An Evaluation of HUD's Healthy Homes Initiative: Current Findings and Outcomes

FINAL REPORT

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LIST OF ABBREVIATIONS

ACGIH	American Conference of Governing Industrial Hygienists
CDC	US Centers for Disease Control and Prevention
CO	Carbon monoxide
CSREES	Cooperative State Research, Education, and Extension Service
EC	Enterprise Community
EPA	Environmental Protection Agency
EZ	Empowerment Zone
FY	Fiscal year
HHI	Healthy Homes Initiative
HUD	Office of Housing and Urban Development
IAA	Interagency Agreement
IPM	Integrated Pest Management
µg/g	micrograms per gram
n	Sample size
NIST	National Institute of Standards and Technology
NOFA	Notice of Funding Availability
OHHLHC	Office of Healthy Homes and Lead Hazard Control
OMB	Office of Management and Budget
PbB	Blood lead
RC	Renewable Communities
USDA	U.S. Department of Agriculture
VOC	Volatile organic compound

EXECUTIVE SUMMARY

Background

The U.S. Department of Housing and Urban Development (HUD) established its Healthy Homes Initiative (HHI) in response to a Congressional directive to partner with other federal agencies and to "develop and implement a program of research and demonstration projects that would address multiple housing-related problems affecting the health of children." As a result, in 1998 HUD's Office of Healthy Homes and Lead Hazard Control (OHHLHC) convened a panel of experts in health, housing, and building science issues to develop a strategic plan for the HHI. The strategic plan, entitled "The Healthy Homes Initiative: A Preliminary Plan," was completed in 1999 and proposed that healthy homes could be created and maintained by addressing four healthy homes principles:

- Excess moisture reduction,
- Dust control,
- Improved air quality, and
- Education.

On the basis of the HHI Preliminary Plan, HUD's OHHLHC developed competitive grant programs to fund Healthy Homes demonstration, education, and research projects. In addition, OHHLHC entered into Interagency Agreements (IAAs) and contracts to develop low-cost, effective methods for identifying and mitigating housing-related environmental health and safety hazards, developing public education/outreach programs, and building local capacity to sustain healthy homes projects.

In 2005, OHHLHC initiated an evaluation of the HHI to determine the degree to which Healthy Homes grants and cooperative agreements addressed the principles of the HHI Preliminary Plan to achieve the HHI goals, as well as their individual project goals. Specific objectives of this evaluation included the following:

- Developing measures to capture the range of interventions, including training and education, that have been conducted through HHI Mold and Moisture Control, Demonstration, Education, and Technical Studies grants, and capturing information on the effectiveness of these interventions based on project evaluations performed by the grantees;
- Capturing the major research findings from Healthy Homes Demonstration[1] and Technical Studies[2] grant programs and documenting how these findings are applied;

[1] The Healthy Homes Demonstration grant program was created to develop, demonstrate and promote cost-effective, preventive measures to correct multiple environmental health and safety hazards in the home that produce serious diseases and injuries in children of low-income families.

[2] The Healthy Homes Technical Studies grant program was created to improve existing methods for detecting and controlling housing-related health and safety hazards, to develop new methods to detect and control these hazards, and to improve knowledge of housing-related environmental health and safety hazards.

- Determining whether HHI grantees have achieved sustainability (i.e., developed local infrastructure to carry out healthy homes activities when grant funding has expired); and
- Obtaining and summarizing the results of healthy homes activities that have been supported through IAAs and through contract-funded activities.

This report summarizes and discusses the information gathered during this evaluation.

Methodology

The main components of the evaluation included designing and administering a questionnaire to current and former HHI grantees, conducting on-site visits to three grantees selected by HUD, interviewing representatives from other federal agencies with IAAs for HHI-related activities, reviewing relevant work products created under these IAAs, and summarizing and reviewing contract-based projects and products.

The questionnaire captured key information about recruitment/enrollment, assessment, interventions, skills training, and community education/outreach in grantee projects funded in fiscal years 1999 to 2004. It was intended to be administered during a two-hour telephone interview. However, to ease the respondent burden for grantees, the contractor extracted information from grantee work plans, quarterly reports, manuscripts, and/or final reports and pre-filled the questionnaire prior to the interview. The pre-filled questionnaire was then sent to grantee representatives who were asked to review information for accuracy and complete the unpopulated responses prior to the phone interview. Interviews were conducted between May and September 2006. A total of 63 grantees (36 Demonstration grantees, 21 Technical Studies grantees, 4 Education grantees, and 2 Mold and Moisture Control grantees) were interviewed (Figure 1), 20 of which had active projects at the time of the interview.

Figure 1. Percentage of Grantees by Grant Type (n=63)

Information collected was entered into a Microsoft Access database for data analysis. For the purpose of analyses, Mold and Moisture Control and Education grants (discontinued grant categories) were combined with the Demonstration grants.

Site visits were made to three grantees identified by HUD as "high performers." These visits included conducting detailed interviews with grantee and partner staff and visiting two to three housing units where interventions were conducted to gain a better understanding of program elements that were associated with achieving programmatic goals. These visits were conducted in September and October 2006.

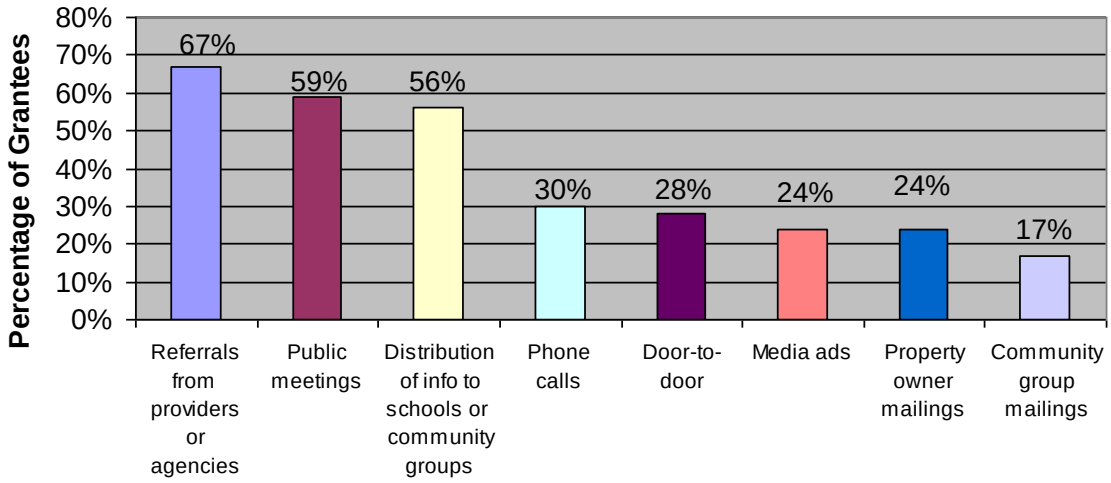
Copies of work products from three IAAs and from contracts with four organizations were also obtained and summarized.

Findings from Grantee Interviews

Recruitment

Most grantee projects (86%) involved recruitment or enrollment of housing clients and/or housing units. Overall, more than 9,700 housing units/clients were enrolled by grantees in Healthy Homes projects. Families with children who had, or were at risk for, a specific health condition (e.g., asthma) and housing units within specific census tracts or geographic boundaries were the primary focus of recruitment efforts. Individuals were commonly recruited through referrals from health care providers and or other agencies, attendance at public meetings, and distribution of information to schools and/or community groups (Figure 2).

Figure 2. Percentage of Grantees that Used Various Recruitment Methods (n=54)



Many grantees reported that recruitment was quite challenging due to difficulty reaching the targeted population, strict enrollment criteria, and relying on partners for referrals. However, several grantees found ways to overcome these challenges by remaining flexible and re-evaluating their enrollment criteria, setting realistic expectations, and identifying appropriate staff, community members and partners to assist with recruitment efforts.

Assessment

Approximately 86% of the grants recruited housing units for the assessment of environmental health and safety hazards. Over 8,000 baseline assessments were conducted in housing units. These assessments focused primarily on the four main areas listed previously: excess moisture reduction, dust control, improved air quality, and education. Grantees used a variety of relatively low-cost methods, including visual assessments, client interviews, and environmental sampling and analysis to identify potential hazards (Figure 3). Fifty-eight percent of grantees that developed assessment tools reported that their tools were validated.

Evidence of visible mold and moisture problems, pest infestations, and potential lead hazards were reported to be frequently observed during visual inspections. Health information, as well as details about their behavior and their knowledge regarding healthy homes issues, was collected from occupants. Over three quarters (79%) of the grantees that responded conducted environmental sampling to assess hazards, including dust sampling for dust mite allergens, molds, lead, and cockroach allergens.

Figure 3. Percentage of Grantees that Conducted Various Types of Assessments (n=54)

Assessment Type

Overall, relatively few grantees identified lessons learned related to conducting assessments. However, several grantees indicated that gaining re-entry into homes to collect equipment used for long-term monitoring (such as radon detectors and relative humidity meters) was often difficult. Assessment strategies that grantees found effective included the collection of only essential data, using established data collection and assessment tools, and having consistent time frames for conducting assessments.

While most grantees conducted assessments to develop appropriate housing unit interventions, some grantees conducted these assessments solely to gain a better understanding and to characterize the distribution of hazards in homes or to link the presence of hazards with health data. For example, one grantee conducted a survey of homes to establish baseline concentrations of fungal species in air and dust found in

urban homes where there was no evidence of significant water damage. In addition to conducting assessments, six grantees focused on the development of tools/instruments that could be used in the assessment process. For example, one grantee conducted a study to determine if a light-weight portable instrument that incorporated radar technology could be used to detect mold behind drywall in the home.

Interventions

The majority of grants (78%) involved remediation of the housing unit and education of the occupants on ways to improve their housing conditions. At the time the contractor conducted interviews of the HHI grantees, interventions were completed in over 6,268 housing units and were in progress in an additional 622 units. Because 35% of the grantees that reported conducting interventions had active projects, the number of housing units with completed interventions will continue to rise. Most of the interventions were relatively low in cost, averaging approximately $3,700 per unit (Table 1).

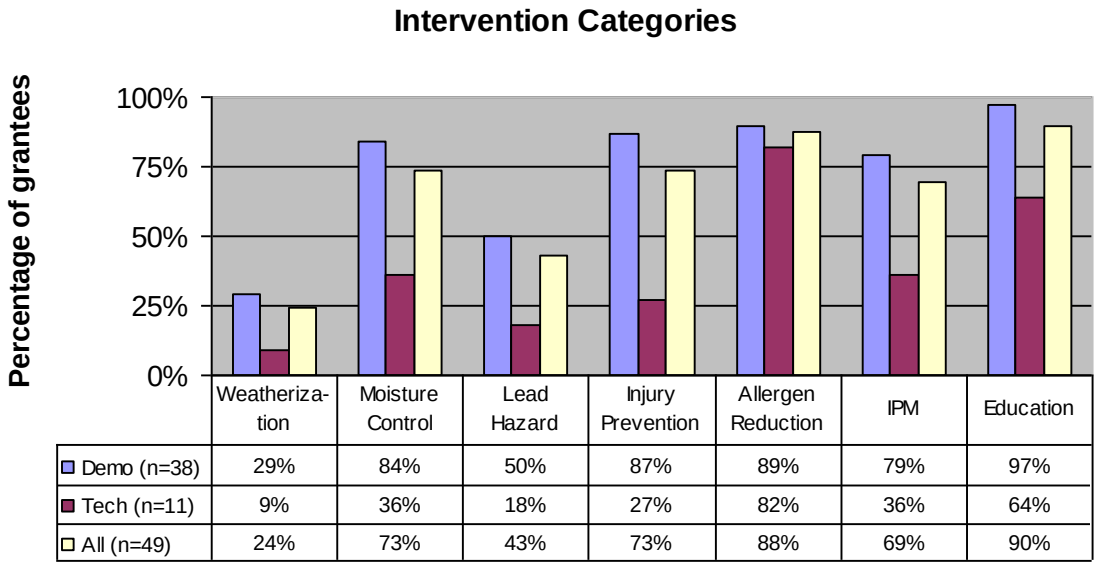
Table 1: Descriptive Statistics for the Average Cost[a] of Intervention Materials per Housing Unit[b,c]

Intervention Category	Cost per Housing Unit	
	Range	Average
Weatherization (n=8)	$47-$7250	$2266
Moisture control (n=13)	$4-$4200	$1272
Lead hazard control (n=8)	$600-$13000	$5312
Injury prevention (n=14)	$7-$850	$233
Allergen reduction (n=17)	$5-$6000	$1292
IPM (n=14)	$39-$800	$290
Education (n=16)	$20-$600	$211
Average total cost per unit for all interventions (n=10)	$450-$7028	$3705

[a]Average cost includes both cost of materials and labor.
[b]Numbers presented in the table include both estimated and actual quantities provided by grantees. 33 of 44 grantees reported that their numbers were estimates.
[c]n=number of grantees who answered questions concerning the costs of various interventions.

While interventions often addressed potential physical hazards, such as high allergen concentrations, injury hazards, excess moisture, and pests, they also focused on increasing community awareness of healthy homes issues by providing education to the tenant or homeowner (Figure 4). Forty-eight percent of grantees that conducted educational interventions reported that pre- and post-tests were used to evaluate the effectiveness of their efforts. Specific activities addressing the physical hazards varied considerably from housing unit to housing unit and program to program.

Figure 4. Percentage of Grantees Focusing on Specific Intervention Categories



	Weatherization	Moisture Control	Lead Hazard	Injury Prevention	Allergen Reduction	IPM	Education
Demo (n=38)	29%	84%	50%	87%	89%	79%	97%
Tech (n=11)	9%	36%	18%	27%	82%	36%	64%
All (n=49)	24%	73%	43%	73%	88%	69%	90%

The implementation of interventions posed a number of difficulties for many grantees. For example, grantees reported having difficulty obtaining a commitment from the property owner, working with contractors, completing interventions within the allotted time and budget, and gaining access to dwellings. In order to overcome these challenges, grantees reported developing interventions that could be implemented without the property owner's consent, increasing the pool of available contractors, changing the bidding process by developing a set list of prices, and focusing on more low-cost interventions. In addition, grantees reported investigating hiring a "handy man" to complete small interventions and using housing code enforcement more effectively as an intervention tool.

Overall, grantees reported that comparisons of pre- and post-intervention visual assessment, client interview data, and analysis of environmental samples were most commonly used to evaluate their intervention efforts.

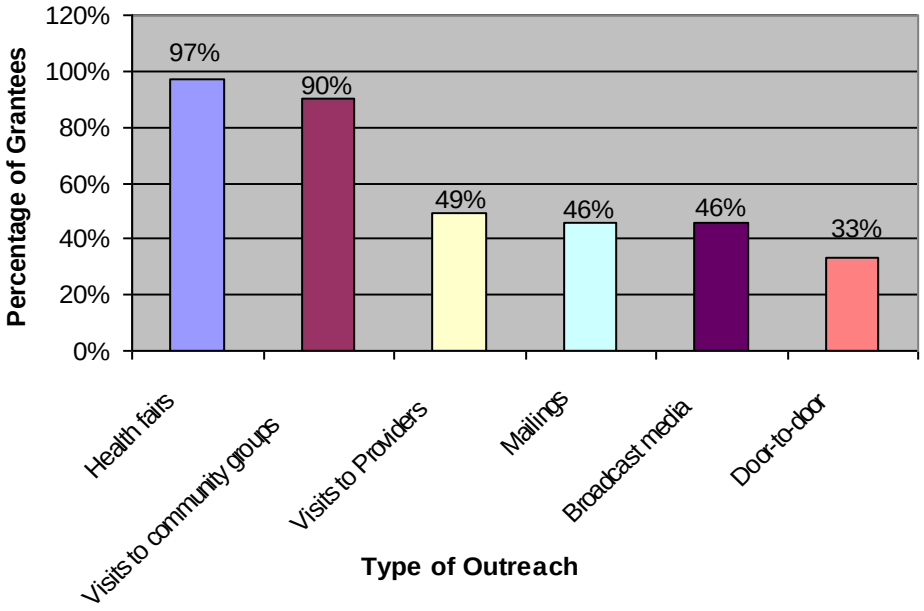
Skills Training

Most grantees (75%) provided skills training aimed at increasing the ability of individuals to provide community education, conduct assessments, and/or carry out interventions. Almost 6,000 individuals received such training. Although a variety of audiences received skills training, the most common target audience was grantee or partner staff. Fifty-five (55) percent of grantees reported that a specific training curriculum was developed for their project. The primary mechanism for evaluating skills training efforts was asking participants to complete an evaluation form.

Community Education and Outreach

Community education and outreach was a component of many grant programs (62%). Grantees used a variety of outreach methods to reach targeted populations, including attending health fairs, visiting community groups, and visiting providers' offices (Figure 5). An estimated 1.2 million individuals, primarily parents/guardians, were reported to have been reached by grantees. In almost all such programs, the estimated numbers of individuals reached were actually greater than the original targeted numbers. Grantees reported that visiting community and/or parents groups, such as faith-based organizations, tenant organizations, and parent-teacher organizations, was most effective in helping to reach their goals. Additionally, 41% of grantees reported that health fairs were effective.

Figure 5. Percentage of Grantees that Conducted Various Types of Outreach (n=39)



Partnerships

In most instances, no single agency is responsible for addressing healthy homes issues. Grantees often collaborated with several different partner organizations to meet their project goals. Through education and involvement of over 260 organizations, grantees reported that they effectively recruited individuals, carried out interventions, and conducted community education and outreach efforts. More specifically, grantees reported that partnerships were helpful in reaching remote and transient populations, gaining institutional review board (IRB) approval, providing technical assistance, and offering additional services to occupants. Keys to successful partnerships included involving partners in all aspects of the projects and frequent communication. In addition, grantees reported that understanding the priorities, strengths, and mission of the partner's organization, as well as clearly defining each partner's responsibilities, were important steps in creating an effective partnership.

Outcomes

Twenty-one (21) percent of grantees, primarily those with active projects or recently completed projects, were unable to provide outcome information because their data had not been analyzed at the time of this evaluation. Of those that were able to report outcomes, the responses varied dramatically, and many outcomes reported were very general. Relatively few grantees that reported outcomes provided specific quantitative information such as percent changes in environmental measures, health symptoms, or caregiver knowledge.

All five grantees with outcomes related to integrated pest management (IPM) interventions, at an estimated average cost of $290 per housing unit, reported that they were successful in decreasing pest infestations and/or decreasing allergen concentrations. For example, based on a pre- and post-visual assessment, one grantee reported that after housing units received interventions, including IPM activities, the number of roaches decreased by 58% and the number of rodents decreased by 27% one year after the intervention. Although not all of the grantees that conducted allergen reduction interventions were able to show statistically significant reductions in allergen concentrations, some were able to demonstrate improvements in health outcomes, such as asthma severity scores, emergency room or doctor visits, and lost school days. For example, the one grantee found that, from self-reporting, severe or very severe asthma declined from 37% to 9% after IPM interventions. Some grantees were able to show that interventions focusing on education, controlling moisture intrusion and mold, and injury prevention also resulted in positive outcomes. For example, a grantee reported that asthmatic children living in homes that received moisture control interventions as part of a randomized controlled trial had significantly lower rates of asthma exacerbation requiring hospitalizations or emergency room visits compared to asthmatic children who lived in homes that did not receive interventions.

Although most grantees reported collecting cost data, less than half used this information to determine the cost-effectiveness of their approach.

Recognizing the importance of publicizing project outcomes, 14 grantees reported writing a total of 28 publications, most of which were submitted to peer-reviewed journals. Because 32% of grantees had not yet completed their projects at the time of the interview and because there is often a lag between completion and acceptance of a manuscript, the number of publications resulting from grantee projects captured in this report may be underestimated. For example, at least 18 additional publications were anticipated by grantees at the time of the interviews in this evaluation.

Two-thirds of grantees used information gained from their projects to encourage changes in policy or practice. Many of these changes occurred within the grantee's organization or within partner organizations. For example, one grantee reported that their local housing authority changed its practices for addressing pest infestations after they partnered with the grantee on a project that demonstrated integrated pest management was cost-effective.

Findings from Review of IAAs and Contracts

Research

HUD has funded several Technical Studies projects designed to develop novel methods or refine existing methods and share technical information. These projects focused on issues, including, but not limited to, indoor air quality, allergen distribution and analysis, and injuries. These research studies have allowed for better characterization of the U.S. housing stock, an increased understanding of the transport of air and pollutants from attached garages, the ability to model the impact of specific interventions on indoor air quality, characterization of the dust allergen levels in US housing, increased knowledge of home injury-related death rates, and an increased understanding of the link between mold exposure and asthma. Results of many of these projects have been presented to the scientific community through publication of at least nine peer-reviewed journal articles.

Tools and Resources

Another goal of the HHI is to establish local capacity to address healthy homes issues. Providing individuals with the tools and resources necessary to address these issues is one method to reach this goal. Healthy Homes guidance documents and tools developed in a number of projects have resulted in:

- An updated "Healthy Housing Reference Manual."
- A series of healthy homes issue papers.
- A matrix identifying healthy flooring options.
- A document on healthy homes maintenance activities.
- A Healthy Homes Clearinghouse of over 600 articles.
- A weatherization assessment tool.
- A tool to assist in developing quality assurance plans.
- A protocol for vacuum dust sample collection.

Training, Education and Outreach

Projects funded through IAAs and other contracts have also played a significant role in increasing healthy homes knowledge within communities. Several projects have resulted in the creation of educational materials about healthy homes topics, including instructional DVDs, brochures and fact sheets, a website for consumers, and an on-line training for nurses. In addition, an "Essentials for Healthy Homes Practitioners" course and three other courses have been developed and offered at over 30 locations across the US through an IAA with the Centers for Disease Control and Prevention. Over 900 health and housing professionals have attended these trainings, which continue to be offered. Through an IAA with the US Department of Agriculture, an estimated 1.6 million consumers have also been reached through various efforts conducted by Cooperative State Research, Education, and Extension Service. Through this IAA, a "Help Yourself to a Healthy Homes Booklet" was created for consumers and healthy homes messages were disseminated through the already established infrastructure created by Extension Service staff.

Conclusions

This evaluation established that HUD-funded projects addressed a diversity of healthy homes issues and the goals of the HHI. For example, development and application of low-cost methods for the identification and control of housing-related hazards are two goals of the HHI. Several projects funded through Technical Studies grants, IAAs, and contracts focused on development of tools that can be used to assess hazards, as well as the evaluation of specific interventions. Further evidence that HHI grantees contributed significantly to this goal is demonstrated by the fact that they reported that low-cost hazard assessments and interventions were conducted in 9,700 homes in high risk communities.

Another goal of the HHI is the development and delivery of targeted public outreach, education, and training programs to address healthy homes issues. Many grantee projects, IAAs, and contractual projects included community education and outreach efforts to raise awareness and build the capacity to address healthy homes issues. Additionally, in two-thirds of grant projects, as well as several projects funded through IAAs, educational materials were developed. It is estimated that through all the HHI grants, IAAs and contractual projects captured by this evaluation, over 2.8 million individuals received information on healthy homes issues. In addition, information was disseminated to the scientific community through technical publications and guidance documents.

Building capacity to operate sustainable programs in the absence of federal funding is critical to addressing housing-related environmental health and safety hazards. Most projects included efforts to build local capacity to operate sustainable programs by training programs or changes in policy. For example, almost 7,000 individuals have received healthy homes training through the HHI and a number of grantees reported that information was used to create changes in policy or practice. These grantees indicated that educational activities are continually carried out by their organizations and partner organizations.

Future Options for Consideration

Overall, findings from this evaluation suggest that HHI projects successfully addressed the identification the identification and control of multiple housing-related hazards relative to goals and principles presented in the HHI Preliminary Plan. This evaluation identified future healthy homes opportunities that include, but are not limited to:

- Identification of additional funding sources should be investigated by grantees and others to continue product improvement and field testing of tools that can be used to assess hazards.
- Creation of a mechanism to facilitate the exchange of information, including assessment tools and intervention protocols among HHI program partners (e.g., similar to the former “grantee exchange” website).
- Consistent analyses of the data collected by grantees to determine if assessment measures (both visual and environmental) correlate with health data.
- Creation of standardized assessment and data (i.e., assessment, outcome and cost)

collection tools that would allow data to be compared or pooled across projects for analysis.

- Provision of standardized treatment packages.
- Identification of best practices.
- Establishment of clearance criteria and increased reporting of results that quantify health outcomes to determine the effectiveness of interventions.
- Provision of written guidance and standardized evaluation protocols that provide quantifiable measures for evaluating project outcomes and indicate how to assess the cost-effectiveness of healthy homes interventions.
- Establishment of evaluation protocols that stress interim data analysis.
- Increased publication of findings in peer-reviewed journals and presentation of findings at scientific and community meetings.
- Increased sharing of educational materials to help grantees avoid having to "re-invent the wheel."
- Increased evaluation of the effectiveness and cultural sensitivity of the educational materials produced.
- More intensive evaluations of skills training efforts to determine the effectiveness of these efforts.
- Greater emphasis on using the data generated from grantee projects to make changes in policies and practices of other organizations.
- Enhanced efforts by grantees and their partners to increase the sustainability of other aspects of their programs, in addition to educational activities, in the absence of federal funding.

Chapter 1: BACKGROUND

The HUD Office of Healthy Homes and Lead Hazard Control (OHHLHC) established its Healthy Homes Initiative (HHI) in recognition that children and their families can be exposed to a variety of housing-related environmental and safety hazards. The HHI advocates a holistic approach to addressing these hazards in a coordinated fashion. The OHHLHC has engaged nationally recognized experts and entered into partnerships and interagency agreements to conduct baseline research and demonstration projects for healthy homes. These efforts focus on assessing and demonstrating low-cost, effective home hazard assessment and intervention methods, as well as public education and outreach.

In its April 1999 document, "The Healthy Homes Initiative: A Preliminary Plan," HUD proposed a strategy for the HHI. The Plan was created in response to a directive from the Committee on Appropriations of the US House of Representatives to "develop and implement a program of research and demonstration projects that would address multiple housing-related problems affecting the health of children," including "preventive measures to correct moisture and mold problems in inner-city housing occupied by families with infants in communities where toxic mold exposure has been linked to acute pulmonary hemorrhage and infant death." HUD was asked to submit a plan that "inventories the problems to be addressed, describes their intersections, identifies key technical questions, and provides a spending plan allocating funds among technical and policy studies, pilot projects, and emergency remediation."

The House Appropriations Committee directed HUD to seek expert advice to develop the Plan. A meeting was convened on December 8-9, 1998 with experts from a broad range of professions, Federal, State and local government agencies, and national and local practitioners in the private sector. This meeting, along with supplemental materials supplied by the experts, identified subjects and approaches on which general professional consensus existed. Meeting participants were asked whether there were sufficient data to develop cost-effective programs to demonstrate and promote housing interventions addressing multiple health, safety and environmental effects. They were also asked to identify the most appropriate single-focus interventions.

HUD, in consultation with these experts, concluded that healthy homes-related interventions, which can be expected to protect children from multiple adverse health outcomes, could be grouped into the following four categories:

- *Excess moisture reduction* – Moisture problems are evident in many homes, especially those that are poorly maintained. While high moisture levels alone are not sufficient to necessarily result in health hazards, it is a common precursor. Such problems can lead to paint deterioration (lead poisoning) and can contribute to pest infestation and increased levels of common allergens related to mold, dust mite, cockroaches, rodents, etc. Moisture problems can also contribute to structural hazards associated with rot and rust (injuries). In addition, moisture problems can be an

independent risk factor for respiratory illnesses and symptoms, particularly in children. These problems require a variety of interventions to correct, ranging from simple patching to correction of basic drainage.

- *Dust control* – Dust sources, sinks and traps can serve as a vehicle for a variety of hazardous agents, such as lead, allergens and pesticide residues. Settled and airborne dust can become problems where surface conditions hinder cleaning, such as rough or porous surfaces. Dust is the principal pathway through which children are exposed to lead and is also an exposure source for common residential allergens - dust mite, mold, cockroach, etc. In young children, transmission occurs through normal hand-to-mouth contact and inhalation of respirable particles. Dust remediation often consists of removal using special vacuum systems, the creation of smooth and cleanable surfaces, and controlling dust sources and sinks (e.g., covering bare lead contaminated soil).

- *Improved air quality (e.g., combustion sources)* – Building materials, paint and other coatings, cleaning products and appliances can emit gasses with irritant, allergic or other toxic properties. Improperly maintained or vented heating and cooking appliances may introduce hazardous gasses such as carbon monoxide and particulate matter into the living environment and are also related to fire hazards. Also, most homes depend upon the infiltration of outside air through building "leakage" for ventilation, which may not be sufficient, especially for more recently constructed homes with tighter building envelopes. Interventions can include measures such as installation of mechanical ventilation, repairing combustion appliances, and installing carbon monoxide monitors.

- *Education* – Education is an important part of all healthy homes interventions. Occupant behavior can be modified using well-understood prompting tools, especially in preventing injuries using low cost methods. It is important to provide education on healthy homes issues to the public at large, not just individual occupants whose homes are treated for hazards. These messages can make use of community-based delivery systems where they exist and help to create them where they do not.

The Plan greatly influenced the HHI and HUD's preparation of the first and subsequent Notices of Funding Availability (NOFAs) to announce funding for projects under four categories of competitive grant programs:

- Technical Studies.
- Demonstration.
- Education.
- Mold and Moisture Control.

In FY 1999, there was a Mold and Moisture Control category, which was not offered in subsequent fiscal years. The separate education NOFA was discontinued starting in fiscal year 2002.

Experience gained from the projects funded through the HHI grant programs, as well as advances in science since 1999, offer a basis for moving forward with additional strategic objectives, performance measures, and guidance to support decisions on the future direction of the program. By learning from its efforts to date, HUD can enhance its capability to extend effective interventions to large numbers of homes, to reduce health risks to vulnerable populations, and to provide data that will support housing guidelines, codes, and standards. Below is a description of how these NOFA programs relate to the larger scientific and practical questions that the HHI seeks to answer.

- **Technical Studies:** There is a critical need to better understand: (1) the link between housing factors and adverse health impacts; (2) how to measure the risk associated with these factors; and (3) the effectiveness of interventions to mitigate hazards and improve health. The overall purpose of the Healthy Homes Technical Studies grant program is to improve existing methods for detecting and controlling housing-related health and safety hazards, to develop new methods to detect and control these hazards, and to improve our knowledge of housing-related health hazards.

- **Demonstration:** The purpose of the Healthy Homes Demonstration grant program is to develop, demonstrate and promote cost-effective, preventive measures to correct multiple safety and health hazards in the home environment that produce serious diseases and injuries in children of low income families. The objectives of the program include (1) direct remediation activities that target children in homes where environmental triggers may be contributing to the child's illness, (2) education and outreach that furthers the goal of protecting children from environmentally induced illness, and (3) capacity building in the target community to assure Healthy Homes programs are sustained beyond the life of the grant award period.

- **Education:** In the FY 2000 and 2001 NOFAs, HUD established three separate categories of fundable grants, including outreach projects. (Separate education and outreach categories were not included in subsequent NOFAs.) These included (1) projects to develop and deliver public outreach to prevent and eradicate housing-related childhood diseases and injuries, (2) increased identification and control of housing-based hazards through education and outreach to specific high-risk communities and other identified audiences, (3) implementation of media strategies to increase public awareness of housing-related hazards, and (4) dissemination of materials to inform parents and caregivers about housing-related hazards.

- **Mold and Moisture Control:** In the FY 1999 NOFA, Congress directed HUD to offer a grant program to assist state and local governments in undertaking demonstration projects of preventive measures to correct mold and moisture problems in inner-city housing. The objectives of this program included (1) developing a survey protocol for identifying homes that are candidates for moisture control interventions, (2) developing intervention strategies, (3) evaluating the effectiveness of interventions for preventing moisture intrusion and controlling mold growth, (4) building local capacity, (5) mobilizing public and private sector resources, (6) integrating mold- and lead-safe work practices into housing maintenance, repair and

improvements, and (7) promoting job training, employment, and other economic opportunities for low-income and minority residents.

Through grant awards and other funding vehicles such as interagency agreements and contracts, OHHLHC has assembled resources on best practices, tools, and successful models, which existing and new HHI grantees and other community organizations can use to develop safer and healthier homes. These resources will continue to grow and be updated as additional information and guidance are developed using results of independent research and demonstration projects conducted by the OHHLHC grantees and other entities.

Current programmatic goals[3] of the HHI are:

- Development and application of low cost methods for the identification and control of housing based health hazards;
- Establishment of local capacity to operate sustainable programs that will prevent and control housing-based health hazards in target housing in the absence of federal funding; and
- Development and delivery of targeted public outreach, education, and training programs that provide information about effective methods for preventing housing-related childhood diseases and injuries and for promoting the use of these interventions.

Through FY 2006, in support of its programmatic goals, OHHLHC has awarded 84 grants, including 2 Mold and Moisture Control grants, 47 Healthy Homes Demonstration grants, 5 Healthy Homes Education grants, and 30 Healthy Homes Technical Studies grants. As shown in Figure 1.1, between the years 1999 and 2006, more funds were awarded to Demonstration grants than any other grant type.

In addition, to providing funding through grant opportunities, HUD has provided support for other Healthy Homes projects through various contracts and Interagency Agreements (IAAs). However, the amount of funding provided through these other mechanisms is substantially lower than that provided through grants (Figure 1.2).

[3] HHI Program Goals identified in the 2003 and 2004 NOFAs.

Figure 1.1 Amounts Awarded (in Millions) from FY 1999 through FY 2006 by Grant Type

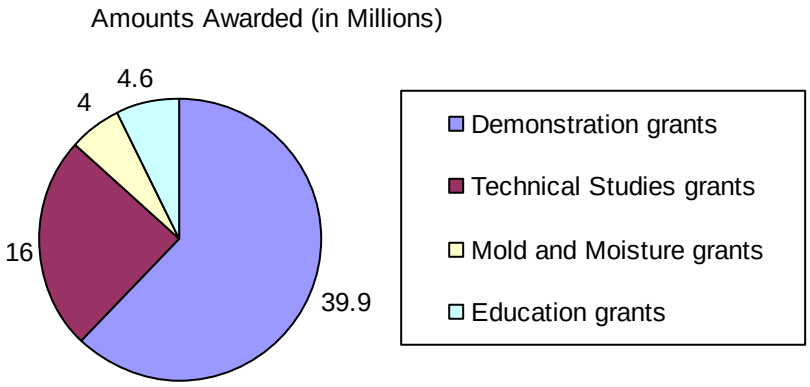
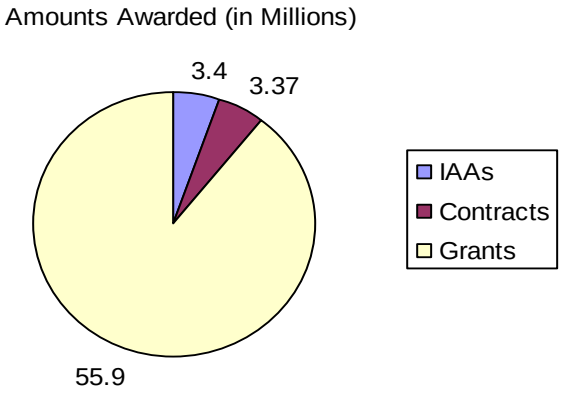


Figure 1.2 Amounts Awarded (in Millions) from FY 1999 through FY 2006 to IAAs, Contracts, and Grants



As programs supported by HHI continue to increase in number and scope, the amount, type, and complexity of information that HUD accumulates through the initiative continues to grow rapidly. Of critical importance to HUD is evaluating the effectiveness of these grants at addressing progress towards its program goals.

In 2005, HUD commissioned an evaluation to determine how well its various grantees have performed in achieving the goals of their individual projects and how this has contributed to achieving the overall goals of the HHI. This report summarizes and discusses the information gathered during this evaluation. Specific objectives of the evaluation were to:

1. Develop measures to capture the range of interventions, including training and education, that have been conducted through HHI Demonstration and Education grants, and the effectiveness of these interventions based on project evaluations performed by the grantees;
2. Capture the major research findings from Healthy Homes Demonstration and Technical Studies grant programs and document how these findings are being used, whenever possible;
3. Determine whether HHI grantees have achieved sustainability, i.e., developed local infrastructure to carry out healthy housing-related activities following completion of the grant project; and
4. Obtain and summarize the results of healthy homes-related activities that have been supported through Interagency Agreements with other federal partners and through contract-funded activities.

Chapter 2: METHODS

The study required seven major tasks: (1) designing a questionnaire to be administered to former and current HHI grantees; (2) abstracting information from grantee deliverables (e.g., quarterly progress reports and final reports); (3) creating a database to enter data collected; (4) administering the questionnaire to former and current HHI grantees; (5) conducting on-site visits to three of the high-performing grantees; (6) interviewing representatives from other federal agencies with which HUD has established Interagency Agreements (IAAs) to conduct HHI-related activities and reviewing relevant work products created under these IAAs; and (7) summarizing and reviewing contract-based projects and products. Figure 2.1 illustrates the flow of events for the first four tasks identified above.

Figure 2.1 Flow of Events for Data Collection from Grantees

2.1 Questionnaire Design

In order to achieve the overall goals of the study, a questionnaire was designed to capture the outputs and evaluate the outcomes for each of the HHI grants. The questionnaire was provided to the grantees prior to a telephone interview so that the grantee could preview the questions that would be asked during the interview and gather any records that would be needed to respond. Grantees were asked to complete the questionnaire ahead of time, if possible.

Due to the large amount of information to be collected and the considerable differences in type of grant activities (e.g., demonstration activities, research, education), the design of an effective and usable questionnaire was crucial to the success of the evaluation. Whenever possible, questions were asked in a manner that required only categorical responses (e.g., Yes/No, Less than Half/About Half/More than Half, etc.). These types of questions reduced the burden on respondents and also facilitated statistical analysis of the collected data. Questions requiring a narrative response (e.g., "Describe three lessons learned during your project") were used only when it was not possible to phrase questions in terms of categorical responses. In addition, whenever possible, questions were worded in a similar manner as found in the HHI quarterly progress reports completed by the grantees. The questionnaire was created as a Microsoft Word document that utilized form fields, in which the interviewers or grantee representatives entered their responses. The document was password-protected before being sent to the grantees, so that questions could not be changed.

Because the grantees' projects differ in their program objectives and expected outcomes, the questionnaire was designed to first gather general information on each grantee, and then use appropriate skip patterns to tailor the remainder of the questionnaire to a particular grantee's program. For example, a grantee with a Demonstration project may have collected specific treatment cost data, which would not have been collected by another grantee. Likewise, an education/outreach grantee may have performed activities on a national basis, whereas other grantees are generally locally anchored. Sections of the questionnaire that did not need to be answered were skipped over based on responses to introductory questions.

Key information collected via the questionnaire included:

- Environmental health hazards that were identified and treated;
- Number of housing assessments performed, by type of assessment method;
- Intervention strategies implemented;
- Residential interventions performed and the number of homes receiving interventions;
- Housing/resident characteristics of treated homes;
- Average cost of interventions;
- Number of individuals trained (e.g., assessment and intervention measures), categories of training, and post-training follow up;

- Public education and outreach activities conducted and estimated number of people reached through these activities;
- Key evaluation or research findings (e.g., changes in risk scores, changes in concentrations of environmental contaminants, changes in health outcomes);
- Key project deliverables (e.g., assessment tools, manuscripts, educational materials, training sessions, remediation tools, sampling/analytical methods);
- "Lessons learned" from project staff for key program areas such as participant recruitment, effective education/outreach methods, training and retaining contractors and program staff, developing partnerships, identifying healthy homes interventions and approaches that the grantee identified as not successful; and
- Identification of practices that the grantee reported as both effective and ineffective (e.g., interventions, sampling/analytical methods, interviews, education protocols).

After approving the questionnaire, HUD identified four grantees to participate in a pilot. The piloting enabled the study team to evaluate how easily the questionnaire could be understood and completed by HHI grantees. In addition to responding to the questionnaire, the grantees were asked to identify: (1) questions that were unclear or confusing; (2) questions that required a significant burden to address accurately; and (3) areas or activities that the grantees felt were important to their operation but were not addressed by the questionnaire. As a result of the pilot, one section of the questionnaire (Assessments) was reworked. Otherwise, only minor changes were made to the questionnaire.

2.2 Data Collection and Review

A variety of work products (e.g., work plans, quarterly progress reports, final reports, publication manuscripts) previously submitted by the HHI grantees were reviewed in order to obtain information relevant to the questionnaire. The purpose of this step was to abstract information that could be used to pre-populate the questionnaires to the extent possible, thus reducing the burden on grantee respondents. Data abstracted from each grantee's reports were entered into the questionnaire, which was then validated and imported into the study database (see Section 2.4).

A total of 84 HHI grants were awarded by HUD between FY 1999 and FY 2006. Because the FY 2005 grantees had only recently started their projects when this evaluation was begun (i.e., there would have been little information to contribute to the evaluation) and FY 2006 grants had not yet been awarded, these grants were excluded from the study. Of the remaining 63 grants, two others were excluded – one (Medical and Health Research Association of NYC, Inc. [FY 1999]) because activities in this grant were expanded in a FY 2001 grant to this organization, and one (Child Abuse Prevention Council [FY 2000]) because the grantee was under investigation by HUD. Table 1.1 lists the 61 grants that ultimately were included in the study, along with an indication of the type of grant and the year that it was awarded.

Table 1.1: HHI Grantees Participating in the Evaluation

Grantee	Grant Type	Award Year
Boston Public Housing Commission	Demonstration	FY 1999
City of Long Beach	Demonstration	FY 1999
City of Providence, Rhode Island	Demonstration	FY 1999
Cuyahoga County Department of Development	Mold and Moisture Control	FY 1999
Environmental Health Watch	Technical Studies	FY 1999
Illinois Department of Health	Mold and Moisture Control	FY 1999
Children's Health Environmental Coalition	Education	FY 2000
Erie County Health Department	Demonstration	FY 2000
Esperanza Community Housing Corporation	Education	FY 2000
Harvard School of Public Health	Technical Studies	FY 2000
Northeast Denver Housing Center	Demonstration	FY 2000
The Opportunity Council	Demonstration	FY 2000
University of Wisconsin - School of Pharmacy	Technical Studies	FY 2000
Air Quality Sciences, Inc.	Technical Studies	FY 2001
Alameda County	Demonstration	FY 2001
Alaska Housing Finance Corporation	Demonstration	FY 2001
City of Stamford	Demonstration	FY 2001
Columbia University, Mailman School of Public Health	Technical Studies	FY 2001
Duke University	Technical Studies	FY 2001
Medical and Health Research Association of NYC, Inc.	Demonstration	FY 2001
Public Health-Seattle & King County	Demonstration	FY 2001
Radiation Monitoring Devices, Inc.	Technical Studies	FY 2001
Research Triangle Institute	Technical Studies	FY 2001
University of Alabama at Birmingham	Education	FY 2001
University of Cincinnati	Technical Studies	FY 2001
University of Maryland at Baltimore	Demonstration	FY 2001
University of Tulsa	Education	FY 2001
Advanced Energy	Technical Studies	FY 2002
City of Milwaukee Health Department	Demonstration	FY 2002
City of Philadelphia	Demonstration	FY 2002
City of Phoenix	Demonstration	FY 2002
Coalition to End Childhood Lead Poisoning	Demonstration	FY 2002
Healthy Homes Network	Demonstration	FY 2002
Montana State University	Demonstration	FY 2002
Mount Sinai School of Medicine	Demonstration	FY 2002
St. Louis University School of Public Health	Technical Studies	FY 2002
University of Massachusetts at Lowell	Demonstration	FY 2002

Grantee	Grant Type	Award Year
University of Medicine & Dentistry of NJ	Technical Studies	FY 2002
Urban Homesteading Assistance Board	Demonstration	FY 2002
City of Minneapolis	Demonstration	FY 2003
Cuyahoga County Board of Health	Demonstration	FY 2003
Erie County Department of Health	Demonstration	FY 2003
Georgia Tech Applied Research Corporation	Technical Studies	FY 2003
Mahoning County	Demonstration	FY 2003
Neighborhood House, Inc.	Demonstration	FY 2003
NY Indoor Environmental Quality Center, Inc.	Demonstration	FY 2003
The Medical Foundation of New England	Demonstration	FY 2003
Tulane University School of Public Health	Technical Studies	FY 2003
University of Illinois	Technical Studies	FY 2003
University of Minnesota	Technical Studies	FY 2003
City of Long Beach	Demonstration	FY 2004
Columbus Health Department	Demonstration	FY 2004
County of Riverside, California	Demonstration	FY 2004
Eastern VA Medical School	Demonstration	FY 2004
Georgia Tech Applied Research Corporation	Technical Studies	FY 2004
Healthy Homes Resources	Demonstration	FY 2004
Philadelphia Housing Authority	Demonstration	FY 2004
St. Louis County	Demonstration	FY 2004
University of Colorado Health Sciences Center	Technical Studies	FY 2004
University of Illinois at Urbana-Champagne	Technical Studies	FY 2004
University of Texas at San Antonio	Technical Studies	FY 2004

The study team received available work products from HUD for each of the above 61 grants. Note that this list does not contain 61 unique grantees; four grantees (in addition to the previously discussed Medical and Health Research Association of NYC, Inc.) received two grants over the 5-year time period, and thus are replicated in this list. For grantees with multiple grants, information from each grant was included in the study (i.e., data abstraction and questionnaire administration was conducted for each grant).

