Appendices

Appendix 1.1 Resources
Neighborhood and Community Health and Safety Issues

Issue	Resource
Brownfields	EPA: http://www.epa.gov/brownfields/ The Brownfields and Land Revitalization Technology Support Center: http://www.brownfieldstsc.org/
Built Environment	CDC: http://www.cdc.gov/nceh/ehs/Topics/BuiltEnvironment.htm
Climate Change	EPA: http://www.epa.gov/climatechange/ National Oceanic and Atmospheric Administration: http://www.noaa.gov/climate.html
Disaster Planning	FEMA: http://www.ready.gov/america/index.html CDC: http://emergency.cdc.gov/
Extreme Cold and Heat	CDC: http://emergency.cdc.gov/disasters/winter/ CDC: http://emergency.cdc.gov/disasters/extremeheat/
Flood Cleanup	http://www.fema.gov/hazard/flood/aftrfld.shtm National Center for Health Housing: http://www.centerforhealthyhousing.org/FloodCleanupGuide_screen_.pdf
Indoor Air Quality	http://www.epa.gov/iaq/homes/retrofits.htm
Natural Disasters	FEMA: http://www.ready.gov/america/index.html My Emergency Planning Kit and My Emergency Widget—to get online updates on disasters CDC: http://emergency.cdc.gov/disasters/
Neighborhood Safety	National Crime Prevention Council: http://www.ncpc.org/topics/home-and-neighborhood-safety
Noise Pollution	EPA: http://www.epa.gov/air/noise.html
Outdoor Air Quality	EPA: http://www.epa.gov/air/
Rural Housing	USDA Rural Development Housing and Community Facilities Programs: http://www.rurdev.usda.gov/rhs/
Violence	CDC: http://www.cdc.gov/ViolencePrevention/index.html
Water Quality	EPA: http://www.epa.gov/safewater/
Workforce/Green Jobs	http://www1.eere.energy.gov/wip/retrofit_guidelines.html
Workplace Hazards	Occupational Safety and Health Administration: http://www.osha.gov/ National Institute for Occupational Safety and Health: http://www.cdc.gov/niosh/ NIEHS: National Clearinghouse for Worker Safety and Health Training http://tools.niehs.nih.gov/wetp/

Appendix 1.2 Case Study
Opportunity Council, Bellingham, WA
Weatherization Partnership

Program Overview

Purpose. The purpose of the project was to address the needs of children with asthma living in low-income housing by reducing environmental triggers.

Target Population. The program targeted very low-income families with children, from birth to age four, and home-based child care programs served by Opportunity Council weatherization and home rehabilitation programs. The target households included Native American children, who have an exceptionally high prevelance of asthma, and recently-settled immigrants from the Ukraine. The target area was comprised of four counties in the northwest corner of Washington State.

Partnerships. The Opportunity Council provided leadership for this initiative. As a community action agency they are responsible for multiple programs and community services including child care, early childhood education, homeless and transitional housing, health care, and community information and referral services.

Program partners included Northwest Clean Air Agency (the regional air pollution authority), Whatcom County Health Department, City of Bellingham Community Development Department, Opportunity Council Head Start, and Childcare Resource and Referral programs. In collaboration with over 30 public and private organizations, the Opportunity Council conducted a two-year public education campaign focusing on healthy homes interventions.

Community Involvement. The Indoor Air Coalition of Whatcom County (IACWC) served as the steering committee for the project and focused on defining the target population as they served to leverage.

Planning. Partner agencies serving the target population coalesced to implement the healthy homes program. Opportunity Council Head Start program recruited families who were receiving weatherization program services. The Northwest Clean Air Agency has the ability to assess in-home hazards in low-income households where children with asthma lived.

Interventions

Recruitment. Families were enrolled using the following eligibility criteria on a "first come, first served" basis:

- Income: The participant family income needed to be 125 percent of poverty or less.
- Health: Family or child care providers must have at least one child clinically diagnosed with asthma. Households with indoor cigarette smoking or pets were not eligible.
- Home conditions: The dwelling needed to be in a condition such that reasonable repairs or weatherization measures and available funding could address imminent hazards.
- Home ownership: Program participants (both families and child care providers) had to be homeowners.

Interventions. Healthy homes program services include:

- Pre- and post-renovation air and dust samples.
- Pre- and post-renovation education to help families identify and control asthma triggers.
- Weatherization services, including enhanced ventilation systems and pollutant mitigation.
- Supplies for the families, including green cleaning kits, HEPA vacuums, walk-off mats, and mite-proof bedding covers.
- Training of Head Start home visitors, child care monitors, health department staff, and other community social service providers in asthma trigger prevention and the "Seven Steps to a Healthy Home" model.
- Dissemination of information to the weatherization network regarding Healthy Home principles.

- Two tools created to support the interactive curriculum:
  - How Your House Works, which is based on the "house as a system" approach.
  - Home Asthma Reduction Training Workbook, a tool to help families create a plan to reduce asthma triggers in their home.

Program Staff. The program used the Opportunity Council's in-house weatherization staff for all repairs except where specialty contractors, such as electricians, plumbers, and HVAC installers, were needed. All in-house staff received training on healthy homes concepts, program parameters, and other topics.

Systems and Policies

The Opportunity Council in collaboration with ICF Consulting and Tohn Environmental Strategies developed the Weatherization Plus Health model and related protocols and training for Department of Energy Weatherization Assistance Programs (WAP).

Funding and Leverage

Funding Sources:

- HUD Healthy Housing Demonstration grant.
- Weatherization program funding and technical expertise was leveraged.
- A private donor committed $100,000 per year in support of energy efficiency retrofits.

Program Costs. The average cost to combine the weatherization program with healthy homes interventions is estimated at $5,620 per housing unit, with a range of $1,500–$6,000.

Evaluation and Outcomes

Housing Outcomes. The visual assessment tool was used to evaluate housing units post-renovation. The tool covered observations of mold and moisture, pest and pesticide use, presence of carbon monoxide detectors, condition of appliances, lead-based paint hazards, environmental tobacco smoke, poisoning, and fire hazards.

Northwest Air Pollution Authority and Opportunity Council staff collected pre- and post-renovation dust tape lifts, air samples, and carpet dust samples. While the results of post-testing varied, in aggregate there were noticeable improvements in the reduction of dust levels in most home and child care environments.

Health Outcomes. Family members reported on children's health, asthma status, family health maintenance, and home cleaning practices at baseline and follow-up visits. The program reported that frequency of unit turnover had decreased in housing units receiving healthy homes program services.

Sustainability

Under the current expanded program, the Opportunity Council continues to follow the Weatherization Plus Health Model, using private sector leverage to cover the additional costs of the health-related assessments and additional upgrades. This is possible mainly because of the existing infrastructure of the weatherization program. Homes asthma trigger reduction strategies have been integrated into the existing weatherization and housing rehabilitation program production systems. With funding from the American Recovery and Reinvestment Act of 2009, the Opportunity Council has expanded its on-line training resources through its Building Performace Center. It has also become an accredited training provider through the U.S. Department of Energy.

Best Practices

- Integrating the resources of a Community Action agency that offers weatherization, Head Start, child care resource and referral, and home visiting to serve the same target group.
- Leveraging existing weatherization funding with Healthy Homes grants.

Appendix 1.3 Case Study
Baltimore City Health Department
Transitioning from Lead to Healthy Housing

Program Overview

Purpose: In 2007, the U.S. Centers for Disease Control and Prevention (CDC) chose the Baltimore City, Maryland Health Department's Childhood Lead Poisoning Prevention Program (CLPPP) to transition from a lead program to a comprehensive Healthy Homes Program. The Healthy Homes Demonstration Project pilot's goal was to develop, implement, and evaluate a cost-effective, outcome-focused, replicable model for transitioning from an urban childhood lead poisoning prevention program to a comprehensive healthy homes program. The program aimed to reduce lead exposure, asthma risks, injury risks and hazards, carbon monoxide poisoning, and fire morbidity and mortality.

Target Population: The program targeted children with elevated blood levels (EBL) and children aged 0–6 years and pregnant women living in housing with hazards identified through its Primary Prevention Initiative (PPI).

Partnerships: CDC, University of Maryland, Coalition to End Childhood Lead Poisoning, Health Care Access.

Community Involvement: The Health Department obtained input through a variety of different mechanisms:

- One-on-one meetings with various individuals and organizations across the city, including community organizations, community leaders, and government agencies.
- A newly developed healthy homes advisory board.
- Focus groups with representatives of the target population.

The program relied on input from clients for ongoing feedback. During baseline visits, field staff asked clients about their home and family priorities. The staff used the client-identified needs to devise a specific and appropriate action plan for each client.

Planning. A pilot team of two field staff representatives, field staff supervisors and managerial staff, was formed to draft, discuss, and revise the assessment forms, protocols, and education materials. In developing the protocols for the program, the pilot team cyclically reviewed scientific studies and other healthy homes protocols and approaches, analyzed Baltimore City health and housing data, and received feedback from field staff. After piloting the protocols and assessment forms in ten healthy homes visits, the pilot team integrated feedback from staff to create the final documents. The program also relied heavily on field staff with lengthy home-visiting experience to shape the protocol, resources, supplies, and assessment form.

During the first year of the transition, the program developed new protocols, assessment forms, referral resources, and completed 90 hours of staff training. Extensive evaluation occurred after the first year, showing statistically significant health outcomes. Stage two of the transition required additional ongoing work, including applying for funds to expand services, building a career ladder for health department staff, implementing a quality improvement initiative, and expanding community outreach. Milestones during the transition year included:

1. Convening the pilot team;
2. Initiating a broad range of trainings for the project staff;
3. Finalizing the healthy homes protocols and two assessment forms (visual and medical);
4. Training the entire staff on the protocols and assessment forms; and
5. Staff-wide expansion of the program.

Interventions

Recruitment. Children with elevated blood lead levels are automatically reported to the Health Department's Healthy Homes Division for case management due to mandated reporting laws. Families under case management were

automatically included in the pilot. Additional cases came from maternal and infant nursing home visiting programs serving high-risk pregnant and post-partum women.

Interventions. All families received two initial home visits (a visual assessment conducted by a sanitarian and a health educational assessment conducted by a community health worker) and one follow-up visit after three months.

Staff members educated families during home visits and provided education materials and healthy homes supplies. Topics addressed included lead and carbon monoxide exposure, fire hazards, moisture/mold and pest problems, indoor smoking, ventilation, physical hazards, and easy accessibility to pesticides. Supplies included books for children, roach disks, caulk, non-toxic cleaning supplies, cribs, covered trash cans, and outlet covers.

The environmental team made referrals to the Baltimore City Fire Department for free smoke alarm installation and to the Coalition to End Childhood Lead Poisoning for legal advocacy, relocation assistance, and lead abatement. In addition, the program worked with Baltimore City Maternal and Child Health on the Safe Sleep Initiative. Through this initiative, the program installed cribs in homes where children under one year old had no safe place to sleep.

During both the initial and the follow-up assessments, caseworkers asked clients to identify any concerns they had with their home and/or family. Then using the client-identified issues, caseworkers developed an appropriate action plan. During follow-up visits, field staff paid attention to client-identified issues and used them as reference points.

Program Staff. In May 2006, the Baltimore City Health Commissioner announced the appointment of the first major U.S. City Assistant Commissioner for Healthy Homes in the nation. From 2006–2009, the Health Department's Healthy Homes Division was comprised of 60 staff members working on five healthy housing programs and initiatives, including an integrated healthy homes inspection and health services program, a fire safety initiative, a lead abatement funding program, and an integrated pest management (IPM) pilot program in housing units owned by the Housing Authority of Baltimore City.

Staff attended approximately 90 hours of training in the first year. Staff attended didactic and interactive training seminars on home environmental health topics, childhood lead poisoning prevention, lead-safe work practices, and behavioral health. Additional topics covered at the trainings included community resources, injury prevention, safe sleep, water testing, blood-borne pathogens, mold prevention, carbon monoxide poisoning, fire safety, and IPM.

Funding and Leverage

Funding Sources. CDC, HUD, EPA, State of Maryland, and City of Baltimore.

Evaluation and Outcomes

The program had statistically significant changes in health and housing outcomes:

- At the initial visit, 50 percent of the homes showed evidence of smoking and only 37 percent at the follow-up visit (90 percent statistically significant).
- At the initial visit, 58 percent of infants had their own cribs and 89 percent had their own cribs at the follow-up visit (95 percent statistically significant).
- At the initial visit, 65 percent of families reported smoking indoors and only 45 percent reported indoor smoking at the follow-up visit (99 percent statistically significant).
- At the initial visit, 33 percent of homes "appeared clean," and 54 percent of homes "appeared clean" at the follow-up visit (99 percent statistically significant).
- At the initial visit, 36 percent of homes were free of garbage or debris and 68 percent of homes were free of garbage or debris at the follow-up visit (99 percent statistically significant).

Sustainability

The Health Department's Healthy Homes Division served as a key consultant in the city's receipt of major Weatherization funds. Healthy homes priorities are being incorporated into weatherization services city-wide.

