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Rochester's Healthy Home: A community-based innovation to promote environmental health action

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Abstract

Environmental hazards in the home can contribute significantly to disease. These hazards disproportionately affect low income, urban, and minority children. Childhood lead poisoning and asthma are prime examples of health concerns to which poor housing conditions may contribute significantly. A community-academic partnership in Rochester, New York created a model Healthy Home, an interactive museum in a typical city home, to help residents, property owners, contractors, and community groups reduce environmental hazards. The Healthy Home project educates visitors about home environmental health hazards, demonstrates low-cost methods for reducing home hazards, and helps visitors develop individualized strategies for action. In its first year of operation, over 700 people visited the Healthy Home. Evaluation surveys indicate that the Healthy Home experience motivated visitors to take action to reduce environmental hazards in their homes. Follow-up phone interviews indicate that most visitors took some action to reduce home environmental hazards. The Healthy Home has established a diverse Advisory Council to share its messages more broadly, invite input into future directions, and recruit visitors. This paper presents experiences from the Healthy Home's first year, highlighting the partnership principles that guided its development and lessons learned from the process.

Introduction

Health care professionals, researchers, and community groups increasingly recognize the important contributions of environmental conditions to health disparities. Especially in low income urban areas, home environmental hazards can pose significant health risks (Cherayil et al., 2005; Saegert and Evans, 2003; Krieger and Higgins, 2002). Lead poisoning, asthma attacks due to mold, pets, or tobacco smoke, and poisoning by household cleaners or pesticides are examples of health problems related to home environmental hazards (Bonner, 2006; Morgan, 2004; Saegert et al. 2003; Landrigan, et al. 2002). Despite increasing awareness of these problems, effective solutions have been elusive (Wu et al., 2007).

Reducing home environmental hazards requires different strategies than do many other kinds of environmental exposures. Many exposure sources, such as toxins in the food we eat, the air we breathe, and the water we drink, are regulated by state and federal agencies. Regulatory programs address many of these issues on a state or national level. However, consistent federal regulations do not mean that environmental risks are evenly distributed among the population. The environmental justice movement arose from the observation that exposures to environmental hazards vary geographically, and often cluster to pose

disproportionate health risks to low income and minority populations. A key strategy of the environmental justice movement, therefore, has been to organize communities to demand reduction of industrial or other pollutions sources around particular neighborhoods (Corburn, 2005; Claudio et al., 1998). However, community groups recognize that the housing in their neighborhoods – particularly older, rental housing in poor condition – can also pose significant hazards to residents' health. Strategies to reduce environmental hazards in housing are different – and in many ways more challenging – than pressuring corporate or public officials to reduce pollution from waste sites, traffic congestion, or industrial emissions. Addressing home environmental health hazards requires changing the interactions among housing providers, government personnel, community groups, individual owners, and residents.

Recognizing that home environmental health hazards require new strategies and new partnership, a group of community organizations and academics in Rochester, New York developed an innovative model Healthy Home focused on reducing home environmental hazards. The Healthy Home is an interactive museum housed in a residential building in a low-income neighborhood in southwest Rochester (see Figure 1). It provides free hands-on education about common home environmental hazards, advice on low-cost solutions, and individualized referral to resources to help address hazards. The Healthy Home is explicitly focused on the challenges of addressing home environmental hazards in low-income urban communities where a high percentage of residents rent their homes.

The Healthy Home addresses three types of challenges related to reducing home-based environmental hazards: 1) developing effective educational approaches; 2) implementing complex solutions; and 3) accessing the needed financial and technical resources. The general population has a low awareness of environmental health issues (Chepesiuk, 2007; Brown, 2004; Claudio et al. 1998). Researchers and practitioners have acknowledged that education has a role to play in promoting behavior and physical changes to address home-based environmental health hazards, although education alone is seldom sufficient (Wu and Takaro 2007; Jordan et al. 2003; Claudio et al. 1998; O'Neill 1996; Himes et al. 1996). Perhaps because home environmental hazards are cross-disciplinary, however, they tend not to be high on the list of messages delivered by either health care providers (who may view them as housing issues) or housing services personnel (who may view them as health issues) (Trasande et al., 2006). According to Krieger and Higgins (2002), "defining the role of public health practitioners in influencing housing conditions has been challenging." In any case, education by either group of professionals may not be as effective as education by peers or community leaders (Corburn 2005; Jordan et al. 2003; Claudio et al. 1998).

In addition to the question of *who* should be doing environmental health education, it is not clear what *kinds* of educational strategies are most effective. Common educational forums like health fairs and brochures do not appear to be effective in increasing action to address home-based environmental health hazards (Himes et al. 1996). This is particularly true in low-income and minority communities where literacy rates are low (Institute of Medicine, 2004). There is some evidence that intensive home visit programs are effective in reducing environmental hazards; however, these programs tend to be single-issue and limited in scale because of their expense (Krieger et al., 2005; Morgan et al. 2004; Saegert, 2003; Jordan et al., 2003).