2.3 Questionnaire Administration

As required by the Paperwork Reduction Act, approval of the questionnaire was obtained from the Office of Management and Budget (OMB) prior to its administration. Approval was received from OMB on June 6, 2006.

Planning for the questionnaire administration process included sending an introductory e-mail communication to each grantee's Project Manager or other designated representative. This communication informed the grantees that the survey was being conducted on behalf of OHHLHC to capture and evaluate activities conducted through the HHI, in particular the Healthy Homes grant programs. Grantees were asked to

identify and notify any major sub-grantees that should be included in the interview. Follow-up telephone calls then were made to each grantee to schedule a date and time for the interview.

One week prior to the interviews, a copy of the pre-populated questionnaire was exported from the database (see Section 2.4) and sent to the grantee. Grantees were asked to verify and update any pre-populated data and to complete the remainder of the questionnaire. Although grantees were asked to return the completed questionnaire prior to the telephone interview, not all of them did. In these cases, the interview involved obtaining responses to every question instead of verifying and discussing responses provided in the submitted questionnaire.

Interviews for the four grants included in the evaluation pilot were conducted in February and March 2006. Both interviewers who were trained for the evaluation participated during the pilot interviews. In addition, another individual served as note taker during the interviews. The specifics of how the interviews were conducted are described below in the paragraph discussing the full study.

The remaining interviews were conducted between May and September 2006. These interviews were conducted by one of the two study interviewers and a note taker. Grantee representatives included the grantee program manager (or designee) and any additional personnel included by the program manager. Typically, there were two grantee representatives participating in the interviews for the Demonstration and Education grantees, while only one representative from the Technical Studies grants typically participated. First, responses for each applicable question on the questionnaire were obtained, and then other relevant issues (as determined by the interviewer or grant representative) were discussed. Interviews were completed in approximately two hours. When the interview was completed, the grantee had no other involvement with the evaluation except in cases where the interviewer needed to clarify an issue. In addition, the interviewer and note taker compared the information they collected to identify any discrepancies in the data. These were discussed and if necessary, the grantee was asked to clarify the information.

Two concerns regarding the administration of the final questionnaire are described below.

- Because the pilot version of the questionnaire was not identical to the final version, a final questionnaire had to be completed for the four grantees that participated in the pilot. For the most part, information was based on notes gathered during the pilot interviews; however, two grantees (Erie County Health Department and Cuyahoga County Department of Health) were asked to assist in updating selected questions. St. Louis University and Esperanza Community Housing Corporation were not contacted again because their grants had already been completed at the time of the pilot interviews and it was decided not to place additional burden on these grantees to answer additional questions. Both the pilot and final version data were retained in the database for these four grantees.

- One grantee (The Medical Foundation of New England) had three substantially different program components (e.g., interventions conducted in Vermont, interventions conducted in Boston, and training and education conducted regionally); therefore three questionnaires were administered. As a result, a total of 63 questionnaires are included in the final study database (i.e., 61 grants plus an extra two questionnaires for this grant).

2.4 Database Development and Usage

A Microsoft Access database was developed to store and process the information obtained through the questionnaire and to facilitate data analysis for preparation of the study report. SAS programs were also used for statistical analysis. The database contained three primary modules:

1. Data Validation - validate the data provided in the questionnaires (e.g., character data not provided for numeric responses, text responses within length limits, skip patterns followed, etc.);
2. Data Import - import data from the completed questionnaires; and
3. Data Export - export stored data into questionnaires for distribution to the grantees.

Data were entered into the database by one individual. Another individual then compared the entered data to the data collected during the interview process to identify discrepancies. Before using the data, each completed questionnaire (from both the data extraction and interview steps) was processed through the validation routine (note that the Word file containing the questionnaire also contained built-in checks to prevent some unacceptable entries, e.g., invalid dates, out-of-range responses, etc., from being entered). Results of the validation routine were written to an Excel file for review by study staff. Any problems uncovered during this process were corrected in the questionnaire, and the re-validation process was repeated prior to importing information into the database. Initial preparation of each questionnaire utilized an export routine to pre-populate various fields using information found in the grantee's quarterly reports prepared for HUD. These questionnaires were then sent to the grantees prior to their interview.

2.5 Site Visits

Site visits were made to the Cuyahoga County Board of Health, Erie County Department of Health, and The Medical Foundation of New England grantees. OHHLHC selected these three grantees for on-site visits on the basis of their depth of experience in implementing healthy homes programs, i.e., the grantees were awarded more than one healthy homes grant. More importantly, the performance of these grantees, relative to the timeliness of achieving proposed benchmarks and project goals, was excellent. In addition, to capture cross-cutting issues, OHHLHC recommended carrying out on-site visits to grantees with diverse programmatic objectives, i.e., research or demonstration. During the site visits, the study team conducted detailed interviews with grantee staff and partners. Two to three housing units that had received interventions using Healthy Homes

principles were also visited to identify successful and cost-effective interventions. The site visits were conducted in September and October 2006.

2.6 Interagency Agreements and Contract-based Projects

Since the inception of the HHI, HUD has established IAAs with the Centers for Disease Control and Prevention (CDC), the National Institute of Standards and Technology (NIST), and U.S. Department of Agriculture's (USDA) Cooperative State Research, Education, and Extension Service (CSREES). Through these IAAs, HUD was able to develop a Healthy Homes Training program, carry out research projects, and leverage already established infrastructure for national education/outreach activites. HUD has also established contracts with Battelle Memorial Institute (Battelle), Westat, Inc (Westat), Newport Partners, LLC and ICF International (ICF). These contacts provided support for a wide variety of healthy homes activities. Copies of the final reports and other work products produced under these IAAs and contracts were obtained and summarized. Brief telephone conversations were held with representatives for each of the IAAs obtain information on their HHI-sponsored projects. The questionnaire used for the evaluation of the HHI grants was not utilized, because activities conducted under the IAAs and contracts were significantly different from typical grantee work. When available, work products created under these IAAs and contracts were obtained and reviewed.

Chapter 3: INFORMATION GATHERED FROM GRANTEES

As reported in Chapter 2, the study team conducted an interview that sought information about five areas of interest: recruitment, enrollment, skills training, community education/outreach and interventions. Additional details about the data collected for the first four areas of interest can be found in Appendix A. Because one of the specific objectives of this study was to capture the range of interventions being conducted by HHI Demonstration, Education, and Technical Studies grantees, this chapter presents more detailed intervention information, as well as data about training and educational activities.

3.1 OVERVIEW

Sixty-three (63) grantees were interviewed during the evaluation of the HUD Healthy Homes Initiative. As shown in Figure 3.1, the majority of these grantees received a Demonstration or Technical Studies grant. Because only a small number of grantees received either a Mold and Moisture Control grant or an Education/Outreach grant, these grantees were included in the Demonstration grant category for further analyses.

Figure 3.1 Percentage of Grantees by Grant Type (n=63)

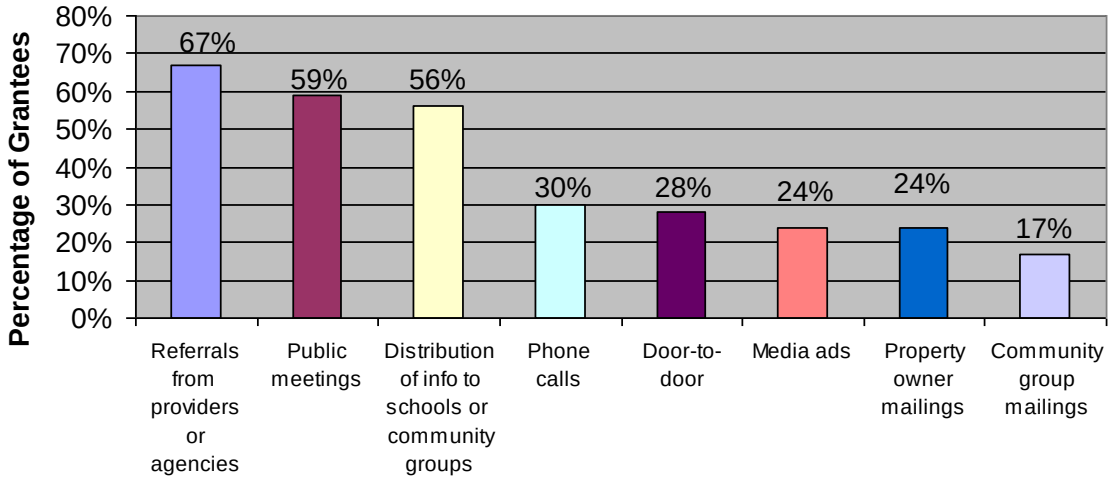
3.2 RECRUITMENT/ENROLLMENT

Most grantees (86%) reported that their projects involved recruitment or enrollment of clients and/or housing units. Overall, more than 9,700 housing units/clients were enrolled by grantees. The primary targets included families with children who had or were at risk for a specific health condition, such as asthma, and housing units within specific census tracts or geographic boundaries. (Refer to Appendix A, Table A.1 for more details.)

Grantees have used a variety of recruitment methods to enroll participants. As shown in Figure 3.2, the most common methods included obtaining referrals from health care

providers or other agencies, attending public meetings, and distributing information to schools and/or community groups.

Figure 3.2 Percentage of Grantees that Used Various Recruitment Methods (n=54)



Grantees were asked to identify the level of success for each recruitment method in recruiting clients for the program on a one-to-five scale (one being not successful, five being very successful). Door-to-door outreach was frequently reported as most successful, followed by referrals from health care providers or other agencies and distribution of information to schools and/or community groups. Phone calls were identified as the least effective method of recruitment. (See Appendix A, Table A.3 for more details.)

3.3 ASSESSMENT INFORMATION

Most grantees (86%) conducted assessments as part of their projects. These assessments, most commonly done at baseline, included visual assessments of the housing unit, client assessments/interviews, biological sampling, and/or environmental sampling. Figure 3.3 indicates the percentage of grantees conducting each type of assessment. Over 8,000 baseline assessments were conducted in housing units.

A large number of grantees (81%) reported that they developed an assessment tool specifically for their project. (Note: This includes development of an assessment tool from scratch as well as modifying existing tools to meet their needs.) In addition, 46% of grantees conducting assessments reported that collection of field data was observed at a specified frequency and 22% reported that inter-rater reliability was determined for assessment tools.

Figure 3.3 Percentage of Grantees that Conducted Various Types of Assessments (n=54)

3.3.1 Summary of Visual Assessments

As shown above, 81% of grantees conducted visual assessments of the housing unit. The majority (94%) used a standardized assessment tool to conduct the assessment and conducted at least two or more assessments. The five most frequently reported hazards assessed include:

- The presence of visible mold and moisture problems;
- Pest infestation;
- Lead hazards;
- Fire hazards; and
- Carbon monoxide hazards.

Table A.6 in Appendix A contains additional detail.

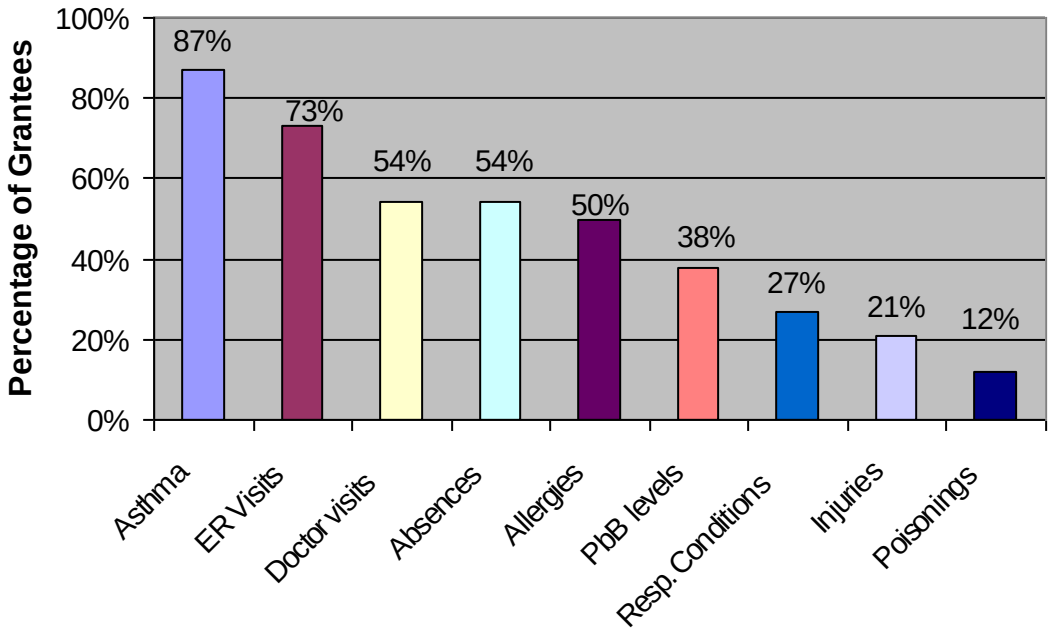
3.3.2 Summary of Client Assessments/Interview Data

Most grantees (83%) routinely conducted multiple assessments or interviews of clients. (Refer to Appendix A, Section A.2.2 for details.) These assessments/interviews often focused on behavioral information (e.g., smoking or cleaning habits), health data (e.g., asthma symptoms), household/resident/family characteristics, or client's knowledge of the focus area.

The most commonly collected health data included information reported by the family on asthma, emergency room visits, doctor visits, and health-related absences from school or work (Figure 3.4). In addition, at least ten grantees stated that they used the SF-8 Quality of Life survey to gather information on physical functioning, role limitations due to

physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health.

Figure 3.4 Percentage of Grantees that Collected Various Types of Health Data (n=52)



3.3.3 Summary of Biological Sampling Information

One-third of grantees reported using information from human biological samples in their project. Samples, listed in order of frequency, often included blood lead levels, pulmonary function testing, allergen skin testing, and allergen-specific antibody testing of the blood. (See Appendix A, Section A.2.3.1 for additional details.) Twenty-nine percent of those using biological samples in their project reported integrating quality control samples into their sampling process.

3.3.4 Summary of Environmental Sampling Information

The majority (79%) of grantees collected environmental samples as part of their projects. Sixty-six percent of these grantees reported integrating quality control samples into their sampling process. The five most frequently reported samples collected include dust mite allergens, relative humidity, temperature, molds, lead, and cockroach allergens. (Appendix A, Section A.2.3.2 contains additional information.)

Figure 3.5 identifies the percentage of grantees that collected specific types of allergens using primarily dust vacuum samples. Most grantees focused on dust mite allergens and

analyzed samples for Der f 1 and Der p 1. However, grantees that collected samples for cockroach allergens reported focusing only on Bla g 1 and not Bla g 2.

Figure 3.5 Percentage of Grantees that Collected Specific Types of Allergens (n=50)

3.4 INTERVENTION INFORMATION

3.4.1 Summary of Housing Units Treated

Seventy-eight percent of grantee projects (49 of 63) performed housing unit interventions, i.e., remediation and education to improve housing units. Sixty-five percent of these grantees reported that as a quality assurance activity they conducted monitoring of interventions/work in progress. Rental properties were the most common type of housing units treated. An average of 79 rental units, 33 owner-occupied units, and 8 vacant housing units were treated per grantee.

On average, 58% of treated housing units were built prior to 1940; 14% were built between 1940 and 1959; 16% were built after 1959; and 11% were of an unknown age. Technical Studies grantees were less likely to track the age of homes as compared to Demonstration grantees (62% age unknown versus 2%). Grantees estimated that an average of 55% of treated housing units were single-family dwellings, and an average of 46% were part of multifamily buildings (typically an average of 10 units per building, with an average of 2 units treated per building). At the time of the interviews, over 6,268 housing units had completed interventions and another 622 units had interventions started.

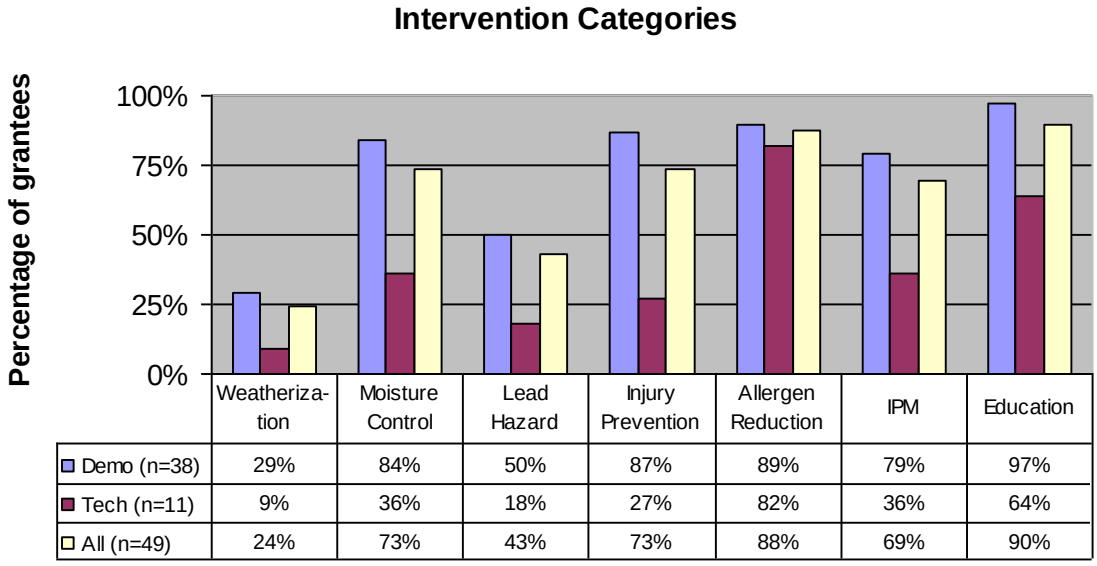
3.4.2 Summary of Housing Interventions

Grantees were asked to identify specific activities that were routinely conducted as part of their intervention process. For the purpose of summarizing results, these activities

were classified into different categories, including weatherization, moisture control, lead hazard control, injury prevention, allergen reduction, IPM activities, and education.

As shown in Figure 3.6, allergen reduction was the second most frequently used intervention, performed by 88% of grantees. While education was the primary type of intervention performed under Demonstration grants, reduction of asthma triggers was the most common intervention for Technical Studies grants.

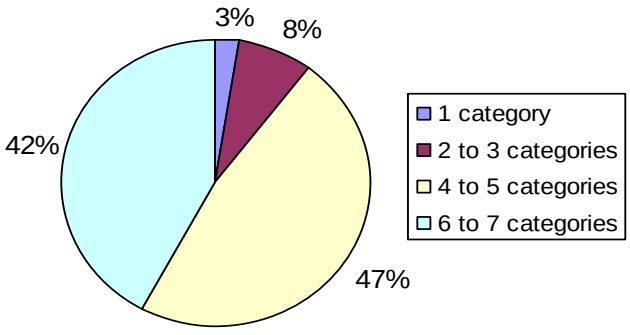
Figure 3.6 Percentage of Grantees Focusing on Specific Intervention Categories



	Weatherization	Moisture Control	Lead Hazard	Injury Prevention	Allergen Reduction	IPM	Education
Demo (n=38)	29%	84%	50%	87%	89%	79%	97%
Tech (n=11)	9%	36%	18%	27%	82%	36%	64%
All (n=49)	24%	73%	43%	73%	88%	69%	90%

Most Demonstration grantees used a holistic approach in dealing with housing issues. As illustrated in Figure 3.7, 76% of Demonstration grantees reported that they conducted interventions in at least four of the seven major categories identified above.

Figure 3.7 Percentage of Demonstration Grantees that Conducted Interventions from Multiple Categories (n=49)



Of the 38 intervention activities specifically listed on the questionnaire (See Appendix A, Table A.16 for additional detail), the 10 most frequent interventions performed by grantees were:

- Education (90%);
- Provision of mattress or pillow covers (65%);
- Installation of smoke detectors (59%);
- Installation of carbon monoxide detectors (57%);
- Cleaning (53%);
- Repair of plumbing/appliance leaks (51%);
- Elimination of pest food sources (51%);
- Use of low-toxicity baits (51%);
- Confirmation that dryer is vented to outside (47%); and
- Sealing of holes and cracks (47%).

It is important to note that many of the specific activities identified can be used to address multiple hazards within a home. For example, repairing plumbing leaks can help control moisture as well as help to eliminate pests and venting a dryer to the outside of a home can help improve indoor air quality as well as reduce excess moisture.

Grantees reported that, at the time of the interview, interventions had been completed in an average of 128 units per grantee (ranging from 5 to 600 units per grantee), while an average of 13 units per grantee had interventions in progress (ranging from 0 to 289 units per grantee) (Table 3.1). On average, 120 housing units per grantee received an education intervention; 111 housing units per grantee received an injury prevention intervention; 64 received an IPM intervention; 57 received a lead hazard control intervention; 53 received an allergen reduction; 42 received moisture controls; and 37 received a weatherization intervention.

Table 3.1: Descriptive Statistics for Number of Housing Units that Received Interventions[a,b]

Intervention Category	Number of Housing Units		
	Minimum	Average	Maximum
Housing units with completed interventions (n=49)	5	128	600
Housing units with interventions in progress (n=48)	0	13	289
Weatherization (n=14)	0	37	173
Moisture control (n=19)	0	42	223
Lead hazard control (n=15)	0	57	213
Injury prevention (n=20)	3	111	447
Allergen reduction (n=23)	5	53	223
IPM (n=21)	3	64	278

Intervention Category	Number of Housing Units		
	Minimum	Average	Maximum
Education (n=23)	0	120	600

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. 7 of 49 grantees reported that their number of houses completed were estimates, and 5 of 49 grantees reported that their number of houses in progress numbers were estimates.
[b] n=number of grantees answering questions related to the number of housing units with interventions complete or in progress.

Of these seven intervention categories, the costliest type of intervention was lead hazard control, which cost an average of $5,312 per housing unit including both labor and materials. (Note: One grantee reported conducting lead hazard control activities in one housing unit costing $22,500. Because this cost was more than double the next highest value, it was considered an outlier and was excluded when determining average costs.) The least costly was education, with an average total cost of $211 per unit (Table 3.2). Grantees conducted a wide range of activities under each intervention category, which contributed to a wide range in estimated costs. For example, one grantee may have installed weather stripping and sealed ducts as part of their weatherization activities, while another may have replaced windows.

Several grantees were unable to provide costs broken down by intervention category; however, these grantees were able to provide average total costs of physical interventions per unit which are captured in Table 3.2. Although the majority of grantees (75%) reported that the cost figures given during the interview were estimates, most grantees (77%) reported that they tracked actual intervention costs. Additional cost information reported by grantees is provided in Appendix B.

Table 3.2: Descriptive Statistics for the Average Cost[a] of Intervention Materials per Housing Unit[b,c]

Intervention Category	Cost per Housing Unit	
	Range	Average
Weatherization (n=8)	$47-$7250	$2266
Moisture control (n=13)	$4-$4200	$1272
Lead hazard control (n=8)	$600-$13000	$5312
Injury prevention (n=14)	$7-$850	$233
Allergen reduction (n=17)	$5-$6000	$1292
IPM (n=14)	$39-$800	$290
Education (n=16)	$20-$600	$211
Average total cost per unit for all interventions (n=10)	$450-$7028	$3705

[a]Average cost includes both cost of materials and labor.
[b]Numbers presented in the table include both estimated and actual quantities provided by grantees. 33 of 44 grantees reported that their numbers were estimates.
[c]n=number of grantees who answered questions concerning the costs of various interventions.

Interventions typically began two or more months after the baseline assessment was performed (60%). Grantees reported that, once interventions began, they were completed quickly, typically on the same day or within one week (52%). Only 11% of the grantees reported that interventions required longer than two months to complete. Half of the grantees reported that they developed work specifications manually, 23% reported that work specifications were computer-generated, and 27% said that work specifications were not applicable to their project. Sixty-one percent of grantees reported that an environmental review was required before they could begin interventions.

3.4.3 Referrals as Part of Interventions

Over 67% of grantees conducting interventions routinely made referrals to other programs as part of their intervention process. Lead programs (70%) were the most common programs to which grantees made referrals, followed by weatherization programs (48%), and IPM programs (21%).[4] Sixty-four percent of grantees making referrals routinely followed-up on such referrals to ensure that client needs were met.

3.4.4 Education Interventions

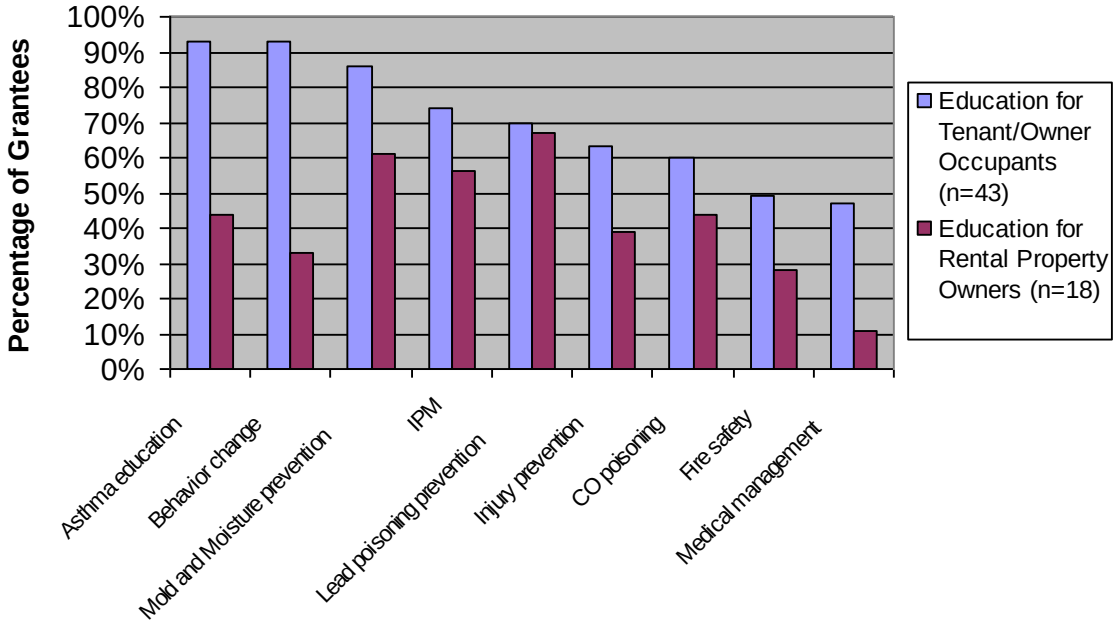
Ninety percent of grantees included education as part of their interventions (excluding community-based education efforts). The tenant/owner-occupant was the most common type of client receiving education (59%), although 39% of grantees reported that they provided education to both tenant/owner-occupants and rental property owners.

Of the nine education focus areas listed on the questionnaire, the three most frequent areas upon which grantees routinely focused for tenant/owner-occupants included behavior change (such as change in smoking or cleaning habits), asthma education, and mold and moisture prevention (Figure 3.8).

The three most frequent focus areas for rental property owners tended to differ from those for the tenant/owner-occupants, with many of the programs focusing on lead poisoning prevention, mold and moisture prevention, and IPM. (Appendix A, Table A.17 shows the breakdown by grant type.)

[4]On the questionnaire, each grantee was permitted to list one other type of program to which referrals were routinely made, other than the three specifically listed.

Figure 3.8 Percentage of Grantees that Conducted Education for Tenant/Owner Occupants and Rental Property Owners by Focus Area



Most grantees (75%) that provided education reported that their educational activities required an average of one to two hours to complete. All educational interventions included distribution of brochures, fact sheets, or other reading materials to clients (Table 3.3). One-on-one education sessions and hands-on demonstrations were also frequent educational activities. Most often, either an educational specialist or trained members of the community provided the educational intervention to clients. Mattress covers were the items most frequently provided to clients as part of the educational intervention (75%), while 61% of grantees provided mops/buckets, 41% provided vacuums, and 34% provided air filters.

Two-thirds of grantees reported that they developed educational materials (e.g., pamphlets, fact sheets) as part of their projects. Of the 30 grantees whose projects were completed at the time of the interview, 24 (80%) reported that their materials were still being used, and 19 (63%) said that these materials were still being used by programs other than the grantee's program.

Table 3.3: Summary of Education Activities, Education Providers, and Supplies Provided as Part of Educational Intervention (excluding Community-based Education Efforts)[a,b]

	Demonstration (n=37)	Technical Studies (n=7)	All (n=44)
Activities Included:			
• Brochures, fact sheets, or other reading materials given to client	37(100%)	7(100%)	44(100%)
• One-on-one education with client, including case mgmt	30 (81%)	4 (57%)	34 (77%)
• Hands-on demonstrations conducted	29 (78%)	4 (57%)	33 (75%)
• Clients asked to repeat hands-on demonstration	13 (35%)	2 (29%)	15 (34%)
• Clients completed pre/post survey	17 (46%)	4 (57%)	21 (48%)
• Other Total [c]	8 (22%)	2 (29%)	10 (23%)
• Other [d]: Group education sessions	4 (11%)	1 (14%)	5 (11%)
Education Provider:			
• Housing professional	11 (30%)	0 (0%)	11 (25%)
• Education specialist	18 (49%)	1 (14%)	19 (43%)
• Trained member of community	16 (43%)	4 (57%)	20 (45%)
• Nurse or other health care professional	11 (30%)	2 (29%)	13 (30%)
• Other Total [c]	7 (19%)	4 (57%)	11 (25%)
• Other [d]: Research staff or students	0 (0%)	3 (43%)	3 (7%)
Cleaning Supplies and Other Materials Provided as Part of Education:			
• None	1 (3%)	2 (29%)	3 (7%)
• Mattress covers	30 (81%)	3 (43%)	33 (75%)
• Mops/buckets	24 (65%)	3 (43%)	27 (61%)
• Loan of vacuum cleaners	4 (22%)	1 (14%)	5 (11%)
• Air filters	14 (38%)	1 (14%)	15 (34%)
• Vouchers	0 (0%)	1 (14%)	1 (2%)
• Other Total [c]	31 (84%)	5 (71%)	36 (82%)
• Other [d]: Provided vacuum cleaners[e]	16 (43%)	2 (29%)	18 (41%)
• Other [d]: Cleaning kits/supplies (excluding items previously mentioned)	17 (46%)	3 (43%)	20 (45%)

	Demonstration (n=37)	Technical Studies (n=7)	All (n=44)
• Other [d]: Safety devices (e.g., fire extinguishers, cabinet locks, outlet covers)	9 (24%)	2 (29%)	11 (25%)

[a]Grantees were permitted to check more than one type of activity, education provider, and cleaning supplies; therefore, summing numbers across all types of activities is not appropriate.
[b] n=number of grantees who answered questions concerning the type of educational activities, education providers, and supplies provided as part of education.
[c]On the questionnaire, each grantee was permitted to list one response other than those specifically listed.
[d] Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."
[e]Grantees reported provision of vacuum cleaners both as an incentive and part of the education.

3.4.5 Evaluation of Interventions

Of the ten difficulties that could be frequently encountered when completing interventions (Table 3.4), the three most frequently reported difficulties for grantees included:

- Getting into housing units to complete interventions (49%);
- Cost constraints (39%); and
- Meeting timeframes (39%).

Table 3.4: Summary of Difficulties Encountered in Completing Interventions[a,b]

Difficulties	Demonstration (n=38)	Technical Studies (n=11)	All (n=49)
Getting into housing units	19 (50%)	5 (45%)	24 (49%)
Cost constraints	15 (39%)	4 (36%)	19 (39%)
Meeting timeframes	15 (39%)	4 (36%)	19 (39%)
Getting landlords/homeowners to do their work	16 (42%)	1 (9%)	17 (35%)
Obtaining consent of the property owner	13 (34%)	1 (9%)	14 (29%)
Obtaining timely environmental review	13 (34%)	0 (0%)	13 (27%)
Obtaining reliable contractors	11 (29%)	0 (0%)	11 (22%)
Obtaining qualified contractors	9 (24%)	2 (18%)	11 (22%)
Contractual issues	4 (11%)	2 (18%)	6 (12%)
Relocating residents	5 (13%)	0 (0%)	5 (10%)
Other Total[c]	9 (24%)	2 (18%)	11 (22%)

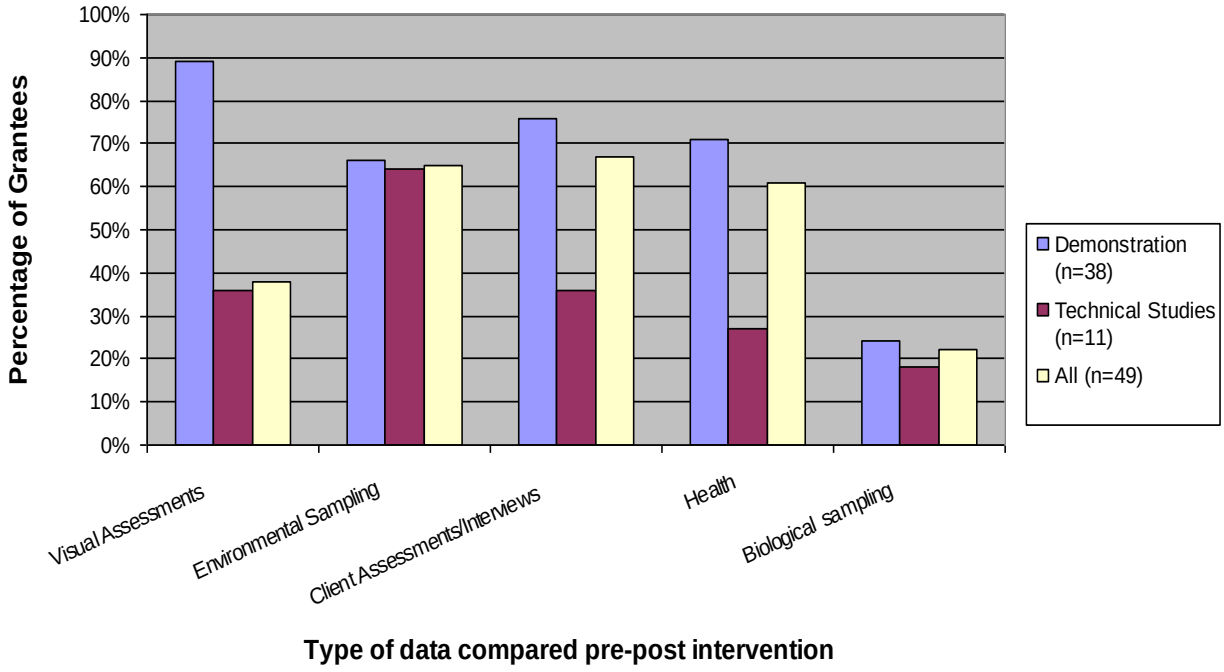
Difficulties	Demonstration (n=38)	Technical Studies (n=11)	All (n=49)
Other[d]: Client mobility	4 (11%)	1 (9%)	5 (10%)

[a]Grantees were permitted to check more than one type of difficulty encountered when completing interventions; therefore, summing numbers across all types of difficulties is not appropriate.
[b]n=number of grantees answering questions concerning the difficulties they encountered in completing interventions.
[c]On the questionnaire, each grantee was permitted to up to three responses other than the 10 specifically listed.
[d] Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

The majority of grantees (78%) used comparisons of pre- and post-intervention visual assessments, client interviews, and environmental sample results to determine the effectiveness of their interventions (Figure 3.9). In addition, only four grantees reported that they used clearance criteria (other than EPA-HUD clearance standards for lead dust on floors, window sills, and window troughs) as part of their evaluation of interventions. These criteria included successful execution of the specifications/scope of work, 100 mg/m^2 settled dust comparison, [5] use of the MITEST indoor allergen dust mite testing kit at post-intervention (any post-intervention positive reading for dust mites triggered a re-cleaning of the unit), a radon criterion of 4 picocuries per liter, and no visible mold growth in the problem area.

[5]According to ACGIH (1999), 100 mg/m^2 is an "arbitrary industry standard" developed by the National Air Duct Cleaners Association for an "acceptable amount of total debris on cleaned ducts." Several organizations propose that its use be extended from debris inside ductwork to residual settled dust remaining on non-porous interior surfaces after mold remediation (Morey et al. 2006).

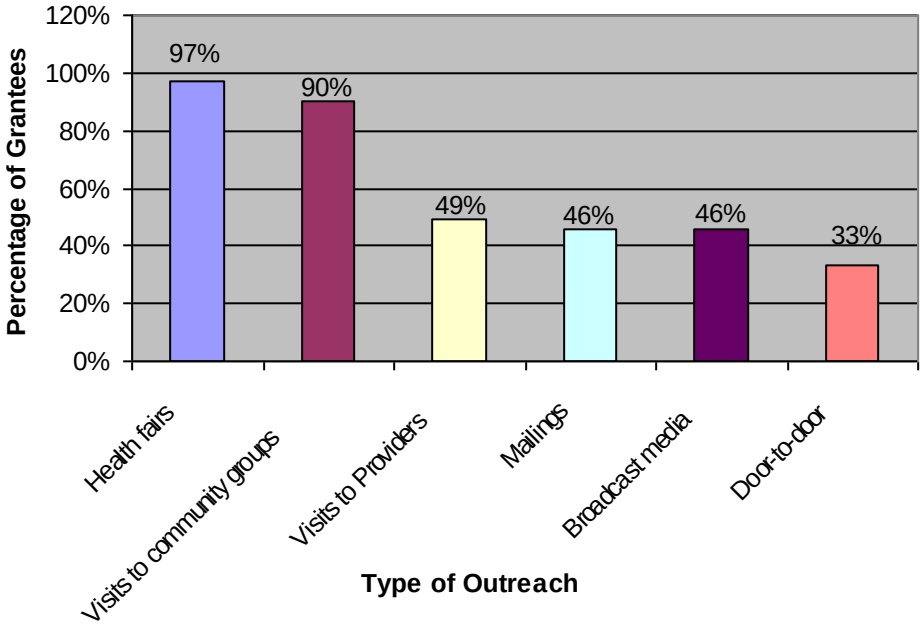
Figure 3.9 Percentage of Grantees Comparing Specific Types of Data Pre- and Post-Intervention



3.5 COMMUNITY EDUCATION AND OUTREACH

Approximately two-thirds of grantees (62%) routinely included community education and outreach as part of their projects. A higher percentage of Demonstration grantees conduct community outreach and education activities as compared to Technical Studies grantees (77% versus 30%). The majority of grantees attend health fairs (97%) and visit community or parent groups as part of the community education and outreach efforts (Figure 3.10).

Figure 3.10 Percentage of Grantees that Conducted Various Types of Outreach (n=39)



More than half of the grantees (56%) reported that they used three to four of the methods for community outreach and education shown in Figure 3.10; 21% reported using one or two methods, and 23% reported using five or six methods.

In addition to identifying specific community education and outreach efforts, grantees were asked to rate the effectiveness of these activities in helping their program obtain its goals on a 1 to 5 scale. Of the six types of community education and outreach efforts listed on the questionnaire, visits to community and/or parent groups and broadcast media outreach were identified by the largest percentage of grantees as being most effective. Mailings to organizations and/or community groups were considered the most ineffective type of outreach. (Additional details provided in Appendix A, Table A17.)

Grantees reportedly targeted 295 to 35,000 individuals with their outreach efforts (average=5,612), but the number of individuals they reported to actually reach was larger, ranging from 20 to 400,000 (average=36,783) (Table 3.5). All total, an estimated 1.2 million individuals were reported to have been reached by grantees. Only 13 grantees reported that they had a tracking system to identify if a housing intervention was a direct result of community outreach efforts; these grantees reported that an average of 148 housing units (range 0 to 600) received an intervention as a result of outreach efforts. Two-thirds of grantees (62%) used education specialists to provide community education and outreach, 49% used trained community members, and 38% used housing professionals.

Table 3.5: Statistics for Community Education and Outreach Efforts[a,b]

	Number of Individuals		
	Minimum	**Average**	**Maximum**
Number of Individuals Targeted for Outreach (n=25)	0	5,612	35,302
Number of Individuals Reached through Outreach (n=35)	20	36,783	400,000

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. Twenty-three grantees reported that their numbers for individuals reached were estimates.
[b]n= number of grantees who answered questions concerning the number of individuals targeted and reached through outreach efforts.

Parents/guardians were the most common target groups for community education and outreach, with a large percentage of grantees placing a high level of emphasis on this target group. This target group was followed closely by tenants/owner-occupants and community members (Table 3.6). Pregnant women were a less frequently targeted group (targeted by 39% of grantees). Asthma education was, by far, the main focus for community outreach activities, followed by lead poisoning prevention and prevention of moisture intrusion/mold (Table 3.7). Few grantees reported providing cleaning supplies or other materials as part of outreach efforts. Most grantees reportedly evaluated their community education/outreach efforts by counting participants and comparing this number to their original targeted number.

