



2012 Number 5

# ISIAQ NEWSLETTER

November 2012

## ISIAQ's Board of Directors Approves Senior Membership Category

At its October meeting, the ISIAQ Board of Directors approved a new membership category for seniors. In order to qualify for a senior membership, members must be retired and must have been an ISIAQ member for 10 years or more. Senior members receive on-line access to the *Indoor Air* journal. The annual membership fee for Senior Members is \$30/year.

This new category is intended to enable those of our members who still maintain an interest in the field but who are no longer actively working in the field to follow progress in through the *Indoor Air* journal and to provide those still active in the field with the benefit of their experience and knowledge.'

## Environment and Health 2013 Basel: Request for Symposium Proposals

ISIAQ is proud to be co-organizer of "Environment and Health – Bridging South, North, East and West" Conference of ISEE, ISES and ISIAQ, to take place in Basel, Switzerland 19 – 23 August 2013

You are invited to submit a symposium proposal to Environment and Health 2013, to be held in Basel Switzerland, 19–23 August 2013. EH Basel 2013 is co-organized by ISIAQ, ISEE, and ISES. This is the first time ISIAQ has partnered with these two important "sister" organizations for a major international conference.

The aim of a symposium (90 minutes) is to provide closely related talks on a topic relevant for the conference. It can be organized as a combination of 4-6 similar/related studies, a review of a topic, a debate with controversial views, or have more open format such as several presentations followed by a panel discussion.

Starting your symposium with an introductory-overview presentation may make it more attractive for a broader audience not necessarily familiar with your topic. It will be an asset to your symposium if your program offers comprehensive coverage, both scientifically and geographically, of the specific topic. We also encourage you to plan for sufficient discussion time. Typically, a symposium has 1-2 chairpersons who act as moderators but do not give presentations. In the light of the conference topic, symposia with contributors from both Southern and Northern continents are particularly welcomed and will be prioritized.

Visit the conference web site <http://www.ehbasel13.org/> for a symposium proposal template. **The deadline for Symposium proposals for the Environmental and Health Basel 2013 Conference is December 10.**

**Abstracts for individual presentations will be due February 15.** Presentation selections are based on abstracts; no conference papers are required.

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## ASHRAE IAQ 2013: Call for Abstracts

IAQ 2013 taking place in Vancouver, 15-18 October 2013. ISIAQ is strongly encouraging all our members to submit abstracts.

The conference is co-organized by ISIAQ and is the 17th in the ASHRAE IAQ conference series. The conference will examine IAQ, thermal comfort, source control, air cleaning, ventilation, exposure and related environmental health concerns associated with low energy building design, construction, retrofit and operation.

IAQ 2013 will review the state of knowledge of the balance of environmental health and energy efficiency in buildings and help define future education, policy and research directions. With an increasing emphasis on energy conservation, there is a tendency to ignore the purpose much of a building's energy use: the maintenance of good indoor environmental quality. The roles of building, HVAC and passive system design and operation for achieving good environmental health in low energy buildings are the core themes of this conference.

The conference program will include internationally acclaimed keynote speakers; original peer reviewed conference papers and extended abstract presentations. Abstracts are invited in the following subject areas:

- Environmental Health in Low Energy Buildings
- Moisture and Health
- Sources and Chemistry
- IEQ Factor Interactions
- Residential Buildings
- Commercial and Institutional Buildings
- Air Cleaning and Filtration
- Microorganisms and Infection
- Tools (models, measurements and more)

For more detailed descriptions of each of the topic areas, visit <http://www.ashrae.org/IAQ2013>.

**The deadline for abstracts is Dec. 15, 2012.**

Abstracts, containing titles and 300 word or less summaries, should be submitted via the submission system on the conference website at <http://www.ashrae.org/IAQ2013>. Authors of accepted abstracts will have the choice of submitting a two-page extended abstract or a lengthier paper.

