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IM REGIERUNGSPRÄSIDIUM STUTTGART

Newsletter

WHO Collaborating Centre for Housing and Health
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Editorial

Emissions from indoor wood-burning oven fireplaces and decorative fireplaces

The usage and control of the element fire are significant factors throughout the history of mankind. Fire provides light and heat and makes it possible to cook food. Recent archaeological findings in the South African Wonderwerk Cave show that man was able to use fire in a controlled manner as early as 1 million years ago [1]. A large part of the world's population today lives in impoverished conditions and depends on open fireplaces to cook. This can potentially have considerable health impacts [2]. But also in more sophisticated living conditions, modern man still enjoys the presence of an open fire and is fascinated by the flames of campfires in the countryside or candles [3,4] in the apartment, for example.

Wood-burning fireplaces have regained popularity in homes over the past years. These ovens create a cosy, warm ambience while offering an attractive lower-cost and ecological alternative to other forms of heating. In times of increasing energy prices, wood-burning ovens can be competitive on running costs and conserve resources when compared to fossil fuels. Combustion of wood as a renewable resource is also close to climate-neutrality in terms of carbon dioxide (CO_2), since in the ideal case only the amount of CO_2 which was drawn in during the tree's growth and stored in the wood is released into the atmosphere again. It is, however, natural that combustion takes place more or less incompletely and causes undesirable by-products. The more complex the combustion material is, the more difficult the reaction process is.

Besides the wood-burning oven fireplaces, recent years have also seen increasing use of ethanol-based liquid or gel fuelled burners which produce flames and are for indoor use. They primarily fulfil a decorative function. These fireplaces have the particular characteristic that they are operated without an enclosed oven, meaning that the products of the combustion process are released directly into indoor air. The manufacturers of such fireplaces state that a chemically complete combustion of ethanol "only" produces carbon dioxide (CO_2) and water. The possibility that other air contaminants could be formed and released due to the ethanol not completely combusting is not taken into consideration at all, although practical experience shows that this does in fact occur. Another factor not taken into consideration is that the fuel is not 100 percent pure ethanol. In fact it contains additives such as the denaturing agents added due to customs requirements in order to discourage from recreational consumption of the product.

Modern buildings are often so well insulated for energy conservation reasons that there is only a limited natural exchange of air. When there is a source of air contaminants in the building, this can lead to elevated concentrations of these contaminants which may exceed guideline values. This situation forms the basis for the current study of the release of combustion products into indoor air through the use of wood-burning oven fireplaces [5] and ethanol fireplaces [6]. The results are investigated thoroughly and evaluated on the basis of guideline values for indoor air. The two following newsletter articles report on the results of this study.

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Emissions from wood-burning oven fireplaces into indoor air

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Wood-burning oven fireplaces are currently enjoying great popularity as an (additional) way of heating homes. Depending on the way the oven operates, the way it is set up, how well the oven is maintained and the kind of fuel (wood species) used, a great number of combustion by-products are formed in addition to carbon dioxide (CO_2) and carbon monoxide (CO). These then escape into the outdoor air via the chimney. The many investigations of these wood-burning oven emissions have shown that the emissions contain fine and ultra-fine dust particles to which heavy metals, polycyclic aromatic hydrocarbons (PAH) and carbon black are adsorbed. The problem of hazardous emissions from wood-burning ovens into the outdoor air has been recognised by legislators and regulated in Germany under the ordinance for small and medium-sized combustion systems [1] in the form of permitted limits on gas and particulate emissions. This is intended to minimise emissions hazardous to health in the outdoor air. Emissions into the interior space due to poor seals (oven door, ash pan etc.) or upon normal opening of the firebox doors (adding more logs) and opening of vents are not dealt with by this statutory regulation in any way.

In this regard Fraunhofer WKI investigated if operating wood-burning ovens can have a negative impact on the quality of indoor air [2]. Comprehensive investigations were carried out in a total of seven homes in the Braunschweig area (Germany) during the 2012/13 heating season. All buildings investigated were fitted with modern, tightly sealing windows and doors and were naturally ventilated. The places in which the wood-burning ovens were situated were not individual rooms with clearly defined room volume. Rather, they were (open) living spaces, in which living room (where the oven is situated), dining room, kitchen and in some cases the entrance hall including the upper floor formed one shared air volume. In one home the tracer gas method showed a natural air exchange of 0.27 per hour in the space where the oven was situated. This value agrees with the generally expected air exchange rate for modern houses with sealed doors and windows (0.1 to 0.3 per hour).