Table 3.6: Summary of the Types of Target Groups for Community Education and Outreach Efforts[a,b]

Target Groups	Demon-stration (n=33)	Tech-nical Studies (n=6)	All (n=39)	#(%) of grantees who used the method reporting a high/very high level of emphasis	#(%) of grantees who used the method reporting a low/very low level of emphasis	#(%) of grantees who used the method reporting neither a high nor low level of emphasis
Tenants/owner occupants	26 (79%)	3 (50%)	29 (74%)	20 (71%)	3 (11%)	5 (18%)
Rental property owners	13 (39%)	1 (17%)	14 (36%)	10 (26%)	3 (8%)	2 (5%)
Community residents	27 (82%)	3 (50%)	30 (77%)	22 (73%)	4 (13%)	4 (13%)
Health care providers	19 (58%)	1 (17%)	20 (51%)	12 (60%)	3 (15%)	5 (25%)
Pregnant women	13 (39%)	0 (0%)	13 (33%)	11 (85%)	1 (8%)	1 (8%)
Childcare providers	18 (55%)	0 (0%)	18 (46%)	10 (56%)	1 (6%)	7 (39%)
Parents/guardians	27 (82%)	6(100%)	33 (85%)	25 (76%)	3 (9%)	5 (15%)
Community-based organizations	22 (67%)	3 (50%)	25 (64%)	14 (56%)	5 (20%)	6 (24%)
Contractors	11 (33%)	0 (0%)	11 (28%)	3 (27%)	2 (18%)	6 (55%)
Outreach workers	12 (36%)	1 (17%)	13 (33%)	8 (62%)	0 (0%)	5 (38%)
Local churches and schools	21 (64%)	1 (17%)	22 (56%)	9 (41%)	6 (27%)	7 (32%)
Children	17 (52%)	1 (17%)	18 (46%)	11 (61%)	3 (17%)	4 (22%)
Other (e.g., housing authorities/inspectors)[c]	8 (24%)	0 (0%)	8 (21%)			

[a]Grantees were permitted to check more than one type of target group; therefore, summing numbers across all types of efforts is not appropriate.
[b]n=number of grantees answering questions concerning the types of target groups for community education and outreach efforts.
[c]On the questionnaire, each grantee was permitted to list up to three responses other than the ten specifically listed; there were no frequently listed responses.

Table 3.7: Summary of the Main Focus Areas for and Supplies Provided During Community Educational Activities[a,b]

	Demonstration (n=33)	Tech-nical Studies (n=6)	All (n=39)
Focus Areas:			
• Asthma education	30 (91%)	5 (83%)	35 (90%)
• Lead poisoning prevention	21 (64%)	4 (67%)	25 (64%)
• Mold and moisture prevention	22 (67%)	2 (33%)	24 (62%)
• Integrated pest management	19 (58%)	2 (33%)	21 (54%)
• Behavior change (e.g., cleaning education)	21 (64%)	0 (0%)	21 (54%)
• Injury prevention	17 (52%)	2 (33%)	19 (49%)
• Carbon monoxide poisoning prevention	16 (48%)	1 (17%)	17 (44%)
• Fire safety	11 (33%)	3 (50%)	14 (36%)
• Medical management	7 (21%)	0 (0%)	7 (18%)
• Other (e.g., indoor air quality, tenants rights)[c]	5 (15%)	0 (0%)	5 (13%)
Cleaning Supplies and Other Materials Provided as Part of Education:			
• None	15 (45%)	2 (33%)	17 (44%)
• Mops/buckets	6 (18%)	1 (17%)	7 (18%)
• Loan of vacuum cleaners	3 (9%)	1 (17%)	4 (10%)
• Mattress covers	2 (6%)	0 (0%)	2 (5%)
• Vouchers	1 (3%)	1 (17%)	2 (5%)
• Air filters	0 (0%)	1 (17%)	1 (3%)
• Other Total[c]	11 (33 %)	3 (50%)	14 (36%)
• Other[d]: Cleaning supplies	8 (24%)	0 (0%)	8 (21%)
Methods Used to Evaluate Community Outreach Efforts:			
• Counts of those who were reached	30 (91%)	3 (50%)	33 (85%)
• Participants complete evaluation	13 (39%)	2 (33%)	15 (38%)
• Pre- and post-tests/surveys	7 (21%)	1 (17%)	8 (21%)
• Changes in behavior	5 (15%)	0 (0%)	5 (13%)
• Demonstration and return demonstration of various techniques (e.g., cleaning)	2 (6%)	0 (0%)	2 (5%)

	Demonstration (n=33)	Tech-nical Studies (n=6)	All (n=39)
• Other Total(e.g., number of referrals received, website hits)[c]	6 (18%)	0 (0%)	6 (15%)

[a]Grantees were permitted to check more than one type of target group, supply, and evaluation method; therefore, summing numbers across all items is not appropriate.
[b]n= number of grantees answering questions concerning main focus areas for and supplies provided during community educational activities.
[c]On the questionnaire, each grantee was permitted to list one response other than those specifically listed for each category.
[d] Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

3.6 SKILLS TRAINING

Approximately three-quarters of grantees (71%) provided skills training as part of their projects. As shown in Table 3.8, a roughly equivalent percentage of grantees focused their skills training programs on individuals trained to provide community education (26 of 45, or 58% of grantees), individuals trained to conduct assessments (e.g., visual, interviews, environmental sampling) (30 of 45, or 67%), and individuals trained to carry out interventions (31 of 45, or 69%). Grantee or partner staff were by far the most common target audience for skills training (32 of 45 grantees, or 71%).

Table 3.8: Summary of the Focus Areas, Target Audiences, and Evaluation Methods for Skills Training[a,b]

	Demon-stration	Tech-nical Studies	All
Focus Areas (n=36 for Demonstration grantees; 9 for Technical Studies grantees; and 45 for all):			
• Individuals trained to carry out interventions	25 (69%)	6 (67%)	31 (69%)
• Individuals trained to conduct assessments	24 (67%)	6 (67%)	30 (67%)
• Individuals trained to provide education	22 (61%)	4 (44%)	26 (58%)
• Other (e.g., use of GIS software, preventive maintenance)[c]	1 (3%)	1 (11%)	2 (4%)
Target Audience for Skills Training (n=36 for Demonstration grantees, 9 for Technical Studies grantees, and 45 for all):			
• Grantee or other partner staff	28 (78%)	4 (44%)	32 (71%)
• Remodelers/contractors	15 (42%)	1 (11%)	16 (36%)
• Community health workers	11 (31%)	3 (33%)	14 (31%)

	Demon-stration	Tech-nical Studies	All
• Code inspectors	9 (25%)	0 (0%)	9 (20%)
• Property owners (non-residents)	8 (22%)	0 (0%)	8 (18%)
• Affordable housing professionals	6 (17%)	1 (11%)	7 (16%)
• Nurses	6 (17%)	1 (11%)	7 (16%)
• Physicians	2 (6%)	0 (0%)	2 (4%)
• Other Total[c]	15 (42%)	6 (67%)	21 (47%)
• Other[d]: Community members living in targeted areas	12 (33%)	2 (22%)	14 (31%)
Methods used to Evaluate Skills Training Efforts (n=30 for Demonstration grantees, 5 for Technical Studies grantees, and 35 for all):			
• Participants completed evaluation	19 (63%)	3 (60%)	22 (63%)
• Pre-/post-tests/surveys used	12 (40%)	2 (40%)	14 (40%)
• Other Total[c]	11 (37%)	3 (60%)	14 (40%)
• Other[d]: Direct observation of trained individuals in the field	5 (17%)	3 (60%)	8 (23%)

[a]Grantees were permitted to check more than one type of focus area and one type of target audience; therefore, summing numbers across all items not appropriate.
[b]n=number of grantees answering questions concerning focus areas, target areas, and evaluation methods for skills training.
[c]On the questionnaire, each grantee was permitted to list one response other than the responses specifically listed.
[d]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

An average of 112 individuals per project received skills training (range 0 to 1,328), with an average of 58% of these trained individuals classified as low-income, and 66% classified as minority groups. Thirty-six percent reported that their programs tracked individuals who had received skills training, and grantees reported that more than half of their trained individuals were still involved with work related to the skills training.

As shown in Table 3.8, 76% of the grantees reportedly evaluated their skills training programs, primarily by having participants complete an evaluation form.

Fifty-five percent of grantees reported that a specific training curriculum was developed for their project. Of these 34 grantees, 39% reported that their training curriculum was distributed to other organizations for use/incorporation into their programs. Of the 19 grantees whose projects were complete at the time of the interview, 58% reported that their training curriculum continued to be used by the grantee after the project ended.

3.7 ADDITIONAL INFORMATION

Sixty-nine percent of grantees reported that they obtained approval for their project from an Institutional Review Board (IRB) (Table 3.9), 40% of which were approved in an expedited process. Half of these grantees said that their projects were delayed by the IRB approval process, and half said that they encountered challenges/obstacles in the IRB approval process.

About one-quarter of grantees reported that their project included a control group (Table 3.9). Of those 16 grantees, 63% reported that housing units and/or clients were randomly assigned to the treatment or control group, and 88% reported that the control group received an intervention.

Table 3.9: Summary of IRB Approval and the Use of Control Groups

	Demon-stration	Technical Studies	All
IRB approval obtained for project (n=42 for demo, 20 for tech studies, 62 for all)	27 (64%)	16 (80%)	43 (69%)
• Project delayed by IRB approval process (n=27 for demo, 15 for tech studies, 42 for all)	15 (56%)	6 (40%)	21 (50%)
• IRB approval process expedited (n=26 for demo, 16 for tech studies, 42 for all)	10 (38%)	7 (44%)	17 (40%)
• Challenges/obstacles encountered in IRB approval process (n=27 for demo, 16 for tech studies, 43 for all)	14 (52%)	7 (44%)	21 (49%)
Control Group Included (n=43 for demo; 20 for tech studies; and 63 for all)	11 (26%)	5 (25%)	16 (25%)
• Housing units/clients randomly assigned to treatment or control groups (n=11 for demo, 5 for tech studies, 16 for all)	8 (73%)	2 (40%)	10 (63%)
• Control group received intervention (n=11 for demo, 5 for tech studies, 16 for all)	10 (91%)	4 (80%)	14 (88%)

Chapter 4: LESSONS LEARNED AS CAPTURED BY THE QUESTIONNAIRE

In addition to capturing data describing the range of grantee interventions, other goals of this project included identifying key implementation issues from the grantees' perspective and identifying important lessons learned and effective practices. To capture this information, the questionnaire enabled grantees to provide additional comments on various topic areas such as recruitment and interventions and to respond to several open-ended questions. The open-ended questions focused on identification of the three most important lessons that their programs learned from their projects, aspects of their projects that were effective in reaching their goals, and aspects of their projects that were ineffective. Although the structure of these questions makes it difficult to quantify in a meaningful way, several important concepts and themes emerged and are presented in this chapter.

4.1 RECRUITMENT

Recruitment is often a critical factor in grantee performance and can be the most difficult aspect of a project. Although most grantees recruit or enroll clients through a variety of mechanisms, numerous grantees struggle with recruitment. (Chapter 3 and Appendix A provides detailed information about recruitment.) Although no specific question asked grantees to expand on the challenges or successes of their recruitment efforts, many grantees provided valuable information when discussing lessons learned or answering other recruitment-based questions. Below, is a list of many recruitment challenges identified by grantees.

Examples of Recruitment Challenges

- Difficulty reaching the targeted population.
    - Some grantees that relied on referrals from other partners found that the population served by the partner often did not fall into the grantee's targeted group. For instance, grantees working with local asthma-based clinics found that the individuals referred from the clinic frequently did not meet the low-income requirement for enrollment into the program.
    - Several grantees noted that client mobility (e.g., transitory life styles) made it difficult to reach and follow-up with their population.
    - One grantee indicated that a new immigration law within the state made it difficult to reach its targeted population of Hispanics.
- Strict enrollment criteria.
    - At least thirteen grantees indicated that strict enrollment criteria hindered their efforts to meet their recruitment goals; therefore, recruitment criteria had to be changed after the start of the project. For example, many grantees indicated that the geographic area targeted for recruitment efforts needed to be expanded.
- Reliance on partners for referrals.
    - While many grantees rely on a variety of partners to refer clients, the time needed to establish the infrastructure or mechanism for making or

accepting referrals is often underestimated.
    - Occasionally, selected partners expressed concern over a client's confidentiality and only agreed to inform clients of the program without relaying the client's interest back to the healthy homes project staff.

Despite the many challenges, several grantees have found recruitment strategies that work for their particular projects. Many grantees improve their recruitment efforts by changing their recruitment criteria (e.g., expanding the geographic areas or increasing the age range of the targeted population) or changing their recruitment methods. In addition, listed below are examples of strategies that grantees have identified as being effective.

Effective Recruitment Strategies

- Know your recruitment partners.
    - Have a clear understanding of your partner's priorities and objectives at the start of the project. Are they able and willing to make recruitment a priority?
- Choose the right person to assist with recruitment efforts.
    - Use an outreach worker or other members of the community. Several grantees found that hiring an outreach worker from the targeted community significantly improved recruitment as these individuals better understood the needs and concerns of their communities.
    - Find at least one contact within an organization to "spearhead" recruitment efforts. For example, one grantee found that they were able to greatly increase the number of referrals from a local hospital by working directly with one asthma coordinator rather than reaching out to all nurses.
    - Encourage a trusted source to become involved. Although several grantees found that nurses and doctors are often unable to assist in recruitment efforts due to hectic schedules and increased demands, one grantee found that gaining the involvement of nurses and doctors greatly improved recruitment efforts since families trusted these individuals.
    - Hire an individual to help with the application process and follow-up throughout this process. Grantees that link with programs, such as weatherization programs, that require an application process to determine eligibility have found that hiring someone to assist clients with completing the application results in a significant increase in the number of enrolled clients.
- Set realistic expectations.
    - Recognize that recruiting and enrolling clients takes time. This may be especially true if the program relies on partners for referrals. Time is needed to build relationships and educate all involved.
    - Identify study exclusion criteria. While it may be difficult for grantees to walk away from deteriorated houses, many recognize that excluding certain houses, such as those with significant structural damage, allows limited resources to be used more effectively.
- Examine your recruitment efforts and be flexible.
    - Establish a system for tracking your referrals, so that referral mechanisms

can be evaluated. Because programs often use a variety of methods for recruitment, it is important to identify the method that is most effective.
    - Re-examine your recruitment forms. One grantee found that including staff photographs on recruitment flyers helped increase the comfort level of clients and increase the number of enrollees.
    - Recognize that recruitment often involves multiple strategies.
    - Have a default plan in place in case recruitment issues manifest themselves.
- "Piggy-back" onto existing studies.
    - Linking with an existing study, such as a health-related study, worked well for studies that focused on the housing unit and gathered little information from the occupant.

Grantees' offered a wide variety of incentives (e.g., cash, gift certificates, vacuums) to help with recruitment and retention of clients. While the types of incentives vary dramatically, so does the idea of what should be considered an incentive. Some grantees responded that the total costs of interventions should be considered an incentive, while others felt that only additional items not included as part of the intervention should be considered.

Regardless of the type of incentive offered, most grantees felt that incentives played a critical role in the ability to enroll clients. Although there are several reasons for why recruitment may have resulted in project delays, we examined if using incentives resulted in fewer recruitment delays. Table 4.1 identifies the number of grantees that experienced delays with and without the offer of an incentive. Of those offering incentives, 47 percent experienced delays, indicating that offering incentives does not by itself ensure delay-free recruitment.

Table 4.1: The Use of Incentives and Project Delay

Use of Incentives	Was project delayed because of recruitment efforts?		Total
	Yes	No	
No incentives were offered	5	3	8
Incentives offered	21	24	45
Total	26	27	53

Grantees frequently have difficulty retaining clients. For example, one grantee reported only being able to retain six percent of the enrolled population for the entire life of the project. The challenge of retention often becomes a bigger issue when the follow-up period is longer than six months from the time of enrollment. Many grantees account for this issue when developing their targeted numbers for recruitment. These grantees tend to assume that they will have a minimum attrition rate of at least ten percent.

While several grantees indicated that incentives help in retaining or recruiting families, the timing of when incentives are distributed plays a critical role. A few grantees found

that families offered larger incentives, such as an air conditioning unit or a vacuum cleaner, within the early phases of the project, frequently dropped out before completing the intervention. Many grantees offer small incentives earlier in the project and a larger incentive at the completion of the intervention or end of the project. This appears to help with retention. However, at least one grantee found that even offering a smaller gift at the end, such as Murphy's oil soap, dramatically improved its retention rate.

Offering incentives to the rental property owners helped some grantees gain access into rental units. However, offering items such as low interest loans to these owners was not as effective as originally expected, as most property owners did not take advantage of this opportunity.

Other grantees cited dedicated staff, flexibility in scheduling home visits, and persistence as effective methods for retaining clients. For example, one grantee found that when scheduling a follow-up visit telephone numbers were frequently disconnected; however, being persistent often paid off because within a month the phone number was usually reconnected.

4.2 ASSESSMENT

Most grantees are conducting visual assessments, client interviews, and environmental sampling and analysis as part of their projects. (Refer to Appendix A for additional details.) Overall, relatively few grantees commented on assessment challenges or lessons learned when asked open-ended questions. Examples of challenges encountered while conducting assessments are provided below.

Examples of Assessment Challenges

- Difficulty in obtaining long-term environmental sampling data.
    - Several grantees indicated that when long-term environmental sampling (e.g., sampling conducted for a week or longer) was conducted in housing units, re-entry into the house to gather equipment (e.g., radon detectors, relative humidity detectors) became an issue. Therefore, long-term monitoring was often dropped from the project.
- Gaining comparable measurements.
    - One grantee found that it was difficult to obtain pulmonary function test results in the home environment that were similar to results obtained in a clinic setting.
    - Another grantee had problems conducting follow-up assessments at equal intervals, which made it difficult to interpret the final results using the sampling data.

Grantees identified some effective strategies for planning and implementing assessment activities. These strategies are listed below.

Effective Assessment Strategies

- Use appropriate assessment measures.

    - Determine if environmental sampling is necessary. At least two grantees stated that information gathered from visual assessments was an adequate surrogate for several environmental measures. For example, one grantee found a strong correlation between observed cockroach infestations and cockroach allergen levels.
- Only gather assessment data that are essential.
    - Many grantees are collecting a wealth of information, which is often never analyzed. By focusing on only essential items, grantees can decrease the burden on project staff and participants.
- Use your assessment data effectively.
    - Baseline information gathered during the assessment process can be just as valuable and informative as outcome information. One grantee found that during initial assessments, it obtained much needed information about a hard to reach population. This information was then relayed to the local housing agencies in an effort to increase resources for the grantee and the population in need.
- Use established data collection and assessment tools.
    - Rather than "recreating the wheel", many grantees are using assessment tools that have been validated by others. This is especially true when it comes to collecting health data. Several grantees use forms from the American Academy of Pediatrics to gather asthma information from families. Several grantees also use the Short Form 8 (SF-8) Quality of Life tool to assess overall health.
- Have consistent timeframes for conducting assessments.
    - Consistent timeframes between pre- and post-assessments for each housing unit allows for easier comparison of data.

4.3 INTERVENTIONS

As identified Chapter 3, grantees are conducting a wide range of interventions within the home. While some grantees complete the interventions themselves or train community members, the vast majority utilized the services of contractors. Regardless of the mode used, the implementation of interventions posed a number of significant difficulties for many of the grantees. Below is a list of items that grantees identified as challenges they encounter during the intervention process.

Examples of Intervention Challenges

- Lack of property owner compliance.
    - Difficulty obtaining property owner consent. When working in rental housing, several grantees found that obtaining property owner consent for completing interventions was often difficult and slowed down the process.
    - Inability to get property owners to complete their part of the intervention. Grantees, especially those without enforcement authority, often described difficulty in getting the property owner to complete their portion of the work.
- Difficulty working with contractors.

    - Finding contractors to complete small repair jobs. Smaller repair jobs presented difficulties for several grantees, especially if the repair was within a specialty trade (such as plumbing or electrical trades). Frequently contractors did not want to involve themselves with smaller repair jobs as these were viewed as non-profitable.
    - Oversight and scheduling of contractors. Because contractors often have many other priorities, grantees without a dedicated pool of contractors working solely on healthy homes interventions often have difficulty in getting contractors to complete interventions in a timely fashion.
    - Relying on one contractor to handle all subcontractors. One grantee hired a single contractor to manage and oversee the activities of all subcontractors. However, it was difficult for one individual to handle this task because several subcontractors were generally used for one housing unit.
    - Obtaining quality work from the contractors. Despite offering training to contractors, a few grantees found that the work completed by the contractors was not of high quality. Therefore, constant oversight and monitoring of the work in progress was required.
- Completing interventions within the allotted budget.
- Meeting set timeframes for completion of interventions.
    - Delays caused by the bidding process. Several grantees identified that the time required to obtain bids on the jobs delayed their projects.
- Prioritizing the interventions when several hazards are identified.
- Getting into the housing unit.
    - One grantee reported frequent difficulty in making phone contact with clients to schedule appointments for interventions.
    - A few grantees acknowledged that the transient nature of their target populations often created difficulties in completion of interventions and follow-up activities.

Several effective strategies for completing interventions in housing units have been identified. Many of the strategies identified below focus on dealing with local property owners and contractors.

Effective Intervention Strategies

- Develop a list of interventions that can be used without property owner consent.
    - One grantee felt that developing a list of interventions that could be done without property owner consent was the key to its success. The grantee provided renters with the necessary tools, such as smoke detectors, CO detectors, and cleaning equipment, and education to complete healthy homes interventions.
- Increase pool of contractors.
    - Train community members to complete minor interventions. Many grantees found that training community members to complete minor interventions, such as cleaning or education, was very effective.
    - Offer additional training to contractors. At least two grantees partnering

with lead and weatherization contractors found that these types of contractors readily accepted the idea of healthy housing interventions.
    - Develop a pool of contractors for healthy housing interventions at the start of the project. Several grantees reported that they established relationships with a pool of contractors before the project began.
- Change the bidding process.
    - Encourage the homeowner to bid out the job. One grantee is currently trying this approach; however, it is too soon to evaluate its effectiveness.
    - Develop a list of set prices for all interventions. Based on past experience, one grantee has developed a price list for each healthy homes intervention. Rather than bid out jobs, this list is used to determine the prices paid to all contractors within its pool.
- Develop an algorithm to help prioritize interventions.
    - One grantee created an algorithm that allows staff to easily prioritize interventions based on assessment results.
- Build in time for quality assurance.
    - Conduct ongoing assessments to check quality and ensure that the most cost-effective methods are being utilized.
- Use local codes effectively.
    - Identify the healthy homes interventions that are covered by local codes and use the codes as an intervention tool.
- Capture the "teachable moment."
    - One grantee found that educational opportunities increased only after being able to show success in its IPM activities. Once individuals saw that IPM was effective in decreasing cockroaches in their buildings, they were ready and willing to learn more about the methods used and their roles.
- Hire a "handy man" to complete smaller projects.
    - Several grantees are investigating hiring a "handy man" to complete smaller interventions since contractors often turn down smaller jobs.
- Consider costs and the equipment.
    - Identify a cap for interventions at the start of the project.
    - Weigh the costs and the quality of work. One grantee found that hiring the lowest cost contractor was not always cost-effective as interventions often needed to be corrected.
    - One grantee found that low cost fans installed in the bathroom or kitchen area were not effective, because many families chose not to use the fans due to the noise they created. It was discovered that families receiving quieter fans were much more likely to use them.

Many grantees also identified important lessons learned that specifically related to educational interventions. These are listed below.

Lessons learned regarding educational interventions

- Occupants play a major role in healthy homes interventions; therefore, education can make a difference.
- Caregivers are often unaware that common household products, such as air

fresheners, can pose a risk.

- Some outcomes are more difficult to achieve than others. For example, it is often easier to get families to use walk-off mats than it is to get families to stop smoking.
- Physicians need to be targeted for educational interventions to ensure that they are sending the same messages.
- Educational efforts are more effective when the process is interactive. Conduct walkthroughs with the client to point out areas for change and involve them as much as possible in the intervention process.
- Audiovisual materials make the educational process more effective than simply relaying information.
- If working with a renter, it is important to make the distinction between landlord responsibilities and tenant responsibilities. Several programs found that this tactic was well-received by the tenants.
- If trained, community members and/or promotoras can be a very effective way to reach your targeted community and provide education.
- It is important to educate families about what to expect when the interventions are completed, so that they have realistic expectations about the work being completed.

4.4 PARTNERSHIPS

In many locations, no single agency is responsible for dealing with all healthy homes issues. Therefore, effectively addressing healthy homes issues often involves collaboration between several different partner organizations. Almost half (33) of the grantees identified the use of partnerships as one of three effective practices to reach their program goals. (Additional information on partnerships is provided in Appendix A.) Most grantees rely on partnerships to assist in their recruitment efforts. While grantees spend a great deal of time and energy in developing partnerships, the rewards can be substantial and crucial to the success of a project. The following list identifies ways that programs effectively used partnerships to reach their goals.

Usefulness of Partnerships

- Use partners to help reach outreach goals.
    - One grantee stated that partnering with an organization that has an existing membership roster was more effective in increasing attendance at community workshops than inviting the general public to attend.
- Partners can help reach remote areas.
    - Grantees working in rural areas found that creating partnerships enabled work to be conducted in remote regions that would otherwise not be served.
- Using partners can avoid duplication of efforts.
    - Grantees controlling asthma triggers found similar and compatible interventions being used by weatherization programs.
- Partners can assist with the IRB approval process.
    - Some grantees, especially Demonstration grantees, may not have

extensive experience with the IRB approval process. However, partnering with universities or other organizations that have more extensive IRB knowledge allowed some grantees to easily complete the process.

- Partnering with others allows additional services to be provided to clients.
    - Because grantees have limited resources to address healthy housing issues, partnering with other programs and organizations has allowed more services to be offered to the clients.
- Partners can help locate families that have moved.
    - One grantee found that certain partners, such as Head Start, were often very effective in helping to track down families who moved.
- Partners can provide technical support and assistance when needed.
    - Grantees not actively involved in the community found that partnering with others provided assistance and technical support when needed.
- Partners may have long standing relationships already within the community.
    - Working with partners that have a long-standing relationship with the community can greatly improve the success of a project. In addition to recognizing the community needs, these partners can help address language and cultural barriers that may arise.

Programs build partnerships with a variety of various organizations and agencies. The key to successful partnerships for many programs lies in the ability to obtain "buy-in" from all partners involved. Because this is often a time consuming process, many grantees often build on existing relationships rather than forging new ones. However, even when building on old relationships, grantees have identified several items to consider. Below is a list of some strategies used to create successful partnerships.

Keys to Successful Partnerships

- Involve partners in all aspects of the project.
    - Many grantees recognize the importance of involving partners in the planning phase when designing a project. This often requires building relationships well before writing a proposal.
    - In addition, partners should be involved in identifying the work requirements of each individual involved with the project so that expectations are clear.
- Understand your partner.
    - Build on the strengths of each partner. Organizations with a strong presence in the community can often be an asset in the recruitment process.
    - Know the limits of their involvement. Several grantees have reported that early recognition of a partner's strengths and weaknesses is critical.
    - Identify their priorities and agenda. Recognizing how your project fits into the partners overall mission is important. This helps grantees identify where their project falls in terms of the partner's priorities.
    - Build the partners into the budget. Several grantees that did not provide adequate financial incentive for their partners found that the partners were not fully engaged in their projects.

- Expect turnover.
    - Like many organizations, partners often undergo staffing changes. Preparing for these changes by having more than one individual from the organization involved with your project can help ease the transition if someone leaves.
- Communicate frequently.
    - Frequent communication among all partners is critical. Many grantees report that it is important to meet with their partners on at least a monthly basis, if not weekly.
    - Effective communication is essential when working in an isolated community with project partners that come from different backgrounds.

4.5 OTHER LESSONS LEARNED

In addition to the lessons learned already presented in this chapter, grantees identified several process-oriented lessons. Many of the lessons learned, listed below, revolve around data analysis, project management, and staffing.

Other Lessons Learned

- Prepare and pilot all forms early in the project. One grantee found that making continuous revisions to forms resulted in difficulty comparing the data during the analysis.
- Document any deviation in project protocols. Detailed, well-documented sampling protocol is critical to identifying if data is comparable in the analysis phase.
- Ensure data are correct. Double-checking all data, even laboratory data, is critical.
- Be sure to budget for evaluation activities. Several grantees stated that they had not yet analyzed most of their data as their projects had ended and no additional funds were available.
- Involve a statistician from the start of the project. One grantee specified that not only is it important to involve the statistician from the beginning, but it is also important that the statistician is fully engaged and articulates his/her analysis plan clearly to the rest of the project staff.
- Conduct interim data analyses. Several grantees reported that building in an evaluation process midway through the project would have helped to uncover problems with the data earlier in the process.
- Develop a database at the start of a project that captures all necessary information. Also, there needs to be a clear understanding of how to use the database effectively to monitor the status of a project.
- If able, choose an IRB wisely. One grantee stated that the IRB chosen was not familiar with Demonstration projects, which made it very difficult to gain approval.
- Good project management is key to the success of any project.
- Keep the momentum going. One grantee reported that delays in the project often resulted in additional time being needed to get everyone onboard again.

Chapter 5: KEY FINDINGS AND OUTCOMES CAPTURED BY THE QUESTIONNAIRE

This chapter summarizes the following key findings and outcomes:

- Top three outcomes reported by grantees.
- Correlations between health measures and assessment measures.
- Healthy homes curricula created.
- Educational materials created.
- Results of product/instrument testing or development.
- Effectiveness of specific interventions.
- Use of a control group and reported outcomes.
- Determination of the cost-effectiveness of the approach used.
- Efforts to raise awareness and increase sustainability.

5.1 Summary of Top Three Outcomes Reported

Grantees were asked to identify the top three outcomes of their projects during the interviews. These outcomes were either recorded on the questionnaire or extracted from published manuscripts or final reports submitted to HUD. Examples of the top three outcomes for those grantees reporting outcomes are included below in Table 5.1. (Note: All numbers in superscript found in Section 5.1.1 through Section 5.1.6, refer to the grantee number identified in Table 5.1.)

Thirteen grantees with active grants stated that they were unable to identify outcomes because they have not yet analyzed their data. Four grantees identified outcomes based on preliminary data and other grantees provided outcomes identified after completion of their projects. Responses varied dramatically and many were very general. Very few grantees provided specific information, such as percent changes in environmental measures or caregiver knowledge, when asked.

Although not all major outcomes were captured from a project since responses were limited to three, each response was reviewed and broadly categorized for summarization purposes. Eighteen grantees reported at least one outcome related to educational efforts, 13 grantees reported at least one outcome associated with mold or moisture, 13 grantees reported at least one outcome associated with health conditions, 14 reported at least one outcome related to allergen or dust concentrations, five reported outcomes related to IPM, and two reported outcomes related to injury hazards.

5.1.1 Education Related Outcomes

The majority of educational outcomes were reported by Demonstration grantees. Only one Technical Studies grantee reported an outcome related to education. Overall, grantees primarily reported that their educational efforts were effective, especially when education was conducted over several visits. Outcomes reported included increases in caregiver knowledge as determined by pre/post tests, changes in behavior, and improvements in the

housing environment.[1,2,3,6,7] In addition, educational efforts in at least two cases resulted in changes to housing codes and an increase in overall awareness of healthy homes issues within a community.[8,10] Table 5.1 highlights examples of educational outcomes reported by some of the grantees.

5.1.2 Mold and Moisture Intrusion Related Outcomes

Nine Technical Studies grantees and four Demonstration grantees reported at least one major outcome related to mold or moisture intrusion. The reported outcomes focus on identification of factors associated with mold and moisture, mold assessment and types of mold found in homes, and the effectiveness of interventions in reducing moisture and exposure to mold. Examples of these factors are included in Table 5.1.

Factors found to be associated with mold and moisture in the home include the presence of unsealed crawlspaces, individual behaviors such as the use of bathroom and kitchen without exhausting humid air, and the number of individuals living in the home.[12,15,26] In addition, improperly functioning gutters, leaking roofs, and high relative humidity levels all contribute to the presence of mold and moisture problems in the home.[26]

Several grantees identified outcomes related to mold assessment.[16,18,19] These include development of tools to assess mold and identification of types of molds typically found in homes. Overall, results indicate that higher mold concentrations typically can be found during the summer months as compared to the winter months.[15,17] Research on homes without known moisture problems identified a very low prevalence of moisture indicator fungi in air and settled dust samples and found that outside molds comprised a major fraction of molds in the home samples.[17]

Although many grantees are currently conducting mold and moisture interventions, only four, two Demonstration grantees and two Technical Studies grantees, reported outcomes related to the effectiveness of these interventions. Overall, interventions focused on controlling moisture intrusion and relative humidity levels, such as sealing crawl spaces have been found to be effective in controlling mold growth.[14,25] In addition, dry steam cleaning conducted in a both a laboratory and home environment has been found to significantly reduce mold levels in carpets.[20] Two grantees reported a change in policy related to mold and moisture activities.[8,10]

5.1.3 Health Related Outcomes

Most health related outcomes reported by grantees focused on asthma-related outcomes and a few focused on declines in blood lead levels. Asthma-related outcomes included decreases in asthma severity scores, reduced emergency rooms or doctor visits, and/or decreases in lost school days after completion of an intervention.[1,10,11,21,26] Overall, grantees that conducted interventions aimed at addressing multiple hazards in the homes typically reported improvements in self-reported health measures.[11,21] However, because multiple interventions are conducted simultaneously, it is often difficult to attribute improvement in health outcomes to specific interventions. In addition, the lack of a

control groups makes it difficult to determine if improvements in self-reported health measures were the result of the interventions that were conducted.

The association between a health measure and an environmental measure was harder for grantees to detect.[4,11] For example, several grantees were unable to show an association between allergen concentrations and reported asthma symptoms. (See Table 5.2 for additional examples.) Grantees with no significant findings frequently reported that a small sample size reduced their ability to identify a statistically significant outcome.

5.1.4 Allergen or Dust Related Outcomes

Several grantees reported outcomes related to allergen or dust levels. Some of the outcomes reported focused on identifying assessment information[11,15,22], while other outcomes focused on the effectiveness of various interventions in reducing allergen or total dust loads.[1,4,9,13,20]

In order to assess overall allergen concentrations, many grantees conduct environmental sampling. Reported outcomes from one study indicate that some of the allergens (e.g., Fel d 1 and Bla g 1) found in homes remain fairly consistent over time while other allergens (e.g., Der f 1 and Der p 1) tend to show more variability.[22] Another study also found similar results for Der f 1.[15] One grantee reported that cockroach allergen concentrations were highly correlated with the levels of cockroach infestation reported by residents.[11]

Although outcome results relating to the effectiveness of interventions in decreasing allergen or dust levels is varied, at least three grantees were able to show reductions in allergen concentrations immediately after a housing intervention[1,20,21] and two were able to show reductions in dust loadings.[4,22] Overall, cleaning and IPM interventions were frequently reported to reduce allergen concentrations.[1,13,21,22]

5.1.5 IPM Related Outcomes

All five grantees that reported outcomes related to IPM found that IPM interventions were successful in decreasing pest infestation and/or decreasing allergen concentrations.[7,9,11,13,21] One grantee was also able to demonstrate that IPM is cost-effective compared to other pest control methods.

5.1.6 Outcomes Related to Injury Hazards

Although many grantees incorporate safety interventions, such as installation of smoke alarms, into their project, only two grantees identified outcomes that focused on injury hazards. One identified an outcome related to injury assessment[24] and the other identified an outcome related to the effectiveness of injury interventions.[9] Although it may be relatively easy for grantees to show improvements in housing conditions related to injury hazards, demonstrating that these improvements result in a reduced incidence of injuries is difficult because of study design limitations.

Table 5.1: Examples of Projects and Major Outcomes Reported

<table>
<tr><th>Type of Grant</th><th>Description of Project</th><th>Examples of Major Outcomes Reported*</th><th>Additional Comments</th></tr>
<tr><td>1. Alameda County Demonstration (FY 2001)</td><td>• Designed to demonstrate that a positive impact on childhood respiratory health could be achieved by a housing, environmental and educational approach with the concurrent medical model.
• Three levels of intervention.
• Limited intervention: standard cleaning with education.
• Full intervention: cleaning plus education and house repairs.
• Educational intervention: education and healthy homes maintenance kit only.</td><td>EDUCATION OUTCOME:
• Significant increase in caregiver knowledge regarding environmental risk factors for childhood asthma over a 6 month period.
HEALTH OUTCOMES:
• Significant decrease in asthma severity scores among children whose caregivers received only an education intervention.
• Significant decrease in asthma severity scores in those that received a housing intervention.
ALLERGEN OUTCOMES:
• Significant decrease in concentration of dust mite P-antigen in all groups.
• Significant immediate reduction of the concentration of dust mite P-antigen and mouse antigen with a full intervention.</td><td>• Frequency of ER visits was recorded, but small sample size reduced the ability to show correlations with housing information.</td></tr>
<tr><td>2. City of Stamford Demonstration (FY 2001)</td><td>• Intervention focused primarily on asthma education and provision of tools to reduce asthma triggers and safety hazards (e.g., mattress covers, smoke detectors, etc.).</td><td>EDUCATION OUTCOMES:
• Significant decrease in the environmental conditions that were under the control of the occupant, such as dust and mold, was observed with the biggest improvement occurring between the first and second home visit.
• Initial assessments found 565 asthma triggers in all homes. At 3 months, 250 triggers were identified, at 6 months 196 asthma triggers were identified, and at one year 110 triggers were identified.</td><td></td></tr>
<tr><td>3. Erie County Department of Health Demonstration (FY 2000)</td><td>• Main intervention was education of landlords and residents.
• Property owners given equipment and supplies (e.g., CO detectors, furnace filters, etc).
• Residents received 2 educational visits six months apart and “housewarming gifts” promoting safe and clean living.</td><td>EDUCATION OUTCOMES:
• Education intervention was very effective in reducing the occurrence of new violations/hazards in the dwelling units between the baseline and six month follow-up.
<table>
<tr><th></th><th># of lead violations</th><th># of injury violations</th><th># of asthma violations</th></tr>
<tr><td>Baseline</td><td>117</td><td>290</td><td>170</td></tr>
<tr><td>Follow-up</td><td>7</td><td>28</td><td>11</td></tr>
</table></td><td>• Health data collected is subjective and difficult to tie into interventions.</td></tr>
</table>

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
		HEALTH OUTCOMES: • Individuals reporting very good or excellent health increased from 53% to 71%. • No significant difference in completing daily work because of health problems. • Number reporting no pain increased from 73% to 94%. • Number reporting lots of energy increased from 47% to 73%. • Number reporting no or very little limitations due to physical problems increased from 67% to 81%.	
4. City of Milwaukee Health Department *Demonstration (FY 2002)*	• Randomized longitudinal control study • Examined the impact of a combination of home environmental interventions and nursing case management services on settled dust loadings and allergen concentrations in homes of asthmatic children. • Random assignment to a control or intervention group. • Control group received educational materials, bed/pillow covers, and treatment of lead-based paint hazards. • Intervention group received all control group interventions plus multiple nursing case management visits, minor home repairs for moisture and safety issues, specialized cleaning, and integrated pest management.	ALLERGEN OUTCOMES: • No significant changes in allergen concentrations from baseline in either group. • Significant decrease in settled dust loadings in intervention group compared to control group. HEALTH OUTCOMES: • No improvement in visits to emergency rooms, missed school days, sleepless nights, parental anxiety regarding asthmatic child. • No correlation between health measures and dust/allergen findings.	• The marginal benefit of the intervention may be due to significant overlap of interventions between the two groups as well as small sample size.
5. City of Providence *Demonstration (FY 1999)*	• Developed an approach to treat homes for multiple environmental hazards and to educate property owners and families about how to maintain properties to prevent such hazards and protect the health of children. • Properties were asssessed for both lead	ALLERGEN OUTCOMES: • Lead only group experienced significant changes for Bla g 1 on bare floors, with a slight increase in concentrations pre-post intervention. • No significant changes in Bla g 1 were seen in the lead plus healthy housing group, although Bla g 1 concentrations did	• Lack of significant findings may be due to significant overlap of interventions between the two groups. • Mold and mildew

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
	and Healthy Homes hazards, including an assessment of lead-based paint hazards, allergens, and basic safety hazards. • Enrolled families were provided with lead and Healthy Homes-related educational materials. • Enrolled properties were randomly assigned to one of two treatment groups: one treated solely for lead hazards and the other treated for both lead and other HH hazards.	decline slightly. MOLD AND MOISTURE OUTCOME: • Mold and mildew were eliminated when moisture control interventions were provided.	were assessed visually.
6. Montana State University *Demonstration (FY 2002)*	• Asthma education program designed for Native Americans.	EDUCATION OUTCOME: • Take home survey consisting of 5 questions indicated at least half of the families educated had taken steps to reduce asthma triggers in the home.	• May be response bias as not all families returned the take home survey. • Self-reported information.
7. Mount Sinai School of Medicine *Demonstration (FY 2002)*	• Provided assistance and education to parents and families about the control of asthma. • Homes received allergen reduction (e.g., mattress covers, cleaning, air filtration devices) and IPM interventions.	EDUCATION OUTCOME: • Number of homes with exposed food present decreased by 14% six months after intervention. IPM OUTCOMES: • Number of roaches decreased by 29% six months after intervention. • Number of roaches decreased by 58% and number of rodents decreased by 27% one year after intervention.	
8. St. Louis County *Demonstration (FY 2004)*	• Main focus of project is moisture control and control of safety hazards in the home. • In addition to enrolling housing units for remediation, a major focus was community education and outreach.	EDUCATION OUTCOME: • As a result of outreach to county officials, two counties are working on new ordinances and regulations regarding moisture in the home.	

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments

9. Medical and Health Research Association of NYC, Inc. *Demonstration (FY 2001)*	• Interventions focused on addresing lead-based paint hazards, mold, cockroaches allergens, and safety hazards.
	• Specific activities included installing CO and smoke detectors, window guards, paint stabilization, cleaning, and IPM.
		IPM OUTCOMES:
		• Bla g 1 levels declined significantly in houses were occupants attended IPM training.
		• Significant declines in Bla g 1 levels in homes that had elevated baselines (≥2U/g).
		• Evidence of cockroaches or rodents declined (43% and 36% declines, respectively).
		MOLD OUTCOME:
		• Mold dust levels declined 50% (borderline significant).
		OTHER OUTCOMES:
		• Between baseline and a 5 month follow-up period, significant reductions were achieved in:
		  • the number of dwellings with multiple problems (75% versus 23%);
		  • high levels of dust lead on floors or sills (67% and 46% declines, respectively);
		  • safety hazards (67% decline in missing window guards, 85% decline in missing smoke detectors, 88% decline in missing fire extinguishers, and 78% decline in electrical hazards).	

10. City of Minneapolis *Demonstration (FY 2003)*	• Interventions focused on moisture control activites, injury prevention, allergen reduction, and IPM.	MOLD OUTCOME: • Housing department wrote a specific violation code for mold and the inspectors received more training on identifying mold and writing up correction orders. HEALTH OUTCOME: • Preliminary results show statistically significant improvement in the quality of life surveys from baseline to six months post intervention.	

11. Boston Public Housing Commission *Demonstration (FY 1999)*	• Two intervention groups:
	  • Standard group: given portable supplies, IPM, dust cleaning.
	  • Expanded group: given all standard interventions, plus in-home
		HEALTH OUTCOMES:
		• Overall improvements in asthma severity, number of missed school days, medication use (not statistically significant).
		• No correlation between allergy to cat, dog, mouse, or cockroach (as measured by RAST) and corresponding
			• Difficult to determine if health effects are related to being studied or due to housing interventions.

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
	remediation, carpet removal, and plumbing repair.	allergen. • Correlation between allergy to dust mites and dust mite allergen. • Reports of severe or very severe asthma declined from 37% to 9% after IPM. ALLERGEN OUTCOMES: • Self-reported levels of infestation correlated significantly with dust allergen levels. IPM OUTCOMES: • Reports of heavy or very heavy cockroach infestation declined from 50% to 0% after IPM. • 95% of homes had detectable levels of mouse allergens. OTHER OUTCOMES: • Significant reductions noted in PM10 and VOC levels. • Declines (not statistically significant) were noted for CO and CO2 levels.	• No significant differences between 2 intervention groups may be due to overlap of interventions.