CDC has produced a report titled Healthy Homes Transition Report—A Study of the Baltimore City Healthy Homes Division for use by other jurisdictions as they evolve from single issue lead poisoning prevention programs to more comprehensive healthy homes programs.

Best Practices

- Conducting focus groups to assess the perspective of program participants directly impacted by the transition.
- Using client-identified needs to help prioritize issues and create an appropriate action plan.

Appendix 1.4 Case Study
Boston Public Health Commission & Boston Inspectional Services Department
Health Care and Housing Code Enforcement Partnership

Program Overview

Purpose. Breathe Easy at Home (BEAH), a program of the Boston Public Health Commission and Boston Inspectional Services Department and the Boston Inspectional Services Department, is a web-based service system designed to allow clinicians to make on-line referrals for housing code inspections for their patients with asthma.

Target Population. BEAH targets children and adults with asthma living in public or private rental housing in Boston neighborhoods with high rates of asthma and multifamily rental housing. Physicians, nurses, social workers and other health workers identify and refer their patients in need of environmental asthma trigger reduction in their homes.

Model. BEAH is an on-line system for referring Boston residents with asthma for housing code inspections. Online referrals originate from clinical sites. Home inspections are conducted by the Boston Inspectional Services Department (ISD) inspection staff. Boston ISD enforces the Massachusetts housing code in the city of Boston. The program is managed out of the Boston Public Health Commission, whose program coordinator works with the program advisory board to undertake planning, outreach and recruitment and evaluation. Referring clinicians receive electronic updates on the status, findings and resolution of the case. Inspections may result in issuance of a notice of violation, with a maximum time to correct the violation. The "correction order" specifies the violations that must be remedied to resolve the case and a required time frame. A case is closed when the violation is corrected. Common asthma triggers covered by the Massachusetts state sanitary code for housing include presence of cockroaches, rodents, excessive moisture or mold, damaged, wet or dirty carpets, excessive heat or absence of heat among others.

Partnerships. Boston's Public Health Commission works with the City of Boston Inspectional Services Department, Boston Medical Center, Boston Housing Authority, Boston Urban Asthma Coalition, Children's Hospital Boston, and Committee for Boston Public Housing and Medical Legal Partnership. These partners worked together to envision the on-line system, implement a pilot project and evaluate, monitor and expand the program.

Interventions

Recruitment. Doctors, nurses and other healthcare professionals located at hospitals and health centers.

Interventions. The program enforces the State Sanitary Code Chapter II: Minimum Standards of Fitness for Human Habitation (Massachusetts Housing Code). Inspections may result in issuance of a notice of violation, with a maximum time to correct the violation. Common asthma triggers covered by the Code include the presence of cockroaches, rodents, excessive moisture or mold, damaged, wet or dirty carpets, excessive heat or absence of heat, among other issues.

Program Staff. The program structure includes a program coordinator employed by the Boston Public Health Commission who works closely with housing inspection staff from ISD. This system capitalizes on integrating core functions of the two city agencies. ISD inspectors conduct all the inspections and the Boston Public Health Commission manages the program, conducts outreach to the health institutions, program evaluation and communications.

The Boston Public Health Commission and Boston Inspectional Services Department co-sponsored annual inspector trainings to increase awareness and skills addressing housing conditions that contribute to asthma. Program staff has also received training in safe pest control practices.

Systems and Policies

The program enforces the Massachusetts Housing Code, officially titled the State Sanitary Code Chapter II: Minimum Standards of Fitness for Human Habitation. Inspections are conducted by Boston ISD's Housing Inspection Division. This healthy homes program leverages an existing regulation and enforcement infrastructure and uses staff whose job responsibilities were broadened to focus on asthma triggers.

Funding and Leverage

The program is dependent on extensive leveraged resources from the Boston Inspectional Services Department. Financial support is also provided by the City of Boston, Boston Public Health Commission, which has secured grants to support the program pilot and supplement city funds for program coordinator support.

Evaluation and Outcomes

Evaluation includes:

- Focus groups with ISD inspectors for feedback and recommendations on program needs.
- Interviews with clients to capture satisfaction and information on environmental and health benefits of the program.
- Interviews with clinician referrers on utility and ease of the on-line system and program benefits.
- Program measures such as housing conditions cited, case resolution rates and timelines.
- Overall referral numbers and by referring institution and neighborhood.
- Health outcome evaluation in planning stage.

Sustainability

This program has been institutionalized within the ISD and the Boston Public Health Commission and uses the current housing code. It is not dependent on grant funding.

Best Practices

- Community-based organizations advocated for local efforts on housing issues that impact asthma management.
- Collaboration with the key housing agencies in the City of Boston resulted in a sustainable service systems and policy change.
- Strong relationships with health care institutions facilitated awareness of housing concerns and their impact on the patients' health.
- Building on existing infrastructure makes the program less dependent on external fundraising.

Appendix 1.5 Case Study
Case Western Reserve University School of Medicine
Swetland Center for Environmental Health
Healthy Homes and Babies Program (Cleveland, Ohio)

Program Overview

Purpose. The purpose of the program is to provide home health and injury hazard assessments and interventions to pregnant women, infants, and geriatric patients. The program also provides the opportunity for physicians-in-training to learn about housing-related health hazards by participating in the environmental assessments of their patients' homes.

Target Population. The target area included the City of Cleveland and its first-ring suburbs. The program targeted homes with young infants as a prevention measure and the elderly to support independent living and aging in place.

Partnerships. The Swetland Center for Environmental Health at Case Western Reserve University School of Medicine provided leadership for the program. Partners include the Departments of Pediatrics and Family Medicine and the Center for Geriatric Medicine at the University Hospital's Case Medical Center, Environmental Health Watch (EHW), a grassroots community-based nonprofit organization, Community Housing Solutions, a nonprofit affordable housing organization, and the Lead Programs of the Cleveland Department of Public Health and the Cuyahoga County Board of Health. The program provided follow-up referrals to weatherization, home repair lead hazard control grant programs as needed.

Community Involvement. Neighborhood Leadership Institute (NLI) organizes and manages a Community Advisory Board to bring community concerns and suggestions to the program. NLI offers a 14-week training program in partnership with Cleveland State University for community residents who wish to improve their grassroots advocacy and leadership skills.

Planning. This project evolved from existing partnerships related to lead poisoning prevention and healthy homes. As these partner organizations became more familiar with each other's strengths and service areas, they were able to identify a variety of program needs and resources. The long term partnership between Case Western Reserve University, EHW, and the city and county health departments was significant in gaining political support and funding. Demonstration programs and technical studies were used to pilot the assessments and interventions.

Interventions

Recruitment. Medical residents recruited their pregnant, infant, and elderly patients for participation in the project and accompanied the EHW inspector to their patients' homes for the assessment.

Interventions. The assessment included an occupant interview, visual assessment of paint condition, collection of dust and soil samples for lead analysis, tap water and refrigerator temperature measurements, observations of child/elderly fall and injury hazards, infant's sleep environment, and visual evidence of smoking, mold, roaches, rodents, dust mites, pets, pesticides, space heaters, faulty combustion appliances, and the presences of smoke and carbon monoxide (CO) detectors.

Four types of interventions were provided: (1) health and safety items; (2) low-level repairs/improvements; (3) referral to other programs for higher-level repairs or improvements; and (4) a written plan for behavioral changes that the family agreed to make. These plans were expected to be reinforced by the medical resident in future visits.

1. Health and safety items: A standard and a variable set of health and safety items were provided to the families, differing somewhat for the infants and elderly, and tailored to the specific needs found in the health-oriented home inspection. The standard items included allergen vacuum, fire extinguisher, smoke

and CO detectors, digital thermometer (mercury thermometers are removed from the household for proper disposal to eliminate breakage risk), door mats, and cleaning supplies. In addition, site specific items were provided, depending on the hazards found.

2. Low-level building interventions: Based on the inspection and the lead sampling results, EHW home environmental specialists conducted low-level building repairs, modifications, and hazard remediation. These were limited interventions that could be performed by EHW staff in rental properties without the owner's permission. The interventions included installation of safety items, environmental cleaning to reduce lead dust and other contaminants, moisture reduction measures, and integrated pest management (IPM).

3. Referral for building interventions: Based on the paint condition and lead dust sampling results, referrals were made to the City of Cleveland and Cuyahoga County Lead Hazard Control Programs. For other repairs and weatherization, referrals were made to Community Housing Solutions and weatherization program. EHW staff worked with the families and the landlords to establish eligibility and complete application forms. EHW's Affordable Green Housing Center has also developed a set of no cost/low-cost recommendations for electricity, gas, and water use reductions for low-income housing.

4. Education and behavioral change: During the inspection, families were educated about their role in reducing home health hazards. Medical residents reinforced these recommendations in the clinic setting.

Interventions for frail elderly clients focused primarily on fall prevention, IPM, lighting, and addressing deferred maintenance and clutter. Electrical repairs were one of the most frequent referrals due to the age of the housing and the medical equipment needs of the elderly clients.

Systems and Policies

The program developed referral networks with multiple health and housing programs in the community and facilitated the application process to assure comprehensive services to families and homes in need.

Funding and Leverage

Funding Sources. HUD Healthy Homes Demonstration grant funding was matched with in-kind support provided by Case Western Reserve University. As the program expanded, private funds were leveraged to partner with HouseCalls, a program designed to serve frail, home-bound seniors. The project received another HUD Healthy Home Demonstration grant to support a Healthy Homes and Patients.

Program Costs. Pediatric home inspections and interventions averaged $927 (ranging from $509 to $4197), and geriatric home inspections and interventions averaged $577 (ranging from $247 to $936). Visits for pediatric patients were more expensive in direct costs because additional health and safety items were required.

Sustainability

The program is being brought to the Greater Cleveland Asthma Coalition with the goal of obtaining Medicaid reimbursement for home visits as a cost-effective means to achieve the health benefits of prevention.

Project staff believes that the residency training component could be replicated in any community where a connection exists with an organization that provides home assessments and/or interventions.

Best Practices

- The inspector used a personal data assistant (PDA) to conduct the visual assessment. As technology has evolved, the program converted to an Access database and a tablet PC for data collection. The computerized assessment guided the inspection through each area of the house, documented building and behavioral conditions, explained the related hazard, provided drop-down alternatives to enter observations, and listed available corrective actions and who would perform the action (e.g., EHW, family, physician, owner), transforming the inspection process and assessment tool into

an educational opportunity for the medical resident and the family member. The action plan was computer-generated, based on the assessment data.

- An established relationship between the patient and doctor eased the process of scheduling home visits, resulting in a much lower rate of cancellations and "no shows."
- The program demonstrated that medical residents benefit from participating in home inspections of their patients. The doctors reported that the experience influenced their practice of medicine, resulting in a more focused environmental history-taking.

Appendix 1.6 Case Study
Children's Mercy Hospitals and Clinics
Clinic/Medical Partnership (Kansas City, Missouri)

Overview

Purpose. The purpose of the Children's Mercy Hospital Environmental Health Program (CMH-EHP) is to create healthy and sustainable indoor environments for children wherever they spend time. The program has four focus areas: patient-centered environmental health, health provider education and training, safe and healthy school and childcare programs, and community education and training programs. Through extensive collaborations with a wide variety of stakeholders the CMH-EHP is able to offer unique and comprehensive environmental health services that might impact families within the community through different community-based channels. Once concerns for a pediatric patient are identified, the CMH-EHP staff can offer multiple services and resources addressing exposure-related health issues in any setting where the patient spends time.

Target population. The CMH-EHP worked with asthmatic children two to 17 years old.

Partnerships. Program partners include Kansas City, MO Health Department Lead Poison Prevention Program; Kansas Department of Health and Environment's Healthy Homes and Lead Hazard Control Program; Metropolitan Energy Center; Wyandotte County, KS, Health Department; EPA's Indoor Environment, Environmental Justice , and Children's Health Protection Departments in Region 7; Mid-America Pediatric Environmental Health Specialty Unit (MAPEHSU); and 60 other community organizations. CMH-EHP is also a member of the Healthy Indoor Environments Coalition of the Heartland.

Interventions

Recruitment. Families may be referred by their private physician or through the entire hospital information system via an internal environmental consult process or by contacting the program staff directly. Families are asked to enroll in a four to six month healthy home program that involves from three to six visits. Some aspects of the program are research-related and require participation in an informed consent process.

Interventions.

- Depending on the severity of a patient's health condition families are offered one of two levels of participation; basic and advanced. In either case, home assessments are conducted to both educate families on healthy home best practices and to identify any issues about the home and its maintenance that represent a significant hazard or might be contributing to health problems of the occupants. Interventions are comprehensive but usually focused on controlling environmental irritants and allergens, including asthma triggers, sources of lead exposure, and safety and injury prevention. For patients with significant health issues, an advanced home environmental health assessment that includes environmental monitoring and sample collection is performed to more specifically identify sources of contaminants. This information is then used to identify targeted interventions to eliminate contaminant sources and exposure.
- All families who agree to participate in the program receive a healthy home kit that includes cleaning supplies, safety supplies and healthy home supplies including a HEPA vacuum, furnace filters, allergen bedding, a pocket hygrometer,
- For families receiving advanced home assessment services, a list of targeted interventions is developed and resources are identified to address the concerns identified. A case review takes where members agree to a list of interventions related to one of five healthy home domains; airflow and ventilation, allergens and dust, moisture control, chemical exposure and safety and injury prevention. Community partners oversee the intervention work and a follow up assessment is performed to verify that any contaminant sources have been removed and the family has begun the process of changing behavior to create a healthier home.

