

EDUCATIONAL EFFORTS TO REDUCE RADON LEVELS IN THE HOME

Kenneth R. Tremblay, Jr.
Colorado State University

Michael P. Vogel
Montana State University

Nancy H. Drennen
Colorado State University

Radon has been identified as the second leading cause of lung cancer in the U.S., and is present in millions of homes. For eight years Cooperative Extension has partnered with the U.S. Department of Agriculture and the U.S. Environmental Protection Agency in a radon educational program as part of the national initiative Healthy Indoor Air for America's Homes. The purpose of this paper was to describe the development, implementation, and evaluation of this radon educational program consisting of a training manual, fact sheets, workshops, a poster contest, and Internet materials. Based on impact data, it is estimated that 14,620 consumers had their homes tested for radon and 4.827 corrected radon problems. Suggestions were provided for family and consumer sciences educators interested in joining efforts to help consumers become aware of potential radon problems in their homes and to reduce radon levels based on testing results.

The purpose of this paper is to describe Cooperative Extension's educational efforts to reduce radon levels in homes. In 1996, the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) launched a national initiative through Cooperative Extension entitled Healthy Indoor Air for America's Homes. The goal of this program is to deliver basic but comprehensive indoor air quality information to consumers. The objective of Healthy Indoor Air for America's Homes is to educate consumers about sources, health risks, and control measures related to common residential indoor air problems and to help them reduce health risks from these problems (Vogel & McMIndes, 1999). One potential indoor air hazard is radon, estimated to be the second leading cause of lung cancer in the U.S.

The need for this program was based on research showing that the quality of indoor air can be worse than that of outdoor air (EPA, 1995). This occurs because many homes are being built and remodeled more tightly without regard to the factors that assure fresh and healthy indoor air. Homes today also contain furnishings, combustion appliances, and household products that can result in poor indoor air quality (EPA, 1995). Of particular concern is radon - a radioactive gas created from the natural decay of uranium in soil and rock beneath and around the home's foundation and in groundwater wells, and found in some building materials. It is a common pollutant found in millions of homes throughout the country.

Program Development

Activities in the Healthy Indoor Air for America's Homes program have consisted of:

1. A programming workshop to develop the program and learning materials.
2. An indoor air quality program training manual (including both subject matter content and process information) for use by Cooperative Extension educators.
3. A national train-the-trainer workshop to prepare Cooperative Extension specialists from each state to become program managers for their respective states. In 2003 there were program managers for 45 states, three territories, and Washington, DC.
4. A train-the-trainer program by state program managers to train county Extension agents.
5. A training program by county agents to educate consumers who are at risk concerning indoor air quality issues and to encourage them to reduce their health risks from indoor air quality problems.
6. A web site, maintained at Montana State University, which is updated on a regular basis (www.healthyindoorair.org).



Healthy Indoor Air for America's Homes

As part of the program consumers learn to identify possible signs of indoor air quality problems (Healthy Indoor Air for America's Homes, 2001). These include noticeable lack of air movement, unusual and noticeable odors, dirty or faulty central heating or air conditioning equipment, unvented combustion air sources for fossil fuel appliances, presence of molds and mildew, health reaction after remodeling, and feeling noticeably healthier outside. Consumers are also instructed in common sources of indoor air quality problems such as moisture, combustion products, formaldehyde, household products and furnishings, asbestos, lead, particulates, tobacco smoke, and radon (Tremblay & Vogel, 2003)

The training manual for this program contains twelve self-guided and self-contained modules consisting of lesson plans, overhead transparencies, and videos. There are also consumer self-assessments, marketing and media materials, program record-keeping materials, and evaluation tools. Dozens of ideas are provided for program implementation (Vogel & McMIndes, 1999). One of the modules focuses on radon. Almost the entire entire network of over 3,000 county Cooperative Extension offices in the nation has this training manual, and thousands of county agents have been trained to use the program materials.