12. Advanced Energy *Technical Study (FY 2002)*	• Examined impact of construction intervention on: allergens, air communication between the house and crawl space, formaldehyde, mold-growth, relative humidity.
	• 16 non intervention homes.
	• 20 intervention homes were built to the System Vision Plus high performance standards:
	  • Idea behind Systems Vision: better HVAC, moisture control mechanisms, improved insulation and framing.
	  • Plus portion adds a sealed crawl space and April Air filter.
		MOLD AND MOISTURE OUTCOMES:
		• Most statistically important factor in relative humidity levels is the number of adults living in the home.
		• Second and third most important factors are whether the kitchen and bath fans draw more than 55 cubic feet per minute of air in the room.
		• Sealing crawl spaces resulted in crawl spaces having relative humidity levels that were lower than required for mold growth.
		• Systems Vision Plus protocol without additional mechanical dehumidification does not reliably reduce RH levels below 50%.
			• Analysis of allergen data to be done under phase 2 of project.

13.Environmental Health Watch *Technical Study*	• Exploratory study to determine the effectiveness of precision targeted IPM combined with a one-time cleaning	ALLERGEN OUTCOMES: • Substantial reductions in cockroach allergen levels were noted for all combinations of interventions.	• Conducted in a small number of units. • Relatively low pre-

<table>
<tr><th>Type of Grant</th><th>Description of Project</th><th>Examples of Major Outcomes Reported*</th><th>Additional Comments</th></tr>
<tr><td>(FY 1999)</td><td>based on the lead protocol and education in decreasing cockroach allergnens.
• 3 variations of the Lead Final Cleaning protocol used:
• Protocol only.
• Protocol plus wet vac for the final cleaning.
• Protocol plus wet vac and bleach solution.</td><td>• Proportion of allergen values greater than or equal to 8 U/g were as follows:<table><tr><td>Time</td><td>Lead only</td><td>Wet vac</td><td>Wet vac & bleach</td></tr><tr><td>Pre</td><td>33.3%</td><td>33.3%</td><td>45.4%</td></tr><tr><td>Post</td><td>16.7%</td><td>20.0%</td><td>27.3%</td></tr><tr><td>Follow-up</td><td>0%</td><td>0%</td><td>0%</td></tr></table>• Proportion of allergen values greater than or equal to 2 U/g were as follows:<table><tr><td>Time</td><td>Lead only</td><td>Wet vac</td><td>Wet vac & bleach</td></tr><tr><td>Pre</td><td>83.3%</td><td>93.3%</td><td>81.8%</td></tr><tr><td>Post</td><td>16.7%</td><td>86.7%</td><td>54.5%</td></tr><tr><td>Follow-up</td><td>0%</td><td>36.4%</td><td>37.5%</td></tr></table></td><td>cleaning allergen levels made it difficult to detect differences between groups.</td></tr>
<tr><td>14. University of Illinois Technical Study (FY 2003)</td><td>• Goal was to determine if insulation retrofits can improve thermal conditions at wall-ceiling juncture, thereby reducing mold growth or discoloration.</td><td>MOLD AND MOISTURE OUTCOMES:
• Insulation treatments at the truss location may be helpful in preventing moisture problems at the wall-ceiling juncture only in borderline cases.
• Determining factor for wall-ceiling moisture problems is indoor relative humidity.</td><td></td></tr>
<tr><td>15. Duke University Technical Study (FY 2001)</td><td>• Designed to assess allergen and asthma triggers in the indoor environment.
• Evaluated the importance of crawl spaces as sources of mold species in the livable part of the home environment.</td><td>MOLD AND MOISTURE OUTCOMES:
• Identified crawlspaces as a major source of mold transported into livable space.
• Noted a strong seasonal variation in indoor airborne fungi with implications for the assessment of indoor health risks.
• Total indoor fungal counts were twice as high during the warm summer months than the cool months, due to high cladosporium populations in the summer months.
ALLERGEN OUTCOMES:
• Identified that presence of bulk dust allergens and bioaersol</td><td></td></tr>
</table>

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
		allergens is related to both demographic (income, race, owner/renter) and physiographic variables (elevation, distance to forested areas). • Levels of Der p1 allergens were lower in warm humid months than colder months. • No seasonal variation noted in Der f1. • Levels of Der p1 found to be higher in higher median incomes and newer homes. • Bla g1 found more often in newer homes and renter-occupied housing.	

16. Georgia Tech Applied Research Corporation *Technical Study (FY 2003)*	• Lab-based study designed to investigate:
	  • if a lightweight, portable economical instrument using radar technology could be used to detect mold.
	  • 4 other technologies including gamma-ray imaging, neutron beam analyses, x-ray imaging, and t-ray imaging.
		MOLD ASSESSMENT OUTCOMES:
		• Radar technology was able to detect a change in dielectric constant caused by moisture content of mold that could be detected and mapped to the mold's location on the back of the wallboard.
		• Other 4 technologies showed promise, however cost and safety issues exclude them from further consideration.	

17. Air Quality Sciences, Inc. *Technical Study (FY 2001)*	• Survey of homes to establish baseline concentrations and types of airborne and dustborne mold in urban homes that do not have mold or signficant water damage.	MOLD ASSESSMENT OUTCOMES: • Leaf surface fungi dominate the composition of culturable fungi. • Water indicator fungi were essentially absent from both indoor air and dust samples. • Suggested that dust samples with less than 20% of colonies of leaf surface fungi are unlikely to be from buildings free of moisture or growth problems. • Concentrations of airborne mold in the summer were higher than in winter months. • Composition of indoor airborne fungi resembles the composition of outdoor airborne fungi.	• Only conducted in one urban area and therefore not representative of other areas.
18. Columbia University, Mailman School	• Goal was to utilize novel cost-effective methods of fungal exposure assessment in order to identify relationships	MOLD ASSESSMENT OUTCOMES: • Fungal specific IgG is not tightly correlated with fungal extracellular polysaccharides (EPS) found in environmental	• Development of assays for detection of Alternaria,

<table>
<tr><th>Type of Grant</th><th>Description of Project</th><th>Examples of Major Outcomes Reported*</th><th>Additional Comments</th></tr>
<tr><td>of Public Health Technical Study (FY 2001)</td><td>between mold exposure and respiratory symptoms.</td><td>dust samples.
• Allergens from mice and cockroaches are associated with fungal EPS.
HEALTH OUTCOME:
• Serum and dust markers of fungal EPS are inversely associated with respiratory symptoms in children within the first few years of life.</td><td>Aspergillus, Cladosporium, Penicillium, and Stachybotrys was hampered due to difficulty in antibody production.</td></tr>
<tr><td>19. University of Cincinnati Technical Study (FY 2001)</td><td>• Developed and tested (laboratory and field tested) a novel Fungal Spore Source Strength Tester (FSSST) that allows for assessment of aerosolization of fungal spores from contaminated surfaces.</td><td>MOLD ASSESSMENT OUTCOMES:
• Significant correlation FSSST and the swab method used to detect mold.
• No association between air or dust samples with the FSSST method.
• FSSST provides a ‘worst case scenario’ of potential mold spore release into the home.
• Culturability of spores from air, swab, and FSSST sampling varied greatly.</td><td>• Small sample size used for field study.</td></tr>
<tr><td>20. St. Louis University School of Public Health Technical Study (FY 2002)</td><td>• Lab-based and field study to evaluate different methods (e.g., steam, use of chemicals, and dry vacuum) in eradicating dust mites and mold in carpets.</td><td>MOLD/ALLERGEN OUTCOMES:
• Steam cleaning is effective method for killing molds and dust mites in carpet.
• Other chemicals such as neems oil and Lysol did not significantly reduce dust mites and molds.
• Proprietary chemical tested (only tested in lab and lacking toxicity testing) is effective in denaturing dust mite allergens in culture. It resulted in a 90% reduction in allergen levels in culture.</td><td>• Application process of the chemicals could affect results.</td></tr>
<tr><td>21. Harvard School of Public Health Technical Study (FY 2000)</td><td>• Community-centered project designed to engage public housing residents.
• Interventions focused on reducing asthma triggers through cleaning, mattress replacement, IPM.</td><td>HEALTH OUTCOMES:
• Significant improvements were noted in quality of life scores. Main areas of improvement included asthma symptoms, activity limitation, and emotional function.
• Several health conditions were reduced by 50% or more.
<table><tr><td>Health condition</td><td>% reporting pre-</td><td>% reporting post-</td></tr></table></td><td>• Cockroach allergen levels declined, but not below the exacerbation thresholds.</td></tr>
</table>

<table>
<tr><th>Type of Grant</th><th>Description of Project</th><th>Examples of Major Outcomes Reported*</th><th>Additional Comments</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td>intervention</td><td>intervention</td></tr>
<tr><td>Wheezing or tightness in chest or cough</td><td>76%</td><td>40%</td></tr>
<tr><td>Slowing down or stop playing</td><td>64%</td><td>26%</td></tr>
<tr><td>Waking up in the night due to asthma</td><td>64%</td><td>30%</td></tr>
</table>
IPM OUTCOME:
• Intense cleaning and IPM reduced allergen loads in all homes.
ALLERGEN OUTCOMES:
• Cockroach allergens were reduced by 77-86% in the kitchen and by 24-46% in the bedroom.
• Mattress covers kept dust mite allergen levels below sensitization levels.
OTHER OUTCOMES:
• Cleaning had little effect on pesticide residues.
• NO2 levels found to be significantly higher in heating season.
• 40% of units exceeded EPA outdoor air standards for NO2.
</td><td></td></tr>
<tr><td>22. University of Minnesota
Technical Study (FY 2003)</td><td>• Randomized trial to evaluate the effect of two interventions—cleaning and education—on reducing the levels of allergens.
• Examined baseline levels of allergens and molds in home.
• Characterized variablity in allergen levels between years and seasons.
• Explored the links between visual inspection tools and allergen prediction.</td><td>ALLERGEN ASSESSMENT OUTCOMES:
• Relative humidity was a better predictor of allergen concentrations over time than indoor temperature.
• Significant seasonal variations in Der f 1 and Der p 1.
• Housing type had more of an effect than season on Der f 1 and Der p 1, with single family homes having higher dust mite levels than apartments.
• Negligible seasonal variations for Fel d 1 and Bla g 1.
• Characteristics such as race/ethnicity, family income, and presence of cats had greater influence on Fel d 1 and Bla g 1.
• Cat and cockroach allergens are highly correlated over time. Suggests single measurements of cat and cockroach allergens are a reasonable surrogate for annual average exposure.
• Low correlations of fungal measures over time. Suggests repeated measurements of fungi are needed to characterize</td><td>• Lack of significant changes in dust mite allergens may be due to the low percentage of detectable samples.</td></tr>
</table>

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
		room-to-room or within-home variability. • Dust loadings significantly decreased by 45%. • Cat allergen levels significantly decreased by 58% (if a home had a cat). • Dust mite levels reduced (not statistically significant). • No significant effects on cockroach allergen levels. MOLD OUTCOME: • Overall fungal levels decreased by 23% (not statistically significant).	
23. University of Medicine & Dentistry of NJ *Technical Study (FY 2002)*	• Investigated the use of dry steam cleaning in reducing levels of dust mite allergens, lead, PAHs, and pesticides in carpets after regular HEPA vacuuming.	ALLERGEN AND DUST OUTCOMES: • Contaminant reductions on carpets improved with the use of dust finder indicator that led to a more prolonged vacuuming than is usually done by households or even than the length specified in HUD protocols. • Suggested that dry steam cleaning adds further reductions over those achieved with HEPA vacuuming alone. • A 29% reduction of lead loadings (as measured by wipe sampling) was seen with HEPA vacuuming, but a 40% reduction of lead loadings was seen with the addition of dry steam cleaning. • Although the same reduction pattern was noted with PAHs and house dust mite antigens, the results were not statistically significant.	

24. University of Wisconsin School of Pharmacy *Technical Study (FY 2000)*	• Interventions focus on lead, asthma, and injury.
	• Two intervention groups:
	  • Faciliation group received education and supplies to reduce risk of injury or asthma.
	  • Installation group was provided with education and the supplies were installed by project staff.
		INJURY OUTCOMES:
		• Developed an assessment algorithm sensitive to changes in the prevalence of home injury hazards. It uses information gathered from a questionnaire to determine a level of risk for the home.
		• No significant differences found in the accuracy of self-reported safety behaviors among ethnic/racial groups.
		HEALTH OUTCOME:
		• Allergy skin testing confirmed a substantial level of atopy in the population.
			• Small numbers reduced the ability to correlate asthma symptoms with dust allergen information.
			• Overlap between two intervention groups reduced the ability to detect differences.

Type of Grant	Description of Project	Examples of Major Outcomes Reported*	Additional Comments
25. Cuyahoga County Department of Development *Mold and Moisture Control (FY 1999)*	• Combined weatherization and healthy homes specifications. • Weatherization interventions include insulation of attics/walls, testing of appliances, electrical upgrades where needed, and venting bathroom and kitchen fans to an outside wall. • Healthy homes interventions focus on keeping water away from the home, particularly at the foundation. • Remediation group received household repairs. The control group received only cleaning information.	MOLD AND MOISTURE OUTCOMES: • Environmental assessments before and after the remediation found a significant decrease in visual mold (p=0.004) in remediated versus control homes. • Surface moisture measured at the basement structural beam was positively correlated with the amount of visible mold growing on cellulose material (Spearman, r=0.26). HEALTH OUTCOMES: • Subjects in the remediation group showed a significant reduction in maximum asthma symptom days compared to baseline, while the control group did not. • Emergency department visits and hospitalizations for asthma in the remediation group were significantly reduced compared to the control group.	
26. Illinois Department of Health *Mold and Moisture Control (FY 1999)*	• Focus of interventions was to control mold and moisture by repairing and replacing damaged materials and addressing sources. • Investigated the relationship between different types and amount of fungi, fungal metabolites, allergens, and moisture and children's health.	MOISTURE OUTCOMES: • Moisture problems from leaks exceeded those from winter condensation. • 79% of homes had improperly functioning gutters. • Roof leaks were the second major contributed to mold contamination. • Bathrooms and finished basements were most commonly affected by moisture problems. HEALTH OUTCOMES: • Significant improvements noted in children with highest antibodies as evidenced by reduction in ER visits and lost school days and improvement in pulmonary function test.	• Small sample size.

* Outcomes reported in this table were either recorded on the questionnaire or extracted from published manuscripts or final reports submitted to HUD.

5.2 Summary of Correlations Between Health Measures and Assessment Measures

Grantees were asked whether their projects were designed to correlate health measures with assessment measures. While such correlations were often not identified as major outcomes of their projects, examining correlations between health and assessment measures is key to improving our understanding of the connection between health and housing.

All of the grantees that investigated the relationship between health and assessment measures examined the connection between asthma symptoms, asthma severity, or frequency of emergency room visits and allergen levels or visual assessment measures. Out of the 23 grantees that indicated their studies were designed to examine correlations, 14 reported that their data analysis was not yet complete, four reported that their sample size proved to be too small to conduct this particular analysis, four found no statistically significant correlations (which may be due to small sample size or undue influence of a few individuals), and one found a statistically significant correlation. Table 5.2 identifies the measures assessed and results for the five grantees that examined their data.

Table 5.2: Links Between Health and Assessment Measures

Grantee (Award Date)	Health Measure(s)	Assessment Measure(s)	Findings
Boston Public Housing Commission (1999)	Allergen sensitivities (as determined by blood testing)	Allergen levels in dust	Allergies to cat, dog, mouse, and cockroaches did not correlate with exposure to their corresponding allergen. However, allergy to one type of dust mite correlated with exposure ($p=0.057$)
City of Milwaukee Health Department (2002)	Visits to ER rooms, missed schools days, sleepless nights, parental anxiety	Dust allergen levels	No statistically significant correlations were found.
Columbia University (2001)	Symptoms of allergic rhinitis, eczema, and asthma	Concentrations of Asp/Pen EPS	There was a statistically inverse association between EPS in the dust and some early markers of asthma (such as wheezing/difficulty breathing).
Cuyahoga County Department of Development (1999)	Asthma symptom days and symptoms scores	Levels of allergens (dust mite, cockroach, rodent urine)	No statistically significant correlation was found.

Grantee (Award Date)	Health Measure(s)	Assessment Measure(s)	Findings
Harvard School of Public Health (2000)	Quality of Life scores	Levels of allergens and pesticides (categorized as high/low)	No direct associations were found between the levels of allergens and pesticides and improvements in quality of life.

5.3 Summary of Healthy Homes Curricula Created

As part of their educational activities, 34 grantees (54%) have developed training curricula that focus on healthy homes issues. Eleven of these grantees continue to use the curricula although their projects have ended. Of the 34 that developed training curricula, 13 (38%) distributed their materials to others for use. Audiences for these trainings include nurses, doctors, field assessors, community health workers and contractors. Appendix C describes some of the trainings developed by various grantees.

5.4 Summary of Educational Materials Created

In addition to using already created materials, 42 grantees (or 67%) have created educational materials specifically for their projects. Twenty-four grantees continue to use the materials even though their projects have ended. Examples include fact sheets, public service announcements, web-sites, videos, and brochures/pamphlets. Appendix D lists some of the materials created by grantees.

5.5 Product/Instrument Testing or Development

Eleven grantees reported that their projects were designed to test or develop specific products or instruments. Most of these grantees (9 out of 11) were Technical Studies grantees. Although, current NOFA's indicate that HUD is primarily interested in the improvement of existing instruments or methods, and not in the development of new technologies or instruments, six of the 11 grantees funded between 1999 and 2004 focused on developing products/instruments that could be used in the assessment process. While most of these tools have not yet been field tested, significant progress has been made in their development. Four of the grantees tested products that could be used as interventions and one tested a commonly used product to determine potential hazards. Table 5.3 provides a brief description of the product/instrument developed or tested, the reason for its development or testing, and the product/instrument's effectiveness. Overall, five grantees reported that the product/instrument was effective for the purposes tested, five other grantees reported that the product/instrument was ineffective, and one reported that the results were inconclusive.

Table 5.3: Testing or Development of a Specific Product/Instrument

Grantee Name (Award Date)	Product or Instrument developed or tested	Purpose for testing or developing	Effective (Yes/No/ Data Inconclusive)	Comments
Advanced Energy (2002)	Testing of the Systems Vision Plus protocol. The Systems Vision protocol focuses on improving HVAC systems, moisture control mechanisms, insulation, framing, and planned exhaust to guarantee increased comfort and energy savings. The Plus part of the protocol involves sealing the crawl space and installing an April Aire Filter.	To determine if using this protocol leads to a more energy efficient and durable house that can have an impact on health.	Data analysis not complete.	No additional comments provided.
Columbia University (2001)	Development of assays for detecting Alterneria, Aspergillus, Cladosporium, Penicillium, and Stachybotrys	To develop markers for fungal exposure in the home and also biomarkers of fungal exposure.	Inconclusive	The development of the fungal EPS assays for detection of the molds of interest in dust was hampered by difficulty in antibody production with sufficient sensitivity and specificity.
Georgia Tech Applied Research Corporation (2004)	Development of a personal exposure monitoring vest for children.	To develop a personal monitoring vest that is able to monitor a variety of pollutants that are suspected as being asthmatic aggravators that could be linked with pulmonary function tests.	Data analysis not complete	No additional comments provided.

Grantee Name (Award Date)	Product or Instrument developed or tested	Purpose for testing or developing	Effective (Yes/No/ Data Inconclusive)	Comments
Medical and Heath Research Association of NYC, Inc. (2001)	Development of a visual assessment tool.	To determine whether a low cost visual assessment tool is as effective as environmental sampling in identifying hazards.	Effective	No additional comments provided.
NY Indoor Environmental Quality Center (2003)	Testing of a window mounted Heat-Recovery Ventilator and Testing of a "real time" multi-sensor data logger in the field.	To determine the effectiveness of the window mounted heat-recovery ventilator in reducing contaminants in a child's bedroom and to identify the usefulness of the real time logger for such studies.	Data analysis not complete	No additional comments provided.
Radiation Monitoring Devices, Inc. (2001)	Development of a portable biosensor that detects and quantifies mold spores.	To develop a sensor that would permit rapid detection (within an hour) of unhealthy levels of mold spores in water-damaged buildings.	Data analysis not complete	This instrument could not be developed due to problems with obtaining the monoclonal antibodies that were necessary.
Research Triangle Institute (RTI) (2001)	Development of a vacuum/XRF system that is battery powered.	To develop a lightweight (2-3 pounds plus battery weight) vacuum/XRF system that efficiently, quickly, and cheaply collects and analyzes lead dust in the field.	Effective	Several issues need to be resolved before the instrument is ready for field testing. These include: 1) minimizing loss to deposition in funnel walls; 2) selection of the optimal filter; and 3) development of a final nozzle design. RTI continues to address these issues.

Grantee Name (Award Date)	Product or Instrument developed or tested	Purpose for testing or developing	Effective (Yes/No/ Data Inconclusive)	Comments
St. Louis University (2002)	Testing of various chemicals including Lysol, neems oil, benzyl benzoate, and a proprietary chemical.	To determine if these chemicals have the ability to decrease dust mites and molds in carpets.	Ineffective	Most of the chemical products (with the exclusion of the proprietary chemical) did not significantly decrease the growth of dust mites and molds. However, the method in which the chemicals are applied to the carpets may have influenced the findings.
University of Illinois at Urbana-Champagne (2004)	Testing of ventless gas fireplaces.	To determine if ventless gas fireplaces increase CO, CO_2, NO_2, and O_2 levels.	See comments	Preliminary results (half of field tests completed) show CO concentrations from vent-free gas fireplaces did not exceed EPA 1-hour average guidelines during periods of use, but did occasionally (two units) exceed EPA 8-hour average guidelines. They also showed that NO_2 concentrations often exceed international guidelines during periods of operation, but O_2 concentrations did not fall below NIOSH guidelines of 19.5%.
University of Medicine and Dentistry of NJ (2002)	Testing of a dry steam cleaner.	To determine if dry steam cleaning decreases the level of contaminants in carpets, especially their surfaces.	Effective	Not all the results achieved statistical significance; however, results indicate that overall there were reductions in contaminant

Grantee Name (Award Date)	Product or Instrument developed or tested	Purpose for testing or developing	Effective (Yes/No/ Data Inconclusive)	Comments
				levels with the addition of dry steam cleaning. The biggest reduction was seen in carpet dust lead levels, including reductions in surface-lead levels as measured by wipe sampling
University of Cincinnati (2001)	Development of a Fungal Spore Source Strength Tester (FSSST) which consists of an inner cup through which HEPA filtered air is directed onto the contaminated surface and an outer cap through which released spores are transported to a bioaerosol sample.	To develop a tool that could be used for measuring fungal spore emissions in residential homes. It would allow assessment of aerosolization of fungal spores from contaminated surfaces under the most favorable release conditions.	Effective	FSSST is suitable for identification and quantification of potential aerosolization of fungal spores. The method is believed to have good potential to be used by inspectors and contractors.

5.6 Determination of the Overall Effectiveness of a Specific Intervention

Fourteen (14) grantees reported that their projects were designed to determine the overall effectiveness of a specific intervention. Five grantees focused on the effectiveness of educational interventions, five focused on the effectiveness of contaminant reduction activities, three focused specifically on the effectiveness of IPM interventions, and one focused on the effectiveness of a specific moisture control activity.

While one grantee reported that education improved the conditions in the housing units, another grantee reported that they were unable to determine the effectiveness of education in reducing hazards due to a small sample size. The other three grantees focusing on educational interventions hope to show that using repeated educational visits is an effective method for reducing allergen concentrations, decreasing blood lead levels, and/or decreasing stress. However, data analyses for these projects are not yet complete as the projects are on-going.

Out of the five grantees focused on determining the effectiveness of interventions in reducing contaminants in the home, one determined that steam cleaning is an effective method for controlling dust mites and molds, one showed that overall trends indicate that dry steam cleaning was effective in reducing contaminant levels including lead dust and dust mites in carpets (only the reduction in lead was statistically significant), and one grantee determined that CO concentrations could be reduced in the home with the installation range hoods vented to the exterior. The other two grantees have not yet been able to determine the effectiveness of their interventions as their projects are on-going. One grantee is examining if designing a home using a specific "Breathe Easy" protocol, which includes insulating the foundation, installing moisture removing fans, using natural products and low VOC paints, and using a filtered air ventilation system, is effective in reducing contaminant levels. The other grantee is investigating the use of a heat recovery ventilator as a method for reducing contaminants in bedroom air.

All three grantees focusing on IPM activities found that IPM interventions were effective in reducing cockroach infestations. Two of these grantees also indicated that the level of effectiveness in multi-family buildings depends on the whether all of the units are treated.

One grantee focusing on moisture control found that specific methods for installing insulation aimed at reducing or eliminating condensation based moisture and mold conditions at the exterior wall/ceiling junction, could be effective in warming the area. However, the effects are marginal since the area is warmed only a few degrees.

5.7 Use of a Control Group and Reported Outcomes

Sixteen (16) grantees reported using a control group in their project. In approximately half (8) of the projects that reported using a control group, the "intervention" groups received a set of immediate interventions and the control groups received the same set of interventions one year later. Although most projects designed this way are not yet

complete, one project was able to demonstrate significant differences between the two groups using this method.

For the other projects using control groups, the control groups received a set of interventions and the intervention groups received the same interventions plus additional ones. (See Table 5.1 for examples.) Many of these projects have not yet analyzed their data; however, four grantees with results available found no significant difference between the groups. These findings may be due to the significant overlap between interventions received by both groups and a limited sample size to detect small differences.

5.8 Determination of the Cost-Effectiveness of the Approach Used

Almost half of the grantees interviewed (28 of 61) reported that they collected data that allowed them to determine the cost-effectiveness of the approach/product. The majority (23 out of 28) were Demonstration grantees. Overall, 12 grantees reported that their approaches/products were cost-effective, 12 reported that their data were not yet analyzed, and four reported that results were inconclusive. Several grantees reported that their approaches/products were cost-effective based on examining the costs of their interventions and comparing these costs to the reduction of hazards. For example, one grantee stated its approach was cost-effective based on comparing the cost of interventions to the improvements in air quality. Other grantees stated that their approaches were cost-effective based on comparing the costs of their interventions or assessments to the cost of other interventions or assessment methods. For example, one program compared the actual costs of remediation to a baseline range of $2100 to $5000 per unit that was established based on prior experience. Another grantee examined the costs associated with using a visual assessment tool versus the cost of using environmental sampling as an assessment measure. Although a few grantees reported that they anticipate comparing the cost of their interventions to savings in health care related costs, no grantee reported completing this type of analysis to date.

5.9 Efforts to Raise Awareness and Increase Sustainability

Highlighting results and raising awareness of others are important first steps towards sustaining the Healthy Homes Initiative. Approximately one-quarter of grantees (14 of 61, or 23%) stated that their project findings were written in manuscript form for publication, while 48% said that they had not yet written manuscripts but intended to do so. Of the 14 grantees that wrote manuscripts, eight (57%) stated that project findings were published in a peer-reviewed journal. A full list of published articles and anticipated publications is included in Appendix E. Figure 5.1 below provides a pie chart showing the percentage of grantees with published manuscripts, the percentage that intend to but have not yet published manuscripts, and the percentage of grantees that do not intend to publish manuscripts (Technical Studies grantees are required to produce a draft manuscript for publication). Assuming that most grantees do not publish results until their projects are completed, Figures 5.2 and 5.3 below show the percentage breakdown for Technical Studies and Demonstration grantees, respectively, that had finished

completed projects as of December 31, 2005. (Note: Two Demonstration grantees with projects ending in 2006 reported publications.)

Figure 5.1 Percentage of Grantees with Publications (n=63)

Figures 5.2 and 5.3 Percentage of Grantees with Publications by Grantee Type

About 67% of all grantees noted that their project findings received coverage in one or more media outlets, including newsletters, newspapers, TV, radio, and websites. Forty-four (44) percent of these grantees reported that the main purpose of this media coverage was to help in recruitment rather than to highlight study results (24%). Two-thirds of grantees (67%, or 42 of 63) reported that formal presentations about the project were made to professional organizations, 11% of grantees made presentations to industry organizations, and 35% made presentations to city officials.

Another step towards increasing sustainability is to use information to push for changes in policy or practice. Two-thirds of the grantees with completed projects reported that information gained in the process became the basis for policy or practice modifications (see Table 5.4 below). The majority of these changes were made within the grantee's organization or within partner organization(s).

Table 5.4: Summary of changes in policy/practices

	Demon-stration	Technical Studies	All
Project information used to make changes in policy/practice (n=25 for Demonstration grantees, 14 for Technical Studies grantees, 39 for all)[a]	20 (80%)	4 (29%)	24 (62%)
• **Policies/practices of grantee's organization**	13 (52%)	0 (0%)	13 (33%)
• **Policies/practices of a partner organization**	13 (52%)	2 (14%)	15 (38%)
• **Housing codes**	2 (8%)	0 (0%)	2 (5%)
• **Medical management**	2 (8%)	0 (0%)	2 (5%)
• **Introduction of new statues/ordinances**	2 (8%)	0 (0%)	2 (5%)
• **Introduction of new codes/regulations**	3 (12%)	0 (0%)	3 (8%)
• **Other[b]**	9 (24%)	3 (30%)	12 (25%)
• **Other[c]: Development of new initiatives (e.g., new trainings programs)**	4 (16%)	0 (0%)	4 (10%)

[a]Grantees were permitted to check more than one type of policy/practice change; therefore, summing numbers across all items not appropriate.
[b]On the questionnaire, each grantee was permitted to list one type of policy/practice other than the six specifically listed.
[c] Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

In the absence of federal funds, two-thirds of the grantees reported that one or more aspects of their projects were sustainable. The majority of these grantees specified that educational activities could continue to be carried out either by their organization or by project partners. At least two grantees reported they were successful in being able to integrate their healthy homes curricula into training done by others. For example, Alameda County, California developed a one-hour training, entitled "The Healthy Homes Concept: Building a Better Future," which continues to be offered as part of the University of California, Berkeley extension course.

Other grantees reported that the results from their projects could be used to leverage funds from other sources. Three grantees, identified below, indicated that other sources of funding were already established:

Boston Public Housing Commission

> "The City has an on-going commitment to deliver education and cleaning supplies to 50 families per year and to provide large scale IPM efforts in public housing. Both of these efforts receive private funding. Future IPM efforts are being funded by the W.K. Kellogg Foundation."

Coalition to End Childhood Lead Poisoning

> "Our program annually receives limited Annie E. Casey Foundation funds to provide 25 Healthy Homes interventions including safety kit installation, cleaning kit distribution, and IPM as part of our Safe at Home Program."

Research Triangle Institute

> "Research Triangle Institute is using internal funds to continue to search for a method to minimize loss of particles to the inside surfaces of the XRF vacuum analyzer that we have been developing as part of the HUD project."

Chapter 6: SUMMARY OF SITE VISITS

Three site visits were conducted to grantees identified as "high-performance" grantees by HUD. Because they are more programmatically oriented, Demonstration grantees were selected with the expectation that they would be more likely to identify effective practices that could be adopted by other programs, as opposed to Technical Studies grantees with their more unique study designs. The purpose of the site visits was to gain a better understanding of the grantees' healthy homes projects and to identify effective aspects of the programs that have helped them reach their goals and objectives. During each visit, meetings were held with various project partners and two to three enrolled housing units were visited at each site. This chapter provides a brief summary of each of the grantee projects, identifies changes instituted from lessons learned in their previous projects, highlights outcome information, and discusses strengths and challenges of each project.

6.1 ERIE COUNTY Department of Health (Buffalo, New York)

Grant Awards: 2000 and 2003 Demonstration grants

Project Partners: Department of Social Services of Erie County
Environmental Education Association
Cortese Brothers Construction
Department of Environmental Planning of Erie County
Buffalo Prenatal Clinic
Home Depot

Project goal: The projects for both grant periods focus on creating safer and healthier homes by educating landlords and residents on how to improve household conditions that can cause injury or adversely affect one's health. Focus areas include asthma, unintentional injuries and lead poisoning.

Recruitment: During both grant periods, properties to be rented to low-income families with young children were primarily identified through the Department of Social Services (DSS) Housing Assistance program. Potential renters were encouraged to participate in the HHI program.

Assessment: An inspector from the health department conducts a visual inspection of each subject property before a tenant moves in, using a standardized assessment tool to identify potential hazards associated with childhood lead poisoning, asthma, and unintentional injury. The assessment tool focuses on items such as: condition of windows, broken stairs, chipped paint, and presence of smoke and carbon monoxide detectors. If deficiencies or violations are observed, the property owner is informed that these violations are to be corrected before a tenant moves in. This information is also relayed back to the Department of Social Services.

During a visit with the tenant, demographic information is collected on the family and the SF-8 form of the Quality of Life tool is administered to assess overall physical and emotional health as well as functional status. In addition, tenants are asked a series of ten questions to identify their knowledge about asthma, household injuries, and lead poisoning.

Intervention: Landlords are provided with training and materials such as carbon monoxide and smoke detectors, outlet and switch plate covers, and furnace filters to improve their properties. If needed, referrals were made to other programs such as the local lead poisoning prevention program. Families moving into the inspected units received an education visit that included information on tenants' rights and safe living practices. They also received "housewarming gifts" promoting safe and clean living such as swiffer mops and refills, laundry detergent, cleaners, shower curtain liners, and kitchen and bath trash cans and liners. It is estimated that average interventions costs are $134 per unit.

Follow-up activities: Six months after the initial unit inspection and educational visit, follow-up visits were conducted. The same assessment tools used initially were re-administered.

Lessons learned from first grant: Even though the activities carried out during both grant periods were very similar, the grantee made several changes based on lessons they learned from the first grant. These changes are described in detail below.

1. During the first grant period, one individual was responsible for conducting the assessments of the properties and another individual provided education to the tenants. However, during the second grant period, the same individual that conducted the assessment also conducted the educational session for the tenant. This continuity helped to gain access back into some of the homes and increased familiarity with the environment and the client household.
2. Radon testing was not included in the second grant. The grantee had difficulty collecting the radon detectors from the homes, because many times no one would be at the property when they returned. Also, radon test results from the first round showed that all of the homes had levels that were less than 2piC/L (half of EPA's action limit).
3. Difficulties in recruitment and retention during the first grant period led to expanding the recruitment area for the second grant.

Outcome information:

1. The grantee developed a variety of educational tools for this project. For example, they created coloring and activity books to educate young children about healthy homes issues. A "Have a Healthy Home" handbook was also developed for residents and made available in both English and Spanish.
2. This grantee compared pre- and post-intervention data and discovered that treated units were less likely to have new violations/hazards at the follow-up evaluation. Also fewer households presented multiple violations and asthma and unintentional injury hazards were reduced. Residents also reported better overall

health as measured by a questionnaire. Individuals who reported being in very good or excellent health increased from 53% to 71%.

Strengths/Effective Practices:

1. In Erie County, the DSS requires that a rental unit be inspected before Social Services will agree to pay a security deposit. Linking with the Department of Social Services to identify housing units has been an invaluable source of recruitment for the grantee. Furthermore, the involvement of this agency in encouraging participation by the tenant family was an added benefit to the process.
2. Because the healthy homes inspections are conducted by the health department staff, citations for code violations and other hazards noted require compliance by the property owner. If the identified hazards are not corrected, the program will refer the issue to its housing court. The program has a close working relationship with the housing court.
3. There has been little turnover in project staff during the two grant periods, which has allowed the program to operate efficiently. In addition, project staff work closely with other health department staff to address identified needs.
4. The program has a well-established referral system. Although the program does not address lead hazards with funds from its healthy homes grant, they have created a referral form sent directly to the lead poisoning prevention program. This referral process is monitored to ensure that the client's needs are met.
5. Effective partnerships also contribute to the success of this grantee. For example, the grantee works closely with a large construction contractor in the area on other projects. This contractor is well-known throughout the community, believes in the healthy housing concepts, and works to engage other landlords in trainings offered and the overall healthy homes initiative.

Challenges:

1. Due to the effectiveness of the grantee's recruitment strategy, this program has an ample supply of eligible units available for enrollment. Recruitment is uniquely secured through this intra-agency collaboration. The grantee's challenge is to keep up with the need to inspect and complete interventions within the local communities of concern.
2. Like many other grantees, Erie County often has difficulty in getting back into the housing units to conduct the follow-up assessments.
3. In order to determine the overall effectiveness of their efforts, the program plans on comparing information collected from homes that received both physical interventions and an educational intervention with those projects that received only the physical intervention. However, the grantee feels that this analytical approach may not have the statistical power to detect a difference between the two intervention groups, because of the significant overlap in interventions. To detect subtle differences would require a larger sample size.

6.2 CUYAHOGA COUNTY (Cleveland, Ohio)

Grant Awards: 1999 Mold and Moisture Control grant (Cuyahoga County Department of Development)
2003 Demonstration grant (Cuyahoga County Board of Health)

Current Project Partners:
Cuyahoga County Board of Health
Case Western Reserve University
Cleveland Housing Network
Environmental Health Watch
Greater Cleveland Asthma Coalition
Cuyahoga County Department of Development
Cleveland Tenants Organization
Starting Point

Project Goal: In its current 2003 healthy homes project, the Cuyahoga County Board of Health partners with an existing weatherization program in an effort to provide an integrated approach to reduce asthma triggers. The goal of this project is to infuse healthy homes considerations into weatherization activities and illustrate that the energy efficiency of a home can be improved while also improving the indoor air quality.

Recruitment: The project targeted families with children under the age of 16 who were eligible for weatherization services. While most of the recruitment came through the Housing Weatherization Assistance Program additional referrals were made through Starting Point for Early Childhood Education and Child Care Homes. The Weatherization Program provided an ample source of eligible housing units and client families for this project, ensuring ease of intake and enrollment.

Assessment: Weatherization and healthy housing inspections are conducted simultaneously using a trained group of seven certified lead risk assessors. A visual assessment tool is used to record lead hazards, moisture problems, visual mold, pest infestations, and appliances presenting carbon monoxide hazards. The program also records basic information about the presence of asthma for any child living in the home. Environmental sampling consists of collecting lead dust, cockroach allergens, dust mites allergens, mouse allergens, mold, temperature, and relative humidity, and beta glucan (an index of fungal mold) measurements.

Interventions: Combined weatherization and healthy homes specifications are written for each unit. Weatherization interventions include insulation of attics/walls, testing of appliances, electrical upgrades where needed, and venting bathroom and kitchen fans to an outside wall. (Window replacement is not done.) Healthy homes interventions focus on keeping water away from the home, particularly at the foundation. This includes directing downspouts and gutters away from the structure, creating a flash joint between the foundation and soil, removing materials such as carpeting and drywall from basements, reducing moisture in the crawlspace, and eliminating sub-slab duct and

heating systems. Plumbing leaks within the unit are repaired as well. In addition, an outside contractor is hired to perform IPM activities when necessary. The weatherization activities are paid for under the weatherization grant and the average cost per unit of the healthy homes interventions is $2,399 per unit. Group education sessions are held for families that have their homes remediated. These education sessions focus on asthma, asthma triggers, and the expected remediation outcomes.

Follow-up: Follow-up visits are conducted six months post intervention.

Lessons learned from the first grant:

1. In the second grant, the information collected was more closely aligned with the intended goals. For instance, instead of analyzing individual environmental samples, composite samples were collected. The visual assessment tool was also shortened and focused on specific concerns to be addressed.
2. Due to difficulty in enrolling clients in the first grant period, the second grant had less strict recruitment criteria, particularly with respect to geographic criteria.
3. Long-term monitoring of relative humidity and temperature was conducted in the first grant cycle; however, logistical difficulties in collecting these records resulted in using "real-time" sampling during the second grant program.

Outcome information:

Although data from the second grant has not yet been analyzed, findings of interest from the earlier grant suggest promising information will be found. This expectation is based on similarity of interventions used in both grant periods and a larger sample size to investigate. These earlier findings include:

1. Moderately severe asthmatic children had a significant decrease in symptom scores and symptom days following remediation.
2. During the six-month period following remediation, asthmatics receiving home interventions had a lower rate of exacerbations requiring hospitalizations or an emergency room visit, compared to control asthmatics.
3. The program successfully integrated healthy homes interventions into weatherization specifications.
4. Asthma symptom days and symptom scores were not found to be correlated with allergens levels in settled dust.
5. The housing interventions reduced mold and moisture in the homes.
6. At least two peer reviewed papers have been published to help disseminate the findings.

Strengths/Effective Practices

1. This program has developed strong partnerships with several organizations. The most effective partnership was developed with the weatherization program. This relationship helped with recruitment efforts and helped to complete integrated interventions in the home.
2. Because the program was intertwined with the weatherization program, families had to meet very specific criteria to be eligible. The program found that providing copies of documentation of income and completing the application was often a

deterrent for potential enrollees. To help address this issue, the project staff now use a hand held scanner in the field to copy income verification forms and an individual was hired to assist clients in completing the application process.

3. The program has developed a pool of contractors for completing interventions. They have also established a fixed price list for each type of intervention. This pricelist eliminates the need for obtaining bids on the job and shortens the time required from scope of work to contractor interventions.
4. This project consists of many different partners, each with clearly defined roles.
5. The grantee has been very effective in disseminating information, both at the local level as well as through published manuscripts disseminated to professionals.

Challenges

1. Although working with many different partners is a strength of this program, effective coordination among the multiple partners is a challenge.
2. Because the program relies on home-improvement contractors working in a variety of venues, there are sometimes delays in scheduling of work. In the future, the program would like to expand its contractor pool.
3. A rigorous cleaning intervention is frequently included in the final phase of work within the unit. Typically, home improvement contractors engaged in this work are reluctant to complete this final cleaning intervention. One possible resolution to this problem being considered by the grantee is to engage a trained cleaning contract crew to carry out this specific intervention.
4. Some houses require extensive repairs likely to exceed the budgetary guidelines/caps set by the program. In these instances, the program has to decide whether to enroll the house or to identify additional resources needed. This frequent complication in deteriorated urban housing is challenging.

6.3 MEDICAL FOUNDATION OF NEW ENGLAND (Boston, MA)

Grant Award: 2003 Demonstration grant

Project Partners: Boston Public Health Commission
Vermont Housing and Conservation Board
ERT Associates
Boston Housing Authority
Boston Urban Asthma Coalition

Project Goals: This project has several goals, including increasing the adoption of healthy homes practices, improving/enhancing inspectional skills of code inspectors through training, and increasing the demand for healthy homes throughout urban and rural communities. These goals include piloting healthy homes interventions in both an urban (Boston) and a rural (Vermont) setting and piloting IPM activities in a multi-unit high-rise building.

Recruitment:

Boston Site: The Boston Public Health Commission worked with two community

development corporations to recruit low-income families with asthmatic children. Vermont Site: The Vermont project staff focused on recruiting the same population through pediatricians' offices, clinics, and the local lead program. IPM project: Project staff worked with the Boston Housing Authority to identify a multi-unit building for IPM interventions.

Assessment: Comprehensive visual assessments of subject properties were completed in both the Boston and Vermont areas. These assessments focused on dust, pest infestations, building systems, mold and moisture, pets, and the presence of environmental tobacco smoke. Detailed health data were collected from all participants.

Intervention: Housing units in Boston were randomized into two groups to receive interventions. One group received the home inspection, education, and portable interventions (such as provision of supplies) immediately followed by "corrective interventions" consisting of carpet removal, installation of bath fans (or proper venting of existing fans), venting of gas ranges, repairs of plumbing or gas leaks, intensive pest management services, and replacement of windows and doors. The second group received the home inspection, education, and portable interventions, but did not receive corrective interventions until four months later. While many of these interventions were the same for housing units in Vermont, there was less emphasis on IPM and more on indoor air quality issues.

In the IPM project, a resident of the multi-family building was trained to engage each of the residents in efforts to reduce or eliminate sources of food contributing to pest infestations in the individual units. IPM was then conducted throughout the building with special emphasis on the common areas which had previously not be been treated. Follow-up visits to "problem units" were then made on a regular schedule by the resident coordinator with consistent reminders to keep food properly stored.