Program Staff. The project utilizes a program manager, an office coordinator, environmental hygienists and environmental health coordinators (e.g., respiratory therapists, health educators, advocates), and social workers. Environmental hygienists are trained in-house on environmental health, environmental assessment protocols, indoor environmental hazard measurements and sampling techniques, basic building science, and healthy homes and school practices. Training is supplemented through outside education opportunities. Environmental health coordinators are trained in environmental health, asthma, and safe and healthy home and school practices. They also serve as the primary educators in all settings. Some training is provided by outside sources.

Systems and Policies

Partial Medicaid reimbursement has been received for some home assessment service. CMH-EHP is currently working with a state-wide stakeholder group in Missouri to establish a policy for Medicaid reimbursement for all home environmental health assessment services.

A relationship between Missouri Legal Aid and the program staff enables advocacy for families on home environmental problems, code violations, lease disputes, or other issues that impede the families' ability to make changes in their homes.

The program is currently exploring expanding services through community partners to assist elderly adults with home environmental concerns.

Funding and Leverage

Funding Sources. Funding has been secured from HUD, EPA, MAPEHSU, corporate sponsors, and health insurance reimbursement.

School-based services are paid for through annual contracts with individual districts.

Because of the mission of Children's Mercy Hospitals and Clinics to serve the community and benefit all children, many services are in-kind or services fees are negotiated down to a level families indicate they can afford.

Program Costs.

- Basic home environmental health assessments include a visual assessment and healthy home education and case management: $100 to $300 per home.
- Advanced home environmental health assessments include a visual assessment, healthy home education and case management, Environmental Measurements and Sample collection and analysis: $500 to $800 per home, depending on the number of environmental samples collected, if any.

The program charges a fee for a home assessment. Attempts are made to obtain reimbursements from health insurance companies, including Medicaid and HMOs. In some cases, families pay for the service out of pocket, and in other cases, a family can negotiate the fee down to little or nothing.

Leveraged resources. The CMH-EHP partners with the two area lead hazard control programs, two local weatherization programs, small home repair programs, and some neighborhood associations to fund housing repairs. They are currently working with local Habitat for Humanity programs to develop volunteer efforts to benefit families in need of assistance with healthy home issues.

EPA funds are used for an Asthma-Friendly Child Care Program for home-based child care operations. This program supports assessments of home-based child care.

The CMH-EHP also receives financial support from private companies:

- Allergy Zone provides furnace filters and N95 masks to all families participating in the Healthy Home Program.
- Mission Allergy provides significant discounts on allergen encasement for mattresses and pillows.
- True Value hardware stores provide special pricing on healthy home supplies.
- Mar-Beck Appliance provides reconditioned HEPA vacuums at a special price for the Healthy Home Program.

Sustainability

School Partnership. CMH-EHP developed the School IEQ Program to provide training related to the indoor environment, asthma, and healthy schools to school district staff. This program also provides an environmental health assessment of school facilities. This effort led to two school districts signing contracts with the CMH-EHP to provide indoor environmental health management programs. To date, the School IEQ Program had assessed over 1400 classrooms.

Training Center. CMH-EHP established a Healthy Homes Training Center for Region VII through a partnership with the National Center for Healthy Housing, the Kansas City, MO, Health Department, and the Kansas Department of Health and Environment's Healthy Homes and Lead Hazard Control Program.

Center for Environmental Health. The program is in the process of converting from CMH-EHP into a Center for Environmental Health. The CMH-EHP addresses indoor environment issues in areas where children spend most of their time (e.g., schools, child care facilities, hospitals, and homes). The program offers training classes on indoor environmental health and asthma for physicians, clinicians, school nurses, home health staff, social workers, public health workers, child care providers, code enforcement inspectors, and families.

Best Practices

- Patchwork funding from a variety of sources including private donations.
- Comprehensive care coordination based on routine communication between environmental health coordinators, health care providers, school nurses, and families.
- A comprehensive, school-based program that focuses on the safety of the environment and classroom-based and hands-on healthy homes training. Staff receives regular training to keep their knowledge current.

Appendix 1.7 Case Study
Esperanza Community Housing Corporation
South Los Angeles Healthy Homes Program

Program Overview

Purpose. The purpose of this program was to prevent lead exposure in pregnant women and children under six years, reduce asthma triggers for families living in substandard housing without jeopardizing their tenancy, and create systemic changes in health and housing agencies by demonstrating that healthy housing is an important health intervention.

Target population. The program targeted low-income families in 13 census tracts in South Central Los Angeles with a particular focus on families with children under age six at high risk for lead poisoning and other consequences of substandard housing.

Partnerships. Esperanza Community Housing Corporation (Esperanza) collaborated with St. John's Well Child and Family Center (St. John's) and Strategic Actions for a Just Economy (SAJE) in leading this project. The Los Angeles Healthy Homes Collaborative, an association of community-based organizations committed to eliminating environmental threats in homes and communities spearheaded the code enforcement aspect of this project. Additional partners were the Los Angeles Community Action Network (LACAN), Inner City Law, Los Angeles Housing Department City Code Enforcement Program, and Eisner Pediatric & Family Medical Center.

Community Involvement. Esperanza was founded as a result of a four-year organizing effort by community residents in the Figueroa Corridor of South Central Los Angeles. Esperanza's project staff are a team of Promotoras de Salud (community health promoters) specializing in healthy homes interventions. They are community residents who are graduates of Esperanza's six-month intensive Community Health Promoters Training, followed by years of specialized training in lead dust sampling, lead-safe work practices, and Healthy Homes related protocols. The program was designed entirely with their input as they were from the community and knew first-hand the needs and housing conditions of the families in the neighborhood.

Interventions

Recruitment. Families were identified and recruited through:

- Referrals from the St. John's Well Child and Family Center;
- Tenant-organizing activities by SAJE; and
- Door-to-door outreach to other families living in the buildings visited by the Healthy Homes Team as a result of any referral.

Interventions. The program is a coordinated, tri-discipline approach involving: (1) community outreach, in-home environmental assessment, and education; (2) tenant rights and displacement prevention; and (3) progressive clinical monitoring of environmentally-caused illness and injury.

The housing interventions included an initial home visit, administration of the Health and Housing Survey, education and management of housing conditions, and monitoring of home environmental triggers. Lead dust samples, moisture meter readings, and cockroach sampling were conducted. Families participating fully in the data collection procedures received a Bucket Cleaning Kit. The kit contained a mop, gloves, baking soda, vinegar, two rags, and a spray bottle, as well as Healthy Homes and poison prevention material.

Program Staff. The project utilized a project manager and data analyst (both trained Promotoras), Esperanza executive director, finance director, and a team of Healthy Homes Promotoras, community organizers, tenant organizers at SAJE, clinicians, and a part-time evaluation consultant. Most of the Esperanza team were certified lead sampling technicians and had years of training in lead-safe work practices and integrated pest management.

Systems and Policies

Esperanza's work, as part of the Los Angeles Healthy Homes Collaborative, has resulted in important State Policy: the development and enactment of Senate Bill 460, put into law January 2002. This law empowers and mandates both local code enforcement agencies and local health departments to stop unsafe work practices and makes the disruption of lead hazards a violation of both housing code.

The South Los Angeles Healthy Homes Program has focused on housing as a highly significant determinant of health, documenting negative health impacts of substandard housing and positive impacts of quality, affordable housing. As a result of this partnership our clinical partners have adopted a "zero-tolerance" for blood lead policy that has resulted in systems of universal testing of all children and universal reporting of all results to the Healthy Homes program.

The partnership between the Los Angeles Healthy Homes Collaborative and the City's Systematic Code Enforcement Program (SCEP) has integrated healthy homes concerns into Los Angeles code enforcement activities. Community outreach workers, whether Promotoras or tenant organizers, work with the City Code Enforcement Inspectors to make their work more impactful, correctly focused on an expanded menu of housing code violations, and specifically beneficial (rather than threatening) to the tenants.

Funding and Leverage

Funding Sources. HUD and in-kind services from project partners.

Leveraged Resources. Leveraged financial support for the project totaled $1,500,000 for the three principal partners combined. St. John's Well Child and Family Center also received a 2009 Everychild Foundation Grant to continue the work of the collaborative. Both SAJE and Esperanza received funding from the California Endowment and California Wellness Foundation.

Housing units were also referred to the City of Los Angeles' Lead Hazard Remediation Program.

Evaluation and Outcomes

Data Management. Significant emphasis was placed on data clean-up and quality in data entry. The Project Manager regularly supervised the data clean-up and provided follow-up training to staff as needed. The Project Manager also made quality assurance calls and visits to households following Promotoras' home visits to ensure that project protocols were properly adhered to.

Health and Housing Outcomes. Participant awareness of lead hazards increased significantly as a result of this initiative. At baseline, 30 percent were aware that chipping and peeling paint can cause lead poisoning. At the time of the follow-up survey, this number increased to 75 percent; by the time of the final survey, it had reached 94 percent.

Records kept by St. John's on 550 asthma patients who are receiving intensive case management services revealed the following results:

- 80 percent reduction in the percentage of clients visiting the ER due to asthma.
- 67 percent reduction in the percentage of clients hospitalized due to asthma.
- 65 percent reduction in the percentage of clients visiting the clinic/doctor due to an asthma attack.
- 55 percent reduction in the number of school days missed because of asthma.
- 69 percent reduction in the percentage of children missing one or more days of school due to asthma.
- 100 percent of clients have had a routine asthma visit.
- 100 percent of clients have a written asthma action plan.
- 100 percent of working caregivers report reduction in the number of missed work days per month due to asthma (one or more missed work days).
- 68 percent of clients report daytime symptoms two days or fewer per month.
- 76 percent of clients report nighttime symptoms two days or fewer per month.

- 73 percent of clients with persistent asthma symptoms taking controller medication.
- 47 percent reduction in treatments for vermin bites, cockroaches, and environmentally-associated skin conditions.
- At the initial visit, more than half of the participants reported having cockroaches; by the final visit, only 14 percent reported having roaches.

Sustainability

- Advocacy is impacting policy change and enforcement of City housing codes.
- The health and human rights model championed by the South Los Angeles Healthy Homes Program is a key sustainability framework; the concept that having access to good housing and healthcare is a fundamental right and not merely a privilege. This framework is currently gaining traction in South Los Angeles, and influence in Los Angeles County.

Best Practices

- The use of Promotoras (representatives of the target community) in recruitment and enrollment, outreach, tenant education, and home visits. Promotoras served as the bridge for other health and housing agencies to gain entry to the home, such as the housing inspectors. The Promotoras' involvement encouraged trust among community and organizations.
- Developed a team trained in both healthy homes protocols and comprehensive community health, such as domestic violence and tenants' rights; cultivating relationships between local families and a cadre of community health leaders that helps build a stable community.
- Linked tenant environmental health education with referrals to tenants' rights clinics and protections to prevent displacement.
- The "Medical Evidence Form" developed under our partnership allowed physicians to note environmentally-driven conditions that children manifest in clinical visits, such as elevated blood lead levels, vermin bites, rashes, and upper respiratory distress. The completed form triggers a visit to the home by health Promotoras who report back to the physician about the status of remediation for some of the housing conditions. The physician may send a letter to the landlord stating the effect of the housing conditions, considered code enforcement violations, on the health of the child and recommendations for remediation practices. This letter is only sent if there is an established relationship between the families and the tenant organizers to limit threats of eviction of tenants.

Appendix 1.8 Case Study
Public Health—Seattle and King County
Evolution of a Healthy Homes Program

Program Overview

Better Homes for Asthma and Breathe Easy Homes represent later stages in the evolution of multiple initiatives conducted in Seattle/ King County. All of these projects addressed housing conditions of low-income children with diagnosed asthma. The first two NIEHS grants focused on the development of protocols for visual assessments and behavioral interventions conducted by Community Health Workers (CHW). The later Healthy Homes Projects received HUD funding and included renovations to the homes.

First Stage. The first study, a randomized controlled trial, compared two interventions:

1. Low intensity intervention: Consisting of a single home visit by a trained CHW, a home environmental assessment, preparation of a behavioral action plan for the household with priority actions jointly developed between a family member and the CHW, limited education on asthma triggers, and distribution of bedding encasements. This control group was offered the full range of high intensity services one year after the baseline visit.

2. High intensity intervention: Consisting of four to eight additional visits by the CHW after the baseline visit over the course of a year, an environmental assessment and action plan, distribution of a more comprehensive package of asthma-trigger supplies (allergy-control mattress and pillow covers, low-emission vacuums, door mats, cleaning kits, roach baits, rodent traps), referrals to smoking cessation clinics, free allergen skin-prick tests, and assistance with pest eradication and advocacy for improved housing conditions.

