

Exploring the impact of a three-prong approach to healthier homes

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A growing body of research exists linking poor housing conditions to the development of chronic health problems. While it seems reasonable to invest more in improving the quality of housing to save money on health care, elected officials and decision makers are not quick to take action, especially in the current economy. Improving housing quality cannot be totally dependent upon new regulations, codes or changes in policies. It is up to consumers and the marketplace to improve the health of our housing. We need to take a broader look at ways to improve substandard housing in the current economic climate. A three-prong approach to developing healthier homes is presented. This integrated approach involves the occupant, property manager, housing advocates, health professionals, code enforcers, building inspectors and elected officials. The first prong focuses on providing reliable information, which is critical to increasing public awareness of the link between housing and health. The second prong is educating occupants, and health and housing professionals on how to recognize and fix potential problems before they become expensive repairs. The third prong represents action, which results from informing and educating occupants, health and housing professionals, and decision makers.

Key words: healthy housing, indoor air quality, indoor environment, environmental health

Introduction

Consumers, housing and health practitioners, researchers and policy makers need a broader understanding of the connections between health and housing, and benefits associated with improving housing quality. Consumers are often not aware of the connections between the structures they call home, house cleaning, home maintenance and their health. Health and housing practitioners need to learn to view the house as a system. Researchers, who often work in silos, narrowly defining hazards and trying to find a solution for a problem in their field of study, need to expand their view of housing and take on a much more integrated approach to research. Their research can help improve the availability of reliable information about the costs and benefits of improving the indoor environment and help policy makers make decisions based on reliable information. The purpose of this paper is to explore ways to integrate research, resources and knowledge to help improve housing quality and occupant health.

Background

According to the U.S. Environmental Protection Agency (EPA) individuals spend about 90 percent of their time indoors where the level of organic pollutants can be two to five times higher inside the home than outside (Wallace, 1987). The groups who are most vulnerable when it comes to the indoor environment are children and low-income individuals and families. The risks for children are greater because their mobility and behaviors tend to place them into more frequent contact with contaminants in the home. Findings from several studies indicate that the greatest number of environmental exposures and risks for young children occur inside the home (Lewis, et al., 1994; Platts-Mills, et al., 1997; Pope, et al., 1993; Wallace, 1987, 1991). The

economically disadvantaged are at higher risk because they lack access to affordable housing that is safe and contaminant-free.

There are several different types and sources of contaminants inside our homes. Indoor contaminants may be categorized as biological, chemical or other environmental hazards. Biological contaminants include mold, mildew, viruses, bacteria, house dust mites, cockroaches, animal dander and cat saliva, rodents, and pollen. These contaminants enter the home in many different ways and most can be controlled by managing the relative humidity level inside the home. The EPA recommends maintaining 30 to 40 percent relative humidity to discourage the development of molds, mildew, bacteria, insects and house dust mites. In 2000 the Institute of Medicine reported that there is sufficient evidence to establish a casual relationship between asthma and the presence of dust mites, cockroaches, fungi (mold) and pet dander. Subsequent studies linked rodents to asthma (Phipatanakul, 2006; Matsui, et al., 2003).

Chemical contaminants inside a home include secondhand tobacco smoke, particulate matter resulting from combustion (fuel-burning appliances, furnaces and fireplaces), volatile organic compounds (VOCs) and radon. It is widely known that exposure to secondhand smoke can cause lung cancer; however, people still expose their children to smoke. A recent study in the U.S. reported that close to 3 million children (11%) are exposed to secondhand smoke in their home four or more days a week (EPA, 2004). The risk of exposure is significantly higher in households at or below the poverty-level. VOCs are found in a wide range of products, including paints, cleaning supplies, pesticides, building materials, furnishings, air fresheners, and dry cleaned clothing. These organic compounds impact people differently, ranging from mild irritation of the respiratory system to major health concerns. The best ways to decrease exposure to VOCs is to increase ventilation, store products outside your home, or stop using products that contain high levels of harmful chemicals. Radon is a radioactive gas that develops from the natural decay of uranium that is found in soils. It seeps into the home through cracks and openings in the foundation and over time can cause lung cancer. Testing for radon is inexpensive and can be done by the occupant. Once the test is completed, the kit is sent to a lab for analysis. If the results indicate a radon level of 4pCi/L (pico Curries per liter of air) or more, then the problem needs to be fixed by installing a radon reduction system.

Other environmental hazards include physical hazards inside homes that may result in death or injury. The leading causes of home injury deaths between 1992 and 1999 were falls and poisoning (Home Safety Council, 2004). Falls account for 41.2% of nonfatal unintentional home injuries.