Reducing environmental home hazards may be complicated by the fact that they require coordination between technical and behavioral change, altering landlord-tenant relationships, or developing individualized solutions. Some housing risks can be addressed by a simple technical change, such as installing window bars or fire detectors. However, reducing environmental hazards often requires that a technical change by a property owner

(such as installing fans to reduce moisture) be coordinated with a behavioral change by residents (turning the fans on after showers). In addition, the most effective course of action is often preventive. It may be more difficult to persuade people to implement a preventive measure than one designed to address a visible existing problem (Wu and Takaro, 2007; Wu et al. 2007). Behavioral changes may depend on family or social dynamics. For example, it may be difficult for an asthmatic resident, particularly a child, to persuade multiple family members to stop smoking indoors. There are few “one size fits all” approaches; strategies should be individualized for particular families and houses. Appropriate solutions vary depending on the nature of the housing, financial resources of the owners, and the specific health conditions and sensitivities of the residents. Unless a holistic approach is taken, solutions to one problem may create another. For example, residents may try to control pests by more extensive use of chemical cleaners that turn out to trigger their children’s asthma. These complexities pose barriers to reducing home environmental health hazards.

Lack of financial resources can also impede reduction of environmental hazards in the home. Although some solutions are primarily behavioral, others may require costly physical changes. Some physical changes are relatively inexpensive, such as new kinds of cleaning agents, mattress and pillow covers, and HEPA filtered vacuum cleaners. However, even these items may be too expensive for residents of low-income housing. More extensive physical changes, such as improved ventilation for mold control or removal of lead hazards may be cost prohibitive for low-income owner-occupants or investor-owners. Some communities have grant programs to improve housing quality, but these may not be effectively targeted to address health hazards in high risk housing.

These complexities contribute to the difficulty of addressing home-based environmental health hazards in low-income urban communities (Wu et al. 2007). Overcoming these barriers to reducing home environmental hazards requires an integrated yet individualized approach. The Healthy Home was designed to address these challenges by providing visitors with holistic strategies to reduce environmental hazards in their specific housing situation. After its first year in operation, the project shows promise as an intervention to promote healthy homes. This paper describes the formation of the Healthy Home, initial accomplishments, and lessons learned. The paper is based on the authors’ experiences as participant observers in the Healthy Home partnership, visitor evaluation surveys, follow-up interviews, and documents related to the project.

Establishing the Healthy Home

Housing-related environmental health problems in Rochester, New York follow the national pattern of higher incidence in low-income and minority neighborhoods (CDC, 2005a; Shenassa, 2004). The hospitalization rate for asthma among African Americans in Monroe County is more than three times greater than for the non-African American population (Finger Lakes Health Systems Agency, 2003). Childhood lead poisoning rates mirror income levels in Rochester’s neighborhoods and are highest among racial minorities (Hanley, 2008; CGR, 2002). In 2000, the lead poisoning rate in high risk neighborhoods of Rochester was 24%, more than ten times the national rate (aCenters for Disease Control and Prevention, 2005a). Concern about lead poisoning had spurred the principal of Rochester Elementary School 17 to conduct a survey in 1999 that found that 41% of his incoming students had high lead levels. This shocking finding helped inspire the formation of the Coalition to Prevent Lead Poisoning (CPLP) in 2000. The CPLP brought together a wide range of stakeholders to pursue the goal of ending childhood lead poisoning in Rochester by 2010. In 2004, the CPLP organized a Community Lead Summit that attracted nearly 500 participants. Building on the public awareness and commitment to ending lead poisoning generated through the Summit, the CPLP successfully advocated for a local lead poisoning

prevention law. The Rochester City Council unanimously passed the new lead law in December 2005 (Korfmacher, 2006).

The new Rochester lead law significantly increased the community's need for information and resources to support lead hazard reduction. The lead law was the first in the state outside New York City to require pro-active identification and repair of lead hazards in all pre-1978 rental housing. The law emphasizes low-cost strategies and ongoing monitoring to insure lead safety. The success of the law depends on property owners understanding how to safely address lead hazards. It also relies on referrals to local government agencies from residents, doctors, and community groups.

As community groups in Southwest Rochester were contemplating how they could support implementation of the lead law in their neighborhood, they were inspired by a project that had evolved from the CPLP's efforts prior to passage of the lead law. In 2004, a community physician based at School 17 had started a project called Get the Lead Out (GLO), which tested the homes of his patients at high risk for lead poisoning (O'Fallon, 2004). GLO also set up a temporary Lead Lab in a vacant house near School 17 to educate volunteers, as well as community residents, government officials, contractors and others (CDC, 2005b; O'Fallon, 2004). The Lead Lab included demonstrations of low cost lead hazard controls, dust wipe testing and risk assessments, lead safe cleaning techniques, and lead safe work practices. In each room, there were photographs and signs reporting dust lead level concentrations before and after controls were performed. Over 100 people visited during two open houses. The Lead Lab was widely recognized by the community as an effective educational approach and was cited by the Centers for Disease Control as a model "Building Block for Primary Prevention," (CDC, 2005b). The Lead Lab experience suggested that physical demonstration of lead hazard control solutions in the setting of a high risk home could be extremely effective in motivating diverse audiences to take action.

Several community groups from southwest Rochester began meeting in the summer of 2004 to discuss how they could build on GLO's Lead Lab experience. These initial core partners included the Southwest Area Neighborhood Association (SWAN), a grassroots organization that provides many capacity-building services in the neighborhood with a particular focus on youth, and the Rochester Fatherhood Resource Initiative (RFRI), which had initiated a program to train underemployed men in the neighborhood to conduct lead hazard control work. These groups reached out to staff of University of Rochester's Environmental Health Sciences Center, including the authors, whom they had met through their involvement in CPLP. The core partners recognized that establishing and maintaining a true partnership can be challenging. Therefore, the partners began by adopting "Principles of Collaboration" to guide their work together.