The study demonstrated that both groups benefited from the home visit experience, but that substantially greater improvements in caregiver quality of life scores and reductions in use of urgent care services were associated with the high-intensity intervention. The researchers attributed much of this success to the use of CHW who resided in the same community as the families, the ability to individualize the training and interventions to the families' needs, and the provision of resources to address the asthma triggers.

Second Stage. A second randomized controlled study compared the effect of asthma management education (that included both medical and environmental aspects of self-management) and support provided by trained nurses in a clinic situation compared to in-home education and support by a nurse in combination with a CHW who made home visits. While both conditions led to improvements in many measures, the families served in their home CHW showed greater levels of improvement on a number of measures, with statistically significant improvements in behavioral changes, symptom-free days and caregiver quality of life.

Third Stage. Public Health Seattle and King County's Better Homes for Asthma grant was designed to combine the CHW home visits of the earlier projects with remediation of structural conditions in the rental properties where the families with asthmatic children lived and test the marginal benefit of the renovation. The earlier studies showed that some of the environmental conditions identified as high-priority items in the family action plans were outside the family's control, such as the temperature of hot water, the ability to remove carpets, mold that could not be controlled through cleaning alone, and roach infestation in multi-family apartment buildings.

This project intended to address those structural conditions in properties owned by the Seattle Housing Authority and private landlords and to determine whether there were additional benefits beyond the Community Health Worker one-year intervention. Due to the complexities of the human subjects application and contracting for renovations, this project was not completed.

Fourth Stage. The Seattle Breathe Easy Homes project was the next effort to address

childhood asthma triggers through structural intervention and in-home education and asthma management plans provided by CHW educators. Thirty-five (35) new units in the Seattle Housing Authority's High Point HOPE VI redevelopment community were constructed as Breathe Easy units. In addition to meeting the Seattle BuildGreen design criteria, these units also included enhancements to the exterior envelope, foundation, interior finishing, flooring, and the ventilation system to reduce moisture infiltration and mold growth, provide smooth and easy-to-clean floors, reduce out-gassing of building materials, increase fresh air exchange, and reduce allergy triggers related to landscaping.

BREATHE EASY HOMES

Program purpose: To provide new, affordable housing for low-income children with asthma and to assess whether this new housing provided more health benefits than achieved through the intensive CHW education and behavioral change program.

Target population: The target population was the High Point HOPE VI development in West Seattle. Families with children aged 3–17 with health-care provider diagnosis of persistent asthma, who agreed to meet all required criteria for documenting low-income status for residents of public housing, passed credit and background checks, and agreed to meet the lease requirements for living in the asthma-friendly units. The project had originally intended to limit enrollment to families that had lived in the High Point development before rehabilitation, but found that some residents chose not to return after relocation so recruitment was opened to others with asthma who qualified for subsidized housing.

Partnerships, agencies, coalitions, and community organizations: Public Health Seattle and King County (PHSKC), Simon-Fraser University, King County Asthma Forum, Seattle Housing Authority (SHA), and Enterprise Community Partners (for a later phase of the project to build an additional 25 Breathe Easy units).

How was the community involved in decision making, implementation, and evaluation?

A community activist and resident of the High Point community raised the possibility of building asthma-friendly units during early discussions of the HOPE VI redesign. A community advisory board was active throughout the project.

Interventions

How were homes and families identified, recruited, and retained? The composition of the surrounding neighborhood changed from the time that the HOPE VI reconstruction was first discussed. At the time of recruitment, the majority of neighborhood residents did not speak English as their first language. Recruitment of the families was achieved through referrals from clinics, hospitals, physicians, community-based organizations, flyers, and word-of-mouth.

In order to be eligible for housing in the Breathe Easy units, the families had to agree to work with the program for one year before placement. Using the CHW model developed in previous projects, at baseline a CHW and translator conducted a visual assessment, collected dust samples from the child's bedroom, and provided bedding covers and education. Subsequent home visits reinforced the educational and behavioral management plan.

Education and/or housing interventions: In addition to meeting the Seattle BuildGreen design criteria for all units in the High Point development, these units also included enhancements to the exterior envelope, foundation, interior finishing, flooring, and ventilation system to reduce moisture infiltration and mold growth, provided smooth and easy-to-clean floors, reduced out-gassing of building materials, increased fresh air exchange, and reduced allergy triggers related to landscaping.

Systems and Policies

What policies, regulations, or government service systems supported or impeded the program's effectiveness?

Although new CHW needed to be hired and trained, the process worked efficiently. The program also had experience working with non-English speaking families and had translated

educational materials available. Healthy Homes I and II projects also prepared the project staff for unique cultural practices that might impact asthma (such as use of incense) and strategies to redirect those behaviors in culturally acceptable ways.

The High Point community had an active citizen base that was actively engaged in the "green" housing design process.

Funding and Leverage

Sources of funding: Healthy Homes Grant for enhancements, Hope VI for basic housing costs.

Leveraged resources: Additional Enterprise Community Partners funding for 25 units.

Evaluation and Outcomes

How were program services monitored and evaluated? The project used a pre-post with historical comparison group evaluation design. Clinical evaluation included a detailed assessment of asthma severity, medication and health services use, administration of the Juniper scale quality of life measurement, skin test sensitization, and a methacholine challenge.

This latter physiologic test is considered the most effective test for pulmonary function, airway sensitivity and a measure of the child's current asthma activity. These evaluation measures were made at the beginning of the one-year CHW intervention in the old home. Additional data was collected after one year of working with the CHW in the old home, after participants moved to their new home, and after one year in the new home (three separate time points). This enabled a pre-post comparison between the established CHW intervention in the old home and the impact of the new home on the same asthma endpoints described in previous studies with the addition of the very sensitive methacholine challenge test.

The study showed:

- BEH residents' asthma-symptom–free days increased from a mean of 8.6 per 2 weeks in their old home to 12.4 after one year in the BEH.
- The proportion of BEH residents with an urgent asthma-related clinical visit in the previous three months decreased from 62 percent to 21 percent.
- BEH caretakers' quality of life increased significantly.
- The BEH group improved more than did the comparison group, but most differences in improvements were not statistically significant.
- Exposures to mold, rodents, and moisture were reduced significantly in BEHs.

Best Practices Across All Programs

- Multiple asthma triggers need to be addressed for sustained health benefits. The studies continued to demonstrate the value of a comprehensive assessment and repairs tailored to observed asthma triggers, as opposed to a "one size fits all" approach.
- Homes specifically designed to reduce asthma triggers may add additional benefit than those obtained through CHW interventions alone and may be particularly desirable for clients who will have difficulties implementing the behavioral changes required in other interventions. More research is needed to understand the impact and role of asthma-friendly homes.
- Use of CHW and the need for systematic training: The CHWs served as role models to the community. They have proved effective in connecting with participants and gaining their trust. They helped families change behaviors, secure resources and ultimately improve control of their children's asthma. CHWs also acquired marketable skills that are sustainable and transferable to other employment situations, such as client counseling. The program has continued to use and value the CHWs, as they were accepted and trusted by the community.
- Multiple CHW visits were important to facilitating residents' behavioral change. Currently, the program recommends one intake visit, three follow-up visits and optional fourth and fifth visits if needed.
- Caregivers need resources and incentives to maintain a home-based asthma trigger reduction program. Distributing cleaning

and other materials at baseline increased credibility of the project with the residents.

- The need for continuous quality improvement: A staff retreat, including all the CHW, was held to identify lessons learned and strategies to overcome obstacles for future projects.
- Home-visiting programs need sustainable sources of funding to assure continuity of services.

Appendix 1.9 Case Study
Cincinnati Children's Hospital Medical Center
Injury Prevention Program Model

Program Overview

Purpose. The purpose of this program was to reduce exposure to injury hazards in the homes of young children from birth through four years of age. This project developed and validated the Home Observations and Measures of the Environment (HOME) Injury Survey that identifies and remediates injury hazards for young children in the home. This project also tested an intervention in which injury hazards in homes were minimized through installation of multiple safety devices.

Target population. Homes of children less than five years of age, living in pre-1978 homes within a five-county study surrounding the City of Cincinnati, Ohio.

Partnerships. Cincinnati Children's Hospital Medical Center, Center for Children's Environmental Health, University of Cincinnati Department of Pediatrics, National Institute for Environmental Health and Safety (NIEHS), U.S. Department of Housing and Urban Development (HUD, U.S. Environmental Protection Agency (EPA), National Center for Injury Prevention and Control (NCIPC) at the U.S. Centers for Disease Control and Prevention (CDC), and National Institute for Child Health and Development (NICHD).

Planning. The HOME Injury Survey was developed by analyzing the leading residential mechanisms for emergency visits, hospitalizations and deaths for U.S. children and reviewing surveys used in other studies.

Interventions

Recruitment. Expectant mothers visiting any of five participating obstetrical practices for prenatal care were screened for potential eligibility. Expectant mothers had to be at least 18 years of age, less than 19 weeks gestation, living in pre-1978 homes within the five-county study area encompassing the City of Cincinnati and not living in public housing, shelters, group homes, or trailer homes. Invitational letters were sent out to potential eligible mothers.

Interventions. Households enrolled, consented, and randomized to the intervention portion of the injury hazard control project underwent a comprehensive, standardized, and validated survey of all living spaces of the home, including stairways, finished basements, and attics (the IPV). Hazard counts and densities (i.e., number of hazards per area) were developed comprehensively for the indoor environment and by high exposure rooms (i.e., kitchen, main activity room, stairways, child's bedroom, and bathroom).

Surveys and interventions were directed primarily at areas below one meter in height (i.e., 39 inches and the 75th percentile in height for a three-year-old male). The recommended interventions were reviewed with the mother who had the option of choosing in rank order from the most passive and durable safety device to the least passive and non-durable (e.g., a self-closing and locking stair gate bolted to a wall as compared to a pressure-mounted stair gate).

Trained research assistants then installed all consumer safety devices suggested to and agreed upon by the enrolled mother (and landlord when the home was rented). Recommended devices not installed were noted and tabulated in the counts of hazards and hazard density during follow-up surveys.

Program Staff. Program staff included intervention technicians, home survey assistants, and phone survey assistants. They worked as teams. Staff was trained on the study protocols and survey forms and how to recognize child neglect and abuse.

Funding and Leverage

Funding Sources. National Institute of Child Health and Development (NICHD, National Institute of Environmental Health Sciences) and the U.S. Environmental Protection Agency.

Program Costs. The intervention cost, on average, was $700–$800 per home:

- $300–$350 per home for consumer safety products.
- Two to three hours to install the consumer safety products properly, averaging $300–$400 in labor costs per home.

Evaluation and Outcomes

This was the first trial of home safety to demonstrate both a reduction in injury hazards and subsequent, medically attended injury in enrolled children randomized to an intervention. The HOME Injury Survey correlated with reported risk factors for childhood injury (i.e., externally valid), including maternal depressive symptoms, household income, and maternal age. Four high-risk, high-exposure rooms (i.e., kitchen, main activity room, child's bathroom, and child's bedroom) identified by parents in previous reports were shown to be representative of similar injury hazards found throughout the entire household.

The primary outcomes for the study were a reduction in medically attended (i.e., office, clinic, or emergency visits) injuries for children from birth through three years of age in the intervention group as compared to the control group.

Maternal reports of injury events, phone calls, office visits, and emergency visits for residential injuries in their child were outcomes assessed in the first 24 months of the trial. The primary outcome measure for this analysis was an emergency visit for a residential injury. Maternal reports of emergency visits were verified by checking medical records using a countywide injury surveillance system.

HOME Injury Surveys were also conducted in homes of families randomized to the lead abatement portion of the trial at baseline, and annually throughout the four-year study period. Injury hazards were similar at baseline but did not change in this control group, and injury rates were significantly higher for preventable, medically attended mechanisms in the lead intervention group. Although lead intervention group children had geometric mean blood leads that were not different from control group children, they had better scores on cognitive and motor development as compared to control children.

The density of unintentional injury-related hazards (i.e., number of hazards per area) was found to be a more reliable and valid measure of childhood residential hazards than the total number of hazards.

Sustainability

The HOME Injury Survey, a 55-item tool to quantify unintentional injury hazards in the indoor environment of homes with young children, was identified as reliable, valid, and reproducible between different users and over time.

Best Practices

- Tailored interventions were developed (e.g., consumer safety product installation) based on family needs and hazards identified during the HOME Injury Survey.
- For replication purposes, it was found that complete and comprehensive installation of consumer safety products or built-in safety devices and mechanisms is more effective than education or provision of free or reduced-cost safety devices.

Appendix 1.10 Case Study
Philadelphia Department of Public Health
Healthy Homes Child Care Program

Program Overview

Purpose. The objective of the Healthy Homes Child Care Program (HHCC) was to educate home-based child care providers about environmental health and safety issues in their homes and remediate lead-based paint and safety hazards.

Target population. Licensed child care providers in the City of Philadelphia in 18 zip codes. The project selected the geographic targets based on the large numbers of children with elevated blood lead levels, children with emergency room visits for asthma, and licensed family child care providers located in those areas.

