: Salford Quays, United Kingdom
Further Information: http://www.cib2010.org/

10th Urban Environment Symposium - Urban Futures for a Sustainable World
Date: June 9 - 11, 2010
Venue: Göteborg, Sweden
Further Information: http://www.hues.se/pdf/HUES_invitation2010_a.pdf

Air Pollution 2010 - 18th International Conference on Urban Regeneration and Sustainability
Date: June 21 - 23, 2010
Venue: Kos, Greece
Further Information: Air Pollution 2010 | 10 Conferences

4th GHUP Annual Meeting 2010 - Society of Hygiene, Environmental and Public Health Sciences (GHUP)
Date**:** September 29 - October 02, 2010
Venue: Aachen, Germany
Further Information: GHUP / University Hospital Aachen

Message Board

In this section we will inform you about activities and projects related to housing and health that are being carried out by WHO or the WHO CC. This may relate to ongoing activities and projects, as well as invitations to participate in data collections or case study projects.

WHO work on indoor and built environments

WHO Indoor Air Quality Guidelines

In November, an expert meting took place in Bonn to develop the **WHO Indoor Air Quality Guidelines for selected air pollutants** (see http://www.euro.who.int/air/activities/20080910_1 for details). The meeting concluded on the evidence reviews and developed the recommended guidelines which will be published by WHO in 2010. The **WHO Indoor Air Quality guidelines on dampness and mould** have been published in summer 2009 (http://www.euro.who.int/air/activities/20070814_1). An executive summary is available in German, Russian and French. Future work is expected on guidelines development for allergens and solid fuel combustion. For an overview of the ongoing work, please refer to http://www.euro.who.int/air/activities/20070510_2.

Actions against dampness and mould

Complementing projects on damp and mould – co-funded by the European Commission – have been carried out to provide technical and policy recommendations on **damp and mould interventions**. The final report, including case studies, technical recommendations and a set of policy recommendations on interventions and actions against damp and mould, has been translated into German and Russian and will be published in the coming weeks. For information, please visit http://www.euro.who.int/Housing/support/20080403_1.
Other products related to this project – a **brochure on damp and mould prevention and remediation** for the public (also in Russian), and a **compilation of national or regional damp and mould advice services** - have been produced with the Health and Environment Alliance (HEAL) and can be accessed at http://www.env-health.org/r/157. Institutions and agencies that are active in the field of public information on damp and mould are asked to sign up for this compilation brochure on the same HEAL website.

LARES book published

The results of the WHO *Large Analysis and Review of European housing and health Status* (LARES) have been published in a monograph edited by David Ormandy. The book can be obtained through http://www.routledge.com/9780415477352.
A summary of key findings of the WHO LARES project can be accessed free of charge at http://www.euro.who.int/Document/HOH/lares_result.pdf.

Social inequities and healthy housing

Preparing for the Fifth Ministerial Conference on Environment and Health (10-12 March, Parma, Italy – see http://www.euro.who.int/parma2010 for details), WHO has undertaken various activities on environmental health inequities. A review of evidence was carried out for a number of environmental topics, focusing on the impact of social determinants on environmental risk. One of the reviewed topics was housing and residential location, and the full review will be made available as a background document at the Fifth Ministerial Conference on Environment and Health.
Already available is a report by WHO on housing inequalities based on the WHO LARES dataset, which shows that income and SES - as well as other social determinants – are highly associated with quality of housing and housing-related health effects. The report can be accessed at http://www.euro.who.int/Document/E92729.pdf

WHO handbook on indoor radon published

WHO Headquarter has published a handbook on indoor radon summarizing the current evidence on the health impacts of radon exposure in dwellings and providing exposure guidelines as well as technical and policy recommendations on mitigation. The book is accessible at http://whqlibdoc.who.int/publications/2009/9789241547673_eng.pdf

Imprint

Publisher

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