During initial meetings, the core partners reflected on feedback from visitors to the Lead Lab and concluded that its practical, hands-on approach was key to its effectiveness. They agreed that the entire city would benefit from a more permanent facility that could provide hands-on education about lead hazards to multiple audiences. Although motivated initially by concerns about lead, the partners were aware of national efforts to integrate treatment of lead hazards with other home-based environmental hazards (AFHH, 2007). This led to the concept of a model Healthy Home that would be used to demonstrate multiple home environmental health hazards in addition to lead. The Healthy Home partners aimed to educate, motivate, and support action to improve environmental health through an approach that other communities could replicate.

Over the next year, the core partners met regularly to develop these goals into a concrete plan. They explored several options for physically locating the Healthy Home, including

buying a building for this purpose, co-locating in an existing community center, and renting space. Meanwhile, the partners developed a model for the types of educational displays that would be included in the Healthy Home, the kinds of information to be provided, and the issues to be addressed (Table 1). For each hazard, they synthesized information about specific health consequences, how to address the hazard at low cost, and relevant resources available in the community. The partners clarified that the Healthy Home's target audiences included residents, property owners, community groups, and professionals from government agencies, health care systems, housing groups, and human services agencies, among others. The core partners also established a Healthy Home Advisory Council of diverse organizations to provide technical input and assistance in reaching potential visitors.

The core partners began writing grant proposals based on these plans and in December 2005 received their first grant of \$15,000 in pilot project funding from the University of Rochester's Environmental Health Sciences Center. This grant enabled the group to start searching in earnest for a facility. They decided to rent space in a commercially zoned house that was large enough to accommodate tour groups and displays, but still looked like an older residential building. Working with a property owner who had been interested in the project for several years, they found first floor space in a house that is located centrally in the neighborhood, convenient to a bus line, and adjacent to free parking. While it had the physical features of an older home, such as wood windows, it did not require extensive repairs.

Staff of the EHSC spent several months developing displays with input from Advisory Council partners including the Coalition to Prevent Lead Poisoning, the Injury Free Coalition for Kids, the Monroe County Department of Public Health, the Regional Community Asthma Network, and the Rochester Fire Department. For each of the substantive topics addressed by the Healthy Home (asthma triggers, lead hazards, household chemicals, and indoor air quality hazards), the staff developed highly visual, low-reading level posters summarizing the source of the hazard, related health impacts, and potential solutions. They then designed hands-on displays around these topical posters. For example, an "asthma safe bedroom" was created that included a bed with mattress covers to control dust mites, a "healthy housekeeping" station, materials on community resources for smoking cessation, and examples of asthma triggers like pets, stuffed toys, and plants (Figure 2). The "lead room" included three windows that had been removed from a house that was being demolished, treated using different lead hazard control techniques, and mounted on stands for display (Figure 3). The lead room also displayed the materials and methods for lead safe work practices, samples of consumer items that could contain lead, information on the city's lead law, and applications for local housing improvement grant programs. The kitchen featured "look-alike" chemicals that children or others could confuse with food products. For each topic, brochures and information sheets from local and national groups were provided on tables adjacent to the related hands-on displays. Throughout the house, signs pointed out potential hazards such as carbon monoxide sources, burn hazards, etc.

Once these displays were in place, the Healthy Home partners developed a protocol for tours of the home. Visitors were asked to sign in and talk with the tour guide about their specific interests so that their tour could be tailored to their needs. Tour guides led visitors through the Healthy Home, discussing the material on the posters, interacting with the hands-on displays, and providing checklists of information and resources for each hazard that applied to the visitor's particular housing situation. At the end of the tour, visitors were asked to complete an evaluation and an "action sheet" that described one or more actions they planned to take to improve the environmental health of their home. Visitors were also asked if they were willing to be contacted in several months to follow up on their planned actions. Tour guide training materials were developed to support this protocol.

The next step was to attract visitors to the Healthy Home. A variety of strategies were implemented as staff became available. A key approach was to advertise the Healthy Home through Advisory Council members, who were invited to hold board, staff, or client meetings in the home, to distribute Healthy Home brochures to clients, and to plan joint programs, such as school field trips, contractor trainings, and media events. An annual community barbeque was planned to reach out to neighborhood residents. In addition, SWAN co-located its Work Experience Program staff in the Healthy Home, which brought in a new group of trainees every week. Additional recruitment mechanisms evolved over time, such as encouraging students who toured or volunteered at the Healthy Home to return with their families and friends.

The Healthy Home opened to the public in June 2006. At that time, there was no paid staff dedicated to operation of the project; all tours were conducted by the core partners, interns, and volunteers. However, with the basic system of displays, evaluation, and follow-up in place, the partners were able to focus on obtaining funding to sustain and expand the project. The next section summarizes the Healthy Home's accomplishments during its first year of operation.