Partnerships. Key agencies included the Philadelphia Department of Public Health's (PDPH) Childhood Lead Poisoning Prevention Program (CLPPP), National Nursing Centers Consortium (NNCC), Philadelphia Early Childhood Collaborative (PECC), the State of Pennsylvania Keystone Stars Initiative, Drexel University's School of Public Health, Environmental Protection Agency's Agency for Toxic Substances and Disease Registry (ASTDR), YMCA of Philadelphia, University of Pennsylvania Center for Community Partnerships, Nonprofit Finance Fund (NFF), AmeriCorps, Penn State Integrated Pest Management, Delaware Valley Association for the Education of Young Children, and Pest-Free Maintenance.

Community Involvement. The following agencies provided ongoing support and served as members of the project's advisory board: Public Citizens for Children and Youth, United Communities of Southeast Philadelphia, the Philadelphia Fire Department, the American Red Cross, Easter Seals of Philadelphia County, the PA Department of Public Welfare, Philadelphia Department of Licenses and Inspections, the City of Philadelphia, National Center for Healthy Housing (NCHH), and Enterprise Community Partners (ECP).

Planning. In preparation for a grant application, members of the advisory board met to determine target activities and define eligibility for services. A variety of child care regulatory and licensing agencies also participated in the planning process.

The PDPH mapped lead poisoning, asthma and injury rates, income levels, locations of home-based child care providers, and other factors to determine optimal neighborhoods for services. It took one year to establish all policies, procedures, and interagency agreements.

Interventions

Recruitment. Child care providers were recruited through partner agency referrals, including Keystone Stars child care quality improvement program. HHCC staff utilized the list of certified child care providers located in the 18 zip code target area. These providers received an invitation to attend an orientation meeting at a location in their community.

HHCC accepted individual providers on the basis of location, income-eligibility for HUD funding, and enrollment in the Keystone Stars program. Individual providers were enrolled on a "first come, first served" basis. If they had a child with an elevated blood lead level, asthma, or allergies in their care, they received a higher priority when interventions were scheduled.

Interventions. Child care providers attended Healthy Homes Orientation meetings at the start of the project to educate them about the "Seven Principles of Healthy Homes" and enroll them into the program. Additional workshops on topics such as infant and child first aid and CPR, emergency preparedness and "greening" your home-based day care were also provided.

The initiative involves (1) child care facility risk assessment, (2) tailored interventions, and (3) hazard remediation. Trained staff visited licensed home-based child care businesses and completed a comprehensive assessment in 150, tested for the presence of lead, and documented pest problems, asthma triggers,

food safety, as well as fire and carbon monoxide hazards. The assessment determined the remediations required for each unit, from the following options:

- Safety Interventions: Railings, gates at the top and foot of stairs, repairs of stair treads and risers, gun locks, secure cubbies to walls, secure loose bathroom sinks and toilets, fencing and gates, hallway lighting, electrical outlets, baseboard repairs, rubber matting on exterior surfaces where children play, first aid kits, and smoke detectors.
- Respiratory Interventions: Exhaust fans, bathroom ventilation/air purifiers, carpet removed and replaced with tile, air conditioners, stove hoods and fans, and pest control.
- Energy interventions: Awning repair, roof cornice replacement, new stack pipes, weather stripping, ceiling and wall repairs, door replacement/repair, and new stoves.
- Lead hazard control interventions: Paint stabilization, window replacement, door replacement, and smooth and cleanable flooring.

The PDPH Lead Abatement Services Supervisor used the combined results of the health and safety and lead risk assessment to prioritize repairs up to an established program funding cap. Eighty-five (85) homes were remediated.

All participants received a HHCC "Cleaning Bucket." The Bucket included a variety of household cleaning supplies, such as non-toxic furniture polish and window and surface cleaners, rubber gloves, sponges, smoke detectors, water temperature gauge, and written information materials. Participants were instructed on cleaning methods to keep their home free of lead dust and allergens.

Program Staff. Key staff members included the Project Manager, the Health and Safety Coordinator, the Environmental Health Services Risk Assessor, and the CLPPP Lead Abatement Supervisor. All staff attended lead risk assessor, "Essentials for Healthy Homes Practitioners," and lead clearance technician training courses.

Systems and Policies

The project integrated established procedures used in several projects, including the Philadelphia Lead Hazard Control Grant, the Philadelphia Healthy Homes/Home Safe Grant, the Lead-Safe Babies program, and the Home-Based Child Care Lead Safety Program.

Funding and Leverage

Funding Sources. HUD Office of Healthy Homes and Lead Hazard Control Healthy Homes Demonstration Grant and Lead Hazard Control Grants, and in-kind contributions from partner agencies.

Leveraged resources.

- The Nonprofit Finance Fund provided $150,000 for safety-related repairs.
- The YMCA supplied furnishings to the lead-safe relocation site.

Evaluation and Outcomes

The program administered a questionnaire to child care providers during the enrollment process and found:

- 67 (79 percent) had no safety gates at either the bottom or top of staircases to prevent child access to stairs;
- 53 (62 percent) had unsecured tall or heavy furniture;
- 47 (55 percent) had toxic cleaning supplies not in a secure location;
- 44 (52 percent) lacked a carbon monoxide monitor;
- 43 (51 percent) had non-intact painted surfaces; and
- 30 (32 percent) reported they did not test their smoke detectors regularly.

Sustainability

- Partnerships between CLPPP, PECC, NNCC, YMCA, NCHH, PA Keystone Stars, and Delaware Valley Association of the Education of Young Children.
- This project demonstrated and developed a model for a home-based child care health and safety program that can be replicated in other jurisdictions.

Best Practices

- The rules of three regulatory agencies with the Childcare Environmental Rating Standards were combined to form the HHCC's EHS Assessment Instruments, Weighted Hazard Scoring and Decision Protocol, and project evaluation tools.

Appendix 2.1
Potential Stakeholders and Their Assets

Type of Organization	Strengths and Assets	Examples
Anti-crime/block clubs; civic and neighborhood associations	• Knowledge of the territory • Available nights and weekends • Trust of the residents • Understanding of community concerns • Ability to generate crowds/participation at large events • Institutional memory • Relationship with local government as constituents • Experienced as advocates	• Esperanza Community Housing Corporation, Los Angeles, CA • King County, WA—High Point Community
Existing coalitions and task forces (health, housing, or Issue-focused)	• Shared interests • Organizational structure and processes for decision-making • Possible source of data, meeting space, personnel, funding • Understanding of community concerns • Institutional memory • Relationship with local government as constituents • Experienced as advocates • Policy development and advocacy skills • Interagency referral networks	• Los Angeles Healthy Homes Collaborative • Indoor Air Coalition of Whatcom County, WA • Coalition to End Childhood Lead Poisoning, Baltimore, MD • King County, WA Asthma Forum • Healthy Indoor Environment Coalition, Kansas City, MO • Asthma Regional Council, Boston, MA • Boston Urban Asthma Coalition, Boston, MA • Robert Wood Johnson Funded Allies Against Asthma Coalitions
Local health departments or regulatory agencies	• Leadership • Ability to bring together multiple groups • Access to other government resources • Access to elected officials • Funding • Ability to enforce health and housing codes • Source of meeting space, data, policies and procedures, staff, speakers • Institutional memory • Jurisdiction and legal enforcement tools • Access to public officials and the media • Ability to dedicate resources and link to existing healthy homes programs and service systems	• City of Los Angeles Code Enforcement • Northwest Air Pollution Authority • Philadelphia Department of Public Health Childhood Lead Poisoning Prevention Program • Cleveland Department of Public Health and Cuyahoga County Board of Health Childhood Lead Poisoning Prevention Programs • Public Health Seattle King County • Baltimore City Department of Health Childhood Lead Poisoning Prevention Program, Baltimore City Healthy Homes Division, Baltimore City Health Homes Asthma Program, Baltimore City Maternal and Child Health Safe Sleep Initiative • Kansas City Health Department, Kansas Department of Health and Environment Healthy Home and Lead Hazard Control Program • Boston Public Health Commission, Division of Healthy Homes and Community Supports

Type of Organization	Strengths and Assets	Examples
Parents' groups (school-based or support groups associated with specific health condition)	• Ability to "put a face" on the problem • Passion • Ability to generate crowds or participation at large events • Direct experience with local conditions/ services • Constituents of public officials and service agencies • Meeting space, volunteers	• Boston Urban Asthma Coalition Parent Asthma Leaders
Local health, housing, or social service providers Grassroots organizations and community-based and non-governmental organizations. Community Action Agencies	• May be able to expand service delivery to address Healthy Homes concerns • Institutional memory • Subject matter expert • Likely to be trusted in community • Access to public officials and the media • Ability to leverage resources, programs and service systems • Many are weatherization assistance program subgrantees	• Esperanza Community Housing Corporation, Los Angeles, CA • YMCA of Philadelphia and Vicinity • Opportunity Council, Bellingham, WA weatherization program • Environmental Health Watch, Cincinnati, OH • Community Housing Solutions • Seattle Housing Authority • Boston Housing Authority
Police, fire, and EMS services	• Knowledge of the territory • Present in target areas on nights and weekends • May or may not understand community concerns • Source of data, educational materials, speakers	• City of Philadelphia Fire Department • Baltimore City Fire Department
Public officials, Political action organizations (parties, advocacy groups)	• Constituents • Advocacy and policy skills • Data • Decision-making power	• Philadelphia Citizens for Children and Youth • Los Angeles City Council
Academic/ universities	• Grant funding, staff (students and faculty), meeting space • Subject matter expertise (housing construction, engineering, architecture, public health, public policy, law, medicine and nursing, nutrition, social work, counseling, education, media and marketing, management, finance) • Skills in program design, data analysis, evaluation, mapping (usually have more sophisticated IT capabilities) • Translator services	• Case Western Reserve, Schools of Medicine and Public Health, Cleveland, OH • Drexel University, School of Public Health, Philadelphia, PA • University of Pennsylvania, Center for Community Partnerships • University of Washington • Harvard School of Public Health • Tulane University School of Public Health • Tufts Medical School • Boston University School of Public Health

Type of Organization	Strengths and Assets	Examples
Organizations that represent or work with at-risk or vulnerable populations	• Trust of the residents • Ability to generate crowds or participation at large events • Ability to "put a face" on the problem • Passion • Knowledge of local conditions/services • Translator services (both language and the ability to describe experiences in terms that policy-makers understand) • Constituents • Advocacy and policy skills	• Esperanza Community Housing Corporation, Los Angeles, CA • Strategic Actions for a Just Economy, Los Angeles, CA • Neighborhood Leadership Institute, Cleveland, OH • Youth Build • AmeriCorps • Missouri Legal Aid
Health care providers, clinics, hospitals, health care insurance	• Trust of the residents • Knowledge of local conditions • Data, staff, and funding resources	• St. Johns' Well Family and Child Center; Eisner Pediatric Center, Los Angeles, CA • Case Western Reserve University School of Medicine, Swetland Center for Environmental Health, Departments of Pediatrics and Family Medicine, and Center for Geriatric Medicine, Cleveland, OH • National Nursing Centers Consortium, Philadelphia, PA • Cincinnati Children's Hospital Medical Center • University of Cincinnati Dept. of Pediatrics • Children's Mercy Family Health Partners, Kansas City, MO • Pediatric Environmental Health Specialty Unit
Child Care providers, resource and referral agencies, early childhood education	• Required to meet standards for safe and sanitary facilities • Access to target population • Located in the target area	• Philadelphia Early Childhood Collaborative • State of Pennsylvania Keystone Stars • Head Start • Children's Environmental Heath Network
Property owners	• Required to comply with health and building codes • Leveraged funding for housing repairs	
Realtors, landlord associations	• Access to rental property owners • Ability to mobilize around public policy	
Contractors	• Training and certification for lead hazard control	• Integrated Pest Management, Inc., Philadelphia, PA

Type of Organization	Strengths and Assets	Examples
Tenants' rights organizations	• Ability to organize to implement housing programs and advance public policy • Access to the target population • Familiar with housing issues in geographic target area • Provide legal representation to tenants involved in landlord issues	• Esperanza Community Housing Corporation—Strategic Actions for a Just Economy (SAJE) • Children's Mercy Hospital—Missouri Legal Aid
Media (TV, radio, specialized media)	• Ability to raise awareness of healthy homes issues • Advertise program services for recruitment purposes	• 2010 National Ad Council Campaign • Tulane University's New Orleans Healthy Homes Technical Study
Foundations and philanthropic organizations	• Provide funding • Provide technical assistance in program design • Serve as program partner • Link to other community services	• Nonprofit Finance Fund, Philadelphia, PA • W.K. Kellogg Foundation • Annie E. Casey Foundation • Robert Wood Johnson Foundation
Chambers of Commerce/ local financial institutions	• Identify program partners • Private sector funding for healthy homes initiatives	• Metropolitan Energy Center, Kansas City, MO