**Indoor Air, Volume 22, Number 6 December 2012**  
**Abstracts**

**William W Nazaroff - Max von Pettenkofer Award**

In August 1892, a cholera outbreak struck Hamburg. In just a few months, 17 000 cases of the illness were recorded resulting in 8600 deaths within a population of about 640 000 (Evans, 1987). At its peak intensity, only a few weeks after the onset, a thousand illnesses and five hundred deaths were reported daily in the city. Intense but short-lived cholera outbreaks had struck Hamburg and other European cities repeatedly through the nineteenth century. The 1892 episode was Hamburg's most severe in terms of lives lost (Evans, 1987). It was to be the last major cholera outbreak in Western Europe.

**K. A. Hoppe, N. Metwali, S. S. Perry, T. Hart, P. A. Kostle and P. S. Thorne - Assessment of airborne exposures and health in flooded homes undergoing renovation**

**Abstract** In June 2008, the Cedar River crested flooding more than 5000 Cedar Rapids homes. Residents whose homes were flooded were invited to participate in this study. Household assessments and resident interviews were conducted between November 2008 and April 2009. We characterized exposures and symptoms experienced by individuals inhabiting 73 flood-damaged homes. Active air sampling and passive electrostatic dust collectors were used to assess exposures to culturable mold, culturable bacteria, fungal spores, inhalable particulate matter (iPM), endotoxin, glucans, allergens, lead, asbestos, radon, carbon dioxide, and carbon monoxide. Wall moisture levels and relative humidity were also measured. Exposures and questionnaire-based health assessments were compared at two levels of remediation, in-progress and completed. Homes with remediation in-progress ( $N = 24$ ), as compared to the completed homes ( $N = 49$ ), had significantly higher airborne concentrations of mold, bacteria, iPM, endotoxin, and glucan. Residents of in-progress homes had a significantly higher prevalence of doctor-diagnosed allergies (adjusted OR = 3.08; 95% CI: 1.05, 9.02) and all residents had elevated prevalence of self-reported wheeze (adjusted OR = 3.77; 95% CI: 2.06, 6.92) and prescription medication use for breathing problems (adjusted OR = 1.38; 95% CI: 1.01, 1.88) after the flood as compared to before. Proper post-flood remediation led to improved air quality and lower exposures among residents living in flooded homes.

**Practical Implications** The number and severity of floods is on the rise, and health departments need evidence-based information to advise homeowners on recovery after such disasters. Our study suggests that proper remediation of flood-damaged homes can reduce bioaerosols to acceptable levels but exposures are significantly increased while remediation is in-progress leading to an increased burden of allergy and allergic rhinitis.

**U. Haverinen-Shaughnessy, A. Borrás-Santos, M. Turunen, J.-P. Zock, J. Jacobs, E. J. M. Krop, L. Casas, R. Shaughnessy, M. Täubel, D. Heederik, A. Hyvärinen, J. Pekkanen and A. Nevalainen, HITEA study group - Occurrence of moisture problems in schools in three countries from different climatic regions of Europe based on questionnaires and building inspections – the HITEA study**

**Abstract** The aim of this study was to assess occurrence of dampness and mold in school buildings in three European countries (the Netherlands, Spain, and Finland), representing different climatic regions. An assessment was performed utilizing both questionnaires and on-site building investigations, and the agreement between these two methods was evaluated for validation purposes. On the basis of questionnaire data from a representative sample of schools, different types of moisture problems were reported in 24–47% of all school buildings at the time of the study. Most commonly reported was dampness in the Netherlands, moisture/water damage in Spain, and mold odor in Finland. Subsequently, 20–24 schools per country were selected for on-site inspections by trained staff. The overall agreement between the questionnaire and inspection data was good (kappa-value 0.62), however, with large differences (0.39–0.91) between countries. Extrapolating from the inspection data, the minimum estimates for prevalence of moisture problems in school buildings are 20% in the Netherlands, 41% in Spain, and 24% in Finland. In conclusion, moisture problems (such as moisture damage, dampness, and mold) are relatively common in schools. The occurrence and severity may vary across geographical areas, which can be partly explained by building characteristics.

