

## **INDOOR AIR QUALITY IN RESIDENTIAL ENVIRONMENTS: INTRODUCTION TO A SPECIAL ISSUE**

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“... In the developed world, people spend an average of about 90% of their time indoors. Therefore the indoor environment is, for many, the environment that most influences their health, comfort and well-being. Whatever the quality of the outdoor air, it is the indoor air they breathe.”

This statement is from the preamble to the *Indoor Air 99 Statement*, developed by a diverse group of international specialists in scientific, engineering, and design fields gathered in Edinburgh, Scotland, for the 8<sup>th</sup> International Conference on Indoor Air Quality and Climate, *Indoor Air 99*, sponsored by the International Academy on Indoor Air Sciences and the International Society of Indoor Air Quality and Climate. It recognized the critical concern for indoor air quality and set the stage for far-ranging discussions on the current state of knowledge and inquiry as to the role of indoor air quality in human health and the quality of life.

If people spend about 90% of their time indoors, then about half of that time is in their homes. The quality of household air is widely recognized as a significant concern, directly impacting health and comfort. Yet, indoor air quality in residential environments is largely untouched by existing health and safety regulations. There are increasing numbers of pollutant sources in the home related to building materials, heating and cooling systems, and activities in the home. Advancing technology and new product development has introduced many potentially hazardous chemicals into the home. In addition, the trend since the 1970s has been for tighter, more energy efficient homes. This reduces ventilation and air exchange rates, and results in higher concentrations of indoor pollutants.

Indoor air quality problems are complex and can be very site specific. Both the nature and severity of the problem are related to interacting factors, including: pollut-

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ant source and strength; interaction of pollutants; ventilation rates; quality of outside air for ventilation; temperature and humidity, which effects the release of airborne pollutants; presence of air cleaning equipment; and sensitivity of the individuals. Common pollutants that can lead to health problems include: radon; environmental tobacco smoke; biologicals, including pollens, fungi, and dust mites; combustion by-products, including carbon monoxide, nitrogen dioxide, and respirable particles; organic gases or volatile organic chemicals, including formaldehyde; pesticides; asbestos; and lead dust.

It is not always easy to detect indoor air quality problems. Some pollutants can be smelled or seen while others are invisible or odorless. Poor air quality may be simply annoying or unpleasant, or it may lead to serious health problems. Common health problems, such as irritated eyes and nose, headaches, dizziness, tiredness, asthma, viral infections, and respiratory diseases, may be due to substances in the air you breathe. Some serious effects of poor air quality, such as lung cancer, may take years to develop. People react differently to air pollutants, depending on their age, sensitivity, health status, and the type and length of exposure.

Children are especially vulnerable to air quality problems. Their bodies are smaller and are still developing. Indoor air quality pollutants are factors in the increasing incidence of childhood asthma. Environmental tobacco smoke, such as from parents who smoke, can result in chronic respiratory problems. And dust from disintegrating lead-based paint is especially a developmental and health hazard for young children.

Although a home's design and construction are important, healthy indoor air quality requires the householder to manage and maintain the structure. Education can help people understand air quality issues and risks, as well as their roles and responsibilities in the solution. Indoor air quality issues require a variety of educational approaches, ranging from creating awareness to changing behavior. The nature of risk and the psychological impact of environmental hazards in the home are important underlying issues.

### **Special Issue of *Housing and Society***

In this special issue of *Housing and Society*, the American Association of Housing Educators highlights some of the work being done to address the critical issues of residential indoor air quality. The need for education of both the public and professionals is a recurring theme through all the articles. The breadth and variety of the topics and educational methodologies covered in these articles is indicative of the range and complexity of indoor air quality issues.

1. *Exposure to Radon in Basement Spaces of Minnesota Homes* by Sylvia Fuoss, Marilyn Bode, and Evelyn Franklin, presents an analysis of basement radon levels and relates residents' exposure to radon to their choices about activities and uses of basement spaces, emphasizing the need for homeowner knowledge about radon issues.
2. *Perceived Effects of Carpet on Indoor Air Quality* by Kenneth Tremblay, Li-Wen Peng, Susan Kreul-Froseth and Brian Dunbar reports how practicing inte-

rior designers perceive the effects of carpet on indoor air quality and identifies the need for these professionals to have access to more complete information on indoor air quality.

3. *Moisture Problems in Houses Built in 1991 and 1992 in Minnesota* by Marilou Cheple and Becky Love Yust investigated moisture problems in new homes and the influence of these problems on housing satisfaction, concluding that there is a need for homeowners to better understand how to manage their homes for reduced moisture problems and improved air quality.
4. *Designing for Good Indoor Air Quality in Hot, Humid Climates: Development of a Student Design Competition* by Katherine Warsco describes the development of a design competition for interior design students as an integrative model for teaching environmental design and increasing an understanding of residential indoor air quality among future professionals.
5. *Radon Publication Information: Impact on Reader's Knowledge, Attitudes and Intentions* by Shirley Neimeyer and Brenda Keller investigated the use of an information publication, in a workshop setting, to increase participants knowledge of radon hazards as well as their intentions to take action to reduce their risk.
6. *Developing Dual Language Publications on Household Environmental Risks for the Hmong, Cambodian and Laotian Communities* by Wanda Olson and Marilyn Bode addresses the development of dual language publications to teach about environmental concerns in an urban, immigrant community, focusing on concerns of risk communication and environmental justice.

### Summary

Indoor air quality is a complex, but critical, issue today. The quality of air that people breathe in their homes is an important factor in overall health and well-being. Teaching people to modify their homes and their lifestyles to improve indoor air quality requires knowledge of the issues and a variety of educational approaches. The articles in this special issue can help housing educators move one step closer to that goal.