Progress at the Healthy Home

In June 2006, the Healthy Home core partners planned an opening event that attracted over 80 people, including elected officials, residents, community groups, and the news media. This high-profile event helped generate community interest in the Healthy Home. During the summer of 2006, two medical student interns helped develop evaluation protocols and trained volunteer tour guides. This team coordinated 13 student and community volunteers who logged over 185 hours during the summer, hosted a community barbeque, and guided hundreds of visitors through the Healthy Home. In cooperation with Atrium Environmental Health and Safety Services, the Rochester Fatherhood Resource Initiative hosted seven free lead safe work practices (LSWP) courses at the Healthy Home during the summer of 2006 that trained a total of 67 contractors and property owners.

The Healthy Home received three additional grants in 2006 to support community youth-adult partnerships, refer Healthy Home visitors with asthmatic children to the Regional Community Asthma Network, and enhance outreach to the local community. With these funds, SWAN was able to hire an Outreach Coordinator and take over administration of the project.

Visitors

During the first year of operation, 740 people visited the Healthy Home. Most visitors came as part of one of 95 groups including the American Lung Association, the University of Rochester Urban Fellows program, the Injury Free Coalition for Kids, and local block clubs. Table 2 summarizes how visitors identified themselves in the Healthy Home's log book. The largest single visitor type was health care professionals, including medical residents, nursing students, and public health professionals (216 visitors, 29.1%). There were also a large number of youth (140, 18.9%) and post-secondary students (32, 4.3%). 130 (17.6%) community residents visited the home, as well as 99 (13.4%) housing professionals (landlords, contractors, housing agencies) and 120 (16.2%) "other" professionals, including child care providers, teachers, and government agency staff. Of those who provided zip code information, over a third lived in the SWAN neighborhood. The distribution of these visitor types varied depending on the season and focus of outreach efforts; for example, during the summer more contractors toured the Healthy Home as part of a Lead Safe Work Practices course and young children visited with camp groups.

Approximately half of the visitors completed evaluation forms.. Responses to these evaluations indicated that visitors' greatest environmental health concerns were mold, household chemicals, pests, lead, and tobacco smoke (Table 3). As noted above, the Healthy Home focused on motivating and empowering visitors to reduce environmental hazards in their homes. Therefore, the evaluation asked respondents to specify what action(s) they planned to take to address hazards in their homes (Table 4). Respondents were allowed to give multiple responses. Over half (57.6%) planned to change their own housecleaning habits. The same number said they would share the information they learned with others. Nearly half of respondents (44.3%) planned to make physical changes in their homes, such as installing carbon monoxide detectors or changing furnace filters. Nearly a quarter (24.3%) of the respondents planned to talk with their landlord about making physical changes in their home. In addition, around a fifth (20.1%) of the respondents planned to contact an agency/organization for further resources.

In order to get feedback on the effectiveness of the Healthy Home's multiple approaches to educating visitors, the evaluation survey asked them to identify the "most useful" features of the facility (352 responses, multiple answers allowed). Visitors clearly appreciated the hands-on visual displays (68.5%) and individualized tours provided by our volunteer guides (71%) (Table 5). These responses, as well as qualitative feedback, confirmed that the hands-on, individualized, and integrated approach of the Healthy Home was effective in engaging visitors.

An open-ended question asked visitors to describe the one "most important thing" they learned from their visit. Coding of the 326 written responses revealed that visitors learned most about lead (30.7%), followed by general home hazards (17.8%) and asthma triggers (17.5%). Several respondents also mentioned learning about the importance of a carbon monoxide detector, how to improve their cleaning practices, and the dangers of "look-alike" poisons/household chemicals. Others commented more generally about the value of the Healthy Home in helping them start thinking for the first time about the variety of hazards that could be in their homes.

In addition to the evaluation surveys, visitors were asked to complete "action plans" detailing one specific action they planned to take to reduce hazards in their homes. In order to determine how many visitors followed through on their plans, Healthy Home staff contacted visitors by telephone or email between 1 and 6 months after their initial visit. Multiple attempts were made to reach each of the 246 visitors who submitted action plans and 119 (48.4%) were reached. Although we expected that it would be more difficult to follow up with residents than professionals, in fact the percentage of residents contacted (around 40%, including K-12, youth, and adults) was almost exactly the same as the total percentage of residents who visited the home (Table 2). Of those 119 who were contacted, 91 (76.5%) had completed their action, 18 (15.1%) had partially completed their action, and only 10 (8.4%) had not taken any action. 81% of those who took action reported changing their housecleaning habits and 71% made a change in their own home, and 31% shared Healthy Home information with family, friends or colleagues. Taken together these facts indicate that about 30% *more* people reported improving their physical environment (putting dust covers on pillows and mattresses, changing furnace filters, installing carbon monoxide a detector, repairing leaks, adding child safe cabinet locks, changing cleaning practices, etc.) than would have been expected based on actions plans visitors completed as part of their exit surveys (Table 4). Other follow-up actions reported included sharing Healthy Home information with family, friends or colleagues (31%), contacting a resource agency for help (11%), or talking with their landlords (9%) – around half the proportions who put these actions in their action plans. Most of those who reported that they did not take their planned action had either forgotten about their plan or changed housing so the planned action was no

longer relevant. Due to resource and logistical limitations, the partners were not able to independently confirm these reported actions through home visits. However, the specific conversations conducted during the follow-up calls suggested that most respondents had in fact changed their housing environment or behavior to reduce hazards as a result of their visit to the Healthy Home.