**Practical Implications** On the basis of this study, the prevalence of verified moisture problems in school buildings was highest in Spain, but lower and similar in Finland and the Netherlands. Questionnaire-based surveys can be used to assess moisture problems in school buildings, but because of large variation in agreement with inspection data, the questionnaire needs to be validated by on-site inspections in a subsample of the surveyed buildings.

**G. Clausen, A. Høst, J. Toftum, G. Bekö, C. Weschler, M. Callesen, S. Buhl, M. B. Ladegaard, S. Langer, B. Andersen, J. Sundell, C.-G. Bornehag and T. Sigsgaard - Children's health and its association with indoor environments in Danish homes and daycare centres – methods**

**Abstract** The principle objective of the Danish research program 'Indoor Environment and Children's Health' (IECH) was to explore associations between various exposures that children experience in their indoor environments (specifically their homes and daycare centers) and their well-being and health. The targeted health endpoints were allergy, asthma, and certain respiratory symptoms. The study was designed with two stages. In the first stage, a questionnaire survey was distributed to more than 17 000 families with children between the ages of 1 and 5. The questionnaire focused on the children's health and the environments within the homes they inhabited and daycare facilities they attended. More than 11 000 questionnaires were returned. In the second stage, a subsample of 500 children was selected for more detailed studies, including an extensive set of measurements in their homes and daycare centers and a clinical examination; all clinical examinations were carried out by the same physician. In this study, the methods used for data collection within the IECH research program are presented and discussed. Furthermore, initial findings are presented regarding descriptors of the study population and selected characteristics of the children's dwellings and daycare centers.

**Practical Implications** This study outlines methods that might be followed by future investigators conducting large-scale field studies of potential connections between various indoor environmental factors and selected health endpoints. Of particular note are (i) the two-stage design – a broad questionnaire-based survey followed by a more intensive set of measurements among a subset of participants who have been selected based on their responses to the questionnaire; (ii) the case–base approach utilized in the stage 2 in contrast to the more commonly used case–control approach; (iii) the inclusion of the children's daycare environment when conducting intensive sampling to more fully capture the children's total indoor exposure; and (iv) all clinical examinations conducted by the same physician. We recognize that future investigators are unlikely to fully duplicate the methods outlined in this study, but we hope that it provides a useful starting point in terms of factors that might be considered when designing such a study.

**L. Casas, C. Tischer, C. Tiesler, I. Brüske, S. Koletzko, C.-P. Bauer, H.-E. Wichmann, A. von Berg, D. Berdel, U. Krämer, B. Schaaf, I. Lehmann, O. Herbarth and J. Heinrich, for the GINIplus and LISApplus Study Group - Association of gas cooking with children's respiratory health: results from GINIplus and LISApplus birth cohort studies**

**Abstract** Previous studies have found inconsistent results on the association between asthma in children and gas cooking emissions. We aimed to assess the effects of the long-term exposure to gas cooking on the onset of asthma and respiratory symptoms, focusing on wheezing, in children from two German birth cohorts: LISApplus and GINIplus. A total of 5078 children were followed until the age of 10 years. Asthma, wheezing, gas cooking, and exposure to other indoor factors were assessed through parental reported questionnaires administered periodically. Logistic and multinomial regressions adjusting for potential confounders were performed. The prevalence of asthma and persistent wheezing was higher among children exposed to gas cooking but the results were not statistically significant. Exposure to gas cooking was positively associated ( $P$ -value  $< 0.05$ ) with exposure to other indoor factors (dampness, environmental tobacco smoke, and pets). Our results did not show a statistically significant association between the exposure to gas cooking and children's respiratory health.

**Practical Implications** These analyses are consistent with the assumption of no effect of the exposure to low doses of nitrogen dioxide. The strong positive associations found between gas cooking and other indoor factors highlight the importance of considering other indoor factors when assessing health effects of gas cooking. Low-dose exposure to indoor nitrogen dioxide through gas cooking might not contribute to increase the risk of asthma and respiratory symptoms in children.