Follow-up: Three months after the interventions, a follow-up assessment of the housing unit and client were completed using the initial assessment forms.

Outcome information:

1. In the multi-family unit, monitoring of pests revealed that common areas of the building had the largest cockroach infestation. The IPM project produced dramatic reductions in pest populations at a housing development that had been plagued with pest problems for many years. Costs were documented and shown to be similar or less costly than traditional pest control methods when full costs were included (e.g., staff time). The effectiveness of this pest management plan advanced a major change in IPM protocols throughout other multi-family buildings within the Boston Housing Authority , and extends information to other multi-family buildings troubled with similar infestations.
2. This project has been successful in ensuring that health considerations are taken into account in the construction, renovation and maintenance of affordable housing. ARC and its sub-grantees participate in a local network of health and green housing advocates and have worked to ensure health is front and center in

the outreach/advocacy efforts of this group. This has resulted in inclusions of health in the language and actions used by the City of Boston, for example, in its efforts to promote green building.

3. This project helped secure changes in state and local level construction and design standards linked to funding of affordable housing in Maine, Massachusetts, Boston, New Hampshire, Vermont and emerging commitments in Rhode Island and Connecticut. These changes will affect the construction of over 2000 units each year and 11,000 existing housing units. The work has also helped spur an innovative healthy homes project in Newport, R.I. to assess asthma and environmental triggers in housing and address these issues through social service delivery, housing and maintenance repairs, and linkages with health care providers.
4. Two educational videos on integrated pest management were developed: one for residents and one for rental property owners.
5. A healthy homes building guidance, technical information on selecting healthier residential flooring, and a companion technical resource were developed. These materials are included in The National Center for Healthy Housing's Health Housing Practitioner Resources CD.
6. There were 5 major training sessions attracting more than 100 participants at each event. The grantee also held a one day healthy homes course for builders. This was done through local partners and sponsoring agencies. Grantee staff and partners trained weatherization contractors and code inspectors in healthy homes concepts.
7. ARC's training, technical guidance and outreach helped to achieve changes in state and local policies. These changes incorporate healthy housing practices into standards affecting the construction, renovation and maintenance of affordable housing. These changes in housing standards will have far-reaching impacts and currently are either in practice or under consideration in all six New England states.
8. Although, final analysis is not complete, preliminary data indicates that most participating children have incurred fewer asthma attacks and missed fewer school days since the intervention. There has also been positive feedback regarding the air purifier installed in the child's bedroom in the Vermont area. Use of the air purifier also corresponds with improved health indicators (e.g. asthma events) for the child.

Strengths/Effective Practices

1. A unique regional approach to health and housing issues sets this grantee apart from others.
2. In addition, the grantee's educational and outreach efforts place great emphasis on changing policy to ensure sustainability of the healthy homes effort.
3. Working with and providing guidance to individuals working on the "green buildings" movement has proved to be an effective means for ensuring that healthy housing concepts are included in policies and practices.

4. This grantee effectively used information they collected, such as the cost savings associated with IPM activities, to push for changes in policies and practices of other organizations.
5. In order to create and promote lasting policy changes at State and regional levels this grantee discovered that working through financing agencies appears to be more efficient and effective than trying to change policies and protocols on a local level.

Challenge

1. The grantee has found that obtaining reliable contractors has been difficult. However, they have found that hiring slightly higher paid contractors has resulted in much better quality of work.

Chapter 7: SUMMARY OF PROJECTS FUNDED THROUGH INTERAGENCY AGREEMENTS AND CONTRACTS

In implementing the HHI, HUD has supported and initiated a variety of work through Interagency Agreements (IAAs) and contracts. Focus areas for these efforts include (1) research, (2) tools and resources, and (3) training, education and outreach. This chapter provides a brief summary of the various projects according to focus area.

7.1 RESEARCH

A major focus of the HHI has been to increase knowledge about healthy homes issues. As a result, several research projects have been funded by HUD. Several of these projects focus on areas of interest identified in the 1999 HHI Preliminary Plan, including indoor air quality issues and allergen distribution in settled dust. In addition, studies were funded to examine variability in dust allergen analysis and to conduct a review of residential injury mortality data.

Information was generated regarding:

- Characterization of the U.S. housing stock.
- The transport of air and pollutants from attached garages.
- Ability to model the impact of specific interventions on indoor air quality.
- The link between endotoxin and *Alternaria alternata* exposure and asthma.
- Characterizing dust allergen levels in a representative sample of U.S. housing.
- Home injury-related death rates.

Databases were created that:

- Can be used in modeling to address indoor air quality, ventilation, and energy issues.
- Contained information on envelope leakage, weather, ventilation system characteristics, contaminant source emission rates, sink removal rates, occupant schedules and air cleaner removal rates.
- Enable modelers to simulate a wide range of exposure scenarios in different types of buildings.

Each research project is summarized below.

7.1.1 Project: A Collection of Homes to Represent the U.S. Housing Stock

Identification of the housing type is an important first step toward assessing the potential impact of indoor air quality controls on a large scale. Because field studies are often complex and costly, modeling can provide a better option for drawing conclusions on which policies can be based. However, in order to provide relevant and useful information, the modeling must include data that are representative of the actual housing stock. This project used information from the US Department of Energy Residential

Energy Consumption Survey and the US Census Bureau American Housing Survey to define a collection of homes that represent the housing stock of the country. Based on results, over 200 types of dwellings, consisting of four main categories of housing (detached, attached, manufactured homes, and apartments), were determined to represent 80% of the U.S. housing stock. Floor plans were also developed for each housing type and entered into a model for predicting airflow and contaminant concentrations. A report entitled "A Collection of Homes to Represent the U.S. Housing Stock" was drafted that describes the process of defining the homes and the validity of using this data in developing and testing models. (Available on-line at http://www.bfrl.nist.gov/IAQanalysis/case20%studies/cwcase_11.htm). Project support: IAA with the National Institute of Standards and Technology (NIST).

7.1.2 Project: Air and Pollutant Transport from Attached Garages to Residential Living Spaces

This project examined the movement of contaminants from attached garages into the living space via computer simulations. First, a literature review was conducted to examine what was previously known about this issue and to identify research gaps. Second, a field study was conducted in a sample of five U.S. homes to estimate the range of air tightness in attached garages and the house-garage interface. Although in draft form, a report describing the results of the study indicates that the garage is often twice as leaky as the house and that the house-garage interface is almost two and half times leakier than the rest of the house envelope. Project support: IAA with the NIST.

7.1.3 Project: Development of IAQ Model Input Databases: Volatile Organic Compound Source Emission Rates

In order to use indoor air quality models for predicting airflows, contaminant concentrations, and personal exposures for a specific indoor environment, a wide range of input data is needed. This includes data on envelope leakage, weather, ventilation system characteristics, contaminant source emission rates, sink removal rates, occupant schedules and air cleaner removal rates. This project focused on reviewing available literature to compile this information into searchable databases for use in indoor air quality models. It also included the development of the volatile organic compound source emission rate database based on published and unpublished data. Creation of such a modeling tool provides valuable information when conducting indoor air quality monitoring. Project support: IAA with the NIST.

7.1.4 Project: Modeling the IAQ Impact of HHI Interventions in Inner-City Housing

This project is a simulation study designed to evaluate the impact of various interventions on indoor contaminant concentrations and occupant exposure using the multi-zone airflow and contaminant dispersal model CONTAM. The contaminants examined included carbon dioxide, carbon monoxide, nitrogen dioxide, water vapor, particulates, radon and volatile organic compounds. Interventions included venting an otherwise

unvented space heater, replacement of a faulty stove, upgrading a furnace filter, installation of air conditioning, use of kitchen and bathroom exhaust fans, stopping the practice of using a gas oven to heat the house, tightening the house's envelope, and installation of mechanical ventilation. Modeling results indicated that in a three-story townhouse a combination of mechanical ventilation, local exhaust, and improved air filter was the most effective approach for reducing the largest number of contaminants. Results also suggested that tightening the envelope could potentially overwhelm the mechanical ventilation and result in higher occupant exposure. Project support: IAA with the NIST.

7.1.5 Project: Effects of Housing Improvements on Health

In an effort to investigate the effects of housing improvements on health, a research project was funded to link data from the American Housing Survey to the National Health Interview Survey. The CDC is currently conducting this research. Project support: IAA with the US Centers for Disease Control and Prevention (CDC).

7.1.6 Project: Inter-laboratory Quality Control Study for Residential Dust Allergens

The focus of this study was to characterize the levels of intra- and inter-laboratory variability in analyses of allergen concentration in residential dust and to investigate if quality control samples for allergens would be useful in monitoring laboratory performance. As part of this study, aliquots of dust were sent to eight laboratories to be analyzed using ELISA methods for a variety of allergens, including Der p 1 (dust mite), Der f 1 (dust mite), Fel d 1 (cat), Can f 1 (dog), Bla g 1 (cockroach), and Mus m 1 (mouse). Results obtained indicate that ELISA technologies allowed laboratories to characterize allergen levels. The coefficient of variation on the estimated geometric means ranged from 61% to 93%. The primary source of total variability was between-laboratory variability. Despite observed variability between laboratories, there generally was reasonable agreement in the within laboratory results. The findings indicated that laboratory results are usually sufficiently accurate to determine whether sample results exceed a specific threshold; however, they also support the value of quality control samples to monitor laboratory results. Results from this project have been published in a peer-reviewed journal. (Pate et al., 2005). Project support: Contract with Battelle.

7.1.7 Project: Review of Residential Injury Mortality Data

This project used information from the National Vital Statistics System Mortality Data from 1985-1997 to calculate injury-related death rates for all US children and adolescents under the age of twenty. These results have been published in a peer-reviewed journal.

Key findings include:

- Over half (55%) of the annual unintentional deaths in children that occurred in a known location occurred in the home.
- Between the time period of 1985 to 1997, fatal residential injuries decreased by 22%. In children, it decreased by 29%, but the proportion of deaths occurring in

the home increased by 7%.
- Children less than one year old and children between the ages of one and four were at higher risk of death than older children.
- Males had a higher risk of death due to residential injuries than females.
- Blacks have a higher risk of death due to residential injuries than whites.
- The most frequent causes of death included fires, submersion or suffocation, poisoning, and falls. (Nagaraja et al., 2005).

Project support: Contract with Battelle.

7.1.8 Project: Analysis of the National Survey of Lead and Allergens in Housing Data

HUD partnered with the National Institute of Environmental Health Sciences (NIEHS) to characterize the distribution of major allergens in the United States. Westat, Inc. (Westat) was contracted to implement the first National Survey of Lead and Allergens in Housing, a nationally representative survey of 831 U.S. homes, to report the national prevalence and exposure risk for house dust mite, cat, dog, mouse, and cockroach allergens. Several peer-reviewed journal articles were produced describing the results. Major findings presented in these articles are captured in Appendix F, Table F.1.

In addition, survey results were used to explore the association between *Alternaria alternata* and endotoxin in US homes and asthma symptoms. Appendix F, Table F.2 summarizes the published results. Project support: Contract with Westat.

7.2 TOOLS AND RESOURCES

One goal of the HHI is to establish local capacity to address healthy homes issues. This can be accomplished in a variety of ways, including providing individuals with the tools and resources necessary to address such issues. Several projects funded through IAAs and contracts provide guidance and tools for those involved in healthy housing work. Examples of outcomes related to these projects include:

- A “Healthy Housing Reference Manual” that reviews important aspects of housing that can affect the health of residents.
- Tools/worksheets for field use.
- A series of background papers focusing on healthy homes topic areas, which can be used by HHI grantees and others.
- An updated matrix identifying healthy flooring options.
- A document on healthy homes maintenance activities.
- A Healthy Homes Clearinghouse containing over 600 articles.
- A weatherization assessment tool that incorporates health issues.
- A tool to assist grantees in developing quality assurance plans.
- Protocol for collection of vacuum dust samples for allergen analyses.
- Methods to increase grantee capacity.

Descriptions of each project are summarized below.

7.2.1 Project: Development of the Healthy Housing Reference Manual

This project focused on developing the *Healthy Housing Reference Manual*. This manual is a companion piece to one other CDC document: *Integrated Pest Management: Conducting Urban Rodent Surveys.* It is designed to offer an overview of housing characteristics related to health and safety. Risk evaluation worksheets, information about interventions, fact sheets for occupants, and information about potential resources for completing interventions are included. Although the initial intent was to produce a paper inspection manual, an interactive electronic tool was created. Based on an evaluation of the tool, it will require several revisions to make it better suited for health and housing personnel in the field. The CDC is currently working on ensuring the proper revisions are made and anticipates the release of the updated tool in fiscal year 2007. Project support: IAA with the CDC.

7.2.2 Project: Review Papers Addressing Healthy Homes Topics

A series of peer-reviewed background papers were created to provide HUD grantees and others interested in housing and health with information on healthy homes topics. Topic areas included carbon monoxide, asthma triggers, mold, injury hazards, pesticides, and housing assessment. Each paper provided a brief overview of the current status of knowledge on:

- The extent and nature of the identified hazards in the home;
- Assessment methods for hazards in the home;
- Mitigation methods for hazards in the home; and
- Information and research needs regarding hazards in the home.

Project support: Contract with Battelle.

7.2.3 Project: Update of the "Choosing Flooring for Affordable Housing: Healthier and Cost-Effective Options" Matrix

A matrix was developed that compares different flooring coverings by cost over the life of the product, maintenance considerations, health considerations, and environmental considerations. It provides guidance and recommendations on traditional flooring choices by room and suggestions for "better" and "best" alternatives. (Available on-line at: http://www.asthmaregionalcouncil.org/about/Flooring_matrix.pdf.) Project support: contract with ICF International (ICF).

7.2.4 Project: Development of the "Property Maintenance for a Healthy Home" Resource Document

A "Property Maintenance for a Healthy Home" document was created that focuses on how to conduct maintenance for multi-family properties in such a way that a healthy

home environment is created and maintained. This document draws on information learned through the work of grantees. (Available on-line at: http://www.asthmaregionalcouncil.org/about/ARC_Property_Maintenance.pdf.) Project support: Contract with ICF.

7.2.5 Project: Guidance for Builders and Designers on Moisture-Resistant Housing

The OHHLHC partnered with HUD's Office of Policy Development and Research to develop guidance for builders and designers on incorporating "best practices" to prevent moisture problems in new home construction and the remodeling of existing homes. The document, titled "Moisture-Resistant Homes", identifies a range of best practices that can be incorporated into the design and construction phases to make housing more moisture-resistant. This is important to the HHI mission because of the health hazards associated with excess moisture in homes (e.g., supporting the growth of mold and other residential allergens). The document is available on the HUD User website at: http://www.huduser.org/publications/destech/moisturehomes.html.
Project support: Contract with Newport Partners, LLC

7.2.6 Project: Development of a Healthy Homes Clearing House

The National Center for Healthy Housing (NCHH) was tasked with developing a Healthy Housing Clearinghouse. The Clearinghouse is an online resource designed to help people locate information about healthy housing issues. It contains publications from federal agencies, peer-reviewed journals and other resources that can be searched using a key word search or by conducting an advanced search using an article's author, publication name, or publication date. (Available on-line at: http://www.centerforhealthyhousing.org/html/clearinghouse_release.htm.) Project support: IAA with the CDC.

7.2.7 Project: Creation of a "Weatherization Plus Health" Assessment Tool

With funding support from HUD, a "Weatherization Plus Health" assessment tool was created by ICF, Affordable Comfort and the Opportunity Council. This tool is designed to be used by weatherization programs across various regions of the country. Project support: Contract with ICF.

7.2.8 Project: Development of QA Plan Template

HUD requires that research grantees submit a Quality Assurance (QA) Plan prior to beginning any field or laboratory research. The purpose of the plan is to fully document the acquisition, analytical, and measurement methods that will be used throughout the study to ensure quality data are collected which can be used to meet the project objectives. To facilitate the process of creating a QA Plan, Battelle was contracted by HUD to design a template that could be used by grantees in the development of their QA

plans. This template was developed using official EPA guidance materials and specific input from HUD. Project support: Contract with Battelle.

7.2.9 Project: Development of Vacuum Dust Sampling Collection Protocol for Allergens

HUD contracted Battelle to develop protocol that could be used by grantees collecting household dust samples for allergen analyses. Several large-scale studies that used vacuum sampling to assess exposure to allergens were reviewed. Based on this review, sampling protocol that allowed flexibility to account for different grantee goals and/or resource limitations were developed. This protocol can be found on-line at: http://www.hud.gov/offices/lead/techstudies/Allergen_Dust_Sample_Protocol.doc. Project support: Contract with Battelle.

7.2.10 Project: Building Grantee Capacity

Through contracts with ICF, HUD funded several projects that focus on building grantee capacity to address healthy homes issues. These projects included:

- Development of a Healthy Homes Grantee Resource Binder containing contact information, assessment tools, intervention resources, program evaluation guidance and other materials.
- Creation of a Grantee Orientation Kit, which included a project start-up checklist, sample evaluation plans, a list of internet resources, and other materials designed to assist new grantees.
- Supporting orientation conferences for new Healthy Homes grantees.
- Development of criteria and procedures for reviewing grantee self-evaluation plans.
- Creation of a healthy homes grantee electronic exchange to facilitate sharing of information.
- Development of an electronic, on-line Quarterly Performance Reporting System for grantees.
- Arrangement of grantee working groups to address common technical topics and challenges and grantee teleconferences to provide additional guidance.

7.3 TRAINING, EDUCATION AND OUTREACH

Another major focus area of the HHI Preliminary Plan and an important component of most healthy homes programs is education. Several projects funded through IAAs and contracts focus on creation of educational materials and education of the community. Major outcomes associated with these projects include:

- Development of partnerships with seven academic institutions to present over 30 training courses focusing on healthy homes issues.
- Training of over 900 health and housing professionals in healthy homes concepts.

- Creation of an "Essentials for Healthy Homes Practitioners" course and piloting of three new healthy homes courses.
- Development of an on-line training to help public health nurses learn how to conduct a Pediatric Environmental Health Assessment.
- Creation of a six-minute Healthy Homes DVD that explains the concept to managers and decision-makers.
- Creation of a Healthy Homes brochure and fact sheets.
- Development of a report to Congress highlighting mold- and moisture-related activities conducted by HUD.
- Creation of a National Healthy Homes Information website for consumers.
- Production of instructional DVDs, workshops, and healthy homes literature by numerous states.

7.3.1 Project: Implementation of the National Healthy Homes Training Center and Network

In 2003, a workgroup of health and housing professionals was convened to develop a healthy homes training curriculum, including both an instructor and a student manual. The final curriculum evolved into a two-day course entitled the "Essentials for Healthy Homes Practitioners" course. This course focuses on seven principles of healthy housing: dry, clean, pest-free, ventilated, safe, free of contaminants, and maintained. The targeted populations for this training include public health nurses, code inspectors, environmental health professionals, and housing professionals. Through partnerships with various academic institutions, this course is delivered in several training locations throughout the country and materials are available on-line. The CDC, through a competitive process, selected the NCHH to develop this National Healthy Homes Training Center and Network. (Materials available on-line at: http://www.healthyhomestraining.org/.) Project support: IAA with the CDC.

7.3.2 Project: Creation of Healthy Homes Educational Materials

ICF was contracted by HUD to work on creating several healthy homes educational materials. A Healthy Homes brochure was created that describes the role and initiatives of the OHHLHC. In addition, several one-page healthy homes fact sheets were developed for the general public. Topics for the fact sheets include asthma, allergens, lead, pest management, radon, home safety, carbon monoxide, and mold. In addition, a Spanish version of the "Help Yourself to a Healthy Home" booklet was created. Project support: Contract with ICF.

7.3.3 Project: Development of a National Healthy Homes Information Website

The structure and content of a National Healthy Homes Information website was created to help consumers obtain information on the evaluation and control of health and safety issues in the home. The website, when launched, will contain a variety of resource documents that address lead, mold and moisture control, allergens, asbestos, radon,

combustion products and particulates, green building products and other healthy homes issues. Project support: Contract with QuanTech.

7.3.4 Project: Report to Congress focusing on Mold and Moisture Activities

A report to Congress was developed that describes residential mold- and moisture-related work being conducted by several different HUD offices, particularly the OHHLHC. Other activities were supported by the Office of Policy Development and Research and the Office of Public and Indian Housing. Lessons learned and notable results of these activities are presented. In addition, the report describes the methods used by HUD to disseminate best practices within the consumer, construction, housing management, public health, and research sectors. The methods used include publications in peer-reviewed journals, presentations at scientific meetings, sponsoring training seminars, conducting outreach through health fairs, and publication of brochures, pamphlets and books. (Available on-line at: http://www.hud.gov/offices/lead/report040105.pdf.) Project support: Contract with Newport Partners, LLC.

7.3.5 Project: Public Outreach and Education Programs

Through the Interagency Agreement with HUD, the US Department of Agriculture (USDA), Cooperative State Research, Education and Extension Service (CSREES) provided funding to state land grant universities for public outreach education programs aimed at reducing deficiencies and risks with associated childhood diseases and injuries. In 2006, 24 state Extension programs have received healthy homes funding to produce instructional DVDs, hold workshops, create healthy homes literature, and coordinate a variety of healthy homes activities. An outline identifying the projects completed by each of the state extension services is included in Appendix G.

The following tables summarize the activities and outcomes for the first two quarters of 2006 that were reported by 21 of the 24 programs that received funding for this year. The data were provided by the Alabama Cooperative Extension Service, which coordinates the Healthy Homes Partnership.

The state extension services partner with a variety of different organizations including family services and health departments (Figure 7.1). They work with these partners and use several different methods to distribute healthy homes messages to their targeted audiences. Examples of methods used include working with local agency staff, presenting at workshops, using the media, and conducting direct mailings (Figure 7.2). Targeted audiences often include many of the same populations reached by HUD grantees, such as low- to moderate- income populations (Figure 7.3). It is estimated that over 1.6 million individuals have received the healthy homes message through the state extension services. In addition, the state extension services have trained over 1600 individuals (Table 7.1) and a large number of "Help Yourself to a Healthy Home" booklets have been distributed (Table 7.2). (Booklets are available on-line at: http://www.hud.gov/offices/lead/healthyhomes/healthyhomebook.pdf.) Project support: IAA with the USDA.

Figure 7.1 Percentages of States Partnering with Various Types of Agencies

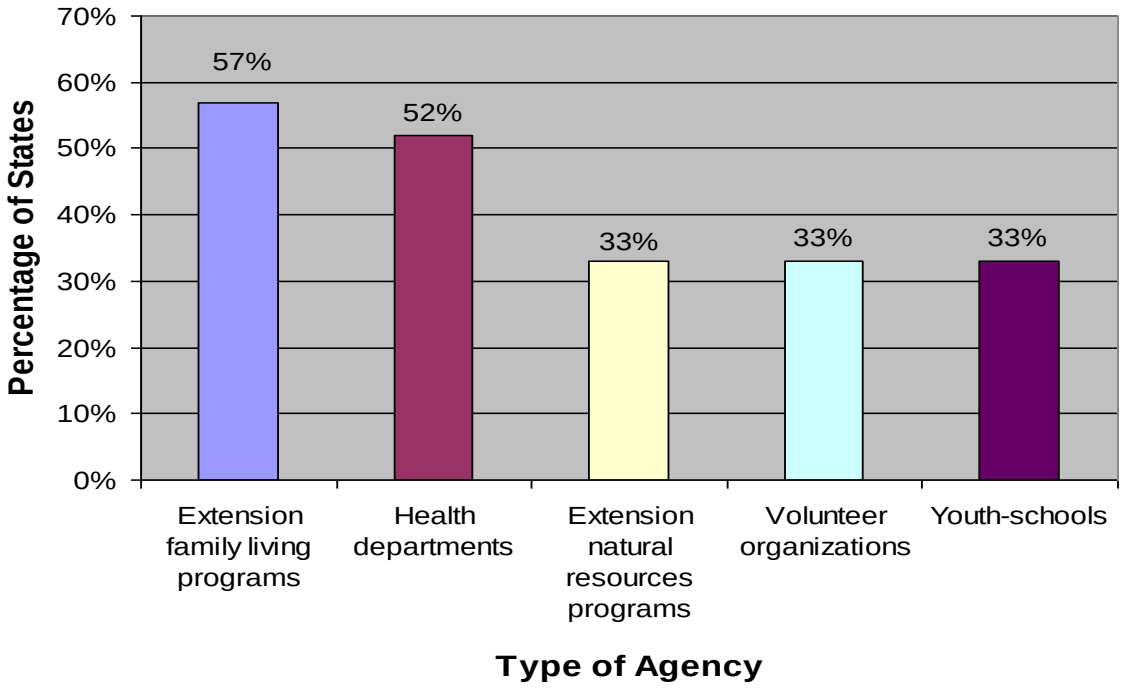


Figure 7.2 Methods for Reaching Consumers and the Percentage of States Utilizing Each Method

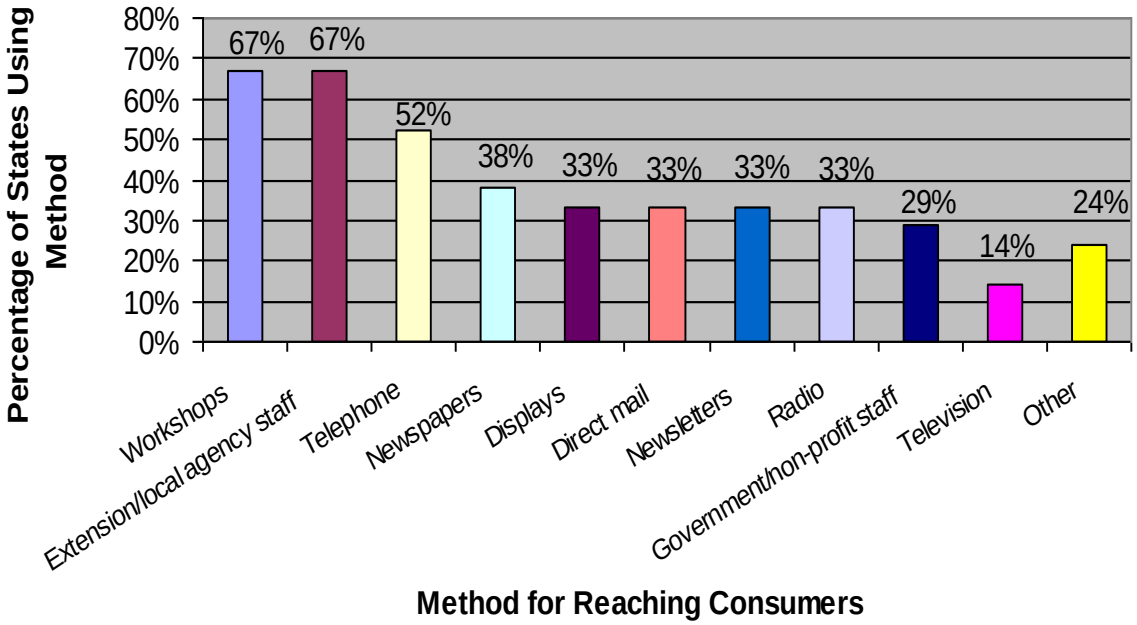


Figure 7.3 Percentage of State Programs Targeting Selected Audiences

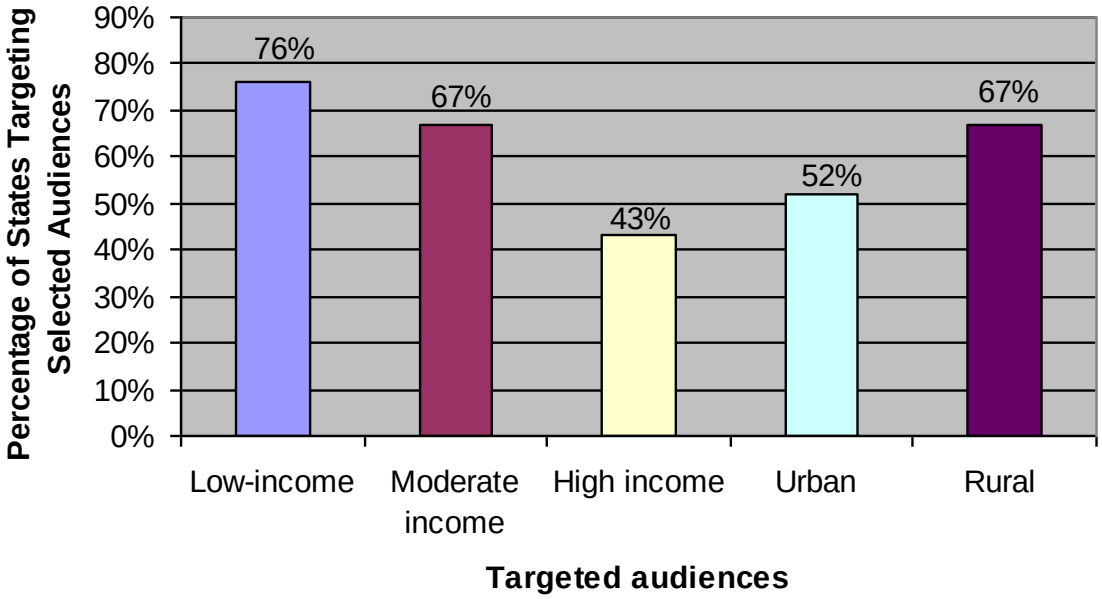


Table 7.1: Individuals Reached or Trained Through Various Activities

Individuals reached or trained January through June 2006	Total Number of Individuals Reached or Trained
Consumers reached through state partners and National CSREES office	1,603,060
Professionals trained/reached	1,334
Extension Agents	463
Social Service Professionals	30
Health Department Officials	42
Childcare Providers	218
Nonprofit Organizations	500
Listserv contacts	81

Table 7.2: Training Sessions and Informational Material Distributed

Activity	Total number held or distributed
Healthy Homes "Train-the-Trainer" sessions held by state partners	38
Distribution of "Help Yourself to a Healthy Home" books in English	1,547
Distribution of "Help Yourself to a Healthy Home" books in Spanish	415
Distribution of "Help Yourself to a Healthy Home" exhibits by the National office	8

Chapter 8: CONCLUSIONS

This chapter summarizes how HUD funded projects have addressed the four recommended principles of the HHI Preliminary Plan and discusses how well these projects have performed in achieving the programmatic goals of the HHI.

8.1 SUMMARY OF HOW FUNDED PROJECTS HAVE ADDRESSED FOCUS AREAS RECOMMENDED BY THE HHI PRELIMINARY PLAN

HUD's Healthy Homes Initiative has awarded grants that address a diversity of healthy homes issues. While this report is only able to capture the highlights of various projects and is limited to information reported by the grantees, our findings indicate that HUD funded projects are consistently addressing the four principles of the HHI Preliminary Plan: excess moisture reduction, dust control, improved air quality, and education.

Excess Moisture Reduction

Many homes have evidence of moisture problems that can lead to other potential hazards, such as deteriorating lead paint, mold formation, increased concentrations of allergens, and structural hazards. Several projects funded through the HHI have focused on developing tools to assess moisture intrusion and improve mold assessments, including research on the distribution of background mold species in non-problem residences. In addition, 84% of HHI Demonstration grantees that conducted housing interventions focused on controlling moisture, based on assessments of a wide range of moisture-related hazards. These grantees often collaborated with a variety of partners, including universities, housing agencies, and community-based organizations, to conduct moisture assessments and interventions.

Dust Control

Recognizing that settled dust can serve as a reservoir for house-related health hazards, including lead and allergens from pets and pests, HUD has funded several projects designed to assess and characterize dust hazards. These projects have focused on characterizing the distribution of allergen levels across the nation, developing and evaluating assessment tools (visual, questionnaires, and environmental), standardizing dust sampling protocols, and assessing the importance of using quality control samples when analyzing dust samples for residential allergen concentrations. HHI grantees have used much of the information generated to conduct interventions to reduce dust in homes. For example, 42% of Demonstration grantees conducted interventions focused on making surfaces smooth and cleanable to reduce allergens; 61% emphasized cleaning as an allergen reduction activity; and 55% conducted vacuuming as part of an IPM intervention. Grantees have also been provided allergen quality control samples to monitor the accuracy of their laboratories.

Improved Air Quality

The HHI Preliminary Plan stresses that inadequate ventilation can result in increased exposure to indoor air pollutants. As a result, projects have been funded by HUD to better

understand the movement and transport of air and pollutants from garages and crawl spaces into the living environment, to assess the impact of installing mechanical ventilation in new low-income housing, and to investigate innovative ways of assessing indoor air quality. In addition, projects have focused on investigating other potential sources of indoor air pollutants, such as ventless fireplaces. Although few HHI grantees conduct air monitoring in the home, most grantees performed interventions that can improve indoor air quality (e.g., moisture and dust control) or alert individuals to potential indoor air quality hazards. For example, 71% of Demonstration grantees that completed interventions installed CO detectors. In addition, 58% of these grantees ensured that dryers were vented to the outside and 53% installed bathroom fans that are vented to the outside.

Education

Education is an important component of all healthy homes interventions. Ninety percent of grantees have included education as a component of their interventions. The majority of these grantees (93%) educated tenants/owner-occupants in an effort to change their behavior. Many grantees (77% of the Demonstration grantees and 30% of the Technical Studies grantees) also conducted community education and outreach efforts in order to raise awareness and build the capacity of others to address healthy homes issues. Often these grantees worked with existing organizations that have already established connections within the community to deliver educational messages. (Seventy-four percent of the Demonstration grantees and 25% of the Technical Studies grantees used partners to assist in community education and outreach efforts.) Two-thirds of grantees reported that they developed educational materials as part of their projects. In addition to the efforts being conducted by grantees, important educational activities are carried out through Interagency Agreements and contract-funded projects. In particular, the IAA with the USDA has been a very effective vehicle for educating the public about healthy homes issues.

It is important to note that HHI grantees used a comprehensive approach that generally incorporated aspects of all or several of these recommended principles. By using such an approach, many grantees have been successful in identifying and reducing multiple potential health and safety hazards. In addition, grantees have been able to show an impact on the health of occupants.

8.2 SUMMARY OF HOW FUNDED PROJECTS HAVE HELPED ACHIEVE PROGRAMMATIC GOALS OF THE HHI

The overall goal of this study was to evaluate how well the HUD-funded projects have performed in achieving the programmatic goals of the HHI. Below is a discussion of how such projects are helping to achieve HHI goals and potential options for the future.

HHI Goal: The development and application of cost-effective methods for the identification of housing based health hazards.

As discussed in Chapter 5, several projects, conducted primarily by Technical Studies

grantees, focused on development of tools that could be used to assess hazards such as mold spores and lead dust. Most of these assessment tools have not yet been field tested; however, it is anticipated that if fully developed, these tools will provide quick and inexpensive means to identify hazards in the home.

In addition, projects funded through Interagency Agreements also focused on the development of tools that can be used to identify housing-related hazards. For example, one on-going project with the CDC includes development of a variety of tools and worksheets that could be used in the field to conduct assessments.

Currently, most grantees work with a wide variety of partners (e.g., other government agencies, community-based organizations, universities) to collect information using several low cost methods, including visual assessments, client interviews, and environmental sampling. The presence of visible mold and moisture, pest infestations, potential lead hazards, fire hazards, and CO hazards are typically identified when conducting visual assessments. Data on behavior, health, and household characteristics are often collected through client interviews. Environmental samples are frequently analyzed for dust mite and cockroach allergens, mold, and lead. While these data are often collected and analyzed prior to and following the intervention, less than half of the grantees report that they are using the information collected to examine correlations between housing measures and health data. Conducting these types of analyses is important in order to better understand the connection between housing and health.

Interestingly, grantees that completed such data analyses typically reported no association between a health measure related to asthma symptoms and levels of allergens in household dust. While some grantees attribute the lack of correlation to a small sample size, sensitivity of the health measures used in the analysis may also play a role as well as limitations associated with the cross-sectional design of most projects. The fact that grantees are using a wide range of assessment tools and techniques to gather information complicates the ability to compare findings between grantees for better insight into the correlations between health and housing. However, a project funded through an Interagency Agreement with the CDC may provide additional information because an objective of this project is to link national housing survey data with health survey data.

Future Options for Consideration:

- Identification of additional funding sources should be investigated by grantees and others to continue product improvement and field testing of tools that can be used to assess hazards.
- Creation of a mechanism to facilitate the exchange of information, including assessment tools among HHI program partners (e.g., similar to the former "grantee exchange" website).
- Consistent analyses of the data collected by grantees are needed to determine if assessment measures (both visual and environmental) correlate with health data.
- Creation of standardized assessment and data (i.e., assessment, outcome and cost) collection tools that would allow data to be compared or pooled across projects for analysis.

HHI Goal: The development, application, and evaluation of cost-effective interventions for controlling housing based health hazards.

As discussed in Chapter 3, Demonstration, Technical Studies, and Education/Outreach grantees are conducting a wide range of interventions aimed at correcting identified hazards within low-income housing units where a child resides. On average, housing unit interventions were reported to cost $3,705 per unit. While interventions can be classified broadly, such as allergen reduction or weatherization activities, specific activities often vary considerably from housing unit to housing unit and program to program. Overall, the most common interventions focus on allergen reduction activities (e.g., reduction of dust mite, cockroach, and mouse allergens) and education.

To evaluate their intervention efforts, the majority of grantees reported using comparisons of pre- and post-intervention visual assessment information, client interview data, and analysis of environmental samples. As part of the survey, grantees were asked to identify the three major outcomes of their projects. Although some grantees were near the completion of their projects, they were unable to report any outcome information, even outcomes based on preliminary data. This suggests that many grantees do not complete an interim data analysis, which may be helpful in detecting problems with data collection or interventions in the early stages of the project.

Overall, grantees reported that IPM interventions, which on average were reported to cost $290 per unit, were successful in decreasing pest infestations and decreasing allergen concentrations. Although not all grantees were able to show a statistically significant reduction in allergen concentrations, some grantees were able to demonstrate reductions in heath measures such as asthma severity scores, emergency room visits or doctor visits, or lost schools days among children in treated homes. In addition, grantees were able to demonstrate positive results for interventions focusing on education, mold and moisture intrusion, and injury prevention. One grantee was the first to show that interventions to address mold and moisture problems resulted in significant improvements in the health of asthmatic children living in treated homes.

Most grantees reported very general outcomes. Very few provided detailed information describing the results of their pre- to post- intervention analysis, although they were encouraged to provide this information.

Even though the method in which cost information is collected varies, most grantees reported that they track actual intervention costs. However, less than half reported that they collect data that would allow them to determine the cost-effectiveness of their approach. In most cases, when cost-effectiveness was considered, grantees reported that their interventions were cost-effective based on comparing the cost of the interventions to the hazard reduction that was achieved. Although more difficult, comparing the costs of interventions to savings in health care is an important aspect of assessing the benefits of healthy homes interventions. A few grantees reported that they are planning on conducting this type of analysis.

Future Options for Consideration:

- Provision of standardized treatment packages and data collection tools that will allow data (e.g., outcome and cost data) to be compared across projects.
- Establishment of best practices.
- Establishment of clearance criteria and increased reporting of results that quantify health outcomes to determine the effectiveness of interventions.
- Establishment of clear evaluation protocols that also stress interim data analysis.
- Increased publication of findings in peer-reviewed journals and presentation of findings at scientific and community meetings.
- Creation of a mechanism to facilitate the exchange of information, including intervention protocols among HHI program partners and lessons learned (e.g., similar to the former "grantee exchange" website).
- Provision of written guidance and standardized evaluation protocols that provide quantifiable measures for evaluating project outcomes and indicate how to assess the cost-effectiveness of healthy homes interventions.

HHI Goal: Development and delivery of targeted public outreach, education, and training programs that provide information about effective methods for preventing housing-related childhood diseases and injuries and for promoting the use of these interventions.

In addition to educating clients enrolled in their programs, approximately two-thirds of grantees (77% of Demonstration grantees and 30% of Technical Studies grantees) included community education and outreach as part of their projects. Most of these grantees participated in health fairs or conducted visits to community or parent groups to disseminate healthy homes messages. Two-thirds of these grantees reported that they developed educational materials as part of their projects. Many of these educational materials were created for low-literacy, English and Spanish speaking populations. In addition, some grantees have translated materials into other languages, such as Somali. Overall, parents/guardians are most commonly targeted to receive healthy homes education primarily focusing on asthma.

To evaluate their community education and outreach efforts, most grantees relied on counts of individuals reached. Based on survey responses, many grantees reached more individuals than were initially targeted.

The Interagency Agreement between the USDA and HUD provides another avenue for reaching the goal of educating the public about healthy homes issues. It is estimated that 24 state extension programs, funded through this agreement, have delivered healthy homes messages to over 1.6 million consumers. Many of these programs have also produced a variety of educational materials, including instructional DVDs, fact sheets and training curricula on healthy homes issues.

Additionally, over 900 health and housing professionals have been trained in healthy homes concepts as the result of the Interagency Agreement between the CDC and HUD.

Future Options for Consideration:

- Increased sharing of educational materials to help grantees from having to "re-invent the wheel."
- Increased evaluation of the effectiveness and cultural sensitivity of the educational materials produced.

HHI Goal: Build local capacity to operate sustainable programs that will prevent and control housing-based health and safety hazards in target housing in the absence of federal funding.

Part of the process in establishing local capacity to address healthy homes issues is to ensure that individuals have training necessary to carry out various activities. Approximately three-quarters of the grantees provided skills training as part of their projects. These trainings focused on providing individuals with essential skills for educating families, conducting assessments, and carrying out interventions. Over half of the grantees reported that a specific training curriculum was developed for their projects. Several have made their training curricula available for use by other programs. Grantee staff, grantee partners, community health workers, remodelers/contractors, and code inspectors are typical groups identified to receive training. On average, grantees provide training to 112 individuals per project.

Another approach for increasing local capacity and for ensuring sustainability of the HHI is to use information to create change in policy or practice. Two-thirds of grantees with completed projects reported that such changes were made. Often these changes occurred in policies or practices of their organization or a partner's organization. Very few grantees reported that they were successful in making changes to local housing codes or in introducing new statutes/ordinances.

When asked to identify aspects of their project that were sustainable in the absence of federal funding, two-thirds of the grantees reported that at least one aspect of their project was sustainable. In the majority of the cases, grantees specified that educational activities could continue to be carried out either by their organization or others in the absence of federal funds. Very few programs reported that interventions other than education could be sustained.

Future Options for Consideration:

- More intensive evaluations of skills training efforts to determine the effectiveness of these efforts.
- Greater emphasis on using the data generated from grantee projects to make changes in policies and practices of other organizations.
- Enhanced efforts by grantees and their partners to increase sustainability of other aspects of their programs, in addition to educational activities, in the absence of federal funding.

In conclusion, despite many challenges, grantees are continuing to make significant strides in achieving the goals of the Healthy Homes Initiative. However, grantees need to continue to evaluate their efforts and it is important that they and HUD look for additional opportunities to make the results of their evaluations available to the public.

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APPENDIX A: Additional Quantitative Data

A.1 RECRUITMENT/ENROLLMENT

A.1.1 Primary Target Groups for Enrollment

The majority of grantees (86%) reported that their projects involved the recruitment or enrollment of clients and/or housing units, with 93% targeting specific population groups for recruitment efforts, and 76% reporting that they targeted housing units (Table A.1). Sixty-eight percent of grantees of those who recruited clients reported that they targeted both population groups and housing units. The most frequently reported targeted population group, reported by 74% of grantees, was families with children who had a specific health condition or were at risk for a specific health condition, with children with or at-risk for asthma or respiratory conditions being the most frequently reported population targeted. Over half of grantees (56%) reported that they targeted housing units located within specific census tracts or geographic boundaries, and approximately one third (35%) targeted rental housing units.