All wood-burning ovens were of modern construction and were fuelled with untreated, seasoned wood (oak, ash, beech, birch). In regard to the operation of the wood-burning ovens no specifications (lighting, adding wood, type of wood etc.) were given. Instead, it was the "normal" operation which was under investigation in each individual case.

The following parameters - relevant in connection with wood-burning - were investigated in the interior air according to a standardised test protocol: CO_2, CO, NOx, formaldehyde, acetaldehyde, VOC, TVOC, benzo[a]pyrene, PM2.5 and particle concentration subdivided into individual size categories in the ranges 5.6 – 560 nm (FMPS measurement) and 0.3 µm – 20 µm (OPC). The details of the test protocol and the analysis are described in [2].

The parameters described were investigated before and during the wood-burning oven in operation in the individual homes. Air pollutants resulting from the combustion processes were clearly detectable during these investigations carried out under normal living and operating conditions. However, the impacts of CO, CO_2, NO, NO_2, TVOC, formaldehyde and acetaldehyde was limited: the guideline values for interior spaces [3] defined by a commission of the Federal Environmental Ministry were not exceeded in any case over the period of the investigations concerned.

On the other hand, significantly increased concentrations of ultrafine particles (UFP), $PM_{2.5}$, benzo[a]pyrene and benzene were measured in the indoor air during operation of wood-burning ovens. As mentioned earlier, these are typical combustion by-products when burning wood. So the question arises, how do these combustion products get into indoor air? As it seems, opening the firebox door in order to add logs to the fire causes the transfer of particles and other combustion products into indoor air: **Figure 1** shows a typical concentration vs. time course of the concentration of particles in the range 5.6 nm – 560 nm during a combustion experiment. It can clearly be seen that each opening of the firebox door led to an increase in particles in indoor air. This effect was particularly marked in the period immediately following lighting of the fire. The average particle diameter in each of the firing experiments was approx. 80 nm. Mainly, it was ultrafine particles (aerodynamic particle diameter < 100 nm) which released into indoor air. These results are in broad agreement with another study [4] which also established a significant increase in UFPs in indoor air in modern residential buildings, caused by the operation of wood-burning ovens.

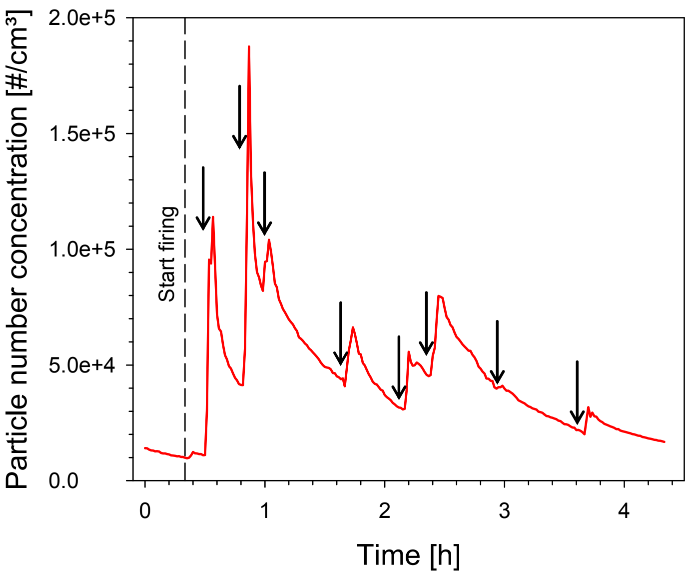

Figure 1: Indoor air ultra-fine particle concentration (5.6 – 560 nm) over time during operation of a wood-burning oven. The average particle diameter was approx. 80 nm. The arrows show when the oven door was opened to put more logs in [2].

This means that we can assume that when operating wood-fired ovens, the users can be exposed to (strongly) increased amounts of UFPs. However, an evaluation of the UFP with regard to possible health effects has not been part of this study. One reason therefore is that there are currently no threshold or guideline values which can be applied for an evaluation. The other reason is that the toxicological significance of UFPs always depends on the actual chemical composition of the particles.