Structural defects can be a major contributor to hazards housing conditions and it is more likely for people of color and with low-incomes to live in housing with severe physical problems. About 9.8% of black householders and 10.9% of households with incomes at or below poverty lived in housing units with severe or moderate physical problems, as compared to 5.2% of all householders (AHA, 2007). Structural defects can result in cracks which facilitate the entry of cockroaches and rodents, and water. In 2007, 2 million occupied units reported leakage from inside or outside the structure within the last 12 months (AHA, 2007). This provides a breeding ground for mold, bacteria, dust mites, cockroaches and rodents.

The term “healthy home” is a broad concept that encompasses many things, including the physical structure, indoor environment, neighborhood, community and family. Currently most housing interventions address only one issue of concern, such as reducing risks associated with lead poisoning or asthma triggers or sources of injury (Saegert, et al., 2003). Treatment of one housing issue, such as spraying pesticides to eliminate cockroaches, can result in other health concerns from the pesticide used to treat for cockroaches. A healthier option would be to use an integrated pest management (IPM) approach, which would involve eliminating the cockroach’s source of food and water. Solving one problem can lead to other problems. This is why it is important to assess the entire property for housing hazards.

To create a viable healthy homes program we need to develop partnerships and incorporate multiple strategies around three basic points or prongs – public awareness, education and action. The key is to address multiple hazards at the levels of community, individual dwellings and occupants.

Prong 1: Public Awareness

Building a healthy homes program begins with translating research findings into consumer-friendly information. Public awareness campaigns reach more than just the occupant. They also reach property managers, housing advocates, home builders, building inspectors, health professionals, code enforcers, and elected officials. All of these audiences need to be made aware of the linkages between housing and health, and learn to discern reliable information from hype. The marketplace is filled with news stories about sick houses and miraculous cures. Often times the so called cures can lead to even more indoor environmental issues.

The University of Georgia Family and Consumer Sciences Cooperative Extension (UGA Extension) has a long history of translating research into information and resources more easily accessible to the public. From April 2008 to March 2009, UGA Extension distributed information on health hazards in the home through 258 Georgia media outlets – television, radio and local newspapers – reaching over 2.18 million people. During this same time, we participated in 51 community health and information fairs, reaching an additional 69,142 people. Like many outreach campaigns, the focus was on one type of hazard in the home. Most of these activities highlighted the dangers of lead and radon. About one-fourth of the news releases covered home maintenance and reducing VOCs in the home.



 **WARNING:** Your home can be hazardous to your family's health.

Some of the greatest dangers to your children's health and safety lurk in a place you'd never expect. Home hazards such as peeling lead paint, mold, and cockroaches are related causes of many childhood illnesses, including lead poisoning and asthma. But there are ways you can keep your children safe and healthy.

HUD's Healthy Homes Initiative can give you the information you need to protect your family from housing-related health and safety dangers, so you and your children can breathe easier.

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While it is good to talk about individual hazards in the home, there needs to be an over-arching public awareness campaign that brings the pieces together and helps people visualize the house as a unified system. Other than a recent HUD Healthy Homes for Healthy Kids campaign in Los Angeles (Figure 1), in the U.S. most indoor environment and air quality issues continue to focus on the dangers associated with individual hazards in the home. A criticism of the HUD healthy homes campaign is that because of the telephone number spelling out the word “lead” the first impression is that the advertisement is about lead safety.

Figure 1 (HUD, 2009)

A public awareness campaign needs to work within the existing market and utilize current interests and information gathering tools, such as online social networks. In the U.S. we are seeing an increased interest in the purchase and use of green or environmentally friendly products and services. The green movement has many positive impacts on improving the health of one's home, such as reducing the level of volatile organic compounds (VOCs) in household cleaning products. Consumer interest has prompted manufacturers to introduce new competitively priced "green" cleaning products. Most of these products are made with more environmentally friendly ingredients that release fewer VOCs. While it is encouraging to see the public interest in green products, there are few labeling guidelines or definitions to guide the consumer through the green minefields. Since a healthy home is in many ways a "greener" home, this presents an excellent opportunity to educate consumers on improving the overall health of their home.

The impact of public awareness campaigns without accompanying regulations or enforcement is difficult to assess. The goal is to increase awareness and prompt action, but unfortunately the information does not prompt a response by everyone. Those who respond are more likely to have financial resources available to them to make repairs or changes to their home. Low-income consumers will probably not respond until someone conducts an assessment of their home and identifies potential hazards. This is why it is so important to provide both consumer education and comprehensive training of health and housing practitioners along with a public awareness campaign.

Prong 2: Education

The second prong is educating housing occupants, and health and housing professionals. Occupants need to gain an understanding of how their home operates, how to recognize and fix potential problems, and what changes they can make in their behaviors to improve the health of their home. Educating consumers helps to increase their knowledge and awareness, but does not always result in behavior changes. Individuals are motivated to change their behavior by different factors. A program on the importance of cleaning one's home regularly will yield many different outcomes. One family may implement a cleaning routine because they just learned that they may be jeopardizing their family's health. Another family will be motivated to clean because they may lose their federally subsidized housing if they don't clean. Yet another family will do nothing. To reach all of these people and elicit some change requires interactive multi-faceted educational tools and resources to help overcome barriers that may be encountered along the way. One educational program alone is generally not enough to elicit lasting changes in behavior. Education combined with home assessments and the public awareness campaign will yield much greater impacts.