Healthy Home Advisory Council (HHAC)

In addition to its direct impacts on visitors, the Healthy Home contributes to environmental health promotion by influencing its partner organizations' activities. The primary strategy to accomplish this objective was to develop a Healthy Home Advisory Council (HHAC). The HHAC consists of a diverse set of organizations that both inform the programming of the Healthy Home and integrate Healthy Home messages into their ongoing and future activities. During the first year of operation, the Healthy Home core partners recruited 25 members to the HHAC (Table 7). Several of the HHAC members, including the community group Action for a Better Community (ABC) and the Regional Community Asthma Network (RCAN), became so involved with the daily operation of the Healthy Home that they joined the weekly core partners meetings to coordinate joint programs, apply for funding, and refer clients to the Healthy Home.

The Healthy Home staff evaluates the project's impacts on the HHAC members by periodically interviewing them about how the Healthy Home affected their organization. Many of the HHAC members contributed to the development of the Healthy Home, providing materials, feedback, and technical advice on creation of the displays. For example, the Monroe County Department of Public Health provided many display materials. Many HHAC members referred clients to the home to complement their agency's services. For example, Neighborhood Empowerment Team (NET) officers (city inspectors) referred property owners cited under the Rochester lead law to the Healthy Home for advice on how to repair lead hazards. HHAC members also serve as a resource for Healthy Home visitors. Smokers were advised to call smoking cessation services, people reporting deteriorated paint were referred to the City's Lead Hazard Control grants program, and visitors with asthma were directed to the Regional Community Asthma Network's (RCAN) services.). Several HHAC partners used the Healthy Home as a programming site, including the Injury Free Coalition for Kids, which hosted a training session at the Healthy Home. Both the Monroe Community College's service learning program and the University of Rochester's Pediatric Links with the Community program for medical residents used the Healthy Home as a regular placement site for their students' service projects and training.

New directions

Although the basic operational model of the Healthy Home has been solidly established, there are both challenges in sustaining this model and opportunities for building on this foundation. Maintaining visitation takes an ongoing effort. Future visitors are expected to come through the efforts of the Healthy Home staff as well as ongoing referrals from the Healthy Home Advisory Council members. In addition, HHAC members disseminate information about the Healthy Home at health fairs and through community presentations. The Healthy Home staff continually develops new partnerships with additional schools, agencies, and housing programs to expand visitation.

Several new projects and directions evolved to capitalize on the Healthy Home's potential as a hub for health promotion in the community. For example, as noted above, SWAN's Work Experience Program director was based at the Healthy Home to help people who are transitioning off public assistance gain work experience. Participants were given Healthy Home tours, advised about addressing hazards in their own homes, and when possible

placed in jobs related to environmental health. In conjunction with local schools and the University of Rochester, core partners initiated projects related to improving nutrition and preventing obesity. Staff members developed training materials for professionals who conduct home visits for other purposes, such as child abuse prevention and asthma interventions. The Healthy Home was integrated into SWAN's youth programming through special Healthy Home tours for children, involving youth from SWAN's other initiatives in Healthy Home activities, and developing programs to reach out to families with children.

Summary of accomplishments

The number of visitors to the Healthy Home, visitors' interactions with staff while touring the home, and the follow up phone interview results indicate that the Healthy Home is a promising initiative. Another positive sign is the continued expansion of the Healthy Home Advisory Council. To the extent that the HHAC member groups integrate the Healthy Home's messages into their staff training, interactions with clients, and referrals to community resources, this project has the potential to have a lasting and multiplied effect throughout the community. Finally, there is growing interest among neighborhood, government, and other groups in replicating this project elsewhere in Rochester and beyond.

Despite the Healthy Home's progress, the project faces several challenges. One of the three initial target audiences for the project was property managers, but visitation and involvement by housing professionals dropped off after the first three months. In part, this may be because the training needs of this group were met by free Lead Safe Work Practices courses offered throughout the city to support Rochester's new lead law. However, those property owners who visited the Healthy Home responded positively to the experience, and several suggested that their tenants visit. Thus, it appears that the Healthy Home has an underutilized potential to effectively educate housing professionals. The Healthy Home staff is developing outreach efforts targeted at this group.

The Healthy Home partners would also like to increase direct involvement by members of the local community. While SWAN is based in the community and the Healthy Home has extensive involvement with local schoolchildren, neighborhood residents do not regularly visit on an individual basis. Special events, such as hosting block club meetings at the Healthy Home and the annual community barbeque, have been positively received but reach a limited number of people. New initiatives to reach out to residents include inviting the local neighborhood groups to locate their offices in the Healthy Home and developing incentives for clients of housing service programs to tour the home.

Finally, the financial sustainability of the Healthy Home is an ongoing challenge. Because the facility is rented and the staff is grant-funded, continued effort must be devoted to attracting new resources. The Rochester Healthy Home operates on a fairly modest budget; the primary expenses are staff (one full time paid staff plus an equivalent amount of staff time contributed by partner organizations) and rent (around \$15,000 per year for an 1100 square foot space, including phone, internet, utilities, insurance, and property management). Nonetheless, unless a long-term sponsor is found for the Healthy Home as a stand-alone facility, it is likely that the project will eventually merge with a larger organization or organizations. Indeed, this was part of the Healthy Home's original vision for sustainability. That is, if the project achieves its goal of integrating healthy homes information into multiple home- and health-based organizations in the community, it will no longer be necessary to have a physical site devoted solely to these issues.