In addition, to determine particle number concentrations, a gravimetric determination of "larger" particles – the $PM_{2.5}$ fraction – was also undertaken. These particles are also typically generated during the operation of a wood-burning oven [5]. Compared to UFP, the number of these particles was significantly lower; due to the size of these particles, however, they weighed significantly more and could therefore also be gravimetrically determined. In three of the seven homes [2] concentrations of suspended particulate matter ($PM_{2.5}$) were measured during operation of the wood-burning oven and were found to be above the WHO air quality limit value (24h) of 25 µg/m³ [6]. The peak value was 55 µg/m³. Another study [5] also describes increased $PM_{2.5}$ concentrations in indoor air when operating wood-burning ovens.

Polycyclic aromatic hydrocarbons (PAH), with the key component benzo[a]pyrene (B[a]P), were measured in indoor air to characterize the chemical composition of the suspended particulate matter. B[a]P is a carcinogenic compound in humans and is usually not present in indoor air unless an emitting source is present. Typical sources for B[a]P in indoor air are incomplete combustion processes e.g. when burning wood. During the operation of the wood-burning ovens, B[a]P could be detected in indoor air of two homes - The peak value was 2.8 ng/m³, which is significantly above normal background concentrations.

As a carcinogenic compound, benzene is also of particular significance from an indoor air quality point of view. Materials/equipment used in interior spaces should not release any benzene at all. Benzene may, however, be formed as a product of incomplete combustion, in a similar way to B[a]P. In three homes comparatively very high indoor air concentrations of benzene were found during the combustion experiments. The peak value was 72 µg/m³. Detailed research on the possible causes showed that in this case, the wood-burning oven ignition fuel itself contained benzene, thus representing an (additional) significant source. When the experiment was repeated without the questionable ignition fuel, "only" 8 µg/m³ of benzene were measured in indoor air. An important conclusion here is that the quality of the ignition fuel alone can have a significant influence on indoor air quality with regard to benzene during operation of the wood-burning oven.

Due to their carcinogenic properties, there are no guideline, threshold or safe values which could entirely exclude a health risk from the compounds benzene or B[a]P. For this reason, an absolute imperative to minimize these components must be applied.

As described above, particles escape into the indoor air in particular on opening the firebox doors. The combustion process within the firebox certainly plays an important role here. This in turn is dependent on construction and climatic conditions, the generally user-specific primary and secondary air regulation of the wood-burning oven and on the fuel. The latter factors were, however, not explicitly investigated. Whether and how changes of construction could achieve a minimization of the emission of combustion products into indoor air is an important issue for the manufacturers of wood-burning ovens. It also seems important here to provide users of wood-burning ovens with appropriate training and to inform them of the need for sufficient and regular ventilation of the room whilst the wood-burning oven is in operation.

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Chemical emissions resulting from the use of decorative ethanol fireplaces in indoor spaces

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In contrast to combustion heating units (e.g. wood-burning ovens), ethanol fireplaces are not primarily a source of heat and fulfill solely decorative purposes. Due to the construction, all the combustion products are released directly into indoor air, as the units are not fitted with extraction systems. Ideally, ethanol is oxidized to only carbon dioxide and water when burned. However, these must then be vented from indoor air, as an increased carbon dioxide concentration has an unpleasant effects on humans (e.g. headache) and influences their efficiency and performance. Furthermore, the water released during combustion can condense on cold surfaces and thereby expedite mould growth. Under ideal conditions, the combustion of 500 mL of ethanol results in the release of 750 g of carbon dioxide and 460 g of water. In reality, a certain amount of incomplete combustion can be expected; this can result in the formation of various by-products, which are then also released into indoor air.

In the past, ethanol fireplaces have been examined primarily in terms of fire protection; incidents involving serious accidents have already been reported in this context. Some of these accidents were the result of an attempt to re-fill an oven whilst it was still burning, or the oven was accidentally overturned, resulting in a large-scale fire (Kraemer et al., 2011). In Germany, there is currently only a technical standard for ethanol fireplaces: the DIN 4734-1 (2011). This standard, however, essentially covers fire protection aspects and mentions only peripherally the release of combustion products into indoor air. As an example, manufacturers are required to specify a minimum room volume in which, with an air exchange rate of 0.5/h, defined values for carbon dioxide and carbon monoxide will not be exceeded. A comparable standard also exists in France (NF D 35-386, 2009).