UGA Extension has a long history of providing educational programs aimed at improving the indoor environment. The outreach efforts have been funded through grants and partnerships with the U.S. Department of Agriculture (USDA), U.S. Department of Housing and Urban Development (HUD), U.S. Environmental Protection Agency (EPA), the National Center for Healthy Homes (NCHH), private industry, and state and local government. Educational programs generally focus on one housing hazard, such as lead, radon or mold. Increasingly educators are presenting programs on home maintenance and household cleaning as ways to improve the indoor environment. Between April 2008 and March 2009, 210 educational

programs for consumers were conducted, reaching 7,155 people, including homeowners, renters, social service providers, health department workers, childcare providers, community leaders and home builders. Additional programs and a follow-up survey are needed to assess program impact and changes in behavior.

Research indicates that education when combined with some type of intervention can be effective in motivating behavior change to improve the indoor environment (Carter, et al., 2001; Krieger, et al., 2005; Morgan, et al., 2004). We have seen this in the radon education program. Between April 2003 and June 2008, educators distributed 29,180 radon test kits. About 30% (8,917) of those who received a kit used it. Fifteen percent of the individuals who conducted the test received results indicating a radon level of 4 pCi/L or above.

Educational training for health and housing practitioners needs to be more comprehensive, focus on the house as a system and provide ways to incorporate healthy housing principles into current work load. To reach practitioners, UGA Extension partners with the National Center for Healthy Housing (NCHH), a nonprofit organization focused on research, education and the development of resources to help the public create and maintain healthy homes. As a training partner, UGA Extension conducts a two-day course entitled *Essentials for Healthy Homes Practitioners*. Participants came from a variety of professions, including home inspection, code enforcement, public housing, lead safety, energy conservation, public health, and social services. The course was launched in June 2005 to provide training for housing and health professionals on seven basic principles of healthy housing – keep it dry, clean, pest-free, ventilated, safe, contaminant-free and maintained. From its inception through 2008, over 3,000 people have been trained nationwide including 123 in Georgia (Table 1). After completing the course, the majority of participants indicated that they intended to incorporate the information into their work (NCHH, 2009).

Table 1: NCHH Essentials for Healthy Homes Practitioners course

Year	Number of courses*		Number of Attendees		Incorporate concepts into work
	Nationwide	Georgia	Nationwide	Georgia	Nationwide
2005	3	0	104	0	73.4 %
2006	20	0	592	0	75.5 %
2007	39	3	1,135	97	81.4 %
2008	39	1	1,225	26	83.1 %
TOTAL	101	4	3,056	123	--

*Courses offered in Ohio, Massachusetts, New Jersey, Rhode Island, Washington, Oklahoma, Georgia, Texas, Illinois, Maryland, Connecticut, Indiana, Michigan, California, Missouri, Missouri, Mississippi, New Mexico, Minnesota, Virginia, Louisiana, Nebraska, Kansas, Tennessee, Washington DC, Iowa, New Hampshire, Florida, Montana, Pennsylvania, North Carolina, Oregon

Participants were surveyed by NCHH about three months after taking the course. Results showed that 79.5% discussed a healthy homes approach with people at work and 48.6% worked with people outside their programs to incorporate a more holistic approach into their program area.

Close to 40% of the participants sought to change their program protocols to include healthy homes concepts in daily practice. Changes included working on a protocol for mold assessment and incorporating healthy homes visual assessment tools into lead poisoning prevention programs. Sixty-one percent of the respondents now carry a visual inspection checklist or home assessment tool when conducting home visits. The top three problems encountered during home visits were mold, home cleanliness and cleaning methods, and lead poisoning hazards. The impacts made by NCHH programs are a good starting point, but we need to continue to expand the program to reach more social service providers, home inspectors and public housing workers.

Prong 3: Action

The third prong represents action, which results from informing and educating occupants, health and housing professionals, and decision makers. Educating consumers and practitioners can help to spur action. The follow-up survey of participants who attended an NCHH *Essentials for Healthy Homes* course indicated that 5.5% were seeking to incorporate healthy homes concepts into legislation. One change being sought is the passage of a sales tax on paint to help pay for lead hazard cleanup.

Action comes in many different forms. It can be a relatively small change such as getting a school to begin using cleaning products with lower VOC emissions. It can also be working to change a housing code so landlords can no longer rent out properties with mold growing on the walls. Some healthy home advocates are already working to improve housing codes and get insurance providers to consider covering home improvements that result in improved health. The key is to help consumers and practitioners see that their actions can make a difference in improving their lives and the lives of others. Engaging people in the learning process is critical to producing actions.