**M. A. Torkmahalleh, I. Goldasteh, Y. Zhao, N. M. Udochu, A. Rossner, P. K. Hopke and A. R. Ferro - PM<sub>2.5</sub> and ultrafine particles emitted during heating of commercial cooking oils**

**Abstract** Seven commercial cooking oils were investigated to determine the PM<sub>2.5</sub> mass and ultrafine particle (UFP) emission rates and emission fluxes (rates per area). The results of this study showed that at 197°C soybean, safflower, canola, and peanut oils produced lower PM<sub>2.5</sub> emission fluxes ( $6.1 \times 10^5$ ,  $3.0 \times 10^5$ ,  $5.4 \times 10^5$ , and  $3.9 \times 10^5$   $\mu\text{g}/\text{min}/\text{m}^2$ , respectively) than corn, coconut, and olive oils ( $2.7 \times 10^6$ ,  $2.9 \times 10^6$ , and  $5.7 \times 10^6$   $\mu\text{g}/\text{min}/\text{m}^2$ , respectively). Similarly, the total particle number flux at 197°C was lower for soybean, safflower, and canola oils ( $3.5 \times 10^{13}$ ,  $8.6 \times 10^{13}$ , and  $1.0 \times 10^{14}$   $\#/ \text{min}/\text{m}^2$ , respectively) than the corn, coconut, olive, and peanut oils ( $2.4 \times 10^{14}$ ,  $1.4 \times 10^{14}$ ,  $1.7 \times 10^{14}$ , and  $3.8 \times 10^{14}$   $\#/ \text{min}/\text{m}^2$ , respectively). In general, oils with a higher smoke temperature resulted in lower particle concentrations over the measured temperature range (131–197°C). The percentage of UFP (particle diameter  $D_p$  10–100 nm) to total particles ( $D_p$  10–500 nm) ranged from 76 to 99% for this temperature range. Particles below 10 nm in diameter were not measured. The particle number size distribution showed a polydisperse behavior with major mode sizes ranging from 25 nm (for peanut oil) to 82 nm (for soybean oil) at an oil temperature of 197°C.

**Practical Implications** The study presents particle number and mass concentrations, size distributions, emission rates, and emission fluxes from heating common cooking oils. The emission rates and emission fluxes can be used as inputs to models for indirect exposure analysis studies. The study may also be used to provide guidance on choosing oils that result in lower emission rates when heated.

### **C. W. Noonan, W. Navidi, L. Sheppard, C. P. Palmer, M. Bergauff, K. Hooper and T. J. Ward - Residential indoor PM<sub>2.5</sub> in wood stove homes: follow-up of the Libby changeout**

**Abstract** In 2005 through 2008, a small rural mountain valley community engaged in a woodstove changeout program to address concerns of poor ambient air quality. During this program, we assessed changes to indoor air quality before and after the introduction of a new, lower emission woodstove. We previously reported a >70% reduction in indoor PM<sub>2.5</sub> concentrations in homes following the installation of a new Environmental Protection Agency's-certified stove within the home. We report here on follow-up of the experiences in these and other homes over three winters of sample collection. In 21 homes, we compared pre-changeout PM<sub>2.5</sub> concentrations [mean (s.d.) = 45.0 (33.0) µg/m<sup>3</sup>] to multiple post-changeout measures of PM<sub>2.5</sub> concentrations using a DustTrak. The mean reduction (and 95% confidence interval) from pre-changeout to post-changeout was -18.5 µg/m<sup>3</sup> (-31.9, -5.2), adjusting for ambient PM<sub>2.5</sub>, ambient temperature, and other factors. Findings across homes and across years were highly variable, and a subset of homes did not experience a reduction in PM<sub>2.5</sub> following changeout. Reductions were also observed for organic carbon, elemental carbon, and levoglucosan, but increases were observed for dehydroabietic acid and abietic acid. Despite overall improvements in indoor air quality, the varied response across homes may be due to factors other than the introduction of a new woodstove.