Despite these challenges, the Healthy Home has inspired a great deal of interest from other communities. Healthy Home partners presented the project at several national conferences and received many requests for additional information. As part of the effort to share lessons

learned from this project, the Healthy Home produced a “Guide to Replication” for interested groups (Korfmacher and Kuholski, 2007))

Lessons learned

As noted above, one of the goals of the Healthy Home core partners was to learn whether or not a hands-on facility is an effective way of promoting home environmental health education and action. The lessons learned to date relate to three key elements: partnerships, an integrated hands-on approach, and a focus on action. These three elements helped the Healthy Home overcome the challenges described above related to education, complexity of required actions, and access to resources.

Partnerships

Because of the interdisciplinary nature of home-based environmental hazards, addressing these problems requires cross-sectoral participation (Krieger and Higgins, 2002). The Healthy Homes core partners had diverse expertise: SWAN had years of experience in youth and community-based programming, RFRI had capacity in housing services, and the EHSC had access to technical resources on environment and health.

In addition, the partners were all strongly committed to a team approach, even when that made progress slower or more complex. At the same time, they were flexible about “ownership,” realizing that the role of each organization in (and attribution of credit for) the project might shift over time. They were also realistic about the limits of their individual and organizational capacity, and agreed on the need to reach out to and maintain substantive relationships with a wide group of additional partners through the Healthy Home Advisory Council to insure the success and sustainability of the project.

Integrated hands-on approach

The effectiveness of experiential, hands-on educational experiences is well-documented in the context of environmental education (Orr, 2004). The Healthy Home experience suggests that this concept is particularly useful in the context of home-based environmental health hazards. The Healthy Home demonstrates the causes, consequences, and solutions to environmental hazards in a realistic residential setting. These interactive displays effectively engage all types of visitors, including residents, property managers, and professionals. The evaluation and follow-up interview responses document the effectiveness of this approach in not only raising awareness, but also supporting action.

Focus on actions—The effectiveness of hands-on education relates to the third key factor: a focus on action. The Healthy Home responded to a well-documented community concern about lead. Although it grew in scope, it continued to focus on health hazards in low-income housing and how to address these hazards. Thus, whereas many educational efforts focus on raising awareness in hopes that the audience will respond with action, each Healthy Home display was developed in response to a need for action that had been identified by the community. For example, there are many resources available in Rochester to support lead testing and safely addressing lead hazards. However, SWAN staff observed that few residents of their neighborhood knew how to access these resources. The lead displays were designed to help visitors recognize the potential for lead hazards, to motivate them through an understanding of the health risks, and to connect them with the appropriate resources to support further action. To the greatest extent possible, the Healthy Home linked visitors directly to resources that could help them act on their individual concerns.

Discussion

While the Healthy Home has met with widespread enthusiasm as an educational project, there are limits to what we can conclude about its actual impacts on home environmental health conditions. Because of the resource intensiveness of conducting home visits, documentation of physical and behavioral changes made in response to the Healthy Home has relied to date primarily on self-report in follow-up interviews. Future research could quantitatively compare the cost-effectiveness of visiting the Healthy Home to simply providing written educational materials or to more intensive interventions like home visits in promoting improvements in home environmental health.

Meanwhile, the intermediate indicators of success are strong. The strength of interest in the Healthy Home, both in Rochester and beyond, the responses of visitors in follow-up surveys, and the engagement of the diverse Healthy Home Advisory Council members all indicate that this is a promising innovation. The Healthy Home Advisory Council members' integration of home environmental health messages into their ongoing programs has already multiplied the project's impacts in the community. Perhaps the most promising development is the Healthy Home's evolution as a community hub for health and housing improvements beyond the initial scope of the project, including a pilot project on nutrition, use of the facility as a training base for individuals transitioning from welfare to work, and involvement of youth from SWAN's other programs in the Healthy Home.

Despite these positive indicators, a Healthy Home like Rochester's may not be appropriate for other communities. The Rochester Healthy Home was designed in response to a particular community's identified needs and the resources of the core partners. Other communities may adapt the lessons learned from the Healthy Home to their particular contexts. For example, instead of renting space, hands-on displays on home environmental health could be added to a community group's existing office space or located in a church, hospital, or training site. Or, as with the original Lead Lab, the Healthy Home concept could be applied in a remodeling project with documentation and display of initial conditions, hazard treatment methods, and outcomes. Other communities might choose to emphasize different topics or audiences to reflect their particular interests, resources, and needs.

The key factors that contributed to the Rochester Healthy Home's success -- partnership, hands-on approach, and focus on action -- could be integrated into any of these various approaches. Broad partnerships that span health and housing interests and bring together complementary skills can be forged in any community. An integrated, hands-on approach can be adopted, whether through full-scale demonstration of hazard treatments or portable displays of materials needed, photographs of actual hazards, or depictions of low-cost treatments. Finally, action can be promoted by recommending individualized strategies, connecting visitors to relevant resources, and following up on actions needed to address the complex causes of environmental hazards. These strategies may help community groups, health care professionals, housing groups, and academics develop a locally appropriate approach to reduce the home-based environmental health hazards that currently contribute to health disparities faced by many low income communities.