Radon Module

The module on radon considers topics such as radon sources, where to locate help, how radon enters the home, radon risk, testing, professional monitoring, and mitigation strategies (Seifert, 1999). Local radon and family and consumer sciences professionals can work with county Extension agents to shape the specific programs delivered to consumers in the community using local data. The learning objectives of the radon lesson module are:

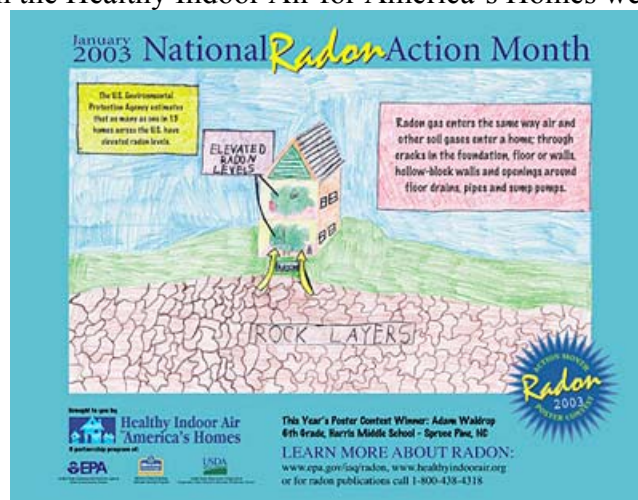
- Radon is known to cause lung cancer in humans over a long period of exposure.
- Radon is present nearly everywhere in small concentrations and is the largest source of radiation exposure for the U.S. population.
- Radon cannot be detected without testing for it specifically because it is invisible, odorless, and chemically inert.
- Testing is simple, relatively inexpensive, and harmless to perform.

- Radon is a manageable risk and help is available to assist the consumer.

In addition to the radon module, there are four EPA supporting publications in the training manual: *A Citizen's Guide to Radon* (1993a), *Home Buyer's and Seller's Guide to Radon* (1993b), *Radon: A Physicians Guide* (1993c), and *Building a New Home: Have You Considered Radon?* (1998). The training manual also references a video on radon available from the American Lung Association (1991). To make this information readily accessible to consumers, Healthy Indoor Air for America's Homes (2001) published a thirteen-page booklet entitled *Indoor Air Hazards Every Homeowner Should Know About*. This booklet, available in both English and Spanish, is available at county Extension offices and the Federal Consumer Information Center (www.pueblo.gov). The booklet would be useful as a handout to educate consumers on radon as a health risk and the importance of testing and, if necessary, mitigation.

Program Implementation

Many creative ideas have been applied over the Healthy Indoor Air for America's Homes program's existence. For example, program participants cooperate with EPA in promoting National Radon Action Month in January. This past year, the EPA and Healthy Indoor Air for America's Homes coordinated the National Radon Action Month 2003 Poster Contest to increase children's knowledge of radon in the home. "State leads" in participating states promoted the contest to area fifth-grade classes, coordinated educational programs for the schools, collected posters, and helped select state winners. They encouraged educators to deliver a lesson on radon, place a radon test kit in the classroom, provide materials to be shared with parents, and assist children in making posters about radon's dangers and solutions. Schools displayed posters in October 2003 during the Healthy Indoor Air for America's Homes' Radon Action Week. Winners at the state level were forwarded for a national competition. The winning poster, shown below, can be ordered from the Healthy Indoor Air for America's Homes web site.



Many of the states involved in the project have developed fact sheets (4-6 pages long) that are available to consumers in print form or on state Cooperative Extension web sites (refer to Pope, 2000; Versch & Niemeyer, 2000). Check your local land-grant university's web site to determine if your state has fact sheets or other materials on radon. Most of the radon fact sheets follow a similar format:

1. Description of what radon is, where it comes from, and its health risk. The likelihood of radon in a specific state and how that risk compares to other states is also discussed.

2. Radon testing using short-term detectors and long-term detectors. Information is provided on how to purchase and use test kits.
3. Understanding test results, especially how radon is measured and what radon levels mean. Consumers are instructed to have an experienced radon contractor fix their homes if the radon level is four picocuries per liter or higher.
4. Radon mitigation, including methods (such as sub-slab, drain tile, sump hole, and block wall suction) and costs. The method and cost estimate is presented in detail for the most commonly used technique of sub-slab depressurization.
5. Selection of a radon mitigator. Consumers are recommended to contact their local health and human services system or state radon office to locate qualified contactors. It is suggested that in choosing the mitigation method, consumers should consider the radon levels, system operation, structural changes, cost, house size, and foundation types.
6. Radon resistant new construction is discussed for those building a new home, with the idea that installation costs are generally much lower during construction and careful planning can allow a variety of strategies to be integrated, ensuring the most effective radon reduction system possible. An option is a passive sub-slab or crawlspace depressurization system.
7. Issues for home buyers and renters, suggesting that they ask if the home has been tested for radon and what the test results showed.
8. Available resources such as:
 - American Association of Radon Scientists and Technologists (www.aarst.org)
 - American Lung Association (www.lungusa.org/air/envradon.html)
 - Environmental Protection Agency (www.epa.gov/iag/radon/)
 - National Radon Information Line: 1-800-767-7236
 - Radon Fix-It Program of the Consumer Federation of America (www.radonfixit.org)
 - State Radon Contact