**Practical Implications** Biomass combustion is a common source of ambient PM<sub>2.5</sub> in many cold-climate communities. The replacement of older model woodstoves with newer technology woodstoves is a potential intervention strategy to improve air quality in these communities. In addition to ambient air, woodstove changeouts should improve residential indoor air quality. We present results from a multi-winter study to evaluate the efficacy of woodstove changeouts on improving indoor air quality. Reductions in indoor PM<sub>2.5</sub> were evident, but this observation was not consistent across all homes. These findings suggest that other factors beyond the introduction of an improved wood burning device are relevant to improving indoor air quality in wood burning homes.

### **B. Stephens and J. A. Siegel - Penetration of ambient submicron particles into single-family residences and associations with building characteristics**

**Abstract** This work improves knowledge of particle penetration into buildings by (i) refining a particle penetration test method that minimizes the duration and invasiveness required by individual tests without sacrificing accuracy, (ii) applying the method in an unoccupied manufactured test house and 18 single-family homes in Austin, Texas, USA, and (iii) exploring correlations between particle penetration and building characteristics, including results from blower door air leakage tests. The mean (±s.d.) measured penetration factor of submicron particles (20–1000 nm, not size-resolved) was  $0.47 \pm 0.15$  in 19 residences that relied on infiltration for ventilation air, ranging from  $0.17 \pm 0.03$  to  $0.72 \pm 0.08$ . Particle penetration factors ( $P$ ) and outdoor particle source terms ( $P \times$  air exchange rates) were both significantly and positively correlated with results from blower door air leakage tests. Outdoor particle source terms were also significantly and negatively correlated with the year of construction. These results suggest that occupants of leakier and older homes are exposed to higher indoor concentrations of outdoor submicron particles than those in tighter and newer homes, and that simple air leakage tests may be able to provide an approximate prediction of outdoor particle infiltration into single-family residences.

**Practical Implications** Results from this work suggest that knowledge of simple building characteristics (i.e., the year of construction and blower door test results) may be used to predict the ability of outdoor particles to infiltrate into single-family residences, which could facilitate easier estimates of indoor exposures to outdoor particulate matter across the building stock. The methods within can also be extended to other buildings and can be used to assess possible changes in penetration factors because of envelope retrofits. Because outdoor particle size distributions were not measured during this study, these tests should also be repeated with size-resolved particle instrumentation.

**S. Roussel, G. Reboux, L. Millon, M-D. Parchas, S. Boudih, F. Skana, M. Delaforge and M. S. Rakotonirainy - Microbiological evaluation of ten French archives and link to occupational symptoms**

**Abstract** Fungi that damage documents in archives may harm workers' health, depending on which mold species are inhaled, the concentrations of fungal species inhaled, and individual factors. Our aim was to identify and quantify fungi in archives and to investigate possible links with the symptoms experienced by workers. Ten French archives were sampled using an air impactor and electrostatic dust collectors. Allergies and general symptoms felt by 144 workers were reported using a self-report questionnaire. Utilizing culture-based analysis methods along with qPCR, *Penicillium chrysogenum*, *Cladosporium sphaerospermum*, and *Aspergillus versicolor* were the three main fungi in air and dust in terms of quantity and frequency. Median fungal concentrations in storage areas, ranged from 30 to 465 CFU/m<sup>3</sup>. People working in the most contaminated archives did not report more symptoms of allergy than others. However, workers in contact with moldy documents reported more headaches (odds ratio, 2.4; 95% confidence interval, 1.1–5.3), fatigue (OR, 2.9; 95% CI, 1.2–6.7), eye irritation (OR, 5.4; 95% CI, 1.9–14.9), throat irritation (OR, 2.4; 95% CI, 1.0–5.7), coughing (OR, 3.2; 95% CI, 1.2–8.4), and rhinorrhea (OR, 2.6; 95% CI, 1.0–6.4) than others. Other parameters such as dust levels and concentrations of metabolites and chemical substances should be considered as confounding factors in further investigations to isolate the role of molds.