Table A.1: Primary Target Populations and Housing Units for Healthy Homes Initiative Grantees, by Type of HHI Grant[a]

	Demonstration (n=38)	Technical Studies (n=16)	All (n=54)
Targeted Populations:	38(100%)	12 (75%)	50 (93%)
• Landlords/rental property owners	11 (29%)	0 (0%)	11 (20%)
• Immigrant families	3 (8%)	2 (13%)	5 (9%)
• Low-income families	28 (74%)	6 (38%)	34 (63%)
• Minority families	13 (34%)	3 (19%)	16 (30%)
• Other under-served populations	4 (11%)	1 (6%)	5 (9%)
• Owner-occupants	11 (29%)	1 (6%)	12 (22%)
• Families residing in specific neighborhood(s)	13 (34%)	4 (25%)	17 (31%)
• Families with children of a specific age	34 (89%)	3 (19%)	37 (69%)
○ Children under 1 year of age	0 (0%)	0 (0%)	0 (0%)
○ Children under 6 years of age	9 (24%)	2 (13%)	11 (20%)
○ Children under 18 years of age	16 (42%)	1 (6%)	17 (31%)
• Families with children having or at risk for specific health condition	34 (89%)	6 (38%)	40 (74%)
○ Lead poisoning	9 (24%)	2 (13%)	11 (20%)

Table A.1: Primary Target Populations and Housing Units for Healthy Homes Initiative Grantees, by Type of HHI Grant[a]

	Demonstration (n=38)	Technical Studies (n=16)	All (n=54)
• Families with children having or at risk for spec. health conditions, cont'd:			
○ Asthma or respiratory conditions	34 (89%)	4 (25%)	38 (70%)
○ Injuries	7 (18%)	0 (0%)	7 (13%)
○ Other potential health conditions	2 (5%)	0 (0%)	2 (4%)
• Other Total[c]	15 (39%)	7 (44%)	22 (41%)
• Other[d]: Families with children in specific age ranges (not captured above)	9 (24%)	2 (13%)	11 (20%)
• Other[d]: Families enrolled in other programs or studies	3 (8%)	2 (13%)	5 (9%)
Targeted Housing Units:	30 (79%)	11 (69%)	41 (76%)
• Housing units of a particular age	7 (18%)	3 (19%)	10 (19%)
○ Before 1950	1 (3%)	2 (13%)	3 (6%)
○ Before 1978	6 (16%)	1 (6%)	7 (13%)
○ New construction	0 (0%)	1 (6%)	1 (2%)
○ Other age classification	0 (0%)	2 (13%)	2 (4%)
• Rental units	16 (42%)	3 (19%)	19 (35%)
• Owner-occupied units	14 (37%)	2 (13%)	16 (30%)
• Housing units within specific census tracts or geographic boundaries	25 (66%)	5 (31%)	30 (56%)
• Housing units located in RCs, EZs, or Ecs[b]	11 (29%)	0 (0%)	11 (20%)
• Public housing units	4 (11%)	2 (13%)	6 (11%)
• Single family units	8 (21%)	2 (13%)	10 (19%)
• Multifamily units (including duplexes)	9 (24%)	2 (13%)	11 (20%)
• Housing units involved in disaster mitigation	0 (0%)	0 (0%)	0 (0%)
• Housing units participating in other health or housing program(s)	8 (21%)	2 (13%)	10 (19%)
• Other[c]	4 (11%)	5 (31%)	9 (17%)
• Other[d]: Housing units with specific hazards present	2 (5%)	5 (31%)	7 (13%)

[a]Grantees were permitted to check more than one targeted population and more than one targeted type of housing unit; therefore, summing numbers across all targeted populations or across all targeted housing units is not appropriate.
[b]RC=Renewable Community, EZ=Empowerment Zone; EC=Enterprise Community
[c]On the questionnaire, each grantee was permitted to list one response other than those specifically listed.
[d] Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

As shown in Table A.2, grantees reportedly contacted 25 to 17,000 potential clients (mean=1,341), but the number of clients actually enrolled was much smaller, ranging from 8 to 1,036 (mean=180).

A.1.2 Recruitment Methods

As shown in Table A.3, the top three most common methods used to recruit clients into projects were as follows:

- Referrals from health care providers and other agencies (67%), reported as a successful or very successful recruitment method by 58% of grantees;
- Attendance at public meetings or other public events (59%), reported as successful or very successful by 29%; and
- Distribution of informational materials to schools, community organizations, health care providers, etc. (56%), with 48% of grantees reporting it as successful or very successful.

Although not widely used, door-to-door recruitment was the method most frequently reported to be successful by grantees (10 of 15 grantees, or 67%). Almost half of grantees (26 of 53, or 49%) reported that the project was delayed because of recruitment difficulties. Three-quarters of the grantees (74%, or 40 of 54) used either a single recruitment method or combinations of two or three different recruitment methods; the remaining 26% of grantees (14 of 54) used combinations of 4 to 6 recruitment methods.

Over 85% of grantees reported the use of incentives to recruit and/or enroll clients, and of these, 88% found the incentives to be effective in retaining clients in their programs. As shown in Table A.4, gift certificates were the most frequently used incentive (used by 43% of the grantees). Cash, used as an incentive by 33% of grantees, was reported to be the most effective type of incentive (10 of 13 grantees, or 77%), while two-thirds of grantees who used grant money given to property owners and gift certificates reported these types of incentives to be effective or highly effective. Demonstration grantees tended to use gift certificates as incentives, while Technical Studies grantees tended to use cash incentives. Vouchers were not often used and were judged to be neither effective nor ineffective.

Values of various incentives are provided in Table A.5. Overall, incentives ranged from $5 per client (for gift certificates) to $8,000 per client (money allocated for interventions as a grant to property owners). Interestingly, a few grantees did not view the outright grant of funds for unit interventions as an incentive for property owners, even though

such funding averaged $3,122 per client. Vouchers were the least costly incentive, averaging $33 per client.

Table A.2: Descriptive Statistics for Client Recruitment[a]

	Demonstration (n=43)			Technical Studies (n=20)			All (n=63)		
	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Targeted Number of Clients	20	192	1800	15	149	600	15	179	1800
Number of Clients Contacted	45	1464	17000	25	1055	6830	25	1341	17000
Number of Clients Enrolled	8	189	1036	18	158	955	8	180	1036

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. 23 of 54 grantees reported that their client contacted numbers were estimates, and 3 of 54 reported that their clients enrolled numbers were estimates.

Table A.3: Summary of Recruitment Methods[a]

Recruitment Method	Demon-stration (n=38)	Technical Studies (n=16)	All (n=54)	#(%) of grantees who used the method reporting it was successful/ very successful	#(%) of grantees who used the method reporting it was unsuccessful/ very unsuccessful	#(%) of grantees who used the method reporting it was neither successful nor unsuccessful
Public Meetings	28 (74%)	4 (25%)	32 (59%)	9 (29%)	10 (32%)	12 (39%)
Media Ads	11 (29%)	2 (13%)	13 (24%)	2 (15%)	10 (77%)	1 (8%)
Property owner mailings	10 (26%)	3 (19%)	13 (24%)	2 (15%)	7 (54%)	4 (31%)
Community group mailings	9 (24%)	0 (0%)	9 (17%)	1 (10%)	7 (70%)	2 (20%)
Phone calls	13 (34%)	3 (19%)	16 (30%)	6 (38%)	3 (19%)	7 (44%)
Distribution of information at schools, community orgs, etc.	26 (68%)	4 (25%)	30 (56%)	15 (48%)	7 (22%)	9 (29%)

Recruitment Method	Demon-stration (n=38)	Technical Studies (n=16)	All (n=54)	#(%) of grantees who used the method reporting it was successful/ very successful	#(%) of grantees who used the method reporting it was unsuccessful/ very unsuccessful	#(%) of grantees who used the method reporting it was neither successful nor unsuccessful
Door-to-door	10 (26%)	5 (31%)	15 (28%)	10 (67%)	1 (7%)	4 (27%)
Referrals from health care providers or other agencies	33 (87%)	3 (19%)	36 (67%)	19 (58%)	4 (12%)	10 (30%)
Other Total[b]	10 (26%)	12 (75%)	32 (59%)			
Other[c]: Self-referrals from word-of-mouth	5 (13%)	2 (13%)	7 (13%)			

[a]Grantees were permitted to check more than one recruitment method; therefore, summing numbers across all recruitment methods is not appropriate.
[b]On the questionnaire, each grantee was permitted to list up to three responses other than the four specifically listed.
[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

Table A.4: Summary of Types of Incentives[a]

Type of Incentive	Demon-stration (n=31)	Technical Studies (n=15)	All (n=46)	#(%) of grantees who used the incentive reporting it was effective/very effective	#(%) of grantees who used the incentive reporting it was not effective/very ineffective	#(%) of grantees who used the incentive reporting it was neither effective nor ineffective
Grant money for property owner to complete interventions	9 (29%)	0 (0%)	9 (20%)	6 (67%)	2 (22%)	1 (11%)
Vouchers	2 (6%)	0 (0%)	2 (4%)	0	0	2 (100%)
Gift certificates	16 (52%)	4 (27%)	20 (43%)	12 (67%)	2 (11%)	4 (22%)
Cash	5 (16%)	10 (67%)	15 (33%)	10 (77%)	1 (8%)	2 (15%)
Other Total [b]	25 (81%)	7 (47%)	32 (70%)			
Other[c]: Vacuums	14 (45%)	2 (13%)	16 (35%)			
Other[c]: Safety supplies	8 (26%)	1(7%)	9 (20%)			
Other[c]: Cleaning supplies (excluding vacuum cleaner)	9 (29%)	2 (13%)	11 (24%)			
Other[c]: Mattress covers	7 (23%)	0 (0%)	7 (15%)			

[a]Grantees were permitted to check more than one type of incentive; therefore, summing numbers across all types of incentives is not appropriate.
[b]On the questionnaire, each grantee was permitted to list up to three responses other than the four specifically listed.
[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

Table A.5: Descriptive Statistics for Cost of Incentives (Dollar Value per Client)

	Demonstration			Technical Studies			All		
	Min	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
Grant money for property owner to complete interventions (n=9 for demo, 0 for tech studies, 9 for all)	900	3122	8000	NA	NA	NA	900	3122	8000
Vouchers (n=2 for demo, 0 for tech studies, 2 for all)	25	33	40	NA	NA	NA	25	33	40
Gift Certificates (n=15 for demo, 4 for tech studies, 19 for all)	5	46	105	15	47	95	5	46	105
Cash (n=5 for demo, 10 for tech studies, 15 for all)	65	127	295	20	109	300	20	115	300
Other Total[a]									

[a]On the questionnaire, each grantee was permitted to list costs for up to three types of incentives other than the four specifically listed.
NA=Not applicable. None of the Technical Studies grantees` reported using this type of incentive.

A.2 ASSESSMENT INFORMATION

Eighty-six percent of grantees included some type of assessment as part of their projects, i.e., a visual assessment of the housing unit, a client assessment/interview, biological sampling, and/or environmental sampling. Of these 54 grantees, 35% conducted all four types of assessment. Assessments were commonly performed at baseline, less commonly at follow-up visits. Of the grantees that conducted one or more types of assessment, 40% reported that it took less than 2 hours to perform baseline assessments, while 8%, 24%, and 4% reported that it required less than 1 hour, half a day, or a full day, respectively, to conduct the baseline assessment.

Eighty-one percent of grantees reported that they developed an assessment tool (e.g., visual, interview, environmental sampling) for their project. Of the 32 grantees whose projects were complete at the time of the questionnaire, 41% reported that they continued to use this assessment tool internally for their Healthy Homes program after the project ended. Forty-seven percent (23 of 49) reported that they distributed the assessment tool for external use, and 58% (28 of 48) reported that their tool was validated in some manner.

Details concerning each type of assessment are presented below.

A.2.1 Visual Assessment of Housing Units

Over 80% of grantees routinely conducted a visual assessment of housing units as part of their projects, with 94% stating that they used a visual assessment tool to collect the same data for each housing unit. Twelve percent of grantees conducted only one visual assessment in each unit, while 40%, 22%, 16%, and 10% conducted two, three, four, and five or more assessments, respectively.

As shown in Table A.6, of the 13 hazards listed on the questionnaire, the top five hazards routinely assessed during the baseline visual assessments included:

- Presence of visible mold and moisture problems (96%)
- Pest infestation (82%)
- Lead hazards (72%)
- Fire hazards (69%), and
- Carbon monoxide hazards (67%).

These same five hazards were also those most frequently assessed at follow-up visits (Table A.6). Over half of grantees (58%) reported that their visual assessments included nine or more types of hazards; the remaining 42% assessed for eight or fewer hazards.

Table A.6: Summary of Housing Unit Visual Assessment Focus Areas[a]

	Demonstration (n=38)		Technical Studies (n=13)		All (n=51)	
	Baseline	**Follow-up**	**Baseline**	**Follow-up**	**Baseline**	**Follow-up**
Inspection of appliances	20 (53%)	16 (42%)	2 (15%)	1 (8%)	22 (43%)	17 (33%)
Carbon monoxide hazards	32 (84%)	24 (63%)	2 (15%)	1 (8%)	34 (67%)	25 (49%)
Housing code issues	15 (39%)	13 (34%)	0 (0%)	0 (0%)	15 (29%)	13 (25%)
Fire hazards	32 (84%)	26 (68%)	3 (23%)	1 (8%)	35 (69%)	27 (53%)
Injury hazards	28 (74%)	21 (55%)	2 (15%)	1 (8%)	30 (59%)	22 (43%)
Lead hazards	34 (89%)	27 (71%)	3 (23%)	1 (8%)	37 (73%)	28 (55%)
Moisture problems	38(100%)	32 (84%)	11 (85%)	7 (54%)	49 (96%)	39 (76%)
Presence of visible mold	38(100%)	31 (82%)	11 (85%)	7 (54%)	49 (96%)	38 (75%)
Pest infestations	35 (92%)	29 (76%)	7 (54%)	4 (31%)	42 (82%)	33 (65%)
Pesticide use	18 (47%)	16 (42%)	0 (0%)	1 (8%)	18 (35%)	17 (33%)
Poisoning hazards	23 (61%)	19 (50%)	2 (15%)	1 (8%)	25 (49%)	20 (39%)
Environmental tobacco smoke	30 (79%)	23 (61%)	3 (23%)	2 (15%)	33 (65%)	25 (49%)
Basic structural hazards	26 (68%)	19 (50%)	1 (8%)	1 (8%)	27 (53%)	20 (39%)
Other Total[b]	19 (50%)	18 (47%)	6 (46%)	3 (23%)	25 (49%)	21 (41%)
Other[c]: Allergen sources (e.g., visible dust)	12 (32%)	12 (32%)	3 (23%)	2 (15%)	15 (29%)	14 (27%)
Other[c]: Ventilation methods	4 (11%)	3 (8%)	4 (31%)	2 (15%)	8 (16%)	5 (10%)

[a]Grantees were permitted to check more than one visual assessment focus area; therefore, summing numbers across all focus areas is not appropriate.
[b]On the questionnaire, each grantee was permitted to list up to three responses other than the 13 specifically listed.
[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

As shown in Table A.7, grantees reported that baseline visual assessments were completed on an average of 164 housing units, ranging from 8 to 1,036 across all grantees that performed a visual assessment, while follow-up visual assessments were completed on an average of 79 housing units (range 0 to 550). Of the grantees that performed follow-up visual assessments, 68% (30 of 44) reported that the follow-up assessment was identical to the baseline visual assessment, while 30% (13 of 44) reported that the follow-up visual assessment focused only on areas that received intervention.

Table A.7: Descriptive Statistics for Number of Houses Visually Assessed at Baseline and All Follow-up Visits[a]

	Demonstration			Technical Studies			All		
	Min	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
Baseline Visit (n=38 for demo, 13 for tech studies, and 51 for all)	8	170	1036	18	148	955	8	164	1036
All Follow-up Visits (n=38 for demo, 9 for tech studies, and 47 for all)	0	91	550	0	28	67	0	79	550

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. Five of the 51 grantees reported that their baseline numbers were estimates, and eight of the 51 grantees reported that their follow-up numbers were estimates.

A.2.2 Client Assessment/Interview Data

Over 80% of grantees routinely conducted assessments or interviews of clients. Twelve percent of grantees (6 of 50) conducted only one client assessment/interview, while 40%, 22%, 10%, and 16% conducted two, three, four, and five or more client assessments, respectively.

As shown in Table A.8, of the seven types of client-related data listed on the questionnaire, the top three types of data routinely included in the baseline assessments/interviews included:

- Behavioral information (88%)
- Health data (83%)
- Household/resident/family characteristics (81%)

Behavioral information and health data were also most commonly collected by grantees during follow-up client assessments/interview (Table A.8). Over three-quarters of grantees (76%) reported that their client assessments/interviews covered four to seven different types of client data; the remaining 24% (12 of 51) covered one to three types of client data.

As shown in Table A.9, grantees reported that baseline client assessments/interviews were completed on an average of 158 clients, ranging from 7 to 955 across all grantees that conducted a client assessment/interview, while follow-up client assessments/interviews were completed on an average of 74 clients (range 0 to 314).

Of the grantees that routinely collected health data during the baseline and/or follow-up client assessments/interviews, they most commonly collected data concerning asthma (87%) and emergency room visits (73%) (Table A.10). Most commonly, the health data were as reported by family members (67%) rather than information provided or verified by a physician or nurse (2%). Such health data most commonly concerned the health of a single child living in the home (34%).

Table A.8: Summary of the Types of Data Collected During Baseline and Follow-up Client Assessments/Interviews[a]

	Demonstration (n=38)		Technical Studies (n=14)		All (n=52)	
	Baseline	**Follow-up**	**Baseline**	**Follow-up**	**Baseline**	**Follow-up**
Behavioral information	37 (97%)	33 (87%)	9 (64%)	6 (43%)	46 (88%)	39 (75%)
Client's knowledge of the focus area	25 (66%)	22 (58%)	5 (36%)	4 (29%)	30 (58%)	26 (50%)
Household/resident/family characteristics	34 (89%)	17 (45%)	8 (57%)	4 (29%)	42 (81%)	21 (40%)
History of household mobility	12 (32%)	8 (21%)	4 (29%)	2 (14%)	16 (31%)	10 (19%)
Health data	35 (92%)	32 (84%)	8 (57%)	6 (43%)	43 (83%)	38 (73%)
Socio-economic data	22 (58%)	9 (24%)	6 (43%)	2 (14%)	28 (54%)	11 (21%)
Survey of client concerns regarding housing characteristics/conditions	21 (55%)	20 (53%)	6 (43%)	3 (21%)	27 (52%)	23 (44%)
Other Total[b]	9 (24%)	10 (26%)	6 (43%)	3 (21%)	15 (29%)	13 (25%)
Other[c]: Quality of Life Information	7 (18%)	7 (18%)	3 (21%)	3 (21%)	10 (19%)	10 (19%)

[a]Grantees were permitted to check more than one type of data collected during client assessments/interviews; therefore, summing numbers across all types of data is not appropriate.

[b]On the questionnaire, each grantee was permitted to list up to three responses other than the 7 specifically listed.

[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

Table A.9: Descriptive Statistics for Number of Clients Assessed/Interviewed at Baseline and All Follow-up Visits[a]

	Demonstration			Technical Studies			All		
	Min	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
Baseline Visit (n=37 for demo, 14 for tech studies, and 51 for all)	7	151	600	18	177	955	7	158	955
All Follow-up Visits (n=37 for demo, 11 for tech studies, and 48 for all)	0	80	314	0	51	300	0	74	314

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. 8/52 grantees reported that their baseline numbers were estimates, and 12/52 grantees reported that their follow-up numbers were estimates.

Table A.10: Summary of Focus Areas for Health Data Collected during Baseline and/or Follow-up Client Assessments/Interviews[a]

Health Data Collected	Demonstration (n=38)	Technical Studies (n=14)	All (n=52)
Elevated blood lead levels	16 (42%)	4 (29%)	20 (38%)
Respiratory conditions (not asthma)	11 (29%)	3 (21%)	14 (27%)
Asthma	37 (97%)	8 (57%)	45 (87%)
Allergies	22 (58%)	4 (29%)	26 (50%)
Emergency room visits	33 (87%)	5 (36%)	38 (73%)
Doctor visits	23 (61%)	5 (36%)	28 (54%)
Injuries	9 (24%)	2 (14%)	11 (21%)
Health-related absences school/work	24 (63%)	4 (29%)	28 (54%)
Poisonings	5 (13%)	1 (7%)	6 (12%)
Other Total[b]	15 (39%)	2 (14%)	17 (33%)
Other[c]: Medication use	11 (29%)	1 (7%)	12 (23%)

[a]Grantees were permitted to check more than one health data focus area; therefore, summing numbers across all focus areas is not appropriate.
[b]On the questionnaire, each grantee was permitted to list one response other than those specifically listed.
[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."

A.2.3 Environmental and Biological Sampling

A.2.3.1 Biological Sampling Information

Approximately one-third of grantee projects (33%) reported the use of human biological samples. Ten percent of these grantees reported that they collected no biological samples from clients; rather, they used biological data that had already been collected. Almost half of those grantees (48%) collected one set of biological samples from each client, while 14% collected two sets of biological samples from each client, and 10% collected three or more sets.

As shown in Table A.11, of the seven types of biological samples listed on the questionnaire, only four were routinely collected at the baseline visit:

- Blood lead levels (62%)
- Pulmonary function testing (57%), more commonly performed in Demonstration grant projects than in Technical Studies grant projects
- Allergen testing of the skin (38%)
- Allergen- specific antibody testing of the blood (38%)

These types of biological samples were also collected during follow-up visits (Table A.11). Thirty-eight percent of grantees reported that they used only one type of biological sample in their project; 33% used two types, 24% used three, and only used four types of biological samples in their projects. Out of the total number of grantees collecting biological samples, 29% reported integrating quality control samples into their sampling process.

Table A.11: Summary of the Types of Biological Samples Collected During Baseline and Follow-up Visits[a]

Biological Sample	Demonstration (n=15)		Technical Studies (n=6)		All (n=21)	
	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
Blood lead levels	9 (60%)	3 (20%)	4 (67%)	2 (33%)	13 (62%)	5 (24%)
Allergen test-blood	6 (40%)	4 (27%)	2 (33%)	2 (33%)	8 (38%)	6 (29%)
Allergen test-skin	6 (40%)	3 (20%)	2 (33%)	0 (0%)	8 (38%)	3 (14%)
Pulmonary function testing	11 (73%)	9 (60%)	1 (17%)	1 (17%)	12 (57%)	10 (48%)
Other (e.g., urinary cotinine)[b]	6 (40%)	4 (27%)	0 (0%)	0 (0%)	6 (29%)	4 (19%)

[a]Grantees were permitted to check more than one type of biological sample; therefore, summing numbers across all types is not appropriate.
[b]On the questionnaire, each grantee was permitted to list up to three responses other than the 7 specifically listed; there were no frequently listed responses.

As shown in Table A.12, grantees reported that baseline biological sampling was conducted on an average of 118 clients, ranging from 7 to 437 across all grantees that performed biological sampling, while follow-up biological sampling was completed on an average of 36 clients, ranging from 0 to 165.

Table A.12: Descriptive Statistics for Number of Clients with Biological Samples Collected at Baseline and All Follow-up Visits[a]

	Demonstration			Technical Studies			All		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Baseline Visit (n=15 for demo, 6 for tech studies, and 21 for all)	7	87	216	44	196	437	7	118	437
Follow-up Visit (n=13 for demo, 5 for tech studies, and 18 for all)	0	39	165	0	28	67	0	36	165

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. 9 of 21 grantees reported that their baseline numbers were estimates, and 7 of 21 grantees reported that their follow-up numbers were estimates.

A.2.3.2 Environmental Sampling Information

Eighty percent of grantees collected environmental samples as part of their projects. Twenty-one percent of those grantees conducted only one set of environmental samples per housing units, while 49%, 6%, 4%, and 6% collected two, three, four, and five or more sets of environmental data per housing unit, respectively.

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As shown in Table A.13, of the 13 types of environmental samples listed on the questionnaire, the top 5 types of samples routinely collected included:

- Dust mite allergens (64%)
- Relative humidity (64%)
- Temperature (56%)
- Molds (52%)
- Lead (50%)

Approximately half of grantees (47%) collected one to four types of environmental samples, 41% collected 5 to 8 types, and 12% collected nine to 11 types of environmental samples.

Table A.13: Summary of the Types of Environmental Samples that were Routinely Collected[a]

Environmental Samples	Demon-stration (n=35)	Technical Studies (n=15)	All (n=50)	Primary Sampling Method[d]
Lead	19 (54%)	6 (40%)	25 (50%)	Dust wipe
Cockroach allergens	16 (46%)	8 (53%)	24 (48%)	Dust vacuum
Cat allergens	11 (31%)	5 (33%)	16 (32%)	Dust vacuum
Dog allergens	8 (23%)	3 (20%)	11 (22%)	Dust vacuum
Dust mite allergens	22 (63%)	10 (67%)	32 (64%)	Dust vacuum
Mouse allergens	12 (34%)	4 (27%)	16 (32%)	Dust vacuum
Pesticide residues	1 (3%)	2 (13%)	3 (6%)	Wipe or vacuum
Molds	16 (46%)	10 (67%)	26 (52%)	[d]
Particulate matter	10 (29%)	2 (13%)	12 (24%)	Air
Formaldehyde	1 (3%)	1 (7%)	2 (4%)	Passive badge
Temperature:	19 (54%)	9 (60%)	28 (56%)	[d]
• **Real-time**	13 (68%)	6 (60%)	19 (66%)	[d]
• **Long-term**	6 (32%)	4 (40%)	10 (34%)	[d]
Relative humidity:	22 (63%)	10 (67%)	32 (64%)	[d]
• **Real-time**	16 (73%)	5 (56%)	21 (68%)	[d]
• **Long-term**	6 (27%)	4 (44%)	10 (32%)	[c]
Radon:	7 (20%)	1 (7%)	8 (16%)	
• **Short-term**	4 (57%)	0 (0%)	4 (50%)	2-7 day
• **Long term**	3 (43%)	1 (100%)	4 (50%)	3-month
Other Total[b]	20 (57%)	6 (40%)	26 (52%)	
Other[c]: CO measurements	9 (26%)	2 (13%)	11 (22%)	
Other[c]: Dust measurements	4 (11%)	0 (0%)	4 (8%)	

[a]Grantees were permitted to check more than one type of environmental sample; therefore, summing numbers across all types of environmental samples is not appropriate.
[b]On the questionnaire, each grantee was permitted to list up to three responses other than the 13 specifically listed.
[c]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question versus just grantees that identified an item under "other."
[d]For molds, temperature, and relative humidity, no single method was predominantly across grantees.

As shown in Table A.14, grantees reported that baseline environmental sampling was conducted on an average of 143 housing units, ranging from 8 to 955 across all grantees that performed environmental sampling, while follow-up environmental sampling was completed on an average of 62 housing units (range 0 to 550).

Table A.14: Descriptive Statistics for Number of Housing Units with Environmental Samples Collected at Baseline and All Follow-up Visits[a]

	Demonstration			Technical Studies			All		
	Min	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
Baseline Visit (n=34 for demo, 15 for tech studies, and 49 for all)	8	153	900	15	121	955	8	143	955
Follow-up Visit (n=34 for demo, 13 for tech studies, and 47 for all)	0	74	550	0	32	69	0	62	550

[a]Numbers presented in the table include both estimated and actual quantities provided by grantees. 8 of 47 grantees reported that their baseline numbers were estimates, and 11 of 47 grantees reported that their follow-up numbers were estimates.

A.3 INTERVENTION INFORMATION NOT PRESENTED IN CHAPTER 3

Table A.15: Summary of Education Focus Areas (excluding Community-based Education Efforts)[a,b]

	Demonstration		Technical Studies		All	
Focus Area	**Rental Property Owners (n=16)**	**Tenant/ Owner-Occupants (n=36)**	**Rental Property Owners (n=2)**	**Tenant/ Owner-Occupants (n=7)**	**Rental Property Owners (n=18)**	**Tenant/ Owner-Occupants (n=43)**
Lead poisoning prevention	11 (69%)	26 (72%)	1 (50%)	4 (57%)	12 (67%)	30 (70%)
Asthma education	7 (44%)	35 (97%)	1 (50%)	5 (71%)	8 (44%)	40 (93%)
Injury prevention	7 (44%)	24 (67%)	0 (0%)	3 (43%)	7 (39%)	27 (63%)
IPM	9 (56%)	30 (83%)	1 (50%)	2 (29%)	10 (56%)	32 (74%)
Mold and moisture prevention	11 (69%)	33 (92%)	0 (0%)	4 (57%)	11 (61%)	37 (86%)
Carbon monoxide poisoning prevention	8 (50%)	23 (64%)	0 (0%)	3 (43%)	8 (44%)	26 (60%)
Behavior change	5 (31%)	33 (92%)	1 (50%)	7(100%)	6 (33%)	40 (93%)
Fire safety	5 (31%)	19 (53%)	0 (0%)	4 (57%)	5 (28%)	21 (49%)
Medical management	2 (13%)	16 (44%)	0 (0%)	2 (29%)	2 (11%)	20 (47%)
Other (tenant rights, landlord and tenant responsibilities)[c]	6 (38%)	8 (22%)	0 (0%)	2 (29%)	6 (33%)	10 (23%)

[a]Grantees were permitted to check more than one education focus area; therefore, summing numbers across all focus areas is not appropriate.
[b]n=number of grantees who answered questions concerning the focus of their education activities.
[c]On the questionnaire, each grantee was permitted to list up to three responses other than the nine specifically listed.
Items most frequently reported for this category are provided as examples.

Table A.16: Summary of Housing Interventions[a, b]

Intervention	Demon-stration grantees (n=38)	Technical Studies grantees (n=11)	All (n=49)
Weatherization activities:	11 (29%)	1 (9%)	12 (24%)
• Repair/replace windows	4 (11%)	0 (0%)	4 (8%)
• Install weatherstripping (e.g., around doors/windows)	7 (18%)	0 (0%)	7 (14%)
• Install insulation	4 (11%)	0 (0%)	4 (8%)
• Seal ducts	4 (11%)	0 (0%)	4 (8%)
• Service furnace/boiler/hot water heater	6 (16%)	0 (0%)	6 (12%)
• Other (e.g., referrals made to weatherization program)[c]	3 (8%)	1 (9%)	4 (8%)
Moisture control activities:	32 (84%)	4 (36%)	36 (73%)
• Fix roof leak	14 (37%)	0 (0%)	14 (29%)
• Fix/clean gutters/downspouts	15 (39%)	0 (0%)	15 (31%)
• Fix plumbing/appliance leaks	24 (63%)	1 (9%)	25 (51%)
• Confirm dryer is vented to outside	22 (58%)	1 (9%)	23 (47%)
• Install bathroom fan vented to outside	20 (53%)	1 (9%)	21 (43%)
• Install range hood fan vented to outside	15 (39%)	0 (0%)	15 (31%)
• Seal dirt crawlspaces in basement with plastic sheeting	6 (16%)	0 (0%)	6 (12%)
• Provide dehumidifier	8 (21%)	1 (9%)	9 (18%)
• Service furnace/air conditioner	16 (42%)	0 (0%)	16 (33%)
• Perform landscaping/grading	7 (18%)	0 (0%)	7 (14%)
• Other Total[c]	14 (37%)	4 (36%)	18 (37%)
• Other[d]: Removal and repair of water damaged or moldy materials	8 (21%)	0 (0%)	8 (16%)
• Other[d]: Clean-up of visible mold	5 (13%)	1 (9%)	6 (12%)
Lead hazard control activities:	19 (50%)	2 (10%)	21 (43%)
• Stabilize paint	11 (29%)	0 (0%)	11 (22%)
• Encapsulate paint	4 (11%)	1 (9%)	5 (10%)
• Strip paint from components	6 (16%)	0 (0%)	6 (12%)
• Enclose walls	2 (5%)	0 (0%)	2 (4%)

Table A.16: Summary of Housing Interventions[a, b]

Intervention	Demon-stration grantees (n=38)	Technical Studies grantees (n=11)	All (n=49)
• Replace components (e.g., doors, windows)	11 (29%)	1 (9%)	12 (24%)
• Make floor and window surfaces smooth and cleanable	9 (24%)	0 (0%)	9 (18%)
• Perform specialized cleaning of horizontal surfaces	12 (32%)	1 (9%)	13 (27%)
• Other Total[c]	9 (24%)	1 (9%)	10 (20%)
• Other[d]: Referrals made to other programs	6 (16%)	1 (9%)	7 (14%)
Injury prevention activities:	33 (87%)	3 (27%)	36 (73%)
• Install smoke detectors	28 (74%)	1 (9%)	29 (59%)
• Install carbon monoxide detectors	27 (71%)	1 (9%)	28 (57%)
• Install window guards	7 (18%)	2 (18%)	9 (18%)
• Install cabinet locks	16 (42%)	1 (9%)	17 (35%)
• Fix stair rails and stair treads	8 (21%)	0 (0%)	8 (16%)
• Provide nightlights	2 (5%)	0 (0%)	2 (4%)
• Other Total[c]	20 (53%)	2 (18%)	22 (45%)
• Other[d]: Correct electrical or fire hazards	13 (34%)	2 (18%)	15 (31%)
• Other[d]: Install/provide outlet covers	8 (21%)	2 (18%)	10 (20%)
• Other[d]: Provide child safety gates	3 (8%)	1 (9%)	4 (8%)
Allergen reduction activities:	34 (89%)	9 (81%)	43 (88%)
• Make floor surfaces smooth and cleanable	16 (42%)	1 (9%)	17 (35%)
• Install air filtration devices	16 (42%)	1 (9%)	17 (35%)
• Perform cleaning	23 (61%)	3 (27%)	26 (53%)
• Provide mattress or pillow covers	28 (74%)	4 (36%)	32 (65%)
• Take steps to reduce environmental tobacco smoke in home	15 (39%)	1 (9%)	16 (33%)
• Other Total[c]	16 (42%)	7 (64%)	23 (47%)
• Other[d]: Provide cleaning supplies such as HEPA vacuum	8 (21%)	4 (36%)	12 (24%)
Integrated pest management activities:	30 (79%)	4 (36%)	34 (69%)
• Seal holes and cracks	20 (53%)	3 (27%)	23 (47%)
• Eliminate food sources	21 (55%)	4 (36%)	25 (51%)
• Use low toxicity baits	21 (55%)	4 (36%)	25 (51%)

Table A.16: Summary of Housing Interventions[a, b]

Intervention	Demon-stration grantees (n=38)	Technical Studies grantees (n=11)	All (n=49)
• Vacuum	21 (55%)	2 (18%)	23 (47%)
• Conduct monitoring	12 (32%)	2 (18%)	14 (29%)
• Other (e.g., provide storage containers, referral to pest program or company)[c]	13 (34%)	3 (27%)	16 (33%)
• Other[d]: Provide storage containers	3 (8%)	1 (9%)	4 (8%)
• Other[d]: Referrals to pest program or company	3 (8%)	1 (9%)	4 (8%)
Education	37 (97%)	7 (64%)	44 (90%)

[a]Grantees were permitted to check more than one type of intervention; therefore, summing numbers across all interventions is not appropriate.

[b] n=number of grantees who answered questions concerning the types of interventions completed as part of their projects.

[c]On the questionnaire, for each major type of intervention, each grantee was permitted to list one other type of intervention in each intervention category other than those specifically listed. Items most frequently reported for these categories are provided as examples.

A.4 COMMUNITY EDUCATION AND OUTREACH INFORMATION

Table A.17: Summary of the Types of Community Education and Outreach Efforts Conducted by Grantees[a,b]

Type of Community Education and Outreach Effort	Demon-stration (n=33)	Tech-nical Studies (n=6)	All (n=39)	#(%) of grantees who used the method reporting it was effective/ very effective	#(%) of grantees who used the method reporting it was ineffective/ very ineffective	#(%) of grantees who used the method reporting it was neither effective nor ineffective
Door-to-door outreach	10 (30%)	3 (50%)	13 (33%)	5 (38%)	5 (38%)	3 (23%)
Visits to primary care provider offices	17 (52%)	2 (33%)	19 (49%)	9 (47%)	6 (32%)	4 (21%)
Mailings to organization and/or community groups	17 (52%)	1 (17%)	18 (46%)	6 (33%)	8 (44%)	4 (22%)
Broadcast media outreach	17 (52%)	1 (17%)	18 (46%)	10 (56%)	4 (22%)	4 (22%)
Visits to community or parent groups	30 (91%)	5 (83%)	35 (90%)	18 (53%)	7 (21%)	9 (26%)
Participation in health fairs	32 (97%)	6(100%)	38 (97%)	15 (41%)	13 (35%)	9 (24%)
Other Total[c]	19 (58%)	3 (50%)	22 (56%)			
Other[d]: Visits to schools	8 (24%)	2 (33%)	10 (26%)			
Other[d]: Community forums	7 (21%)	0 (0%)	7 (18%)			
Other[d]: Presentations/ trainings to healthcare providers	5 (15%)	2 (33%)	7 (18%)			

[a]Grantees were permitted to check more than one type of community education and outreach effort; therefore, summing numbers across all types of efforts is not appropriate. Items most frequently reported for this category are provided as examples.
[b]n=number of grantees answering questions concerning types of education and outreach conducted.
[c]On the questionnaire, each grantee was permitted to list up to three other responses other than the six specifically listed.
[d]Under the "other" category, this item was frequently listed by grantees. The percentages provided are based on the total number of grantees that answered this question, versus just grantees that identified an item under "other."

A.5 OTHER FUNDING SOURCES

Two-thirds of grantees (68%) reported that, in addition to HUD Healthy Homes Initiative funds, they used other sources of funding to complete their projects. Leveraged funds from the grantee were the most common type of alternate funding, with grantees utilizing an average of $262,000 in funds from this source (Tables A.18 and A.19). Lead hazard control grant funds and community development block grant funds were also commonly used, by about a quarter of grantees (Table A.18), with average funding amounts of $273,000 and $331,000, respectively (Table A.19). Two-thirds of grantees (61%) reported that one or more aspects of their projects were sustainable in the absence of federal funds.

Table A.18: Summary of Other Funding Sources[a]

Other Funding Source	Demon-stration (n=34)	Tech-nical Studies (n=10)	All (n=44)
Weatherization funds	9 (26%)	0 (0%)	9 (20%)
HOME funds	2 (6%)	0 (0%)	2 (5%)
Lead hazard control grant funds	11 (32%)	0 (0%)	11 (25%)
Community development block grant funds	11 (32%)	0 (0%)	11 (25%)
Leveraged funds from grantee	12 (35%)	4 (40%)	16 (36%)
Other[b]			

[a]Grantees were permitted to check more than one type of funding source; therefore, summing numbers across all items not appropriate.

[b]On the questionnaire, each grantee was permitted to list up to three funding sources other than the five specifically listed.

Table A.19: Descriptive Statistics for Amounts of non-HUD Funding Used for Grantee Projects

	Demonstration			Technical Studies			All		
	Min	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
Weatherization funds	$7500	$223864	$985686	NA	NA	NA	$7500	$223864	$985686
HOME funds	$40000	$295000	$550000	NA	NA	NA	$40000	$295000	$550000
Lead hazard control grant funds	$8000	$272833	$1750000	NA	NA	NA	$8000	$272833	$1750000
Community development block grant funds	$50000	$330698	$1500000	NA	NA	NA	$50000	$330698	$1500000
Leveraged funds from grantee	$8000	$296298	$822083	$25000	$185813	$575000	$8000	$262303	$822083
Other[a]									

[a]On the questionnaire, each grantee was permitted to list up to three funding sources other than the five specifically listed.
NA=not applicable, no tech studies grantees used these types of funding.

A.6 PARTNERSHIPS

Eighty-six percent of grantees provided information on partner(s) involved in their projects, including sub-grantees. As shown in Table A.20, common partners included health departments (54%), community-based organizations (48%), housing departments (44%), and universities (44%). Partnership activities included recruitment and referrals (80% of grantees) as well as performance of interventions and provision of community outreach and education (59% of grantees).

Table A.20: Summary of Grantee Partnerships with Other Organizations and Agencies[a]

	Demon-stration (n=38)	Tech-nical Studies (n=16)	All (n=54)
Type of Partner Organization:			
• Advocacy	6 (16%)	1 (6%)	7 (13%)
• University/academic	16 (42%)	8 (50%)	24 (44%)
• Faith-based	3 (8%)	0 (0%)	3 (6%)
• Parent	0 (0%)	0 (0%)	0 (0%)
• Local school	3 (8%)	1 (6%)	4 (7%)
• Health department	24 (63%)	5 (31%)	29 (54%)
• Housing department	19 (50%)	5 (31%)	24 (44%)
• Community-based organization	22 (58%)	4 (25%)	26 (48%)
• Hospital/Health center	15 (39%)	3 (19%)	18 (33%)
• Other[b]			
Project Areas in Which Partner Participated:			
• Recruitment or Referrals	32 (84%)	11 (69%)	43 (80%)
• Performance of Assessments	23 (61%)	8 (50%)	31 (57%)
• Performance of Interventions	26 (68%)	6 (38%)	32 (59%)
• Skills Training	22 (58%)	4 (25%)	26 (48%)
• Community Outreach and Education	28 (74%)	4 (25%)	32 (59%)
• Other[b]			

[a]Grantees were permitted to check more than one type of partner organization and more than one area that the partner(s) participated in; therefore, summing numbers across all items not appropriate.
[b]On the questionnaire, each grantee was permitted to list partnership activities other than the five specifically listed, and other types of partnership organizations.