In the study presented here (Schripp et al., 2013), investigations were carried out regarding emissions from 4 ethanol fireplaces with 8 different fuels in a 48 m³ emission test chamber (Figure 1). Ethanol fuels in liquid and gel form were thereby used. The ventilation conditions for the tests were in accordance with the manufacturers' specifications as well as those of the DIN 4734-1 standard. The standard restricts ethanol fireplaces in indoor spaces to a maximum consumption of 0.5 L/h, which was fulfilled by all the tested systems. A comparable French study (Guillaume et al., 2013) examined ethanol fireplaces with greater reservoir volumes and therefore longer burning times. Due to the continuous release of combustion gases, the peak concentrations in the respective studies are higher.

The ethanol fireplaces examined within the framework of the WKI study were - as had been expected - powerful sources of combustion gases and organic compounds. The German guideline values for carbon dioxide concentrations in interior spaces classify concentrations in excess of 2000 ppm as hygienically unacceptable and concentrations in excess of 1000 ppm as hygienically conspicuous (Figure 2). During the chamber tests, peak concentrations in the range of 2200 ppm to 5900 ppm were obtained for the individual units. The peak concentration is thereby essentially dependent on the rate of combustion of the fuel. The flame size, for example, plays a role in this.

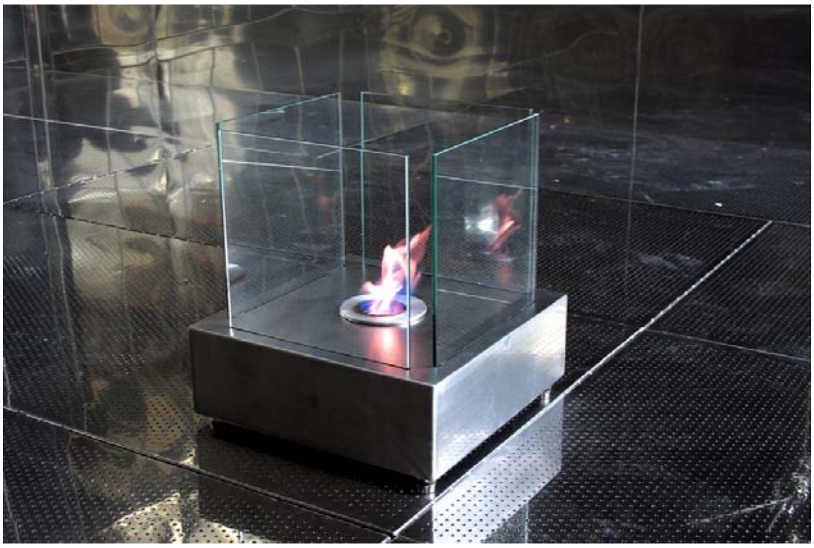

Figure 1: Examination of an ethanol fireplace in the WKI 48m³ stainless steel chamber

The continuous formation and release of nitrous oxides, such as NO_2 and NO, was also observed during the tests. This can possibly be attributed to the high flame temperature (approx. 1000°C; determined via optical thermography), which effects a direct oxidation of the atmospheric nitrogen (thermal NO_X). As a result, the guideline value for NO_2 of 0.35 mg/m³ (RWII) was exceeded by all the units tested. The origin of these emissions could not be determined within the framework of the WKI study. However, the concentrations lay within a similar range to that already reported by Guillaume et al.