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References

- Alliance for Healthy Homes (AFHH). 2007 [Accessed July 1 2007.]. www.afhh.org
- Bonner S, Matte TD, Fagan J, Andreaopoulos E, Evans D. Self-reported moisture or mildew in the homes of head start children with asthma is associated with greater asthma morbidity. *Journal of Urban Health* 2006;83(1):129. [PubMed: 16736360]
- Brown V. Setting a new syllabus: Environmental health science in the classroom. *Environmental Health Perspectives* 2004;12(14):813–819.
- Centers for Disease Control and Prevention (CDC). Blood lead levels--United States, 1999–2002. *MMWR - Morbidity & Mortality Weekly Report* 2005a;54(20):513–516.
- Centers for Disease Control and Prevention (CDC). Building blocks for primary prevention: Protecting children from lead based paint hazards. 2005b [Accessed August 1, 2007.]. http://www.cdc.gov/nceh/lead/publications/Building_Blocks_for_Primary_Prevention.pdf
- Center for Government Relations (CGR). Lead poisoning among young children in Monroe County, NY: A needs assessment, projection model, and next steps. Rochester, NY: Prepared for the Monroe County Department of Health; 2002 [Accessed March 27, 2007.]. Available at: <http://www.monroecounty.gov/p/eh-LeadPoisoningAmongYoung.pdf>
- Chepesiuk R. Environmental Literacy: Knowledge for a Healthier Public. *Environmental Health Perspectives* 2007;115(10):A494–A499. [PubMed: 17938718]
- Cherayil M, Oliveira D, Sandel M, Tohn E. Lawyers and doctors partner for healthy housing. *Clearinghouse REVIEW Journal of Poverty Law and Policy* 2005 May–June;:65–72.
- Claudio L, Torres T, Sanjurjo E, Sherman LR, Landrigan PJ. Environmental health sciences education: A tool for achieving environmental equity and protecting children. *Environmental Health Perspectives Supplements* 1998;206(S3):849–855.
- Corburn, J. *Street science: Community knowledge and environmental health justice*. MIT Press; Cambridge, MA: 2005.
- Dunn JR, Hayes MV. Social inequality, population health, and housing: A study of two Vancouver neighborhoods. *Social Science and Medicine* 2000;51:563–587. [PubMed: 10868671]
- Finger Lakes Health Systems Agency (FLHSA). What's Goin' On: Report of the African American Health Status Task Force. Rochester, NY: May. 2003
- Hanley M. A Matter of Racial Justice: The Alarming Disparities of Lead-Poisoning Rates in New York State. *Poverty and Race: Poverty and Race Research Action Council* 2008;17(1):3–4.
- Himes L, Parrott K, Lovingood R. The radon project: A study in environmental hazard education. *Journal of Extension* 1996;34(3)
- Institute of Medicine (IOM). *Health Literacy: A prescription to end confusion*. National Academies Press; Washington, DC: 2004.
- Jordan CM, Yust BL, Robison LL, Hannan P, Deinard AS. A randomized trial of education to prevent lead burden in children at high risk for lead exposure: Efficacy as measured by blood lead monitoring. *Environmental Health Perspectives* 2003;111(16):1947–1951. [PubMed: 14644671]
- Korfmacher KS. Rochester moves to make lead history. *Lead and Environmental Health Solutions*. 2006 March 1;
- Korfmacher, KS.; Kuholski, K. Rochester's Healthy Home: Guide to the Home. 2007 [Accessed May 1, 2008.]. <http://www2.envmed.rochester.edu/envmed/ehsc/outreach/COEPpubs/COEPpub.html>
- Krieger JW, Takaro TK, Song L, Weaver M. The Seattle-King County Healthy Homes Project: A randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers. *American Journal of Public Health* 2004;95:652–659. [PubMed: 15798126]
- Krieger J, Higgins DL. Housing and health: Time again for public health action. *Public Health Matters*. *American Journal of Public Health* 2002;92(5):758–768. [PubMed: 11988443]
- Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: Estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. *Environmental Health Perspectives* 2002;110(7):721–728. [PubMed: 12117650]

- Landrigan, PJ.; Needleman, HL.; Landrigan, M. Raising healthy children in a toxic world. Rodale Press; 2002.
- Morgan W, et al. Results of a home-based environmental intervention in urban children with asthma – the Inner City Asthma Study. *The New England Journal of Medicine* 2004;351(11):1068–80. [PubMed: 15356304]
- O’Fallon L. Go for the GLO. *Environmental Health Perspectives* 2004;112(6):351.
- O’Neill M. Helping schoolchildren with asthma breathe easier: Partnerships in community-based environmental health education. *Environmental Health Perspectives* 1996;104(5):464–466. [PubMed: 8743428]
- Orr, D. *Earth in mind: On education, environment, and the human prospect*. Island Press; Washington, DC: 2004. number of pages in book
- Saegert SC, Klitzman S, Freudenberg N, Cooperman-Mroczek J, Nassar S. Healthy housing: A structured review of published evaluations of US Interventions to improve health by modifying housing in the United States, 1990–2001. *American Journal of Public Health* 2003;93(9):1271–1477. [PubMed: 12893610]
- Saegert S, Evans GW. Poverty, housing niches, and health in the United States. *Journal of Social Issues* 2003;59(3):569–589.
- Shenassa E, Stubbendick A, Brown MJ. Social disparities in housing and related pediatric injury: A multi-level Study. *American Journal of Public Health* 2004;94(4):633–639. [PubMed: 15054017]
- Trasande LJ, Boscarino N, Graber, et al. The environment in pediatric practice: A study of New York Pediatrician’ Attitudes, beliefs, and practices toward children’s environmental health. *Journal of Urban Health* 2006;83(4):760–772. [PubMed: 16736113]
- Wu F, Jacobs D, Mitchell C, Miller D, Karol MH. Improving indoor environmental quality for public health: Impediments and policy recommendations. *Environmental Health Perspectives* 2007;115(6):953–957. [PubMed: 17589606]
- Wu F, Takaro TK. Childhood asthma and environmental interventions. *Environmental Health Perspectives* 2007;115(6):971–975. [PubMed: 17589609]

Figure 1.
The Healthy Home, created by a community-academic partnership in Rochester, New York.