Appendix 2.2
Data Available from Different Sources

Types of Data	National Data	State-Level Data	Local Data	Neighborhood-Level Data
Demographic	• U.S. Census: http://www.census.gov/. Decennial census data can be downloaded by county, Congressional and legislative district, zip code, or census track/block. Quick Facts will compare localities to the state and national values for the indicators. • U.S. Census also administers the more frequent American Community Survey, which estimates population, economic, and housing indicators by county subdivisions, Metropolitan Statistical Areas (SMAs), Congressional districts, and other factors between decennial censuses. These estimates are derived from surveys of households in geographic areas with 20,000 or more inhabitants. The most recent data are from 2005–2007 surveys.	• State Offices of Planning often track population changes on key economic and demographic features. State offices of Planning also have extensive Geographic Information System (GIS) capabilities.	• City and county plans for comprehensive development, zoning, and sustainability often contain demographic projections for neighborhoods, as well as projections for services. The larger communities will have GIS capabilities. • Local universities, especially departments of public health or sociology may have the ability to generate this data.	• Windshield (or drive-by) surveys are quick methods to identify areas where services are delivered and the characteristics of the population who use them at different times of the day. • Community meetings and focus groups can service as vehicles to identify groups in need of services. • Interviews with key informants from the community.
Health Status, Health Care Consumption, Quality of Life	• Healthy People 2010: http://www.healthypeople.gov/. Environmental Health Mid-course review: http://www.healthypeople.gov/data/midcourse/html/focusareas/FA08TOC.htm. Injury and Violence Mid-course review: http://www.healthypeople.gov/data/midcourse/html/focusareas/FA15TOC.htm. Respiratory Disease Mid-course review: http://www.healthypeople.gov/data/midcourse/pdf/FA24.pdf. Access to Quality Health Care Services Mid-Course review: http://www.healthypeople.gov/data/midcourse/html/focusareas/FA01TOC.htm.	• State Healthy People 2010 plans: http://www.healthypeople.gov/Implementation/stateplans.htm. • U.S. Centers for Disease Control and Prevention, National Environmental Public Health Tracking Network: http://ephtracking.cdc.gov/showStateTracking.action. • National Survey of Children's Health, 2007 State Profiles Pages: http://www.nschdata.org/Content/States.aspx?rid=5. The 2007 survey contains data on neighborhood safety and family mental health ratings.	• Local health department annual reports. • National Association of Counties, Healthy Counties Database identifies strategies used in other locations to address obesity, nutrition, and housing: http://www.naco.org/Template.cfm?Section=New_Technical_Assistance&Template=/cffiles/healthycounties/search.cfm.	• Community surveys can assess perception of community needs and knowledge of health behaviors. These can be administered by neighborhood associations to their members, or at community events, such as health fairs. Models for these surveys can be found at (1) Enterprise Community Partners: Step- by-Step Tutorials: http://www.enterprisecommunity.org/resources/tutorials/resident_services/design_process.asp;

Types of Data	National Data	State-Level Data	Local Data	Neighborhood-Level Data
	• Healthy People 2020: http://www.healthypeople.gov/2020/about/default.aspx • America's Children: Key National Indicators of Well-Being, 2009: http://www.childstats.gov/americaschildren/index.asp. • U.S. Centers for Disease Control and Prevention, National Health Information Survey (NHIS): http://www.cdc.gov/nchs/nhis.htm. • U.S. Centers for Disease Control and Prevention U.S. Department of Health and Human Services, National Health and Nutrition Examination Survey (NHANES): http://www.cdc.gov/nchs/nhanes/nhanes_products.htm. • U.S. Centers for Disease Control and Prevention, National Health Care Surveys (NHCS): http://www.cdc.gov/nchs/nhcs.htm. • U.S. Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System: http://www.cdc.gov/brfss/. • National Health Statistics Reports provide national summary data from a variety of health-related surveys, including NHIS, NHANES, and BRFSS: http://www.cdc.gov/nchs/products/nhsr.htm. • U.S. Centers for Disease Control and Prevention, Injury Prevention and Control: Data and Statistics (WISQARS™) provides a web-based injury statistics query and reporting system http://www.cdc.gov/injury/wisqars/index.html • U.S. Environmental Protection Agency, America's Children and the Environment. http://www.epa.gov/envirohealth/children/.	• BRFSS Selected Metropolitan/Micropolitan Area Risk Trends (SMART): http://apps.nccd.cdc.gov/BRFSS-SMART/. • Healthy States webpage from the Council of State Governments: http://www.healthystates.csg.org/. • Agency for Health Care Research and Quality—Health Care, Cost, and Utilization Project: http://www.ahrq.gov/data/hcup/; state in-patient and ambulatory care data and 2008 State Snapshots http://statesnapshots.ahrq.gov/snaps08/index.jsp?menuId=1&state=NY. • Robert Wood Johnson Foundation, Commission to Build a Healthier America, State-by-State Data: http://www.commissiononhealth.org/StateByStateData.aspx. • Annie E. Casey Foundation, Kids Count website: http://datacenter.kidscount.org/data/bystate/Default.aspx provides state, county, and selected locality data on a variety of health and social indicators. • National Governors Association, "Shaping a Healthy America" website reviews state-level demographic and health data and provides model best practices implemented in the states: http://www.nga.org/portal/site/nga/menuitem.9123e83a1f6786440ddcbeeb501010a0/?vgnextoid=fbdb2f2d98ac6110VgnVCM1000001a01010aRCRD.		(2) CDC's and the National Association of City and County Health Officials' Community Environmental Health Assessment Protocol for Assessing Community Excellence in Environmental Health (PACE-EH) Guidebook: http://pace.naccho.org/DownloadPage.asp.

Types of Data	National Data	State-Level Data	Local Data	Neighborhood-Level Data
Characteristics of the Housing Stock, Neighborhood conditions, Transportation systems, Quality of housing stock	• American Housing Survey (AHS): http://www.census.gov/hhes/www/housing/ahs/ahs.html. • National Center for Healthy Housing, State of Healthy Housing webpage: http://www.nchh.org/Policy/State-of-Healthy-Housing/Supporting-Documentation.aspx—provides an easy-to use comparison of 20 indicators from the AHS incorporated into two general indices of housing (Basic Housing and Healthy Housing). This enables users to compare more than 40 Metropolitan Statistical Areas (MSAs) on a variety of factors including interior and exterior deterioration, pests, and heating issues. The indices also allow users to compare within the MSA central city v. areas outside the central city, and owner-occupied v. rental properties. • American Planning Association, Health Communities Through Collaboration website: http://www.planning.org/research/healthy/index.htm	• American Planning Association, state chapters contact information: http://www.planning.org/chapters/#1 • National Association of Counties, Healthy Counties Database, "Built Environment": http://www.naco.org/Template.cfm?Section=New_Technical_Assistance&Template=/cffiles/healthycounties/search.cfm provides program models that address housing development and transportation planning related to obesity reduction, greenways, school safety, transportation corridors, open space preservation. • National Conference of State Legislatures (NCSL), Healthy Community Design and Access to Healthy Food Legislative Database: http://www.ncsl.org/IssuesResearch/EnvironmentandNaturalResources/HealthyCommunityDesign and AccesstoHealthy Foo/tabid/13227/Default.aspx. • Association of State and Territorial Health Officials (ASTHO), Built and Synthetic Environment website contains the ASTHO Smart Growth Toolkit with models for legislative action and policy development: http://www.astho.org/programs/environmental-health/built-and-synthetic-environment/.	• Every community that receives federal rehabilitation funding must submit a Consolidated Plan to HUD every three to five years and must update that plan annually. The Plan will include information on key housing problems and plans for use of funds to address these problems. • The National Association of Housing and Redevelopment Officers (NAHRO). • National Association of Counties Indoor Air Quality Project, which ended in 2007, developed a CD with model practices, fact sheets, educational campaigns, and other materials related to mold, asthma, radon, ETS, and school indoor air quality: http://www.naco.org/Template.cfm?Section=New_Technical_Assistance&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=62&ContentID=14017.	• National Association of County and City Health Officers (NACCHO) provides a variety of Healthy Community Design toolkits that can be used by professionals and community residents to assess neighborhood fall hazards and other hazards: http://www.naccho.org/toolbox/veritysearch/search.cfm?keywords=&p=Healthy+Community+Design+Toolkit%7C14&st=ALL&x=68&y=14. • The Alliance for Healthy Homes (AFHH) Community Environmental Health Resource Center provides a number of hazard assessment tools that community residents can use: http://www.afhh.org/res/res_cehrc.htm. • American Association for Retired Persons (AARP) Livable Communities: An Evaluation Guide provides tools for residents to use to assess affordability, design, access to services, et cetera: http://assets.aarp.org/rgcenter/il/d18311_communities.pdf.

Types of Data	National Data	State-Level Data	Local Data	Neighborhood-Level Data
Energy-Related	• U.S. Department of Energy's Residential Energy Consuption Survey (RECS): http://www.eig.gov/consuption/residential. • The U.S. Energy Information Administration (EIA) administers the Residential Energy Consumption Survey (RECS) to a nationally representative sample of housing units. Energy characteristics on the housing unit, usage patterns, and household demographics are collected. This information is combined with data from energy suppliers to these homes to estimate energy costs and usage for heating, cooling, appliances, and other end uses. Data from the 2009 RECS are tabulated for the four census regions, the nine census divisions, and 16 states.			

Note: Please note that URLs can change and that these web addresses were accurate at the time the Guidance Manual was published.

Appendix 3.1
Available Educational Materials on Healthy Homes
Free and available for reproduction from PDF

Source	Document/ website name	Website link	Purpose
U.S. Department of Housing and Urban Development, Office of Health Homes and Lead Hazard Control, Outreach website	Help Yourself to a Healthy Home	http://www.hud.gov/offices/lead/library/outreach/How2Maintain HealthyHome_booklet.pdf	58 pages. Comprehensive overview for program staff and clients. Available in English and Spanish.
	How To Maintain a Healthy Home	http://www.hud.gov/offices/lead/library/outreach/How2Maintain HealthyHome_booklet.pdf	Seven pages. 2006 Alameda County brochure. Appropriate for distribution to families.
	Making Homes Healthier for Families webpage	http://www.hud.gov/offices/lead/healthyhomes/index.cfm.pdf	Link to two pages. Healthy Homes Maintenance Checklist. Also contains links to seven web pages that provide guidance for families on allergies, asthma, carbon monoxide, Integrated Pest Management, lead, mold, and radon.
	How to Make Your Own Green Cleaning Materials	http://www.hud.gov/offices/lead/library/outreach/How2Make GreenCleaning.pdf	One page. Alameda County Lead Poisoning Prevention, adapted from Toxics Use Reduction Project, U. of Mass. Lowell. Appropriate for distribution to families.
	Asthma Triggers Checklist	http://www.hud.gov/offices/lead/library/outreach/AsthmaTriggersChecklist_Eng.pdf	One page. Alameda County Healthy Homes Project. Appropriate for distribution to families. In English and Spanish.
U.S. Department of Agriculture, National Institute of Food and Agriculture, Healthy Indoor Air for America's Homes website	Healthy Indoor Air for America's Homes website	http://www.csrees.usda.gov/nea/family/in_focus/housing_if_epa.html web site under development	Consumer awareness educational campaign for use by agricultural extension agents and community leaders.

Source	Document/ website name	Website link	Purpose
U.S. Environmental Protection Agency	EPA's Indoor Environmental Media Campaigns webpage	http://www.epapsa.com/	Asthma and radon PSAs in English and Spanish.
	Indoor Air Quality Publications webpage	http://www.epa.gov/iaq/pubs/index.html	Variety of publications, including Care for Your Air: A Guide for Indoor Air Quality.
	The Inside Story: A Guide to Indoor Air Quality	http://www.epa.gov/iaq/pubs/insidest.html	Overview of key indoor air quality threats with links to resources and technical publications. Useful for program planners.
	Indoor Air Quality House: Care for Your Air webpage	http://www.epa.gov/iaq/iaqhouse.html	Interactive tour of a home that highlights common environmental triggers. Helpful for families.
	Asthma Awareness Month planning materials planning kit	http://www.epa.gov/asthma/awm/index.html#Event Planning Kit	
	Asthma Environmental Checklist	http://www.epa.gov/asthma/pdfs/home_environment_checklist.pdf	Eight page checklist and action plan for families.
	Dusty the Asthma Goldfish and His Asthma Triggers Funbook	http://www.epa.gov/asthma/pdfs/dustythegoldfish_en.pdf	Funbook in English and Spanish.
	IAQ Tools for Schools: Managing Asthma in the School Environment	http://www.epa.gov/iaq/schools/pdfs/publications/managing_asthma.pdf	Overview of the IAQ Tools for Schools Program.
	Radon webpage	http://www.epa.gov/radon/index.html	Includes A Citizen's Guide to Radon and media campaign toolkits for Living Green and Healthy Starts from the Ground Up.
	Indoor Air Plus webpage	http://www.epa.gov/indoorairplus/index.html	Guidance for contractors who wish to meet Energy Star and additional healthy housing criteria for national certification.
	Carbon Monoxide webpage	http://www.epa.gov/iaq/co.html	
	Pesticides and Integrated Pest Management	http://www.epa.gov/pesticides/ipm/index.htm	Includes IPM in Schools toolkit.