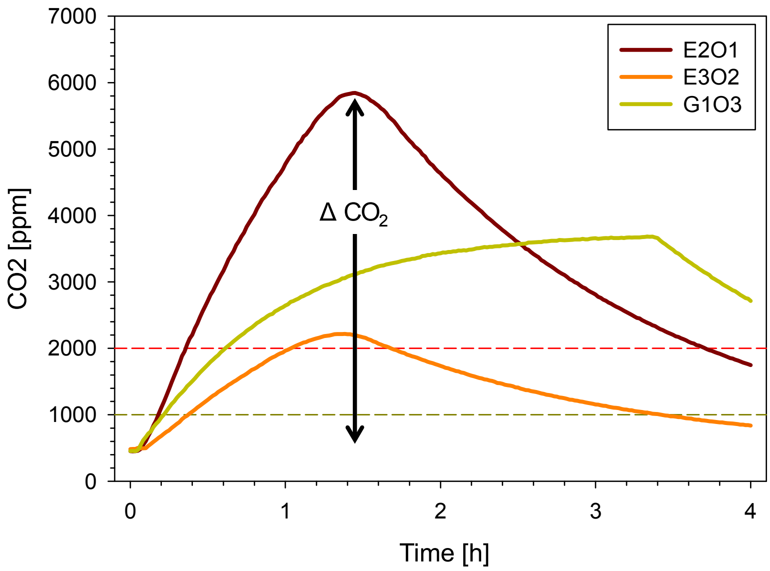

Figure 2: Development of the carbon dioxide concentration in the test chamber during operation of three ethanol fireplaces with liquid (E2O1, E3O2) and gel fuel (G1O3). The fuel quantities consumed up until extinction of the flame are demonstrated by the curves. The dashed lines show the hygienically-conspicuous range (1000-2000 ppm) and the hygienically-unacceptable range (>2000 ppm).

In the case of the organic emissions, the evaporation of the fuel and its constituent parts (e.g. ethanol, denaturants, etc.) as well as the products of incomplete combustion (e.g. formaldehyde, etc.) was observed. Furthermore, five of the examined units caused an exceedance of the guideline value for formaldehyde of 0.1 ppm (peak value: approx. 0.45 ppm). In view of formaldehyde's carcinogenic potential for humans, this exceedance is to be evaluated as critical. This applies similarly to the - also carcinogenic - compound benzene. For benzene, increased concentrations (up to 52 µg/m³) were determined in some cases. By testing a particular oven with various fuels it could be determined that the choice of fuel influences the release of benzene.

The ethanol fireplaces were, when in use, powerful sources of ultra-fine particles. Particles were mainly formed with a size of around 10 nm. The formation of these particles is, however, subject to significant fluctuations throughout the combustion phase and is not continuous (as is, for example, the development of the nitrous oxides and carbon dioxide). The various influencing factors (such as air currents, residues from previous use, etc.) seriously restrict the repeatability of particle measurements with these units. All ethanol fireplaces release ultra-fine particles. An assessment of these emissions on the basis of guideline values is currently not possible. Also, the toxicological effects cannot be deduced on the basis of the available measurements. The particles are, however, of such a size as to exhibit a similar behaviour to that of a gas. The particles, when inhaled, can reach the alveoli of the human lung. Depending on their size, the particles can also be deposited there. Compared to the background concentrations in normal residential buildings (ca. 10^3-10^4 #/cm³), determined during the measurement of wood-burning ovens (Salthammer et al., 2013), the concentrations determined in the test chamber up to approx. $2 \cdot 10^6$ #/cm³ are considerably higher in some places. The numerous cases of exceedance of the guideline values show that ethanol fireplaces are a powerful source of indoor pollutants, even under ideal ventilation conditions.

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Kraemer, R., Knobloch, K., Lorenzen, J., Breuing, K.H., Koennecker, S., Rennekampff, H.O., Vogt, P.M., 2011. Severe Burn Injuries Caused by Bioethanol-Design Fireplaces-An Overview on Recreational Fire Threats. J. Burn Care Res. 32, 173-177.

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Publications and Resources

Children's environmental health textbook

Over the past four decades, the prevalence of autism, asthma, attention-deficit hyperactivity disorder (ADHD), obesity, diabetes and birth defects have grown substantially among children around the world. During the same period, more than 80 000 new chemicals have been developed and released into the global environment. WHO attributes 36% of all childhood deaths to environmental causes. Evidence is also mounting that children are exquisitely sensitive to their environment, and that exposure during developmental 'windows of susceptibility' can trigger cellular changes that lead to disease and disability in infancy, childhood, and across the life span. A compelling need exists for continued scientific study of the relationship between children's health and the environment. The *Textbook of children's environmental health* codifies the related knowledge base and offers an authoritative and comprehensive guide to this important new field.

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!

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Allergies and Respiratory Diseases

Remission and persistence of asthma followed from 7 to 19 years of age.
Andersson M, Hedman L, Bjerg A, Forsberg B, Lundbäck B, Rönmark E.
Pediatrics. 2013 Aug;132(2):e435-42.

Analysis of the prevalence of and risk factors for atopic dermatitis using an ISAAC questionnaire in 8,750 Korean children.
Baek JO, Hong S, Son DK, Lee JR, Roh JY, Kwon HJ.
Int Arch Allergy Immunol. 2013;162(1):79-85.