APPENDIX B: Examples of Intervention Costs

Table B.1: Examples of Intervention Costs Provided by Grantees[a]

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
Advanced Energy					X			$2500 for Systems Vision Protocol $3000 additional for Plus portion of protocol
Alameda County		X		X	X	X	X	Average cost = $3247/unit
Alaska Housing Finance Corporation	X	X			X		X	Average total costs for weatherization and moisture activites = $7250/unit ($2900 per material, $4350 labor). Average total costs for allergen reduction activities = $4500/unit ($1800 per material, $2700 labor)
Boston Public Housing Commission		X		X	X	X	X	Estimated moisture control costs = $600/unit Estimated injury prevention costs = $500/unit Estimated allergen reduction costs = $2500/unit Estimated IPM costs = $200/unit Estimated education costs = $375/unit
City of Long Beach (1999)			X	X	X	X		Average total costs = $1554/unit
City of Long Beach (2004)				X			X	Average injury prevention costs for materials= $55/unit Average educational costs = $200/unit ($160 for materials; $40 for labor)
City of Milwaukee		X	X	X	X	X		Moisture control costs= $217/unit ($42 materials, $175 labor); Lead hazard control costs= $2643/unit ($532 material, $2114 labor) Injury costs = $273/unit for materials

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
								Allergen reduction = $571/unit ($428 materials, $142 labor) IPM costs = $243/unit ($48 materials, $193 labor)
City of Minneapolis	X	X		X	X	X		Average costs of materials = $637/unit Average costs of labor = $410/unit Average total costs = $1047/unit
City of Philadelphia			X	X	X	X		Average lead hazard control costs = $5000/ unit ($2000 for materials, $3000 for labor) Average IPM costs = $100/unit
City of Providence		X		X		X	X	Average moisture control costs = $4200 per unit Average injury prevention costs = $100/unit Average IPM costs = $150/unit
City of Stamford				X	X	X	X	Costs of first education visit= $53 to $75/unit Costs of second education visit = $72/unit Costs of third visit= $73 to $305/unit
Coalition to End Childhood Lead Poisoning		X	X	X	X	X	X	Average moisture control costs = $239/unit ($189 for materials, $50 for labor) Average lead hazard control costs= $5750/unit ($2100 for materials, $3650 for labor) Average injury prevention costs= $102/unit ($65 for materials, $38 for labor) Average allergen reduction costs= $300/unit ($100 for materials, $200 for labor) Average IPM costs= $39/unit ($14 for materials, $25 for labor)
Columbus Health Department		X		X	X	X	X	Average IPM costs for materials= $150/unit Average education costs= $300/unit ($30 for

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
								material, $270 for labor)
County of Riverside		X		X	X	X	X	Average injury costs for materials = $89/unit Average allergen reduction costs for materials = $38/unit Average educational costs = $32/unit ($2 for material, $30 for labor)
Cuyahoga County Board of Health	X	X		X	X	X	X	Average weatherization costs= $2605/unit ($850 for materials, $1755 for labor) Average moisture control costs = $2355/unit ($470 for materials, $1875 for labor) Average injury costs = $60/unit ($10 for materials, $50 for labor) Average allergen reduction costs = $720/unit ($70 for materials, $650 for labor) Average IPM costs= $150/unit Average education costs = $100 for labor
Cuyahoga County Department of Development		X		X		X	X	Average moisture control costs=$3147/unit
Eastern VA Medical School		X		X	X	X	X	Average education costs = $50/unit
Environmental Health Watch						X	X	Average IPM costs = $650/unit ($50 for materials, $600 for labor)
Erie County Department of Health				X	X	X	X	Average costs per unit = $134
Esperanza							X	Average educational costs= $25/unit for labor, $80 materials)
Harvard School of Public health	X	X			X	X	X	Average weatherization costs= $100/unit Average allergen reduction costs= $1100/unit

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
								Average IPM costs= $800/unit Average education costs= $300/unit
Healthy Homes Network	X	X	X	X	X	X	X	Average weatherization costs = $125/unit ($100 for materials, $25 for labor) Average moisture control costs= $500/unit ($375 for materials, $125 for labor) Average lead hazard control costs=$600/unit ($425 for materials, $125 for labor) Average injury prevention costs= $130/unit ($85 for materials, $35 for labor) Average allergen reduction costs = $575/unit ($375 for materials, $250 for labor) Average IPM costs = $420/unit ($185 for materials, 235 for labor) Average education costs= $275/unit ($75 for materials, $200 for labor)
Illinois Department of Health	X	X						Average total costs= $6828/unit
Mahoning County	X	X	X	X			X	Average weatherization costs= $3500/unit Average moisture control costs=$1500/unit Average lead hazard control costs = $13000/unit Average injury prevention costs= $850/unit
Medical and Health Research Association of NYC, Inc.		X	X	X	X	X	X	Average costs of labor and materials = $398.29/unit (range: $20 - $3,498) and $486.54 (range: $0 - $1,737), respectively. Average total costs= $865/unit (range: $120 - 5,235).
Neighborhood House, Inc.					X			"BreatheEasy" protocol = $6000/unit

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
Northeast Denver Housing Center		X	X	X	X	X	X	Average moisture control costs= $3500/unit Average lead hazard control costs = $4500/unit Average injury prevention costs= $600/unit Average allergen reduction costs= $800/unit Average IPM costs= $200/unit Average education costs= $125/unit
NY Indoor Environmental Quality Center, Inc				X	X	X	X	Average allergen reduction costs= $1570/unit ($870 for materials, $700 for labor) Average IPM costs= $210 ($140 for materials, $70 for labor)
Philadelphia Housing Authority		X		X	X	X	X	Average education costs= $50/unit
Public Health-Seattle King County	X	X		X	X	X	X	Average total costs = $4529/unit
The Medical Foundation of NE (Vermont site)		X	X	X	X		X	Average moisture control costs = $500/unit Average lead hazard control costs= $22500/unit Average injury prevention costs= $100/unit Average allergen reduction costs= $1500/unit
University of Colorado Health Sciences Center							X	Average education costs = $25/unit
University of Maryland		X	X	X	X	X	X	Average moisture control costs= $719/unit Average lead hazard control costs= $5960/unit Average injury prevention costs= $122/unit Average allergen reduction costs= $207/unit Average education costs= $176/unit

Grantee	Weather-ization Activities	Moisture control activities	Lead Hazard Control Activities	Injury prevention activities	Allergen reduction activities	IPM	Education	Provided Cost Information
								Average total costs= $7028/unit
University of Texas at San Antonio							X	Average education costs= $225/unit ($90 for materials, $136 for labor)
University of Tulsa					X	X	X	Average allergen reduction activities= $450/unit Average IPM activities= $300/unit
University of Wisconsin		X		X	X	X	X	Average total costs= $100/unit

[a]Note: Grantees conducted a wide range of activities under each type of intervention category; therefore, costs varied dramatically between programs depending on the specific activities being conducted.

APPENDIX C: Examples of Curricula Created By Grantees

Table C.1: Examples of Curricula Created by Grantees for their Projects

Grantee Name	Topic(s)	Audience	Additional information (if provided)
Alameda County (2001)	Title: "Asthma 101 and In-home Environmental Assessment for Asthma Triggers and Safety" Focus: Asthma, asthma treatment, recognition of asthma triggers, home safety, how to correct hazards.	Public health nurses, outreach workers, code enforcement official	4 hour course
Alaska Housing Finance Corporation (2001)	Focus: specification writing, assessment protocols and procedures for the project	Field assessors	
City of Long Beach (2004)	Focus: training curriculum developed for the Healthy Homes Promotora Training Academy and Junior Health Inspector Program.	Young children	Grantee is currently working with a media production agency to develop and produce the Junior Health Inspector program curriculum in an educational visual tool (DVD format)
City of Minneapolis (2003)	Focus: what to look for when doing a home inspection, identifying potential sites of mold growth	Home visiting nurses	Trainings take one to hours and are conducted over two to three visits.
City of Philadelphia (2002)	Focus: overview of healthy homes issues including assessments and interventions	Project staff and contractors	Curriculum covers two binders of materials, consisting of different modules, over one full week of training

Grantee Name	Topic(s)	Audience	Additional information (if provided)
City of Stamford (2001)	Focus: assessment forms (medical and housing forms)	Project staff	
Coalition to End Childhood Lead Poisoning (2002)	Focus: general healthy homes issues	Individuals reached by community groups	PowerPoint presentation designed to raise awareness
County of Riverside, California (2004)	Focus: use of alternative cleaning methods and materials, IPM using boric acid, delivery of the healthy homes message in the community	Promotoras	Consists of 10 modules
Cuyahoga County Board of Health (2003)	Focus: general healthy homes issues	Residents	PowerPoint presentations, reminder cards and other materials created. Used to train residents in a group session.
Eastern VA Medical School (2004)	Focus: how to conduct assessments and provide education, deal with difficult clients through role playing, improve communication skills, and become aware of community resources	Community health workers	Two week session Grantee used this training to help decide which community health workers to hire for the project.
Harvard School of Public Health (2000)	Focus: Public Housing Residents Survey Training Manual focuses on healthy homes issues, especially IPM.	Public housing residents	Training model is being implemented in a project funded by the Kellogg Foundation and managed by the Boston Housing Authority and the Boston Public Health Association.
Healthy Homes Resources (2004)	Focus: asthma basics and cleaning interventions	Caregivers	Is completed within an hour

Grantee Name	Topic(s)	Audience	Additional information (if provided)
Illinois Department of Health (1999)	Focus: mold and moisture	Lead hazard control workers and weatherization workers	This curriculum was designed to cross-train the targeted audience.
Mahoning County (2003)	Focus: Healthy Homes concepts	Families enrolled in program, parent groups, physicians	Course contains several different modules. These modules can be used to provide 3,4, or 8 hour trainings.
Medical and Health Research Association in NYC (2001)	Focus: residential hazards, health effects, environmental assessment, remediation methods, data collection	Project staff	An intensive two week training.
Northeast Denver Housing Center (2000)	Focus: General healthy homes info	Homebuyers	Curriculum was added to homebuyers workshop
NY Indoor Environmental Quality Center (2003)	Focus: childhood asthma, triggers, means to reducing episodes and frequency	Peer-educators	
Philadelphia Housing Authority (2004)	Focus: data collection, environmental sampling, HIPAA regulations, identification of structural/basic construction hazard, mold inspections, and Housing Quality Services inspections and violations.	Project staff	Training was 7 to 8 days
Public Health Seattle King County (2001)	Focus: how to become community home environmental specialists and provide education to residents on healthy housing issues	Community members	

Grantee Name	Topic(s)	Audience	Additional information (if provided)
Tulane University School of Public Health (2003)	Focus: how to do assessments, provide education, and conduct interventions.	Community health workers	Consists of 8 modules usually completed over two weeks
University of Alabama (2001)	Focus: how to address healthy homes hazards using safe work practices	GED graduates and Welfare to Work candidates	
University of Maryland at Baltimore (2001)	Focus: reasons for housing failure/deterioration; performing lead work in occupied homes; carbon monoxide, sources, health effects, interventions to reduce CO	Workers and families	
University of Massachusetts at Lowell (2002)	Focus: "Train the Trainer` curriculum focusing on healthy homes issues	Individuals who conduct home visits	This curriculum was integrated into the New Ventures project and the Community Outreach Center at the University of MA Lowell.
University of Texas at San Antonio (2004)	Focus: Family Education Curriculum was developed to educate about lead poisoning and lead poisoning prevention. Health Care Provider Education curriculum focuses on lead poisoning.	Families and pregnant women; physicians, nurses, and dentists	The family education curriculum consists of 8 one hour sessions. The healthcare provider curriculum is one hour and was often presented during Grand Rounds.
University of Tulsa (2001)	Focus: environmental factors that contribute to disease and injury in children	Health professionals	This material was incorporated into the training curriculum of South Texas Environmental Education and Research program.

APPENDIX D: Examples of Educational Materials Created By Grantees

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Table D.1: Examples of Educational Materials Created By Grantees

Grantee Name	Type of Material Developed	Focus of Materials	Other Comments
Medical Foundation of NE	Video	Two videos on IPM	Target groups: one video is for residents and the other for rental property owners
City of Minneapolis	Video	Asthma	Target group: parents Available in non-English languages
City of Stamford	Video	Proper management of asthma	Available in English and Spanish Target group: youths Cost of video is approximately $15 each
Mahoning County	Video	Consists of six modules on various healthy homes topics	Target group: families
Montana State University	Video	Asthma triggers	Target group: Native American adults and children This is a 15 minute video
University of Maryland	Video	Shows local houses with health hazards, assessment methods, interventions, and houses with reduced hazards	Target group: occupants
City of Phoenix	Public Service Announcements	Safe home hints	6 PSAs of 30 seconds were developed and aired on local radio and advertisements placed in local Spanish newspapers.
Boston Public Housing Commission	Booklet	Healthy homes step-by-step guide to improving air quality and reducing asthma triggers, injury, and lead hazards	Translated into: 7 languages Available on-line

Grantee Name	Type of Material Developed	Focus of Materials	Other Comments
Duke University	Booklet	Individualized reports describing sampling results and guidelines on how to correct hazards	Target group: occupants of a home
Environmental Health Watch	Booklet	1. Cockroach Control guide 2. How Baits work 3. IPM slide show	1. Target group: practitioners and members of the public. 6 page document 2. General public. Short cartoon guide for low literacy populations. Available on-line 3. Target group: school custodians
Erie County Department of Health	Booklet	1. "Have a Healthy Home" handbook 2. "My healthy home" coloring book	1. Target group: occupants of a home. English and Spanish versions available. 2. Target group: children. Available in English and Spanish and for two age groups.
University of Tulsa	Booklet	Asthma triggers and methods to improving homes	Target group: families
University of Maryland	Booklet	"Maintaining a Home – Safe and Affordable Methods in Occupied Homes"	Target group: individuals doing work in the home. 28 page booklet with illustrations.
Harvard School of Public Health	Pamphlet	IPM	Translated into: English and Spanish
Northeast Denver Housing Center	Pamphlet	General healthy housing issues including a list of programs that help correct the issues	Target group: homeowners and renters
Columbus Health Department	Pamphlet	Healthy Homes Action Plan Guide based on individual results	Target group: occupant

Grantee Name	Type of Material Developed	Focus of Materials	Other Comments
Air Quality Sciences	Fact Sheets	Mold and Moisture	Target group: homeowners
City of Long Beach	Fact Sheets	Housing hazards including lead and injury hazards	Target group: tenants
County of Riverside	Fact Sheets	Prevention and removal of rodents, roaches, and mold	
Healthy Homes Network	Fact Sheets	7 Indoor hazards and cleaning techniques	Target group: low-income families
Healthy Homes Resources	Fact Sheets	Asthma triggers and cleaning methods	Target groups: owner occupants and renters
Illinois Department of Health	Fact Sheets	Moisture sources and health effects	Target groups: tenants and home owners
University of Minnesota	Fact Sheets	Asthma and asthma triggers	Translated into: English, Somali, and Spanish
University of Colorado	Fact Sheets	Instruction sheets for developing fire plans, installing smoke detectors, preventing electrical injuries and preventing falls.	Target group: low-literacy populations. Translated into: English and Spanish

APPENDIX E: Publications and Anticipated Publications

Publications

Table E.1: Reported Publications from Grantees

Grantee Name	Award Date	Type of Grant	Publication information
Cuyahoga County Department of Development	1999	Mold and Moisture	• Kercsmar, C.M., Dearborn, D.G., Schluchter, M., Xue, L., Kirchner, H.L., Sobolewski, J., Greenberg, S.J., Vesper, S.J. & Allan, T. Reduction in asthma morbidity in children as a result of home remediation aimed at moisture sources. *Environmental Health Perspectives* (in press). • Vesper, S.J., McKinstry, C., Yang, C., Haugland, R.A., Kercsmar, C.M., Yike, I., Schluchter, M.D., Kirchner, H.L., Sobolewski, J., Allan, T.M., & Dearborn, D. (2006). Specific molds associated with asthma in water-damaged homes. *Journal of Occupational and Environmental Health, 48*(8): 852-858. • Vesper, S.J., Varma, M., Wymer, L.J., Dearborn, D.G., Sobolewski, J., & Haugland, R.A. (2004). Quantitative polymerase chain reaction analysis of fungi in dust from homes of infants who developed idiopathic pulmonary hemorrhaging. *Journal of Occupational and Environmental Medicine, 46*:596-601.
Harvard School of Public Health	2000	Technical Study	• Vermeer K. (2002). Saving energy, preserving health. *Journal of Housing and Community Development, 59*:20-24. • Vermeer K. (2002). An opportunity for healthier public housing. *Home Energy, Nov/Dec*: 42-44.

Grantee Name	Award Date	Type of Grant	Publication information
			• Brugge, D., Vallarino, J., Ascolillo, L., Osgood, N.D., Steinbach, S., & Spengler, J. (2003). Comparison of multiple environmental factors for asthmatic children in public housing. *Indoor Air, 13*:18-27. • Hynes, P.H., Brugge, D., Osgood, N.D., Snell, J., Vallarino, J., & Spengler, J. (2003). Where does the damp come from? Investigations into the indoor environment and respiratory health in Boston public housing. *Journal of Public Health Policy, 24*(3/4):401-426. • Brugge, D., & Kole, A. (2003). Exploring community-based research ethics. Case study: Healthy Public Housing Initiative. *Science and Engineering Ethics, 9:485*-501. • Brugge, D., Melly, S., Finkelman, A., Russell, M., Bradeen, L., Perez, R., Henson, L., Heeren, T., Snell, J., Helmes, D., & Hynes, H.P. (2003). A community-based participatory survey of public housing conditions and associations between renovations and possible building-related symptoms. *Applied Environmental Science & Public Health, 1:*89-101. • Snell, J., Brugge, D., Helmes, D., & Julio, B. (2004). Central Steam Heating Challenges and Solutions. *Home Energy*, *March/April*:38-44. • Levy, J.I., Welker-Hood, L.K., Clougherty, J.E., Dodson, R.E., Steinbach, S., & Hynes, H.P. (2004). Lung function, asthma symptoms, and quality of life for children in public housing in Boston: a case-series analysis. *Environmental Health: A Global Access Science Source 3*:13. Available (BioMed Central): http://www.ehjournal.net/content/3/1/13.

Grantee Name	Award Date	Type of Grant	Publication information
			• Hynes, H.P., Brugge, D., Osgood, N-D., Snell, J., Vallarino, J., & Spengler, J. (2003). Where does the damp come from? Investigations into the indoor environment and respiratory health in Boston public housing. *Journal of Public Health Policy, 24*(3-4):401-426. • Zota, A., Adamkiewicz, G., Levy, J.I., & Spengler, J.D. (2005). Ventilation in Public Housing: Implications for Indoor Nitrogen Dioxide Concentrations. *Indoor Air, 15*:393-401. • Brugge, D., Panikkar, B., Snell, J., Vinas, B., & Welker-Hood, K. (2005). Environmental and Health Impact of Energy and Water Saving Renovations in Public Housing. *Proceedings of the 2nd WHO International Health and Housing Symposium, Sept. 29-Oct. 1, 2004,* Vilnius, Lithuania: 286-293. • Brugge, D., Hynes, H.A (editors). (2005). *Community Research in Environmental Health.* Williston, VT: Ashgate Publishing. • Clougherty, J.E., Levy, J.I., Hynes, H.P., & Spengler, J.D. (2006). A longitudinal analysis of the efficacy of environmental interventions on asthma-related quality of life and symptoms among children in urban public housing. *Journal of Asthma, 43*(5):335-343. • Vermeer, K.V. (2006). Battling childhood asthma. *Home Energy, July/August*: 30-34.
The Opportunity Council	2000	Demonstration	• Finet, D. (2004). Restoring indoor health, one house at a time. *Home Energy Magazine, January/February*: 21-24.
University of Wisconsin –	2000	Technical Study	• Hatfield, P.M., Staresenic, A.G., Sorkness, C.A., Peterson, N.M. Schirmer, J., & Katcher, M.L. (2006). Validating self reported home safety practices in a

Grantee Name	Award Date	Type of Grant	Publication information
School of Pharmacy			culturally diverse non-inner city population. *Injury Prevention, 12*(1):52-57. • Katcher, M.L., Meister, A.N., Sorkness, C.A., Staresinic, A.G., Pierce, S.E., Goodman, B.M., Peterson, N.M., Hatfield, P.M., & Schirmer, J.A. (2006). Use of the modified Delphi technique to identify and rate home injury hazard risks and prevention methods for young children. *Injury Prevention, 12*(3):189-194.
Air Quality Sciences	2001	Technical Study	• Horner, W.E., Worthan, A.G., & Morey, P.R. (2004). Air- and dustborne mycoflora in houses free of water damage and fungal growth. *Applied and Environmental Microbiology, 70*(11): 6394-6400.
Medical and Health Research Association in NYC, Inc.	2001	Demonstration	• Klitzman, S., Caravanos, J., Deitcher, D., Rothenberg, L., Belanoff, C., Kramer, R., & Cohen, L. (2005). Prevalence and predictors of residential health hazards. *Journal of Occupational and Environmental Hygiene, 2*:292-301. • Klitzman, S., Caravanos, J., Belanoff, C., & Rothenberg, L. (2005). A multihazard, multistrategy approach to home remediation: Results of a pilot study. *Environmental Research, 99*: 294-306.
University of Cincinnati	2001	Technical Study	• Sivasubramani, S.K., Niemeier, R.T., Reponen, T., & Grinshpun, S.A. (2004). Fungal spore source strength tester: laboratory evaluation of a new concept. *Science of the Total Environment, 329*(1-3): 75-86. • Sivasubramani, S.K., Niemeier, R.T., Reponen, T., & Grinshpun, S.A. (2004). Assessment of the aerosolization potential for fungal spores in moldy homes. *Indoor Air, 14*(6): 405-12. • Sivasubramani, S.K., Niemeier, R.T., Reponen, T., & Grinshpun, S.A. (2006). Assessment of fungal contamination in moldy homes: comparison of

Grantee Name	Award Date	Type of Grant	Publication information
			different methods. *Journal of Occupational and Environmental Hygiene, 3*(5): 262-273. • 2004 assessment of mold sources in indoor environments. In *Bioaerosols, Fungi, Bacteria, Mycotoxins, and Human Health – Pathophysiology, Clinical Effects, Exposure Assessment, Prevention and Control in Indoor Environments and Work.* Albany, NY: Boyd Printing Company, Inc. • Release of Aspergillus versicolor fragments and spores from contaminated surfaces. In *Bioaerosols, Fungi, Bacteria, Mycotoxins, and Human Health – Pathophysiology, Clinical Effects, Exposure Assessment, Prevention and Control in Indoor Environments and Work.* Albany, NY: Boyd Printing Company, Inc.

Anticipated Publications

Table E.2: Publications Anticipated by Grantees

Grantee Name	Award Date	Type of Grant	Publication information
University of Wisconsin – School of Pharmacy	2000	Technical Study	Two articles are in preparation. • Goodman, B.M. et al., Development of a novel risk assessment algorithm to derive a quantitative outcome measure home safety score. (In preparation.) • Hatfield, P.M. et al., Use of risk assessment algorithm to measure the affect of home visits on safety behaviors. (In preparation.)
Duke University	2001	Technical Study	Two articles are in submission and an additional three articles in preparation.
University of Alabama at Birmingham	2001	Education	Anticipates that students involved with the project will publish the results of the pre/post sampling data.
Advanced Energy	2002	Technical Study	Anticipates submitting three papers for publication. These papers will focus on: • Crawl spaces (for submission to peer review) • Crawl spaces (for submission to trade journal) • Allergens and relative humidity (for submission to peer review)
City of Milwaukee Health Department	2002	Demonstration grant	Anticipated publications include: • "A Randomized Controlled Study of Homes of Children with Asthma" (expect abstract to be included in the International Society of Environment and Epidemiology) • "A Randomized Controlled Study to Reduce Loading and Allergen Concentrations in Homes of Children with Asthma" (expect to be published in Environmental Health Perspectives)

Grantee Name	Award Date	Type of Grant	Publication information
University of Medicine and Dentistry of NJ	2002	Technical Study	Two manuscripts have been drafted. One manuscript focuses on lead results and the other focuses on PAHs and dust mite results. Project staff hope to have these submitted to a peer review journal by the end of 2006.
Georgia Tech Applied Research Corporation	2003	Technical Study	Anticipates submission of: • "Using millimeter wave radar to detect moisture and mold hidden in indoor surfaces" (to a technical journal)
University of Minnesota	2003	Technical Study	Expects that two papers will be submitted within the next three months to peer reviewed journals. The papers will focus on: • Longitudinal variability in allergens over time • Effectiveness of the intervention
Georgia Tech Applied Research Corporation	2004	Technical Study	Anticipates publishing information on the exposure monitoring vest they created. However, this effort may be delayed if the decision is made to patent the vest.
University of Texas at San Antonio	2004	Technical Study	Anticipates submitting two articles to peer reviewed journals. Topics are: • Implications of an EBLL for pregnant women with pica. • Course of treatment for neonates with lead poisoning.

Table E.3: Reported Publications from Contract-funded Projects

Contractor	Publication Information
Battelle Memorial Institute	• Pate, A.D., Hamilton, R.G., Ashley, P.J., Zeldin, D.C., and Halsey, J.F. (2005). Proficiency testing of allergen measurements in residential dust. *Journal of Allergy and Clinical Immunology, 116:* 844-850. • Nagaraja, J., Menkedick, J., Phelan, K.J., Ashley, P., Zhang, X., and Lanphear, B.P. (2005). Deaths from residential injuries in US children and adolescents, 1985-1997. *Pediatrics, 116*(2): 454-61.

Contractor	Publication Information
Westat, Inc.	• Arbes, S.J., Cohn, R.D., Yin, M., Muilenberg, M.L., Burge, H.A., Friedman, W., and Zeldin, D.C. (2003). House dust mite allergen in US beds: Results from the National Survey of Lead and Allergens in Housing. *Journal of Allergy and Clinical Immunology, 111:* 408-414. • Arbes, S., Cohn, R.D., Yin, M., Muilenberg, M.L., Friedman, W., and Zeldin, D.C. (2004). Dog allergen (Can f 1) and cat allergen (Fel d 1) in US homes: Results from the National Survey of Lead and Allergens in Housing. *Journal of Allergy and Clinical Immunology, 114:* 111-117. • Cohn, R.D., Arbes, S.J., Jaramillo, R., Reid, L.H., and Zeldin, D.C. (2006). National prevalence and exposure risk for cockroach allergen in US households. *Environmental Health Perspectives, 114*(4): 522-526. • Cohn, R.D., Arbes, S.J., Yin, M., Jaramillo, R., and Zeldin, D.C. (2004). National prevalence and exposure risk for mouse allergen in US households. *Journal of Allergy and Clinical Immunology, 113:* 1167-71. • Salo, P.M., Arbes, S.J., Sever, M., Jaramillo, R., Cohn, R.D., London, S.J., and Zeldin, D.C. (2006). Exposure to *Alterneria alternata* in US homes is associated with asthma symptoms. *Journal of Allergy and Clincal Immunology, 118*(4): 892-894. • Salo, P.M., Yin, M., Arbes, S.J., Cohn, R., Sever, M., Muilenberg, M., Burge, H.A., London, S., and Zeldin, D.C. (2005). Dustborne *Alterneria alternata* antigens in US homes: Results from the National Survey of Lead and Allergens in Housing. *Journal of Allergy and Clinical Immunology, 116:* 623-629. • Thorne, P.S., Kulhankova, K., Yin, M., Cohn, R., Arbes, S.J., and Zeldin, D.C. (2005). Endotoxin exposure is a risk factor for asthma: the national survey of endotoxin in United States housing. *American Journal of Respiratory Critical Care Medicine, 172*(11): 1371-1777.

APPENDIX F: Results from the Analysis of the National Survey of Lead and Allergens in Housing Data

Table F.1: Prevalence and Exposure Risk Factors Associated with Household Allergens

Allergen ***(Reference)***	**Prevalence**	**Exposure Risk Factors**
Cockroach allergen (Bla g 1) *(Cohn et al., 2006)*	• 11% of homes have levels exceeding 2.0 U/g • 3% of living room floors have levels greater than 8.0 U/g • 10% of kitchen floors have levels exceeding 8.0 U/g • Detectable levels found in 63% of all homes	• High-rise apartments • Urban settings • Pre-1940 construction • Households with income <$20,000 • Exposure increased with reported cockroach problems and increased number of cockroaches observed
Mouse allergen (Mus m 1) *(Cohn et al., 2004)*	• Detectable levels found in 82% of all homes • 22% of kitchen floors have levels exceeding 1.6µg/g	• High-rise apartments • Mobile homes • Pre-1945 homes • Households with income <$20,000 • Odds of increased concentrations increased (OR=3.38) when rodent problems were reported • Odds of increased concentrations increased (OR=2.17) when cockroach problems were reported • Odds of increased concentrations were increased when floor mopping was done compared to vacuuming (OR=2.17)

Cat allergen (Fel d 1)
 	
(Arbes et al., 2004)
	• Detectable levels found in 99.9% of homes (even when cat was not present)
	• Average geometric mean concentration for all homes was 4.73 µg/g
	• Average geometric mean concentration for homes with a cat was 200 µg/g
	• Detectable levels found in 96.6% of the beds, 96.9% of bedroom floors, 96.1% of living room
		• Demographic variables related to pet ownership;
		  • Living in the northeast
		  • White
		  • Higher household income

Allergen *(Reference)*	**Prevalence**	**Exposure Risk Factors**
	floors and 97.9% of living room sofas	

Dog allergen (Can f 1) *(Arbes et al., 2004)*	• Detectable levels found in 100% of homes (even when dog was not present)
	• Average geometric mean concentration for all homes was 4.69 µg/g
	• Average geometric mean concentration for homes with a dog was 69 µg/g
	• Detectable levels found in 93.8% of the beds, 95.6% of bedroom floors, 94.9% of living room floors and 98% of living room sofas
		• Demographic variables related to pet ownership;
		  • Single family home
		  • Owner occupied housing
		  • Homes with more than one household member
		  • Higher income households
		  • White households

Dust mite allergens (Der f 1 and Der p 1) *(Arbes et al., 2003)*	• 84.% of homes have detectable dust mite allergen levels in a bed • 46.2% had levels exceeding 2.0 µg/g • 24.2% had levels exceeding 10.0 µg/g	• Living in a nonwestern region • Higher humidity levels • Older homes • Homes with a frequent musty or mildew odor • Homes with a main heating source other than gas or electric forced air • Lower household income • Homes without resident children • Single-family homes
Dustborne *Alternaria Alternata* antigens *(Salo et al., 2005)*	• Detected in most dust samples (95%-99%) • Geometric mean concentration was 4.88 µg/g	• Older homes, non-urban homes • Homes in the Midwest or South regions • Owner-occupied, single family homes • Homes in impoverished census areas • Homes inhibited by white individuals • Homes inhabited by individuals with less education • Homes with heating systems other than forced air or radiant heat

Allergen *(Reference)*	Prevalence	Exposure Risk Factors
		• Homes that are cleaned less often than weekly • Homes with observed mold or moisture problems • Use of a dehumidifier • Homes where smoking occurred

Table F.2: Exposures Associated with Asthma

Exposure *(Reference)*	Exposure Information	Association with Asthma

Endotoxin
 	
(Thorne et al., 2005)
	• Endotoxin concentration and surface loading were highly correlated (r=0.73-0.79)
	• Geometric means:
	  • Bedroom floors=35.3 EU/mg
	  • Bedding = 18.2 EU/mg
	  • Family room floors = 63.9 EU/mg
	  • Sofas = 44.8 EU/mg
	  • Kitchen floors = 80.5
		• Increasing endotoxin levels significantly associated with:
		  • diagnosed asthma
		  • asthma symptoms in the past year
		  • current use of asthma medications
		  • wheezing
		• Strongest association for bedroom floor and bedding dust was observed in adults only.
		• Joint effect of bedding and bedroom floor endotoxin on recent asthma symptoms resulted in an odds ratio of 2.83
		• Allergic subjects were no more likely to have symptoms when exposed to high levels of endotoxin than non-allergic subjects

Alternaria alternata
 	
(Salo et al., 2006)
	• Geometric mean concentration was 4.88 µg/g
	• Detected in most dust samples (95%-99%)
	• Geometric means:
	  • Living room floor = 5.73 µg/g
	  • Bedroom beds = 2.38 µg/g
		• Recent wheezing was not associated with *Alternaria*
		• Increasing *Alternaria* concentrations significantly associated with:
		  • Current symptomatic asthma
		  • Asthma symptoms

APPENDIX G: Summary of USDA Projects Receiving HUD Funding

ALABAMA

Alabama Cooperative Extension System

1. Adapted the "Help Yourself to a Healthy Home" book to the state of Alabama.
2. Wrote an article for the local Habitat of Humanity Newsletter about healthy housing.

ARKANSAS

University of Arkansas Cooperative Extension Agreement

1. Developed a curriculum on mold for volunteers.
2. Curriculum includes:
    a. A Volunteer Leader Training Guide with objectives and suggestions for teaching
    b. Power Point presentations
    c. Handouts
        i. Ten Things You Should Know About Mold
        ii. Controlling Moisture in Your Home
        iii. What Do I Do if a Leak Occurs
        iv. Strategies for Preventing or Removing Mold Growth After Contamination
3. Curriculum is available in all 75 Arkansas counties and is being used by civic groups, clubs, churches, and others.

CALIFORNIA

University of California Cooperative Extension Service

1. Asthma and mold are the main focus topics for the first year of this program.
2. Designed curriculums for Asthma and Mold education and two research-based Power Point presentations that are available on the web.
3. Developed a PowerPoint presentation entitled "Moisture and Fungi in Homes: California Issues".
4. Distributed 650 "Help Yourself to a Healthy Home" booklets.

CONNECTICUT

University of Connecticut Cooperative Extension Service

1. Created bookmarks and posters to promote the availability of the "Help Yourself to a Healthy Home" booklet.
2. The bookmarks and posters were distributed to participants in the Extension Expanded Food and Nutrition Education Program outreach, state licensed day care programs, and Extension parenting program.
3. Over 200 Healthy Homes publications have been distributed through Connecticut's Extension programs.

COLORADO

Colorado State University Cooperative Extension

1. Created a "House Records Organizer - What happens to this house – stays with this house"
    a. It is a binder for homeowners to organize all information and vital documents related to their house.
    b. These binders are used in various workshops.
    c. Information in the organizer includes date of installations, maintenance records, warranties, fact sheets, and lists of resources.
    d. Sections include:
        i. General House Information
        ii. Indoor Air Quality and Testing
        iii. Property and Landscape
        iv. House Exterior
        v. House Interior
        vi. Major Appliances
        vii. Indoor Climate Control
        viii. Plumbing Systems
        ix. Electrical Systems
        x. Home Technology Systems
        xi. Emergency Preparedness
2. Developed 4 fact sheets: Lead-based paint in homes, Improving air quality in your home, Preventing carbon monoxide problems, and Radon in the home. Available at http://www.ext.colostate.edu/pubs/consumer/pubcons.html#house
3. Compiled Radon Outreach and Education Materials from EPA.
    a. Includes informational booklets for consumers about radon
    b. Resource list for the state of Colorado
    c. Media and Outreach materials

DISTRICT OF COLUMBIA

University of District of Columbia Cooperative Extension Service

1. Provides hands-on maintenance workshops to the community. Healthy Homes information is presented at these workshops.

2. Developed collaboration with the DC Housing Finance Agency, DC Department of Health, and DC Asthma Coalition to start a program called "CES Asthma Project".
3. Materials and activities include:
    a. Workshops on Asthma Triggers
    b. Pest Management
    c. Basic Home Maintenance
    d. Home Sanitation
    e. Development of CES Asthma brochure in English and Spanish
    f. Roach fact sheet
    g. Distributed 350 'Air'ickson Adventure Coloring Books
    h. Distributed 350 Kids Care About Clean Indoor Air Worksheets – These provide a list of teaching resources for Elementary Teachers

FLORIDA

University of Florida Cooperative Extension Service

1. Developing an age-appropriate curriculum for middle-school youth on healthy homes issues. Target date for completion is the summer of 2007.

GEORGIA

University of Georgia Cooperative Extension Service

1. Designed circulars known as "Mold: The Uninvited Guest" to help consumers identify and manage household mold problems using unbiased, research-based solutions. These publications are brief and written in a non-technical fashion.
    a. Available in English and Spanish
    b. "Mold the Uninvited Guest: Preventing Mold in Your Home" is available at http://www.fcs.uga.edu/ext/pubs/hace/HACE-E-52.pdf
    c. "Mold the Uninvited Guest: Removing Mold in Your Home" is available at http://www.fcs.uga.edu/ext/pubs/hace/HACE-E-53.pdf
2. Created circulars known as "Household Water Quality Series" designed to help consumers using private water sources to identify and manage water problems using unbiased, research-based solutions.
    a. Titles include:
        i. Protecting Your Well and Wellhead
        ii. Testing for Water Quality
        iii. Home Water Quality and Treatment
        iv. Disinfecting Your Well Water: Shock Chlorination
        v. Your Household Water Quality: Nitrate in Water
        vi. Your Household Water Quality: Solvents and Petroleum Products
        vii. Your Household Water Quality: Coliform Bateria in Your Water
        viii. Your Household Water Quality: Hydrogen Sulfide and Sulfate
        ix. Your Household Water Quality: Corrosive or Scaling Water
        x. Your Household Water Quality: Lead and Copper
        xi. Your Household Water Quality: Iron and Manganese

xii. Your Household Water Quality: Arsenic in Your Water
xiii. Your Household Water Quality: Mercury in Your Water

b. Available at http://www.fcs.uga.edu/ext/pubs/house.php

3. Created a series of circulars known as "Residential Pest and Pesticides" designed to help consumers identify and manage pest problems using IPM.
    a. Titles include:
        i. Help! Ants are everywhere!
        ii. Help! Fleas are biting my pet!
        iii. Help! Flies are in my house!
        iv. Help! I think I need to use pesticides!
        v. Help! Insects are in my food!
        vi. Help! Mosquitoes are biting my baby!
        vii. Help! Roaches are in my house!
    b. Available at http://www.fcs.uga.edu/ext/pubs/house.php
4. Currently working on developing circulars entitled "Mold Quick Facts."
5. Have conducted several train-the-trainer sessions and educational presentations to the public. Target audiences include Latino audiences in poultry-processing plants, personal home care providers and day care providers.

ILLINOIS

University of Illinois Cooperative Extension Service

1. Developed an informational packet for homeowners about the importance of Healthy Indoor Air.
2. Fact sheets include:
    a. Radon
    b. Mold
    c. Carbon Monoxide
    d. Lead
    e. Water Alarm Detectors
    f. Smoke Detectors
    g. Furnace Filters
    h. Vacuum Cleaner Efficiency
3. Created PSAs to promote radon testing and a calendar suggesting optimal months for media promotion.

INDIANA

Purdue University Cooperative Extension Service

1. Developed a teaching curriculum for the "Help Yourself to a Healthy Home" program.
    a. Resources developed for the curriculum include:
        i. A Power Point Presentation
        ii. A Teacher's Guide with
            1. Program objectives

2. Notes for the Program Presenter with ideas/suggestions for teaching
3. Other resources
4. Link to Participant handout
5. Script of Power Point presentation

iii. A pre-test
iv. A post-test
v. A streaming video presentation of the Power Point
vi. A feedback form

b. Curriculum consists of 9 modules:
i. Indoor Air Quality
ii. Asthma and Allergies
iii. Mold and Moisture
iv. Carbon Monoxide
v. Lead
vi. Drinking Water
vii. Hazardous Household Products
viii. Pesticides
ix. Home Safety

2. Created a mold in the home resource guide on CD. Topics covered include:
   a. What is mold
   b. Health Effects of Mold
   c. Testing for Mold
   d. Controlling for Mold
   e. Clean up of Mold
   f. Flooding Concerns
   g. Additional Resources

IOWA

Iowa State University Cooperative Extension Service

1. Used healthy homes funds to enhance support to a telephone hotline at Iowa State University. Consumers can call the toll-free number (800-262-3804) to get immediate answers to their home and family-related questions, including questions related to healthy homes issues.
2. Based on questions received from the hotline, a Web site with the most frequently asked questions on home environment topics has been developed. http://dbs.extension.iastate.edu/answers/projects/answerline/questions/

KANSAS

University of Kansas Cooperative Extension Ser vice

1. Developed a fact sheet and leader's guide entitled "Breathing Easy: Controlling Asthma Triggers" and a Power Point presentation for use by Extension Educators. This material is available at:
   a. http://www.oznet.ksu.edu/library/hlsaf2/mf2598.pdf

   b. http://www.oznet.ksu.edu/library/hlsaf2/mf2597.pdf
2. Created two displays to be used by Extension Educators. One display focused on Asthma triggers and the other on Lead Safe Homes.
3. A child safety checklist was also developed in English and Spanish for Extension Educators. This checklist is to help parents with young children childproof their homes. Available at:
   a. http://oznet.ksu.edu/library/hlsaf2/s134d.pdf
   b. http://oznet.ksu.edu/library/hlsaf2/S134DS.pdf
4. Other activities included:
   a. Conducting a healthy home program on a TV station
   b. Articles in newspapers and newsletters
   c. Providing radon test kits
   d. Delivering trainings on mold, radon, and lead.

KENTUCKY

University of Kentucky Cooperative Extension Service

1. Developed materials for train-the-trainer workshops, special interest seminars, health fairs, field days, home and garden shows, and professional association exhibits
2. Materials include fact sheets, Power Point presentations and teaching guides.
3. Topics include:
   a. Clean It Healthy! Clean it Right!
   b. Managing Asthma Triggers in the Home
   c. Mold and Mildew
   d. Lead Poisoning Prevention
   e. Mercury and Your Health
4. A unique target group for education is homemaker clubs.

LOUISIANNA

Louisiana State Agricultural Center Cooperative Extension Service

1. Developed a "Storm Recovery Guide for Homeowners" which was printed and distributed to over 100,000 people.
2. Created fact sheets on "Avoiding Mold Hazards in Your Flooded Home" and "Mold Removal Guidelines for Your Flooded Home"
3. Developed a "Creating a Healthy Home: A Field Guide for Clean-up of Flooded Homes" with assistance other organizations.
4. Created a "Mold Clean-Up Guidance for New Orleans Area Residents Affected by Hurricane Katrina" DVD with the assistance of others. This DVD is an instructional tool produced to train volunteers, small contactors and individual homeowners.
5. Developed and conducted in-service trainings for Louisiana Extension agents on mold hazards and remediation and trainings on mold and worker safety for home builders of New Orleans.

MICHIGAN

Michigan State University Cooperative Extension Service

1. Created a CD for the Home Safe Kids curriculum.
2. Lesson areas include:
    a. The Low Down on Radon
    b. Lead
    c. Breathe Easy the Dangers of Second Hand Smoke
    d. Mold. What Color is that? Where mold lurks
    e. Home Safe Kids Evaluation

MINNESOTA

University of Minnesota Cooperative Extension Service

1. Conducted a presentation, "The Truth About Mold" to 105 property managers at Working Together Conference in Minnesota.
2. Completed a game-based educational module and currently working on a script to accompany the CD.

MONTANA

Montana State University Extension Service

1. Developed a touch screen kiosk (that looks like an ATM) that distributes healthy homes information. The caption on the front of the kiosk states "How safe is your home. Take the test, get the answer….FREE". The user simply answers questions about their home and the machine identifies potential hazards and prints out fact sheets for the user to take home. These kiosks are placed in public locations such as libraries and shopping centers.
2. Topics include:
    a. Household mold
    b. Lead
    c. Asthma
    d. Hazardous Household products
    e. Well water quality
    f. Home safety
    g. Energy Saving tips
    h. Carbon Monoxide
    i. Water Heater maintenance
    j. Mobile homes

NEW JERSEY

Rutgers Cooperative Extension Service

1. Developed an asthma PowerPoint presentation with instructor's notes in English and Spanish. These slides are available on-line at www.rce.rutgers.edu/asthma

2. The materials created are used in the current Healthy Homes grant that provides asthma trigger management training to urban, low income parents via community educators.
3. Provided 18 train-the-trainer sessions, educated 139 municipal health officers, and educated 150 parents.

NEW MEXICO

New Mexico State University Cooperative Extension Service

1. Through home visits and small group discussions, promotoras, who are trained to address local health needs and conduct community education, provide education about carbon monoxide and distribute CO alarms.
2. The promotoras also distribute the "Help Yourself to a Healthy Home" Booklet

NEW YORK

Cornell University Cooperative Extension Service

1. Developed a Healthy Homes Resource Manual that was printed and distributed in 3 ring binders to Extension Educators
2. Created 14 healthy homes posters, covering seven different indoor pollutants are covered.
3. Developed practical management strategies that includes one-page fact sheets written for limited resource households. Topics include: lead, asbestos, radon, carbon monoxide, and excess moisture. There were used in a pilot program in which peer educators were trained to conduct home visits and teach households about these topics.
4. A 20 minute DVD entitled "Healthy Homes Assessing Your Indoor Environment" was created that presented information about radon, mold, environmental tobacco smoke, carbon monoxide, and home safety issues. It is available in English and Spanish. The program is currently producing a manual to accompany the video.
5. Hosted a two hour kick-off satellite broadcast for the Healthy Homes program which included participants from 30 states.