Source	Document/ website name	Website link	Purpose
	Smoke Free Homes and Cars Program publications website	http://www.epa.gov/smokefree/publications.html	Includes links to English and Spanish versions of Secondhand Smoke and the Health of Your Family and the Smoke Free Pledge kit.
	Ground Water and Drinking Water webpage	http://www.epa.gov/safewater/	Consumer information on drinking water, well head protection, water treatment in emergency situations, lead in drinking water.
U.S. Centers for Disease Control and Prevention (CDC)	Healthy Homes Webpage	http://www.cdc.gov/HealthyHomes/	This site offers health and safety tips about the home structure and land and things to do at home to protect health and lower risks for the leading causes of death.
	Air Pollution and Respiratory Health webpage	http://www.cdc.gov/nceh/airpollution/links.htm	Links to CDC and other agency publications on asthma, carbon monoxide, outdoor air quality.
	Carbon Monoxide Poisoning webpage	http://www.cdc.gov/co/	Includes PDFs in multiple languages of You Can Prevent Carbon Monoxide Poisoning.
	Asthma webpage	http://www.cdc.gov/asthma/	Includes Asthma-friendly schools initiative toolkit.
	Mold webpage	http://www.cdc.gov/health/mold.html	Includes Protect Yourself from Mold.
	Childhood Lead Poisoning webpage	http://www.cdc.gov/co/	Publications, prevention tips, data and surveillance, policy, training tools.
U.S. Consumer Products Safety Commission	Neighborhood Safety Toolkit	http://www.cpsc.gov/nsn/nsn.html	Resources on Child Safety, Fire Safety, Carbon Monoxide, Older Adults, Drowning Prevention and ATV Safety.
	Indoor Air Quality Publications webpage	http://www.cpsc.gov/cpscpub/pubs/iaq.html	Includes 28 CPSC fact sheets on asbestos, carbon monoxide, lead, mercury, paint strippers, cleaning of air humidifiers, use of generators. Many available in English and Spanish.
Ready America website (Federal Emergency Management Agency)	Emergency Supply List	http://www.ready.gov/america/_downloads/checklist.pdf	List of additional items to add to an emergency supply kit.

Source	Document/ website name	Website link	Purpose
	Make A Plan	http://www.ready.gov/america/makeaplan/index.html	Directions on how to make a family emergency plan.
	Be Informed webpage	http://www.ready.gov/america/beinformed/index.html	Webpage providing information on many emergency types such a Biological threats, blackouts, earthquakes, fire, flood, severe weather, tsunamis, radiation, and disease.
	Outreach materials for media	http://www.safekids.org/media/	Collection of media documents, including research and reports and press statements.
	Safety Resources By Risk Area Website	http://www.safekids.org/safety-basics/safety-resources-by-risk-area/	Contains fact sheets and other materials by the following topics: Bicycling and Skating, Car Seats, Boosters and Seat Belts, Choking, Suffocation and Strangulation, Falls, Drowning, Fire, Burn and Scalds, In and Around Cars, Pedestrian, Playground, Poison, and Toys.
Safe Kids USA	Outreach materials for parents	http://www.safekids.org/parents/	Informational and preventive campaign for parents. Categorized by age. Includes safety resources in links.
	Outreach materials for educators	http://www.safekids.org/educators/	Collection of safety-related materials and activities for educators to adapt for school-room use.
	Outreach materials for media	http://www.safekids.org/media/	Collection of media documents, including research and reports and press statements.
	Safety Resources By Risk Area Website	http://www.safekids.org/safety-basics/safety-resources-by-risk-area/	Contains fact sheets and other materials by the following topics: Bicycling and Skating, Car Seats, Boosters and Seat Belts, Choking, Suffocation and Strangulation, Falls, Drowning, Fire, Burn and Scalds, In and Around Cars, Pedestrian, Playground, Poison, Sports and Recreation, and Toys.

Source	Document/ website name	Website link	Purpose
American Red Cross	Preparedness Fast Sheets	http://www.redcross.org/portal/site/en/menuitem.86f46a12f382290517a8f210b80f78a0/?vgnextoid=92d51a53f1c37110VgnVCM1000003481a10aRCRD&vgnextfmt= default	Comprehensive fact sheets for preparation of the following topics: Earthquake Safety, Fire Prevention & Safety, Flood Safety, Flu Safety, Heat Wave Safety, Hurricane Safety, Landslide Safety, Pet and Disaster Safety, Power Outage, Taking Care of Emotional Health, Thunderstorm Safety, Taking Care of People with the Flu, Tornado Safety, Wild Fire Safety, and Winter Storm Safety. Available in Spanish, Arabic, Chinese, French, Haitian-Creole, Korean, Tagalog and Vietnamese.
American Lung Association	Protecting Your Air at Home webpage	http://www.lungusa.org/healthy-air/home/protecting-your-air-at-home/	Includes annual State of the Air report.

Appendix 4.1
Housing and Health Assessment Tools for Use by Healthy Homes Programs

This document provides additional information on leading tools and methods that can be used by Healthy Homes Demonstration programs to select appropriate interventions and help evaluate their effectiveness. The tools are based on the following unranked criteria:

1. Comprehensiveness
2. Validated/Used in Published Evaluation
3. Practicality and Ease of Adapting to Local Conditions
4. Potential Burden on Occupant and Inspector

Because local programs and conditions differ, there is no single best tool that can currently be applied universally. Each has its own strengths and weaknesses. Healthy homes programs should evaluate these tools and methods to determine which elements can be adapted to their programs and local conditions. Appendix 6.2 contains extensive literature describing how each tool was developed. This list is not intended to cover the pros and cons of all tools that could be used by healthy homes programs, only those offering the greatest promise at this time.

Table 1. Comparison of Leading Healthy Housing Assessment Tools

Tool Name	Link or Source	Comprehensiveness/ Topics (see key below)	Validation/ Used in Published Evaluation	Practicality and Ease of Adaptation	Burden
Healthy Housing Inspection Manual, 2008	http://www.cdc.gov/nceh/publications/books/inspectionmanual/default.htm	High AS, GH, HC, IS, MM, OP, PA, TC	No (earlier version used in HUD Programs)	Low	Medium
NCHH Survey for Housing-Related Disease and Injury—Adaptation of the CDC National Health Interview Survey	National Center for Healthy Housing http://www.nchh.org	High AS, GH, HC, IS, MM, OP, PA, TC	Evaluation pending (used in two previous studies)	Medium	Medium
Asthma Control Questionnaire—Measuring quality of life in children with asthma	http://ajrccm.atsjournals.org/cgi/reprint/162/4/1330 (Juniper Quality of Life Survey)	Medium AS	Validated	Medium	Low
Asthma Therapy Assessment Questionnaire—For health professionals only	http://www.asthmacontrolcheck.com/asthma_control/asthma controlcheck/hcp/index.jsp	Medium AS	Validated	Low	High
Asthma Control Test—Measuring asthma control of persons 12 years of age and older	http://www.qualitymetric.com/WhatWeDo/DiseasespecificHealthSurveysAsthmaControlTest%20%20 %20ACT/tabid/190/Default.aspx	Medium AS	Validated	Medium	Medium

Table 1. Comparison of Leading Healthy Housing Assessment Tools (continued)

Tool Name	Link or Source	Comprehensiveness/ Topics (see key below)	Validation/ Used in Published Evaluation	Practicality and Ease of Adaptation	Burden
Childhood Asthma Control Test—Measure of asthma control of children 4–12 years of age	http://download.journals.elsevierhealth.com/pdfs/journals/0091-6749/PIIS0091674907001674.pdf	Medium AS	Validated	Medium	Low
Asthma Core Care-giver Survey—Allies Against Asthma	http://asthma.umich.edu/mediaeval_autogen/core_caregiver.pdf	Medium AS	Uses Juniper plus other questions	Medium	Low
EPA Asthma Home Environmental Checklist	http://www.epa.gov/asthma/pdfs/home_environment_checklist.pdf	Medium MM, PA,OP	No	High	Low
Seattle-King County HomeBASE	http://www.kingcounty.gov/healthservices/health/chronic/asthma/homebase/questionnaires.aspx	High AS, HC, IS, MM, PA, OP, TC	Evaluation published (prev. edition)	Medium	Medium
Cuyahoga County Mold and Moisture Project: Visual Assessment and Testing	http://www.ehw.org/Healthy_House/HH_VAT.pdf	High HC, MM, PA, OP, TC	Evaluation published	High	Medium
Home Moisture Audit	http://www.ehw.org/Healthy_House/HH_Moist_Audit.htm	Medium MM	No	Medium	Medium
Allergen Trigger Screening Questions—NCHH	National Center for Healthy Housing http://www.nchh.org	Low HC, MM, PA	Evaluation publication pending	High	Low
Assessment Questions for Environmental and Other Factors that can Make Asthma Worse—NIH	http://www.nhlbi.nih.gov/guidelines/asthma/06_sec3_comp3.pdf (Figure 3-17)	Low MM, PA, OP	No	High	Low
Community Environmental Health Resource Center	http://www.cehrc.org/res/res_cehrc.htm	Medium HC, MM, OP, PA	Evaluation publication pending	High	Low
Pediatric Environmental Health Assessment	http://www.healthyhomestraining.org/Nurse/PEHA_Start.htm	Medium HC, IS, MM, OP, PA, TC	No	High	Low

Table 1. Comparison of Leading Healthy Housing Assessment Tools (continued)

Tool Name	Link or Source	Comprehensiveness/ Topics (see key below)	Validation/ Used in Published Evaluation	Practicality and Ease of Adaptation	Burden
Housing Health and Safety Rating System (UK)	http://www.communities.gov.uk/documents/housing/pdf/propertyquestionnairegeneral.pdf	Medium HC, MM	No	Medium (May only be applicable to UK Housing)	--
LARES	http://www.euro.who.int/Housing/LARES/20080506_3	High AS, GH, HC, IS, MM, PA, TC	Evaluation published	Low (May only be applicable to European housing)	--

Survey Topic Key: AS: Asthma Symptoms and Health Effects; GH: General Health; HC: Housing Conditions—General; IS: Injury/Safety Conditions; MM: Mold/Moisture; OP: Other Pollutants/Irritants; PA: Pests/Animals; and TC: Temperature/Comfort

Healthy Home Rating System SCORING SHEET

ADDRESS

Survey date | | | | | | | **Surveyor**

DWELLING **House or flat** hse | flat **HMO** Non | HMO **Age of dwelling**

HAZARDS

Physiological		Psychological		Safety	
Damp & mold etc	01	Crowding & space	11	Falls in baths etc	19
Excess cold	02	Entry by intruders	12	Falling on the level	20
Excess heat	03	Lighting	13	Falling on stairs etc	21
Asbestos (& MMFs)	04	Noise	14	Falling between levels	22
Biocides	05			Electrical hazards	23
Carbon monoxide etc	06	**Infection**		Fire hazards	24
Lead	07	Domestic hygiene etc	15	Flames, hot surfaces etc	25
Radiation	08	Food safety	16	Collision/entrapment	26
Uncombusted fuel	09	Personal hygiene etc	17	Position of amenities etc	27
VOCs	10	Water supply	18	Explosions	28
				Structural collapse	29

HAZARD & No. | | **Item/s**

LIKELIHOOD

5600	3200	1800	1000	560	320	180	100	56	32	18	10	6	3	2	1
< 4200	2400	1300	750	420	240	130	75	42	24	13	7.5	4	2.5	1.5 >	

Justification

OUTCOMES

	<0.05	0.15	0.3	0.7	1.5	3	7	15	26	38 >
Class I	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
Class II	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
Class III	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
	<0.05	0.15	0.3	0.7	1.5	3	7	15	26	38 >

Class IV 100-(I+II+III)

Justification

RATING

A	B	C	D	E	F	G	H	I	J
<5000	2500	1000	500	200	100	50	25	10 >	

Score (if calculated)

HAZARD & No. | | **Item/s**

LIKELIHOOD

5600	3200	1800	1000	560	320	180	100	56	32	18	10	6	3	2	1
< 4200	2400	1300	750	420	240	130	75	42	24	13	7.5	4	2.5	1.5 >	

Justification

OUTCOMES

	<0.05	0.15	0.3	0.7	1.5	3	7	15	26	38 >
Class I	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
Class II	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
Class III	0	0.1	0.2	0.5	1.0	2.2	4.6	10.0	21.5	46.4
	<0.05	0.15	0.3	0.7	1.5	3	7	15	26	38 >