**Practical Implications** Most studies about fungi and archives deal with the conservation of manuscripts and documents, and few discuss workers' health problems. Our study shows that archives do not represent a highly contaminated environment. Symptoms felt by workers were more often linked to direct contact with moldy documents than to high concentrations of mold in the air of archive storage areas. This study provides data on concentration levels in archives that could be used to interpret microbiological investigations in this type of environment in the future.

**C. Gao, K. Kuklane, F. Wang and I. Holmér - Personal cooling with phase change materials to improve thermal comfort from a heat wave perspective**

**Abstract** The impact of heat waves arising from climate change on human health is predicted to be profound. It is important to be prepared with various preventive measures for such impacts on society. The objective of this study was to investigate whether personal cooling with phase change materials (PCM) could improve thermal comfort in simulated office work at 34°C. Cooling vests with PCM were measured on a thermal manikin before studies on human subjects. Eight male subjects participated in the study in a climatic chamber ( $T_a = 34^\circ\text{C}$ , RH = 60%, and  $v_a = 0.4$  m/s). Results showed that the cooling effect on the manikin torso was 29.1 W/m<sup>2</sup> in the isothermal condition. The results on the manikin using a constant heating power mode reflect directly the local cooling effect on subjects. The results on the subjects showed that the torso skin temperature decreased by about 2–3°C and remained at 33.3°C. Both whole body and torso thermal sensations were improved. The findings indicate that the personal cooling with PCM can be used as an option to improve thermal comfort for office workers without air conditioning and may be used for vulnerable groups, such as elderly people, when confronted with heat waves.

**Practical Implications** Wearable personal cooling integrated with phase change materials has the advantage of cooling human body's micro-environment in contrast to stationary personalized cooling and entire room or building cooling, thus providing greater mobility and helping to save energy. In places where air conditioning is not usually used, this personal cooling method can be used as a preventive measure when confronted with heat waves for office workers, vulnerable populations such as the elderly and disabled people, people with chronic diseases, and for use at home.

**Send us your news to fill this space in the next ISIAQ Newsletter**

Tell your ISIAQ Colleagues what you are doing! Send us news about your latest publication, grant or project.

Has your government adopted a new law or regulation that would be of interest to your ISIAQ colleagues around the world? Send us a brief summary or send a link to a web site where we can learn about it.

## About ISIAQ

With more than 800 members from more than 45 countries, ISIAQ is an international, independent, multidisciplinary, scientific, non-profit organization whose purpose is to support the creation of healthy, comfortable and productive indoor environments. We strongly believe this is achievable by advancing the science and technology of indoor air quality and climate as it relates to indoor environmental design, construction, operation and maintenance, air quality measurement and health sciences.

As a Society, our major role is to facilitate international and interdisciplinary communication and information exchange by publishing and fostering publication on indoor air quality and climate. We organize, sponsor and support initiatives such as meetings, conferences, and seminars on indoor air quality and climate; and we develop, adapt and maintain guidelines for the improvement of indoor air quality and climate.

ISIAQ's journal, *Indoor Air*, published six times per year, is the most respected and widely-cited source of scientific information relevant to building scientists and professionals. Our two major international conferences -- the Indoor Air 'xx and the Healthy Buildings 'xx conference series -- set the standard for high quality scientific information and its application to making healthy buildings. We also cooperate with government and other agencies and societies with interests in the indoor environment and climate.

To find out more about us, visit our website: <http://isiaq.org>

## International Society of Indoor Air Quality and Climate—ISIAQ

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## Corporate Memberships are available

If your organization is involved in indoor air science, policy, or practice, a corporate membership in ISIAQ will place you in the limelight with the international indoor air community.

- ISIAQ reaches more than 45 countries around the world.

- ISIAQ's conferences, considered the most important in the field, have been attended by more than 4,000 individuals.

- The official Society journal, *Indoor Air*, is respected by scientists and policy-makers as the most reliable way to keep up with the latest scientific findings in the field.

To learn more about the benefits of corporate membership in ISIAQ, visit the membership page on our web site and click on the [corporate membership link](#).

### Corporate Members