Figure 2.
An intern demonstrates dust-mite-proof pillow covers in the Healthy Home's "asthma-safe bedroom."

Figure 3. Healthy Home displays show visitors, among other things, various options for controlling lead hazards in windows.

Table 1

Overview of home environmental hazard information*

Health risk	Environmental hazards	Solutions	Resources
Chemical poisoning	Pesticides, herbicides, cleaning products	Alternate cleaning products, appropriate use and storage	Cooperative Extension, Health Department
Lead poisoning	Deteriorated lead paint Lead in dust Lead in soil	Lead hazard reduction, Lead-specific cleaning	Coalition to Prevent Lead Poisoning, Health Department, City of Rochester
Asthma	Mold Indoor tobacco use Cockroaches/rodents	Leak repair, air filters, smoking cessation, integrated pest management	Rochester Community Asthma Network, Smoking cessation programs
Indoor Air Quality	Asbestos Carbon Monoxide Radon	Containment Carbon monoxide detectors Radon testing, increased airflow	Health Department Rochester Fire Department New York State Health Department, USEPA

* For purposes of clarity, only a few solutions and resources for each hazard are listed here. The Healthy Home provides information on many additional solutions and resources.

Table 2

Self-identified interest/role in healthy home from sign-in log and follow-up interviews

Interest/role Category	Percent of visitors (N=740)	Percent of follow-up interviewees (N=119)
Youth (K-12)	18.9%	13.4%
Post-secondary student	4.3%	15.9%
Community residents	17.6%	11.7%
Health care professional	29.1%	31.9%
Housing professional	13.4%	1.7%
Other professional	16.2%	22.7%
Other	0.4%	2.5%

Note: Percent of visitors as indicated on the sign-in logs (N=740) and those reached for follow-up phone interviews (N=119)

Table 3

Home hazard concerns reported by healthy home visitors (multiple answers allowed)

Hazard	N*	Strongly Disagree	Disagree	Agree	Strongly Agree
	N*	%	%	%	%
Mold	321	19.6%	20.2%	41.1%	19%
Pests	323	23.2%	26.7%	35.6%	14.2%
Tobacco	327	60%	12.8%	12.2%	14.4%
Asbestos	276	47.8%	23.9%	17%	11.2%
CO	289	37%	30.4%	19.4%	12.8%
Radon	254	44.5%	30%	17.3%	8.2%
Lead	294	31.6%	23.8%	26.2%	18.4%
Chemicals	323	19.8%	18.6%	44.6%	17%

* N = total number of responses to this question

Table 4

Actions to reduce home hazards (multiple responses allowed)

Action	% planning to take this action (N = 337)	% reporting they took this action (N=119)
Contact resource agency	20.1%	10.9%
Make physical changes in my home	44.3%	70.1%
Talk to owner of home I rent	24.3%	9.2%
Change housecleaning habits	57.6%	80.7%
Teach others	57.6%	31.1%
Other	6.0%	4.2%

Note: “% planning to take this action” based on action plans completed at end of Healthy Home tour; “% reporting they took this action” based on follow up interviews.

Table 5

Most 'useful' part of the Healthy Home (N = 352, multiple responses allowed)

Healthy Home feature	%
Posters	47.4%
Display items	68.5%
Small signs	20.2%
Check lists/handouts	26.7%
Tour guides	71.0%
Brochures	36.1%
Give away items	16.2%

Table 6

‘Most important thing learned’ at the Healthy Home (N = 326)

Healthy Home feature	%
Indoor Air Quality	12.0%
Asthma Triggers	17.5%
Chemicals/Household Cleaning	13.8%
General Home Hazards	17.8%
Lead	30.7%
Resources	8.3%

Table 7**Healthy Home Advisory Council members**

Action for a Better Community
American Lung Association/Regional Community Asthma Network
Center for Environmental Information
City of Rochester Neighborhood Empowerment Teams (code inspectors)
City of Rochester Fire Department
City of Rochester Lead Hazard Control grant program
Coalition to Prevent Lead Poisoning
Finger Lakes Lead Poisoning Prevention Center
Injury Free Coalition for Kids of Rochester
Leadership Rochester
Lenox Street Block Club
Monroe Community College Service Learning Center (Americorps)
Monroe County Department of Environmental Services
Monroe County Department of Health and Human Services Youth Bureau
Monroe County Department of Public Health
Neighborhood United
Neighborworks Rochester
Poison Control Center
Rochester Fatherhood Resource Initiative
Southwest Area Neighborhood Association
School #29
The Housing Council
University of Rochester Environmental Health Sciences Center
University of Rochester-Pediatric Links to the Community
University of Rochester School of Nursing