[Respiratory symptoms and sensitization to airborne pollen of ragweed and mugwort of adults in Southwest Germany].
Boehme MW, Kompauer I, Weidner U, Piechotowski I, Gabrio T, Behrendt H.
Dtsch Med Wochenschr. 2013 Aug;138(33):1651-8.

Prevalence of childhood asthma, rhinitis, and eczema in the Ternopil region of Ukraine--results of BUPAS study.
Fedortsiv O, Brozek GM, Luchyshyn N, Kubey I, Lawson JA, Rennie DC, Zejda JE.
Adv Med Sci. 2012;57(2):282-9.

Urban vs. rural factors that affect adult asthma.
Jie Y, Isa ZM, Jie X, Ju ZL, Ismail NH.
Rev Environ Contam Toxicol. 2013;226:33-63. *Review.*

Development of temporally refined land-use regression models predicting daily household-level air pollution in a panel study of lung function among asthmatic children.
Johnson M, Macneill M, Grgicak-Mannion A, Nethery E, Xu X, Dales R, Rasmussen P, Wheeler A.
J Expo Sci Environ Epidemiol. 2013 May-Jun;23(3):259-67.

Effects of outdoor and indoor air pollution on respiratory health of Chinese children from 50 kindergartens.
Liu MM, Wang D, Zhao Y, Liu YQ, Huang MM, Liu Y, Sun J, Ren WH, Zhao YD, He QC, Dong GH.
J Epidemiol. 2013;23(4):280-7.

Allergy sensitization and asthma among 13-14 year old school children in Nigeria.
Oluwole O, Arinola OG, Falade GA, Ige MO, Falusi GA, Aderemi T, Huo D, Olopade IO, Olopade CO.
Afr Health Sci. 2013 Mar;13(1):144-53. *Free Article.*

Pet exposure and risk of atopic dermatitis at the pediatric age: a meta-analysis of birth cohort studies.
Pelucchi C, Galeone C, Bach JF, La Vecchia C, Chatenoud L.
J Allergy Clin Immunol. 2013 Sep;132(3):616-622.e7.

Predictors of indoor exposure to mouse allergen in inner-city elementary schools.
Permaul P, Sheehan WJ, Baxi SN, Gaffin JM, Fu C, Petty CR, Gold DR, Phipatanakul W.
Ann Allergy Asthma Immunol. 2013 Oct;111(4):299-301.e1.

The spectrum of aeroallergen sensitization in children diagnosed with asthma during first 2 years of life.
Sahiner UM, Buyuktiryaki AB, Yavuz ST, Yilmaz EA, Cavkaytar O, Tuncer A, Sekerel BE.
Allergy Asthma Proc. 2013 Jul-Aug;34(4):356-61.

Epigenetics of allergy.
Tezza G, Mazzei F, Boner A.
Early Hum Dev. 2013 Jun;89 Suppl 1:S20-1. *Review.*

Interleukin-13 genetic variants, household carpet use and childhood asthma.
Tsai CH, Tung KY, Su MW, Chiang BL, Chew FT, Kuo NW, Lee YL.
PLoS One. 2013;8(1):e51970. *Free Article.*

Sensitization to pets is a major determinant of persistent asthma and new asthma onset in Sweden.
Uddenfeldt M, Janson C, Lampa E, Rask-Andersen A.
Ups J Med Sci. 2013 May;118(2):111-21. *Free Article.*

Factors associated with asthma prevalence among racial and ethnic groups--United States, 2009-2010 behavioral risk factor surveillance system.
Zahran HS, Bailey C.
J Asthma. 2013 Aug;50(6):583-9.

Indoor Air

New details on organophosphate flame retardants: exposure in men appears stable over time.
Betts KS.
Environ Health Perspect. 2013 May;121(5):a168. *Free Article.*

Lead-based paint awareness, work practices, and compliance during residential construction and renovation.
Blando JD, Antoine N, Lefkowitz D.
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Distribution of peanut protein in the home environment.
Brough HA, Makinson K, Penagos M, Maleki SJ, Cheng H, Douiri A, Stephens AC, Turcanu V, Lack G.
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Peanut protein in household dust is related to household peanut consumption and is biologically active.
Brough HA, Santos AF, Makinson K, Penagos M, Stephens AC, Douiri A, Fox AT, Du Toit G, Turcanu V, Lack G.
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Human exposure assessment of indoor dust: importance of particle size and spatial position.
Cao Z, Yu G, Wang B, Huang J, Deng S.
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Temporal variability of pesticide concentrations in homes and implications for attenuation bias in epidemiologic studies.
Deziel NC, Ward MH, Bell EM, Whitehead TP, Gunier RB, Friesen MC, Nuckols JR.
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Sick building syndrome by indoor air pollution in Dalian, China.
Guo P, Yokoyama K, Piao F, Sakai K, Khalequzzaman M, Kamijima M, Nakajima T, Kitamura F.
Int J Environ Res Public Health. 2013 Apr 11;10(4):1489-504. *Free Article.*