Science must be integrated with policy making, so that individual and public benefits of a healthy home can be translated into economics terms. Consideration must be given to the costs of interventions (cleanup and prevention) and the benefits (*e.g.* improved health, reduced health costs) to individuals and the public. For example, one study estimated the annual cost associated with childhood diseases linked to the indoor environment (lead poisoning, asthma, cancer and developmental disabilities) at \$54.9 billion (Landrigan, et al, 2002). Savings like these capture the attention of policy makers and can result in positive changes. The current economic climate actually presents a good opportunity to engage decision makers in a discussion about changing policies and promoting healthier homes, especially when there is evidence of benefits outweighing costs.

Discussion

Implementing a three prong approach to healthier homes begins by identifying key partners and building an alliance of representatives from community health and housing organizations, non-profit groups, the building community, the faith community, child care, public housing, environmental health, codes and compliance and building inspection. The partners need to work together to develop a plan to meet the needs of their community. In most instances this involves the development, or use, of a more standardized housing hazard assessment tool that can be used in homes and child care facilities to identify hazards in the home. An assessment tool needs to look at the individual dwelling along with the surrounding community and take into

consideration the occupant's behaviors. A critical component of a housing assessment tool is an action plan for the occupant that includes a plan for resolving any found problems or concerns and information on how to prevent future problems.

Cross-training health and housing practitioners to incorporate healthy homes assessments in their current home visits is critical to building a strong viable healthy homes program. The marginal cost of adding additional inspections or assessments to a professional who is already in the home inspecting it for one hazard is relatively small. Training existing inspectors to recognize multiple hazards can help to expedite the assessment process and address multiple hazards at one time. Efficiencies may also be gained from interventions for one thing having spill over effects. For example replacing a broken staircase railing because it was painted with lead-based paint not only eliminates a potential source of lead poisoning, but also reduces the risk of injury from the broken staircase railing.

Interest in healthy housing had grown exponentially at the federal level. This is due in part to changes in funding for programs focusing on just one hazard, such as lead. In 1997 the President and Congressional Commission on Risk Assessment and Risk Management issued a report highlighting several indoor environmental risks and concern about child environmental health. This report helped to re-focus federal housing and health programs. In 1999, the U.S. Department of Housing and Urban Development (HUD) launched the Healthy Homes Initiative to address child health and safety concerns in a comprehensive manner. HUD began to work with the U.S. Department of Agriculture Cooperative State Research, Education and Extension Service (USDA - CSREES) to expand healthy homes programs through the existing network of Cooperative Extension professionals throughout the United States.

The U.S. Environmental Protection Agency (EPA) worked with USDA-CSREES in the 1990's to create a program called *Healthy Indoor Air in America's Homes*. Since then the EPA has created a voluntary program called Indoor airPLUS which encourages builders to build homes that reduce energy consumption and provide good indoor air quality. EPA used to focus more on outdoor air pollution, but increasingly they are emphasizing indoor environmental issues, such as childhood asthma, mold and radon.

The U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC) developed Healthy People 2010 which contains several goals relating to improving the indoor environment. It is a coordinated holistic approach to preventing disease and injuries that calls for a 52% reduction in the number of substandard occupied housing units in the United States. CDC is in the process of broadening the focus of their staff from lead to healthy homes. In March 2009, UGA Extension and NCHH provided an *Essentials for Healthy Homes Practitioners* training for several of the lead specialists at the CDC.

HUD worked closely with other federal agencies to create the Healthy Homes Strategic Plan which focuses on four goals: (1) building a national framework to foster partnerships; (2) creating healthy housing through support of research on links between housing and health and cost-effective methods to address hazards; (3) mainstreaming healthy homes approach by promoting the incorporation of healthy homes principles into existing programs and practices; and (4) enabling communities to create and sustain healthy homes (HUD, 2008). The final

version will be available on June 9, 2009, when the U.S. Surgeon General issues a Call to Action to promote healthy homes.

Federal initiatives are encouraging but do not guarantee funding or action. It is ultimately left to consumers, health and housing professionals, and researchers to take an interest in healthy housing and act on it. For change to occur people and policy makers need to be aware of the risks associated with an unhealthy home. Additional research is needed to more fully understand the exposure pathways and levels of risk associated with hazards in the home. Along with medical research, there is a need for more longitudinal studies to help us understand the full impact of educational programs and interventions and the sustainability of resident behavior changes.

Success will come from integrated research approaches to improving the indoor environment, motivating consumers to change their behavior, and providing policy makers with the information they need to see that the benefits in terms of improved health, productivity and lowered medical costs, far outweigh the costs of implementing changes.

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