NORTH CAROLINA

North Carolina State University Cooperative Extension Service

1. Developed a "Help Yourself to a Healthy Home" curriculum that has been shared with Extension Agents throughout the state of North Carolina, as well as housing specialists across the country.
    a. Available in English and Spanish and on DVD.
    b. Target audience includes parents of young children and childcare providers
    c. Focus areas include:
        i. Home safety
        ii. Pesticides
        iii. Hazardous products

iv. Lead
v. Water quality
vi. Indoor air quality
vii. Carbon monoxide
viii. Mold and moisture
ix. Asthma and allergens

2. Developed a "Mold 101" curriculum.
    a. Modules include:
        i. What is Mold and Where Does It Come From?
        ii. Moisture Causes and Prevention
        iii. Mold and Potential Health Effects
        iv. Tools for Solving Moisture Problems
        v. Mold and Moisture Remediation
        vi. Mold and Legal Issues
        vii. Mold and Real Estate Issues
        viii. Preventing Mold Issues After a Flood
    b. Provided to states in the southern region. Moisture meters and humidity gauges were also purchased.

NORTH DAKOTA

North Dakota State University Cooperative Extension Service

1. Distributed over 1100 copies of the "Help Yourself to a Healthy Home" publication to 59 Extension Service Agents, 61 North Dakota Public health and tribal health offices, 73 clinics and selected hospitals, the ND WIC clinics, and others.
2. Presented information at the Health Homes Satellite Videoconference on mold.
3. Developed and taught a 15 hour one-credit college course on Resolving Mold and Moisture Problems. The course covered:
    a. Mold Health Effects
    b. Mold Ecology
    c. Investigating and Testing for Mold
    d. Investigating Moisture Problems
    e. Understanding and Preventing Moisture Problems
    f. Guidelines for Mold removal including Containment and PPE
    g. Water Damage Restoration
4. Developed lesson plans to be used adult and community educators, teachers, and other professionals on Mold and Keeping your Home Healthy.
5. Created a "Keep Your Home Healthy" booklet for occupants and a poster illustrating areas of the home where steps can be taken to reduce hazards.

OREGON

Oregon State University Extension Service

1. Offers a number of workshops that focus on mold control, well water protection, and housing accessibility.

2. Produced an 18 page publication "My Own Home" in English and Spanish that outlines assessments and ideas for retrofitting existing housing for families with children with physical challenges. The focus is on improving the safety, convenience and comfort of the home. This is available in hardcopy, pdf download from the website and on a CD.
3. Developed and distributed over 1000 copies of a low literacy flyer on Household Mold in English, Spanish, Vietnamese, and Russian. These were also created in poster size and distributed for posting in laundry and community rooms in apartments and public facilities.

RHODE ISLAND

University of Rhode Island Cooperative Extension Service

1. Currently preparing a private well video that can be aired on TV and distributed on DVDs and related outreach materials that highlight and expand the visibility of available private well protection program resources to Rhode Island private well owners.
2. Incorporated the Healthy Homes materials into the University of Rhode Island Home*A*Syst Program. This program is a statewide voluntary residential pollution prevention program that trains citizens to identify environmental and health risks in and around the home and take actions to protect their health and environment.
    a. Developed a training module to train volunteers in using the Healthy Homes Publication.
    b. Updated the Home*A*Syst web page to include the Health Homes work.

TENNESSEE

No information received

TEXAS

Texas A&M Cooperative Extension Service

1. Materials developed include:
    a. Three Power Point presentations – Steps to a Healthy Home (Moisture Control, Pest Control, and Cleaning)
    b. A fact sheet on the "Seven Steps to a Healthy Home"
    c. Demonstrations kits for pest control, cleaning, and moisture control
    d. Reproductions of Put It Outside exhibits, brochures, CD and table tents
2. Activities include:
    a. Conducted Child Care Conference Presentations for Healthy Indoor Environments for Children Head Start Parents programs
    b. Participated in the Healthy Home Satellite Video Conference at three regional sites
3. Trained over 70 County Extension Agents

VIRGINIA

Virginia Cooperative Extension Service

1. Developing publications on mold.
2. Created a Radon and Mold Update CD with PowerPoint presentations and supporting materials for In-service Trainings
3. Created a PowerPoint presentation on Attacking the Epidemic of Childhood Asthma: Helping Children Learn to Manage Their Environment which is part of the Healthy Spaces, Healthy Faces CD

WISCONSIN

University of Wisconsin Cooperative Extension Service

1. Program is partnering with the Affordable Housing Team to incorporate Healthy Homes topics into environmental health supplements. These supplements will become a standard component of the Wisconsin Rent Smart and the First-Time Home Buyers pre and post-purchase curricula content. Rent Smart is a tenant curriculum developed in Wisconsin in 2000. Participation in the program is require by landlords and local housing authorities in some areas of the state.
    a. Supplements will cover mold, lead, pesticides, household hazardous products and indoor air quality.
    b. Expected completion date is January 2007.
    c. Anticipated training of approximately 200 family living and housing professionals expected in late January 2007 in conjunction with the release of the updated edition of Rent Smart.
    d. New website to be developed to provide support resources to professional seeking detailed information regarding Healthy Homes topics.
2. Program is building relationships with affordable housing professional in Wisconsin and investigating ways to partner with Wisconsin tribes.
3. Distributed 625 Healthy Homes booklets to Wisconsin citizens and non-profit organizations from June 1 through August 31, 2006.

WYOMING

No information received.

APPENDIX H: Grantee Questionnaire

Evaluating Outcomes of HUD's Healthy Homes Initiative Grants

Grantee Questionnaire

Interviewer's Name: _____

Interview Date: _____

This collection of information is being collected to assist HUD in program planning and in responding to the Office of Management and Budget's Program Assessment Rating Tool (PART). Public reporting burden for this collection of information is estimated to average 10 hours per response, including the time for reviewing instructions, reviewing pre-answered questions, and gathering the data needed in preparation for the telephone interview. Responses are voluntary. The information requested does not lend itself to confidentiality. HUD may not collect this information, and you are not required to complete this form, unless it displays a currently valid OMB control number.

I. GENERAL GRANT INFORMATION

Grantee: _____

Grantee #: _____

Grantee Representative(s): _____

Title of Grantee Representative(s): _____

Project Director: _____

Project Manager: _____

Phone Number: _____ Fax Number: _____

E-mail: _____

FY Award Date (1999 - 2005): _____
Type of HHI grant awarded (Demonstration|Technical Studies|Education|Mold and Moisture Control): _____

Project Period of Performance:
Start Date (mm/dd/yyyy) _____ Expiration Date (mm/dd/yyyy) _____

DATA ENTRY INFORMATION (for internal use only)

Date data extracted (mm/dd/yyyy): _____

Data extracted by: _____

Date data entered into database (mm/dd/yyyy): _____

Data entered by: _____

Date data entry checked (mm/dd/yyyy): _____

Data entry checked by: _____

To help orient the interviewers, please provide a BRIEF (2 minute) synopsis of your project.

1. Does/Did your project involve recruitment or enrollment of clients/housing units (Yes|No)?

_____ *(If No, skip to Assessment Information section)*

2. Who/What did you identify as <u>primary target groups</u> for your recruitment efforts? (Note: We are interested in only the main target groups of our recruitment efforts, not in identifying all groups captured by your efforts.) (Check all that apply.)

☐ **Targeted Populations (If checked, please indicate all that apply.)**
- ☐ Landlords/Rental property owners
- ☐ Immigrant families
- ☐ Low-income families
- ☐ Minority families
- ☐ Other under-served populations
- ☐ Owner-occupants
- ☐ Families residing in a specific neighborhood(s)
- ☐ Families with children of a specific age (If checked, please indicate all that apply.)
  - ☐ *Families with children under the age of 1 year*
  - ☐ *Families with children under the age of 6 years*
  - ☐ *Families with children under the age of 18 years*
- ☐ Families with children that have a specific health condition or are at-risk for a specific health condition (If checked, please indicate all that apply.)
  - ☐ *Children with or at-risk for lead poisoning*
  - ☐ *Children with or at-risk for asthma or respiratory conditions*
  - ☐ *Children with or at-risk for injuries*
  - ☐ *Children with or at-risk for other potential health conditions*
- ☐ Other (Specify): _____

☐ **Targeted Units (If checked, please indicate all that apply.)**
- ☐ Housing units of a particular age (If checked, please indicate all that apply.)
  - ☐ *Housing units built prior to 1950*
  - ☐ *Housing units built prior to 1978*
  - ☐ *New construction*
  - ☐ *Other age classification (Specify):* _____
- ☐ Rental units
- ☐ Owner-occupied units

☐ Housing units within specific census tracts or geographic boundaries
☐ Housing units located in RCs (Renewable Communities), EZs (Empowerment Zones), or ECs (Enterprise Communities)
☐ Public housing units
☐ Single family units
☐ Multifamily units (including duplexes)
☐ Houses involved in disaster mitigation
☐ Housing units participating in another/other health or housing program(s) (Specify): _____
☐ Other (Specify): _____

3. What is/was the targeted number of clients? (Note: A family or housing unit is considered one client)

_____

4. What is/was the number of clients contacted?

_____ ☐ Check, if number estimated.

5. What is/was the number of clients enrolled? (Note: Enrolled indicates that the client agrees to receive some form of assessment, intervention, or education)

_____ ☐ Check, if number estimated.

6a. What method(s) do/did your program use to recruit clients? (Check all that apply.) For those methods that are/were used, rate each effort as to its success in recruiting clients for your program, from 1 (not successful) to 5 (very successful).

Check if method is/was used	**Success rating (unsuccessful =1-> successful=5)**	**Method for recruitment**
☐		Attendance at public community meetings or other public events (e.g., health fairs)
☐		Advertisements in newspapers, TV, radio
☐		Mailings to property owners
☐		Mailings to organizations and/or community groups
☐		Phone calls
☐		Distribution of informational materials to schools, community organizations, health care providers, etc.

☐		Door-to-door recruitment
☐		Referrals from health care providers or other agencies
☐		Other recruitment method (Specify):
☐		Other recruitment method (Specify):
☐		Other recruitment method (Specify):

6b. Was the project delayed because of recruitment difficulties (Yes|No)?

_____

6c. Additional comments about recruitment methods and recruitment success:

_____

7a. Are/Were incentives used to recruit and/or enroll clients (Yes|No)? (Note: Incentives are items or benefits that clients know they will receive for participation)

_____ *(If No, skip to Assessment Information section.)*

7b. From the list below, please check the type(s) of incentive used and dollar value. Also, rate on a 1-5 scale how effective you think incentives are/were in your recruitment efforts (with 1 indicating ineffective and 5 indicating very effective).

Check if method is/was used	**Effectiveness rating (ineffective=1 --> very effective=5)**	**Type of incentive**	**Dollar Value per Client**
☐		Grant money for property owner to complete interventions (Additional Detail: _____)	
☐		Vouchers (Additional Detail: _____)	
☐		Gift certificates (Additional Detail: _____)	
☐		Cash	
☐		Other 1 (specify):	
☐		Other 2 (specify):	
☐		Other 3 (specify):	

7c. For each of the incentives checked above, please indicate when the incentive is/was provided. (Check all that apply.)

Type of incentive	**Provided upon enrollment**	**Provided prior to the intervention**	**Provided at time of intervention or during a follow-up visit to client**	**Provided at completion of the intervention**	**Provided at end of the project**
Grant money for property owner to complete interventions	☐	☐	☐	☐	☐
Vouchers	☐	☐	☐	☐	☐
Gift certificates	☐	☐	☐	☐	☐
Cash	☐	☐	☐	☐	☐
Other 1 (listed in 7b):	☐	☐	☐	☐	☐
Other 2 listed in 7b):	☐	☐	☐	☐	☐
Other 3 (listed in 7b):	☐	☐	☐	☐	☐

7d. Are/Were incentives effective in retaining clients in the program (Yes|No)?

_____

7e. Additional comments regarding use of incentives:

_____

Section A: VISUAL ASSESSMENT OF THE HOUSING UNIT

1a. Does/Did your program routinely conduct visual assessments of the housing unit (Yes|No)?

_____ (*If No, skip to Section B: Client/Interview Data.*)

1b. On average, how many visual assessments are/were typically completed per housing unit (One|Two|Three|Four|Five or more)?

_____

1c. Please identify the average number of weeks post enrollment or post intervention that each visual assessment occurs.

Visual Assessments	**Average number of weeks**	**Reference Point (Post enrollment or Post intervention)**
First visual assessment		
Second visual assessment		
Third visual assessment		
Fourth visual assessment		
Fifth visual assessment		
Additional assessments		

2. Please indicate the focus area(s) that are/were routinely assessed during a visual assessment and specify if the area is/was assessed in a *baseline* and/or *follow-up* visual assessment. (Check all that apply.)

Check if routinely assessed at *baseline*	**Check if routinely assessed during *follow-up***	**Main focus area(s) of the visual assessment**
☐	☐	Lead hazards (e.g., chipping, peeling paint)
☐	☐	Poisoning hazards (e.g., chemicals stored in home)
☐	☐	Injury hazards (e.g., loose handrails, broken stair treads)
☐	☐	Fire hazards (e.g., electrical hazards, no working smoke detector)
☐	☐	Presence of visible mold
☐	☐	Moisture problems
☐	☐	Pest infestations
☐	☐	Pesticide use
☐	☐	Carbon monoxide hazards (e.g., lack of CO detector)

☐	☐	Environmental tobacco smoke
☐	☐	Inspection of appliances
☐	☐	Housing code issues
☐	☐	Basic structural hazards
☐	☐	Other (Specify):
☐	☐	Other (Specify):
☐	☐	Other (Specify):

2b. Does your program use a visual assessment tool to collect the same data for each housing unit (Yes|No)?

_____

3. What is/was the number of housing units with completed *baseline* visual assessments?

_____ ☐ Check, if number estimated.

4. What is/was the number of housing units with all *follow-up* visual assessments completed?

_____ ☐ Check, if number estimated.

5. When conducting a follow-up visual assessment(s), is/was the assessment typically concerned only with areas that received interventions identical in scope to the pre-intervention assessment, or more extensive than the pre-intervention assessment. (Follow-up visual assessments focus/focused only on areas that received interventions|Follow-up visual assessments are/were identical in scope to the pre-intervention assessment|Follow-up visual assessments are/were more extensive then pre-intervention assessment)

_____

Section B: CLIENT/INTERVIEW DATA

6a. Does/Did your program routinely conduct assessments/interviews of the client (Yes|No)?

_____ (*If No, skip to Section C: Environmental and Biological Sampling)*

6b. Typically, how many assessments/interviews of the client are/were completed (One|Two|Three|Four|Five or more)?

_____

6c. Please identify the average number of weeks post enrollment or post intervention that each assessment/interview of the client typically occurs.

Client Assessments/Interviews	**Average number of weeks**	**Reference Point (Post enrollment or Post intervention)**
First client assessment/interview		
Second client assessment/interview		
Third client assessment/interview		
Fourth client assessment/interview		
Fifth client assessment/interview		
Additional client assessment/interview		

7a. Please check all types of data that are/were routinely included in the assessments/interviews of the client and specify if the data are/were collected at *baseline* and/or *follow-up*?

Check if routinely collected at *baseline*	**Check if routinely collected during *follow-up***	**Type of data collected**
☐	☐	Health data
☐	☐	Household/resident/family characteristics
☐	☐	Socio-economic data
☐	☐	Survey of client concerns regarding the housing characteristics/conditions
☐	☐	History of household mobility (e.g., moved within the past 3 years)
☐	☐	Client's knowledge of the focus area

☐	☐	Behavioral information (e.g., cleaning, smoking inside/outside, closeness to pets)
☐	☐	Other (Specify):
☐	☐	Other (Specify):
☐	☐	Other (Specify):

7b. Additional comments regarding type of data collected during assessment/interviews of the client:

_____

8. What is/was the number of clients that have completed *baseline* assessments/interviews?

_____ ☐ Check, if number estimated.

9. What is/was the number of clients that have all *follow-up* assessments/interviews completed?

_____ ☐ Check, if number estimated.

10a. If health data are/were collected during the baseline and/or follow-up assessments/interviews of the client, which health conditions are/were the focus of your program? (Check all that apply. *If not applicable, skip to question 11a.*)

☐ Elevated blood lead levels
☐ Respiratory conditions (not asthma)
☐ Asthma
☐ Allergies
☐ Emergency room visits for (Specify): _____
☐ Doctor visits for (Specify): _____
☐ Injuries
☐ Health related absences from school or work
☐ Poisonings (e.g., pesticide poisoning)
☐ Other (Specify): _____

10b. Which of the following best describes how the health data are/were collected? (Information is/was reported by families|Information is/was provided by or verified by a physician or nurse|Both of the methods listed above are/were used|Information is/was provided from previous study dataset)

_____

10c. For which participants do/did you collect health data (Health data is/was collected on all household members|Health data is/was collected on all children living in the home|Health data is/was collected on only one child living in the home|Other)?

_____

Other (Specify): _____

Section C: ENVIRONMENTAL AND BIOLOGICAL SAMPLING

11a. Does/Did the project involve use of human biological samples (Yes|No)?

_____ *(If No, skip to question 16a.)*

11b. How many repeat biological samples are/were typically determined for each client (Zero|One|Two|Three|Four|Five or more)?

_____

11c. Please identify the average number of weeks post enrollment or post intervention that biological sample(s) are/were typically determined.

Biological Samples	**Average number of weeks**	**Reference Point (Post enrollment or Post intervention)**
First biological sample(s)		
Second biological sample(s)		
Third biological sample(s)		
Fourth biological sample(s)		
Fifth biological sample(s)		
Additional biological sample(s)		

12a. Please identify all types of biological samples that are/were routinely used in the project and specify if they are/were taken at *baseline* or during *follow-up* assessments? (Check all that apply)

Check if routinely determined at *baseline*	**Check if routinely determined during *follow-up***	**Type of biological sample**
☐	☐	Blood lead levels
☐	☐	Allergen testing – skin
☐	☐	Allergen testing – blood
☐	☐	Pulmonary function testing
☐	☐	Pesticide measurements – urine
☐	☐	Pesticide measurements – blood
☐	☐	Saliva tests for exposure to hazards

☐	☐	Other (specify):
☐	☐	Other (specify):
☐	☐	Other (specify):

12b. Additional comments regarding biological samples:

_____

13. What is/was the number of clients with *baseline* biological samples determined?

_____ ☐ Check, if number estimated.

14. What is/was the number of clients with all *follow-up* biological samples determined?

_____ ☐ Check, if number estimated.

15. Is/was your program collecting the biological samples or using data from already collected sources? (Collecting the samples|Using data already collected)

_____

16a. Does/Did your program collect environmental sampling data (Yes|No)?

_____ *(If No, skip to question 20.)*

16b. How many times was environmental sampling data typically collected from housing units (One|Two|Three|Four|Five or more)? (Note: if 5 lead dust wipes and several allergen samples were collected at the same visit, this counts as being collected at one time.)

_____

16c. Please identify the average number of weeks post enrollment or post intervention that environmental samples (or set of samples) are/were typically collected?

Environmental Samples	**Average number of weeks**	**Reference Point (Post enrollment or Post intervention)**
First environmental sample(s)		
Second environmental sample(s)		
Third environmental sample(s)		
Fourth environmental sample(s)		
Fifth environmental sample(s)		
Additional environmental sample(s)		

17. Please indicate all environmental sample types that are/were routinely collected. Also, indicate the sampling method, approximate number of enrolled housing units that are/were sampled (Less than half|Most|All), and the average number of samples taken per unit.

Check if your program collects/ collected	**Housing unit sampled for:**	**Sampling method (e.g., dust wipes, air sample):**	**Approximate number of units enrolled that are/were sampled at baseline (Less than half|Most|All)**	**Average number of samples taken per unit**	
				Baseline	**Follow-up**
☐	Lead				
☐	Cockroach allergens				
☐	Cat allergens				
☐	Dog allergens				
☐	Dust mite allergens				
☐	Mouse allergens				
☐	Pesticide residues				
☐	Molds				
☐	Particulate matter				
☐	Formaldehyde				
☐	Temperature ☐ Real-time ☐ Long-term				
☐	Relative humidity ☐ Real-time ☐ Long-term				
☐	Radon ☐ Short-term ☐ Long-term				
☐	Other (Specify):				
☐	Other (Specify):				

☐	Other (Specify):				

18. What is/was the number of housing units with completed *baseline* environmental sampling?

_____ ☐ Check, if number estimated.

19. What is/was the number of housing units with all *follow-up* environmental sampling completed?

_____ ☐ Check, if number estimated.

20. On average, how long does/did it take to perform all baseline assessments for a typical housing unit/client (including visual assessments, interviews, and environmental sampling) (Check one: Less than 1 hour|Less than 2 hours|Half a day|A full day|Other|Not applicable)?

_____
Other (Specify): _____

1. Does/Did your project involve housing unit interventions (Yes|No)?

_____ *(If No, skip to Community Education and Outreach section.)*

2. How many housing units have/had completed interventions?

_____ ☐ Check, if number estimated.

3. How many housing units currently have interventions in progress?

_____ ☐ Check, if number estimated.

4a. From the list below, please indicate all interventions that typically are/were completed as part of your project. In addition, for each broad category (identified in bold), indicate the number of housing units that received this type of intervention and the average cost of materials, labor, and total costs per unit for this type of intervention.

Check if the intervention is/was typically done in your program	Intervention	Number of units that have received this intervention	Average cost of materials per unit (A)	Average labor costs per unit (B)	Average total costs per unit (A+B)
Weatherization activities					
☐	Repair/replace windows				
☐	Install weather stripping (e.g., around doors/windows)				
☐	Install insulation				
☐	Seal ducts				
☐	Service furnace/boiler/hot water heater				
☐	Other (Specify):				
Moisture control activities					
☐	Fix roof leak				
☐	Fix/clean gutters/downspouts				
☐	Fix plumbing/appliance leaks				
☐	Confirm dryer is vented to outside				
☐	Install bathroom fan vented to outside				
☐	Install range hood fan vented to outside				
☐	Seal dirt crawl spaces in basement with plastic sheeting				
☐	Provide dehumidifier				
☐	Service furnace/air conditioner				
☐	Perform landscaping/grading				
☐	**Other (Specify):**				

Lead hazard control activities					
☐	Stabilize paint				
☐	Encapsulate paint				
☐	Strip paint from components				
☐	Enclose walls				
☐	Replace components (e.g., doors, windows)				
☐	Make floor and window surfaces smooth and cleanable				
☐	Perform specialized cleaning of horizontal surfaces				
☐	Other (Specify):				
Injury prevention activities					
☐	Install smoke detectors				
☐	Install carbon monoxide alarms				
☐	Install window guards				
☐	Install cabinet locks				
☐	Fix stair rails and stair treads				
☐	Provide nightlights				
☐	Other (Specify):				
Allergen reduction activities					
☐	Make floor surfaces smooth and cleanable				
☐	Install air filtration devices				
☐	Perform cleaning				
☐	Provide mattress or pillow covers				
☐	Take steps to reduce environmental tobacco smoke in the home				
☐	Other (Specify):				

Integrated pest management activities					
☐	Seal holes and cracks				
☐	Eliminate food sources				
☐	Use low toxicity baits				
☐	Vacuum				
☐	Conduct monitoring				
☐	Other (Specify):				
Education					

4b. Additional comments regarding interventions:

_____

4c. Are the costs you provided in the table estimates or actual costs (Estimates|Actual costs)?

_____

4d. If estimates are provided, does your program track the actual costs (Yes|No)?

_____

5a. Does/Did your program routinely make referrals to other programs as part of the intervention process (Yes|No)?

_____ (*If No, skip to question 6a*.)

5b. Please check the programs to which referrals are/were routinely made. (Check all that apply.)

☐ Weatherization program
☐ Lead program
☐ IPM program
☐ Other (Specify): _____

5c. Does/Did your program routinely follow-up with referrals made to ensure that client needs were met (Yes|No)?

_____

6a. Do/Did your intervention strategies include education of the rental property owner or tenant/owner-occupant (Yes for the rental property owner|Yes for the tenant/owner-occupant/Yes for both the rental property owner and tenant/owner-occupant|No)?

_____ (*If No, skip to question 7*.)

6b. What is/was the main area(s) of focus for educational activities for each targeted group? (Check all that apply.)

Area of focus	**For rental property owners**	**For tenants/ owner-occupants**
Lead poisoning prevention	☐	☐
Asthma education	☐	☐
Injury prevention	☐	☐
Integrated pest management	☐	☐
Mold and moisture prevention	☐	☐
Carbon monoxide poisoning prevention	☐	☐
Behavior change (e.g., cleaning education)	☐	☐
Fire safety	☐	☐
Medical management	☐	☐
Other (Specify):	☐	☐
Other (Specify):	☐	☐
Other (Specify):	☐	☐

6c. On average, approximately how long do/did the educational activities take to complete (One hour|Two hours|Three hours|Four hours|Five or more hours)?

_____

6d. What activities were included as part of the educational intervention? (Check all that apply.)

- ☐ Brochures, fact sheets, or other reading materials were given to the participant
- ☐ Intensive one-on-one education was done with the participant (including case management activities)
- ☐ Hands-on demonstrations were conducted (e.g., cleaning demonstrations)
- ☐ Participants were asked to repeat a hands-on demonstration
- ☐ Participants completed a pre/post-survey
- ☐ Other (Specify): _____

6e. Who provides the education? (Check all that apply.)

- ☐ Housing professional
- ☐ Educational specialist
- ☐ Trained member of the community
- ☐ Nurse or health care professional
- ☐ Other (Specify): _____

6f. What cleaning supplies or other materials do/did you provide as part of the education? (Check all that apply.)

- ☐ None
- ☐ Mattress covers
- ☐ Mops/buckets
- ☐ Loan of vacuum cleaners
- ☐ Air filters
- ☐ Vouchers
- ☐ Other (Specify): _____

7. On average, how long after the baseline assessment does/did it take before the intervention is/was started (Same day|Within 1 week|Within 2 weeks|Within 1 month|Within 2 months|Longer than 2 months)?

_____

8. How long, on average, does/did it take to complete the interventions, once they are/were started (Same day|Within 1 week|Within 2 weeks|Within 1 month|Within 2 months|Longer than 2 months)?

_____

9. How were the work specs developed (Work specs were developed manually|Work specs were computer generated|Not Applicable)?

_____

10. Was an environmental review required before intervention could begin (Yes|No)?

_____

11. What difficulties, if any, were frequently encountered in completing the interventions? First check all that apply and then identify the one difficulty most frequently encountered.

Difficulty frequently encountered	**Check ALL that are frequently encountered**	**Check the ONE most frequently encountered**
Cost constraints	☐	☐
Obtaining reliable contractors	☐	☐
Obtaining qualified contractors	☐	☐
Obtaining consent of the property owner	☐	☐
Meeting timeframes	☐	☐
Getting into housing units	☐	☐
Contractual issues	☐	☐
Obtaining timely environmental review	☐	☐
Getting landlords/homeowners to do their work	☐	☐
Relocating residents	☐	☐
Other (Specify):	☐	☐
Other (Specify):	☐	☐
Other (Specify):	☐	☐

12a. What evaluation method(s) are/were used to determine if interventions are/were effective? (Check all that apply.)

☐ Pre- and post-intervention visual assessments are/were compared
☐ Pre- and post-intervention environmental sampling results are/were compared
☐ Pre- and post-intervention client/interview data (excluding health data) are/were compared
☐ Pre- and post-health data are/were compared
☐ Pre- and post-biological sampling results are/were compared
☐ Other (Specify): _____

12b. For the evaluation method(s) checked in 12a, does your program use clearance criteria, aside from the EPA clearance standards for lead on floors, window sills, and window troughs (e.g., a 50% reduction of allergen levels is/was considered acceptable)

(Yes|No)? _____ (*if No, skip to Housing Unit and Residency Characteristics for Treated Units section*)

12c. Please describe the clearance criteria used.

_____

1. How many housing units have/had interventions completed for the following categories?

☐ Check, if numbers estimated

Number of housing units with completed interventions that are:			
Owner-occupied	**Rental units**	**Vacant units**	**Total units**

2. Approximately what <u>percentage</u> of housing units with interventions completed are/were single-family units?

_____%

3a. Approximately what <u>percentage</u> of housing units with interventions completed are/were part of multifamily buildings (including duplexes)?

_____% *(If zero, skip to question 4.)*

3b. For multifamily buildings involved in your project, how many individual housing units does/did a typical multifamily building contain?

_____ units

3c.What is/was the typical number of individual housing units <u>treated</u> within multifamily buildings?

_____

4. How many housing units have/had interventions completed for the following groups?

☐ Check, if numbers estimated

Number of Treated Housing Units by Age of Housing:				
Built before 1940	**Built 1940-1959**	**Built 1960-1978**	**Built after 1978**	**Age Unknown**

5. What is the total number of occupants residing in the housing unit at the time the intervention was completed?

☐ Check, if numbers estimated.

Number of occupants living in housing units with completed interventions:		
Under 6 years of age	**Between the ages of 6 and 17 years**	**Age 18 years and over**

1. Is/Was community education and outreach included as part of your project (Yes|No)?

_____ *(If No, skip to Skills Training section.)*

2a. What type of community education and outreach methods are/were conducted by your program as part of this project? (Check all that apply.) For those methods that are/were used, please rate each type as to its effectiveness in helping your program obtain its project goals, from 1 (not effective) to 5 (very effective).

Check if method is/was used	**Effectiveness rating (not effective=1 --> effective=5)**	**Community education and outreach effort**
☐		Door-to-door outreach
☐		Visits to primary care provider offices
☐		Mailings to organization and/or community groups
☐		Broadcast media outreach
☐		Visits to community or parent groups
☐		Participation in health fairs
☐		Other (specify):
☐		Other (specify):
☐		Other (specify):

2b. Additional comments on effectiveness of community outreach and education efforts:

_____

3. How many individuals are/were targeted for community outreach/education efforts?

_____

4. How many individuals are/were reached by community outreach/education efforts?

_____ ☐ Check, if number estimated.

5a. Does/Did your program have a tracking system to identify if a housing intervention is the result of your community outreach/education efforts (Yes|No)?

_____ (*If no, skip to question 6.*)

5b. How many housing units received an intervention as a result of your community outreach/education efforts?

_____ ☐ Check, if number estimated.

6. Who provides the community education and outreach? (Check all that apply.)

☐ Housing professionals
☐ Educational specialists
☐ Trained community members
☐ Nurses or other health care professionals
☐ Other (Specify): _____

7. What is/was the specific target group (or groups) for community education and outreach efforts of this project? (Check all that apply.) For those that are selected, please rate the targeted groups based on the level of emphasis and/or effort your program placed on them on a scale from 1 (least amount of emphasis) to 5 (most amount of emphasis).

Check if applicable	**Emphasis level (least emphasis=1 → most emphasis=5)**	**Target groups for education and outreach efforts**
☐		Tenants/owner-occupants
☐		Rental property owners
☐		Community residents
☐		Health care providers
☐		Pregnant women
☐		Childcare providers
☐		Parents/guardians
☐		Community-based organizations
☐		Contractors
☐		Outreach workers
☐		Local churches and schools
☐		Children
☐		Other (Specify):
☐		Other (Specify):
☐		Other (Specify):

8. What is/was the main area(s) of focus for community educational activities? (Check all that apply.)

☐ Lead poisoning prevention
☐ Asthma education
☐ Injury prevention
☐ Integrated pest management
☐ Mold and moisture prevention
☐ Carbon monoxide poisoning prevention
☐ Behavior change (e.g., cleaning education)
☐ Fire safety
☐ Medical management
☐ Other (Specify): _____

9. What cleaning supplies or other materials do/did you provide as part of the community education and outreach? (Check all that apply.)

☐ None
☐ Mattress covers
☐ Mops/buckets
☐ Loan of vacuum cleaners
☐ Air filters
☐ Vouchers
☐ Other (Specify): _____

10. What methods do/did you use to evaluate your community education/outreach efforts? (Check all that apply.)

☐ Counts of those who were reached
☐ Demonstration and return demonstration of various techniques (e.g., cleaning)
☐ Pre- and Post-tests/surveys
☐ Participants complete evaluation
☐ Changes in behavior
☐ Other (Specify): _____

1. Does/Did your program provide skills training as part of the project (Yes|No)?

_____ *(If No, skip to Key Evaluation or Research Findings section.)*

2. What is/was the main focus of the skills training? (Check all that apply.)

- ☐ Individuals trained to provide education
- ☐ Individuals trained to conduct assessments (visual/interviews/environmental sampling)
- ☐ Individuals trained to carry out interventions
- ☐ Other (Specify): _____

3. What is/was the target audience for your skills training? (Check all that apply.)

- ☐ Code inspectors
- ☐ Affordable housing professionals
- ☐ Grantee or partner staff
- ☐ Remodelers/contractors
- ☐ Property owners (non-residents)
- ☐ Nurses
- ☐ Physicians
- ☐ Community health workers
- ☐ Other (Specify): _____

4. What is/was the total number of individuals that received skills training from your project?

_____ ☐ Check, if number estimated.

What percentage of those trained are/were low-income? _____%

b. What percentage of those trained are/were minorities? _____%

5a. Does your program track individuals who have been trained (Yes|No)?

_____ (*If no, skip to question 6.)*

If yes, provide additional details:

_____

5b. Approximately, how many of the individuals trained by your project are still involved with work related to the "skills training" received from your program (Less than half|About half|More than half|Don't Know)?

_____

6a. Are/were the trainings evaluated (Yes|No)?

_____ *(If No, skip to Key Evaluation or Research Findings section.)*

6b. How are/were the trainings evaluated? (Check all that apply.)

☐ Participants completed evaluation
☐ Pre/post tests/surveys are used
☐ Other (Specify): _____

1a. Did your project include a control group (Yes|No)?

_____ *(If No, skip to question 2a.)*

1b. Were housing units/clients randomly assigned to the treatment or control group (Yes|No)?

_____

1c. Did the control group receive any intervention (e.g., housing treatment or education) (Yes|No)?

_____

1d. Additional comments regarding control group:

_____

2a. If your study was designed as a research study, what are/were the main hypotheses of your study? *(If not applicable, skip to question 3a.)*

a. _____

b. _____

c. _____

2b. Do/Did your results support or refute your hypotheses (Support|Refute|Inconclusive|Data analysis not complete)? Explain.

_____

Explanation:

a. _____

b. _____

c. _____

3a. What are/were the main objectives of your project (e.g., to evaluate the effectiveness of cleaning interventions on reducing allergen levels)?

a. _____

b. _____

c. _____

3b. Did you achieve your objectives (Yes|No)?

_____ (If No, describe below which objectives were not met and why.)

a. _____

b. _____

c. _____

4. What are/were the top three major outcomes of your project?

a. _____

b. _____

c. _____

5a. Is/Was your project designed to evaluate or develop a specific product/instrument (Yes|No)?

_____ *(If No, skip to question 6a.)*

5b. What is/was the product/instrument?

_____

5c. What is/was the main purpose of evaluating or developing the product/instrument?

_____

5d. What is/was your main conclusion regarding the product/instrument (Product is ineffective for purposes tested|Product is effective for purposes tested|Results are inconclusive regarding the effectiveness of the product|Data analysis not complete)?

_____

5e. Additional comments regarding the conclusions:

_____

6a. Is/Was your project designed to determine the overall effectiveness of a specific intervention (Yes|No)?

_____ *(If No, skip to question 7a.)*

6b. What is/was the focus of the intervention?

_____

6c. What is/was your conclusion regarding the effectiveness of the intervention (Intervention is ineffective for purposes tested|Intervention is effective for purposes tested|Results are inconclusive regarding the effectiveness of the intervention|Data analysis not complete)?

_____

6d. Additional comments regarding the effectiveness of the intervention:

_____

7a. Does/Did your program collect data that would allow determination of the cost-effectiveness of your approach/product (Yes|No)?

_____ *(If No, skip to question 8a.)*

7b. Can you make any conclusions regarding the cost-effectiveness of your approach/product (The approach was not cost-effective|The approach was cost-effective|Results are inconclusive regarding cost-effectiveness of the approach|Data analysis not complete)?

_____

7c. What data do/did you consider to determine if the approach/product was cost-effective?

_____

8a. Is/Was your project designed to correlate health measures with assessment measures (e.g., link reports of increased asthma episodes to levels of allergens) (Yes|No)?

_____ *(If No, skip to question 9a.)*

8b. Which measures are/were examined and what are/were the main findings?

a. _____

b. _____

c. _____

9a. Did you obtain Institutional Review Board (IRB) approval for your project (Yes|No)?

_____ *(If No, skip to question 10a.)*

9b.Was your project delayed by the IRB approval process (Yes|No)?

_____

9c. Was the IRB approval process expedited or non-expedited (Expedited|Non-expedited)?

_____

9d. Did you encounter challenges and/or obstacles in the IRB approval process (Yes|No)?

_____ (If yes, explain.)

Explanation: _____

10a. If your project is completed, was information from your project used to make changes in policy or practice (Yes|No)? *(If project is still current, skip to 11a.)*

_____ *(If No, skip to Additional Information section.)*

10b. Did the information result in changes to any of the following categories? (Check all that apply.)

- ☐ Policies/practices of your organization
- ☐ Policies/practices of a partner organization
- ☐ Housing codes
- ☐ Medical management
- ☐ Introduction of new statutes/ordinances
- ☐ Introduction of new codes/regulations
- ☐ Other (Specify): _____

11a. If your project is not yet complete, do you expect information from your project to be used to make changes in policy or practice (Yes|No)?

_____ *(If No, skip to Additional Information section.)*

11b. If your project is not yet complete, do you expect information to result in changes in any of the following categories? (Check all that apply.)

- ☐ Policies/practices of your organization
- ☐ Policies/practices of a partner organization
- ☐ Housing codes
- ☐ Medical management
- ☐ Introduction of new statutes/ordinances
- ☐ Introduction of new codes/regulations
- ☐ Other (Specify): _____

1a. Was an assessment tool (visual, interview, environmental sampling) developed for this project (Yes|No)?

_____ *(If No, skip to question 2a.)*

1b. If the project has ended, is this assessment tool being used internally for your Healthy Homes program (Yes|No|Project still active)?

_____

1c. Was your assessment tool distributed for external use (Yes|No)?

_____

1d. Was your assessment tool validated in any way (Yes|No)?

_____

If yes, indicate how:

_____

2a. Was a specific training curriculum developed for this project (Yes|No)?

_____ *(If No, skip to question 3a.)*

2b. Was this training curriculum distributed to other organizations for use/incorporation into their programs (Yes|No)?

_____

2c. If the project has ended, is this training curriculum still being used by your program (Yes|No|Project still active)?

_____

2d. Please state the focus of the training curriculum and identify the type of organization using it (if applicable):

_____

3a. Were educational materials (e.g., pamphlets, fact sheets) developed as part of this project (Yes|No)?

_____ *(If No, skip to question 4a.)*

3b. If the project has ended, are the materials still being used (Yes|No|Project still active)?

_____ *(If No or Project still active, skip to question 4a.)*

3c. Are the materials still being used by programs other than your own (Yes|No)?

_____

3d. Briefly describe the type of education material developed:

_____

4a. Were project findings written in manuscript form for publication (Yes|No|Not Yet)?

_____ *(If No or Not yet, skip to question 5a.)*

4b. Were project findings published in a peer-reviewed journal (Yes|No)?

_____

4c. If information is published, please provide citation information (e.g., journal name, title of article, date of publication).

_____

5a. Did information from your project receive coverage in any of the following venues? (Check all that apply. *If none apply, skip to question 6.*)

- ☐ Community newsletters
- ☐ Newspapers
- ☐ Local TV news broadcast
- ☐ Local radio news broadcast
- ☐ Website posting
- ☐ Other (Specify): _____

5b. Was the purpose of the coverage used to help in your recruitment efforts or to highlight the results from your project (Help in recruitment efforts|Highlight project results|Other)?

_____
Other (Specify): _____

5c. Additional comments regarding coverage:

_____

6. Were formal presentations about this project made to professional organizations, industry representatives, city officials, or other groups? (Check all that apply and indicate the reason for the presentation.)

Check if applicable	**Groups formal presentations given to:**	**Reason for Presentation**			
		Help with recruitment	**Highlight results**	**Obtain funding**	**Other (Specify)**
☐	Professional organizations	☐	☐	☐	
☐	Industry representatives	☐	☐	☐	
☐	City officials	☐	☐	☐	
☐	Others (Specify):	☐	☐	☐	
☐	Others (Specify):	☐	☐	☐	
☐	Others (Specify):	☐	☐	☐	

7a. In addition to HUD Healthy Homes Initiative funds, does/did your program use other sources of funds for completing this project (Yes|No)?

_____ *(If No, skip to question 8.)*

7b. Please check any sources of other funds that apply and indicate the approximate dollar amount of the funds used:

Check if applicable	**Source of funds**	**Approximate dollar amount used for this project**
☐	Weatherization funds	

☐	HOME funds	
☐	Lead hazard control grant funds	
☐	Community development block grant funds	
☐	Leveraged funds from grantee	
☐	Other (Specify):	
☐	Other (Specify):	
☐	Other (Specify):	

8. Is/was any aspect of your project sustainable in the absence of federal funds (Yes|No)?

_____ (If yes, please explain below.)

Explanation:

_____

9a. What quality assurance (QA) and quality control (QC) activities were incorporated into your project? (Check all that apply.)

☐ Data was double-entered into the study database
☐ Range checks were programmed into the study database
☐ Inter-rater reliability was determined for assessment tools
☐ Questionnaires were pilot tested during their development
☐ QC samples were integrated into the biological sampling process
☐ QC samples were integrated into the environmental sampling process
☐ Collection of field data was observed at a specified frequency
☐ Staff provided with refresher training at specified intervals
☐ Frequent meetings with all project staff
☐ Monitoring of interventions/work in progress
☐ Other (Specify): _____

9b. Provide more detail, if needed, on any QA/QC activities.

_____

1. Briefly describe the three most important lessons that your program learned as a result of this project.

a. _____

b. _____

c. _____

1. What aspect or aspects of your project do you think are/were most *effective* in reaching the project goals? Be as specific as possible. (Provide up to three, if applicable.)

a. _____

b. _____

c. _____

2. What aspect or aspects of your project do you think are/were the most *ineffective* in reaching the project goals? Be as specific as possible. (Provide up to three, if applicable.)

a. _____

b. _____

c. _____

3a. What are/were some of the challenges that you encountered during the project? (Check all that apply.) Also for those selected, please rate the challenges according to the level of difficulty in overcoming the challenge, from 1 (least difficult to overcome) to 5 (most difficult to overcome).

Check if challenge was encountered	**Rating for the level of difficulty in overcoming (least difficult=1 → most difficult=5)**	**Challenge**
☐		Recruiting clients
☐		Retaining clients
☐		Finding contractors to complete work
☐		Meeting deadlines
☐		Meeting budget constraints
☐		Finding qualified staff
☐		Retaining qualified staff
☐		Other (Specify):
☐		Other (Specify):
☐		Other (Specify):

3b. Additional comments regarding challenges:

_____

1. Please complete the following table, by naming the partners (including sub-grantees) involved in this project, identifying the type of organization represented by the partner (advocacy, university, faith-based, parent group, local school, health department, housing agency, community-based organization, or other), specifying if the partner was a sub-grantee (Yes|No), and identifying if the partner had a contract/MOU with benchmarks for this project (Yes|No). In addition, please check all areas that the partner participated in.

Partner name	**Type of organization**	**Was this partner a sub-grantee (Yes/No)?**	**Did this partner have a contract/ MOU with benchmarks for this project (Yes/No)?**	**Please check the areas below that the partner participated in**					
				Recruitment or Referrals	**Performing Assessments**	**Performing Interventions**	**Skills Training**	**Community Education or Outreach**	**Other (describe)**
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	

2. How many of these partnerships were newly formed as a result of this project?

_____

3. If your grant period has ended, how many of these new partners continue to work with your organization on other projects?

_____