Trace metals, anions and polybromodiphenyl ethers in settled indoor dust and their association.
Kefeni KK, Okonkwo JO.
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Health risk assessment of exposure to chlorpyrifos and dichlorvos in children at childcare facilities.
Kim HH, Lim YW, Yang JY, Shin DC, Ham HS, Choi BS, Lee JY.
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Fungi in Water-Damaged Buildings of Vilnius Old City and Their Susceptibility Towards Disinfectants and Essential Oils.
Levinskaitė L, Paškevičius A.
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Urinary metabolites of organophosphate flame retardants: temporal variability and correlations with house dust concentrations.
Meeker JD, Cooper EM, Stapleton HM, Hauser R.
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Cardiovascular outcomes and the physical and chemical properties of metal ions found in particulate matter air pollution: a QICAR study.
Meng Q, Richmond-Bryant J, Lu SE, Buckley B, Welsh WJ, Whitsel EA, Hanna A, Yeatts KB, Warren J, Herring AH, Xiu A.
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Relationship between household air pollution from biomass smoke exposure, and pulmonary dysfunction, oxidant-antioxidant imbalance and systemic inflammation in rural women and children in Nigeria.
Oluwole O, Arinola GO, Ana GR, Wiskel T, Huo D, Olopade OI, Olopade CO.
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Chronic exposure to biomass fuel is associated with increased carotid artery intima-media thickness and a higher prevalence of atherosclerotic plaque.
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Events Announcement

DCONex - Trade Fair for Hazardous Substances Management
Date: January 15-17, 2014
Venue: Essen, Germany
Further Information: Home - DCONex

Allergo Update 2014
Date:March 14-15, 2014
Venue: Wuppertal, Germany
Further Information: Allergo Update 2014

VDI - Wissensforum - Schadstoffe in Innenräumen Ursachen - Messstrategie - Bewertung
Date: March 25-26, 2014
Venue: Munich, Germany
Further Information: VDI Wissensforum: Schadstoffe in Innenräumen

WHO | World Health Day 2014 : vector-borne diseases
Date: April 7, 2014
Venue: Worldwide
Further Information:

Indoor Air 2014 - ISIAQ International Society of Indoor Air Quality and Climate
Date: July 7-14, 2014
Venue: Hong Kong, People's Republik of China
Further Information: Indoor Air 2014 — ISIAQ

7. GHUP Jahrestagung 2014
Date: July 26-27, 2014
Venue: Cologne, Germany
Further Information: GHUP - Jahrestagung

26th Conference of the International Society for Environmental Epidemiology ISEE
Date: August 24-28, 2014
Venue: Seatle / Washington, USA
Further Information: ISEE - International Society for Environmental Epidemiology

24th ISES Annual Meeting
Date:October 12-16, 2014
Venue: Cincinnati / Ohio, USA
Further Information: International Society of Exposure Science (ISES)

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

Multiple exposure in indoor built environments

Strong evidence is available on the health impacts of certain building- and indoor-related risk factors. However, in real life, many of these indoor exposures occur in parallel and much less evidence is available on such multiple exposures, their health effects, and the appropriate countermeasures. Based on an evidence review prepared for a capacity building workshop on multiple exposures in indoor built environments, WHO/Europe is currently preparing a report on multiple exposures in indoor built environments such as homes, day care centers and schools. The report is expected to be available in early 2014.

URGENCHE workshop at International Conference on Urban Health

The WHO European Centre for Environment and Health is leading a work package on health and wellbeing within the URGENCHE project which aims at assessing impacts of urban greenhouse gas reduction policies. First results on the impact of local policies to mitigate climate change on health and wellbeing will be presented during a session hosted during the International Conference on Urban Health taking place in Manchester from 4-7 March 2014. The European Centre for Environment and Health will also be involved in a further session on urban environments and health, presenting ongoing work.

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