The coordinating office for Healthy Indoor Air for America's Homes at Montana State University publishes a newsletter entitled *Breathing Room*. State activities are highlighted in the newsletter to provide ideas for program managers around the country. Other ways that states and counties disseminate information to consumers include workshops, the distribution of an annual poster "Kids Care about Clean Air" that features a calendar with helpful indoor air quality tips listed for each week of the year (a poster can be ordered at the Healthy Indoor Air for America's Homes web site), exhibits at county fairs and home shows, newspaper columns, articles in state and county Cooperative Extension newsletters, and press releases. The web site includes an air quality home tour in which consumers can click on a room to discover possible radon problems and remedies. A number of materials can be ordered at the web site, including the training manual and a radon book cover and book mark.

Evaluation and Recommendations

Based on Healthy Indoor Air for America's Homes program impact data from 1996 to 2003, an estimated 122,232 educators and professionals have been trained by the national program. Other audiences included parents, children, child care providers, health department nurses, social workers, and school principals. Additionally, as a direct result of this program 14,620 consumers had their homes tested for radon and 4,827 consumers had their homes

mitigated for radon. The numbers are most likely higher as follow-up of behavior from workshop participants can be difficult to fully track.

As the program continues to expand, efforts are underway for greater cooperation with other educators. A starting point is to locate your county Extension office in the county government section of the telephone directory. Often the family and consumer sciences agent is the radon contact person. Ask what radon programs are in place, how you might participate, and what materials are available for your educational efforts. Contact at the state level can be made by going to the Healthy Indoor Air for America's Homes web site which contains names, addresses, telephone numbers, and e-mail addresses for each state program manager. State program managers will welcome the opportunity to help you in radon education.

References

- American Lung Association. (1991). [Video] *Radon: The risk indoors*. New York: American Lung Association.
- Healthy Indoor Air for America's Homes. (2001). *Indoor air hazards every homeowner should know about*. Bozeman, MT: Montana State University Extension Service.
- Pope, S. (2000). *Radon information*. Raleigh, NC: North Carolina State University Cooperative Education.
- Seifert, R. D. (1999). Instructional module: Radon in the home. In M. P. Vogel & K. McMIndes (Compilers) (3rd Ed.), *Healthy indoor air for America's homes: A training and reference manual for state program managers and community educators*. Bozeman, MT: Montana State University Extension Service.
- Tremblay, K. R., Jr., & Vogel, M. P. (2003). *Improving air quality in the home*. Fort Collins, CO: Colorado State University Cooperative Extension.
- U.S. Environmental Protection Agency. (1993a). *A citizen's guide to radon*. Washington, DC: EPA.
- U.S. Environmental Protection Agency. (1993b). *Home buyer's and seller's guide to radon*. Washington, DC: EPA.
- U.S. Environmental Protection Agency. (1993c). *Radon: A physician's guide*. Washington, DC: EPA.
- U.S. Environmental Protection Agency. (1995). *The inside story: A guide to indoor air quality*. Washington, DC: EPA.
- U.S. Environmental Protection Agency. (1998). *Building a new home: Have you considered radon?* Washington, DC: EPA.
- Versch, B., & Niemeyer, S. (2000). *Radon in Nebraska's homes*. Lincoln, NE: University of Nebraska Cooperative Extension.
- Vogel, M. P., & McMIndes, K. (Compilers). (3rd Ed.). (1999). *Healthy indoor air for America's homes: A training and reference manual for state program managers and community educators*. Bozeman, MT: Montana State University Extension Service.

About the Authors

Kenneth R. Tremblay, Jr., Ph.D., is Professor in the Department of Design and Merchandising and Cooperative Extension Housing Specialist, Colorado State University; Michael P. Vogel, Ph.D., is Extension Housing Specialist, Montana State University; and Nancy H. Drennen, Ph.D., is Professor in the Department of Design and Merchandising, Colorado State University.