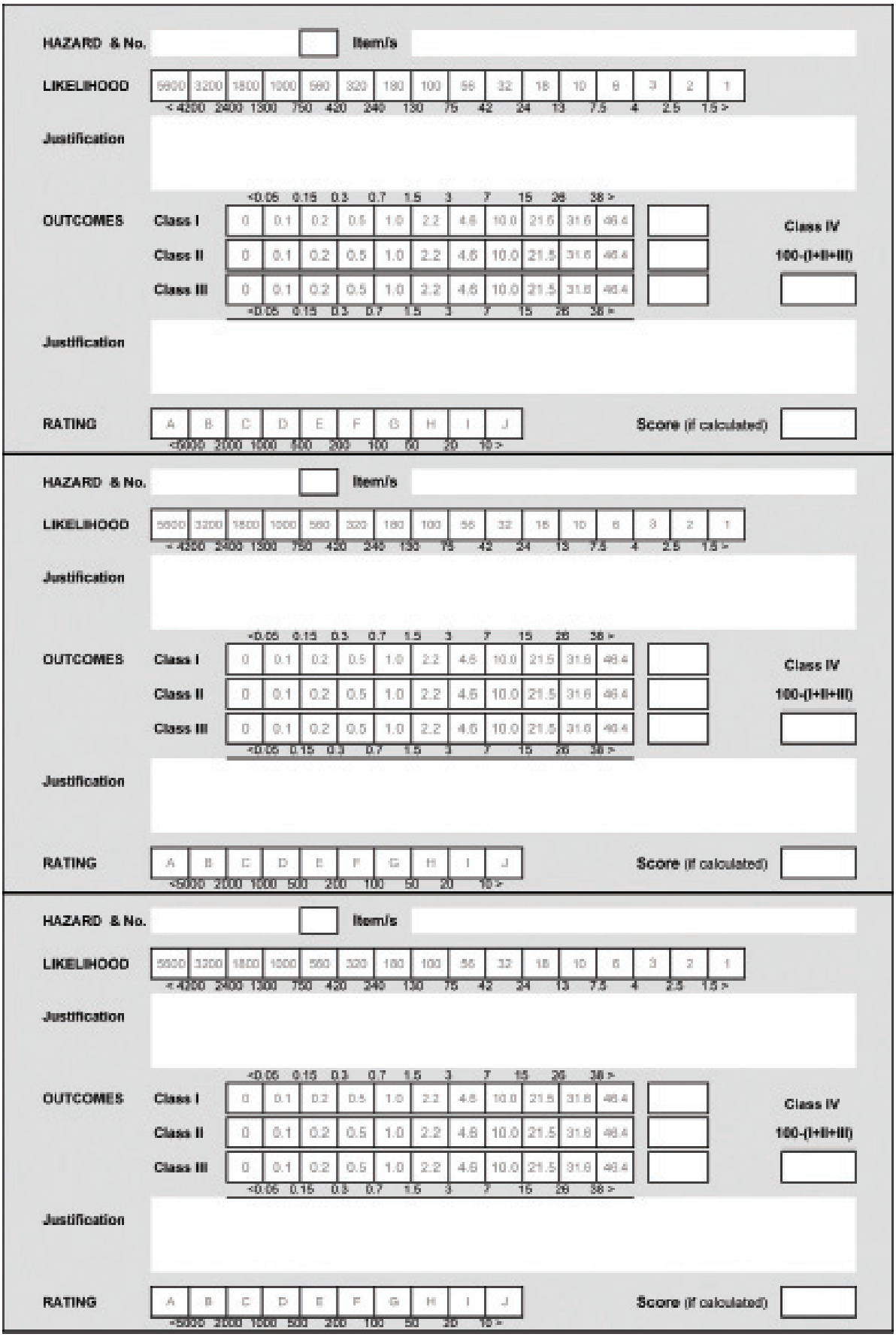
Class IV 100-(I+II+III)

Justification

RATING

A	B	C	D	E	F	G	H	I	J
<5000	2500	1000	500	200	100	50	25	10 >	

Score (if calculated)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Item/s
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Justification
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OUTCOMES
Class I
Class II
Class III
0 0.1 0.2 0.5 1.0 2.2 4.6 10.0 21.5 31.6 46.4
Class IV
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Justification
RATING
A B C D E F G H I J
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Score (if calculated)

Appendix 5.1
Examples of Healthy Housing Criteria for Housing Rehabilitation and New Construction

The two sets of criteria for housing rehabilitation and new construction provided here include information reprinted from:

- Enterprise Green Community Criteria (2008) http://www.practitionerresources.org/cache/documents/666/66641.pdf; and
- EPA Indoor airPLUS Construction Specifications (2009) http://www.epa.gov/indoorairplus/construction_specifications.html.
- 2011 Green Community Standards http://www.greencommunitiesonline.org/tools/criteria/

Enterprise Green Community Criteria (2008)

Enterprise Community Partners' Green Communities criteria for new construction and rehabilitation promote smart growth, public health, energy conservation, operational savings, and sustainable building practices in affordable housing design. As a result, the methods and materials referenced in the following pages enhance affordable housing and communities as a whole. In addition to increasing resource efficiency and reducing environmental impacts, green building practices can yield cost savings through long-term reduction in operating expenses. The benefits include improved energy performance and comfort, a healthier indoor environment, increased durability of building components, and simplified maintenance requirements.

Alignment with LEED for Homes Rating System (LH)	Criteria	Mandatory Provisions and Eligibility Point System
Healthy Living Environments		
7.1 LH	Low/No Volatile Organic Compounds (VOC) Paints and Primers Specify that all interior paints and primers must comply with current Green Seal standards for low-VOC limits.	Mandatory
7.2 LH	Low/No VOC Adhesives and Sealants Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. Caulks and sealants must comply with Regulation 8, Rule 51 of the Bay Area Air Quality Management District.	Mandatory
7.3	Urea Formaldehyde-free Composite Wood Use particleboard and MDF that is certified compliant with the ANSI A208.1 and A208.2. If using non-rated composite wood, all exposed edges and sides must be sealed with low-VOC sealants.	Mandatory
7.4 LH	Green Label Certified Floor Coverings Do not install carpets in below grade living spaces, entryways, laundry rooms, bathrooms, kitchens or utility rooms. If using carpet, use the Carpet and Rug Institute's Green Label certified carpet, pad and carpet adhesives.	Mandatory (if providing floor coverings)
7.5a LH	Exhaust Fans—Bathroom: New Construction and Substantial Rehabilitation Install Energy Star-labeled bathroom fans that exhaust to the outdoors and are connected to a light switch and are equipped with a humidistat sensor or timer, or operate continuously.	Mandatory

Alignment with LEED for Homes Rating System (LH)	Criteria	Mandatory Provisions and Eligibility Point System
7.5b LH	Exhaust Fans—Kitchen: New Construction and Substantial Rehabilitation Install power vented fans or range hoods that exhaust to the exterior.	Mandatory
7.5c	Exhaust—FansKitchen: Moderate Rehabilitation Install power vented fans or range hoods that exhaust to the exterior.	5
7.6a LH	Ventilation: Except for Moderate Rehabilitation Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.	Mandatory
7.6b	Ventilation: Moderate Rehabilitation Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.	10
7.7 LH	HVAC Sizing Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts J and S, ASHRAE handbooks, or equivalent software.	Mandatory
7.8	Water Heaters: Mold Prevention Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans with drains piped to the exterior of the dwelling and with non-water sensitive floor coverings.	Mandatory
7.9a	Materials in Wet Areas: Surfaces In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold-propagating materials such as vinyl wallpaper and unsealed grout.	Mandatory
7.9b	Materials in Wet Areas: Tub and Shower Enclosures Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).	Mandatory
7.10a	Basements and Concrete Slabs: Vapor Barrier Provide vapor barrier under all slabs. For concrete floors either in basements or on-grade slab install a capillary break of 4 four inches of gravel over soil. Cover all gravel with 6-millimeter polyethylene sheeting moisture barrier with joints lapped 1 foot or more. On interior below grade walls, avoid using separate vapor barrier or below grade vertical insulation.	Mandatory
7.10b LH	Basements and Concrete Slabs—Radon: New Construction and Substantial Rehabilitation In EPA Zone 1 and 2 areas, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary. For substantial rehab, introduce radon-reduction measures if elevated levels of radon are detected.	Mandatory

Alignment with LEED for Homes Rating System (LH)	Criteria	Mandatory Provisions and Eligibility Point System
7.11	Water Drainage Provide drainage of water to the lowest level of concrete away from windows, walls and foundations.	Mandatory
7.12 LH	Garage Isolation Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space. In single-family houses with attached garages, install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area, and do not install air handling equipment in the garage.	Mandatory
7.13 LH	Clothes Dryer Exhaust Clothes dryers must be exhausted directly to the outdoors.	Mandatory
7.14 LH	Integrated Pest Management Seal all wall, floor and joint penetrations with low-VOC caulking. Provide rodent-proof and corrosion-proof screens (e.g., copper or stainless steel mesh) for large openings.	Mandatory
7.15	Lead-Safe Work Practices: Rehabilitation For properties built before 1978, use lead-safe work practices during renovation, remodeling, painting and demolition.	Mandatory
7.16	Healthy Flooring Materials: Alternative Sources Use non-vinyl, non-carpet floor coverings in all rooms.	5
7.17	Smoke-free Building Enforce a “no smoking” policy in all common and individual living areas in all buildings. See full criteria for “common area” definition.	2
7.18 LH	Combustion Equipment: Includes Space and Water-Heating Equipment Specify power vented or combustion sealed equipment. Install one hard-wired CO detector for each sleeping area, minimum one per floor.	Mandatory
Operations and Maintenance		
8.1 LH	Building Maintenance Manual Provide a manual that includes the following: a routine maintenance plan; instructions for all appliances, HVAC operation, water-system turnoffs, lighting equipment, paving materials and landscaping, pest control and other systems that are part of each occupancy unit; an occupancy turnover plan that describes the process of educating the tenant about proper use and maintenance of all building systems.	Mandatory

Alignment with LEED for Homes Rating System	Criteria	Mandatory Provisions and Eligibility Point System
8.2 LH	Occupant's Manual Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features, along with the location of transit stops and other neighborhood conveniences, and encourages additional green activities such as recycling, gardening and use of healthy cleaning materials, alternate measures for pest control and purchase of green power.	Mandatory
8.3 LH	Homeowner and New Resident Orientation Provide a walk-through and orientation to the homeowner or new resident using the Occupant Manual from 8-2 above that reviews the building's green features, operations and maintenance along with neighborhood conveniences.	Mandatory

Notes:

(1) Standards are subject to change.

(2) LEED Rating System can be found at http://www.usgbc.org.

(3) Mandatory Provisions and Eligibility Point System: To be eligible for Green Communities grants, loans and tax credit equity through Enterprise, a project must comply with all of the mandatory provisions of the Green Communities criteria. In addition, new construction projects must earn 35 points from the Optional Criteria, while moderate rehabilitation projects must earn 30 points from the Optional Criteria.

(4) This table is a partial representation of the eight criteria.

EPA Indoor airPLUS Construction Specifications (2009)

These specifications for new construction were developed by the U.S. Environmental Protection Agency (EPA) to recognize new homes equipped with a comprehensive set of Indoor Air Quality (IAQ) features. They were developed with significant input from stakeholders, based on best available science and information about risks associated with IAQ problems, and balanced with practical issues of cost, builder production process compatibility, and verifiability. Although these measures were designed to help improve IAQ in new homes compared with homes built to minimum code, they alone cannot prevent all IAQ problems. Occupant behavior is also important. For example, smoking indoors would negatively affect IAQ and the performance of the specified Indoor airPLUS measures.

Indoor airPLUS Verification Checklist

Address or Div/Lot#:					
City/State/Zip:		Date:		Verified by	
Section		Requirements (see Indoor airPLUS Construction Specifications for details)	N/A	Builder	Rater
Moisture Control		**Water-Managed Site and Foundation**			
	1.1	Site & foundation drainage: sloped grade, protected drain tile, & foundation floor drains		☐	☐
	1.2	Capillary break below concrete slabs & in crawlspaces (Exception - see specification)	☐	☐	☐
	1.3	Foundation wall damp-proofed or water-proofed (Except for homes without below-grade walls)	☐	☐	☐
	1.4	Basements/crawlspaces insulated & conditioned (Exceptions - see specification)	☐	☐	☐
		Water-Managed Wall Assemblies			
	1.5	Continuous drainage plane behind exterior cladding, properly flashed to foundation		☐	☐
	1.6	Window & door openings fully flashed		☐	☐
		Water-Managed Roof Assemblies			
	1.7	Gutters/downspouts direct water a minimum of 5' from foundation (Except in dry climates)	☐	☐	☐
	1.8	Fully flashed roof/wall intersections (step & kick-out flashing) & roof penetrations		☐	☐
	1.9	Bituminous membrane installed at valleys & penetrations (Except in dry climates)	☐	☐	☐
	1.10	Ice flashing installed at eaves (Except in Climate Zones 1 - 4)	☐	☐	☐
		Interior Water Management			
	1.11	Moisture-resistant materials/protective systems installed (i.e., flooring, tub/shower backing, & piping)			☐
	1.12	No vapor barriers installed on interior side of exterior walls with high condensation potential		☐	☐
	1.13	No wet or water-damaged materials enclosed in building assemblies		☐	☐
Radon	2.1	Approved radon-resistant features installed (Exception - see specification)	☐	☐	☐
	2.2	Two radon test kits & instructions/guidance for follow-up actions provided for buyer (Advisory-see specification)	☐	☐	☐
Pests	3.1	Foundation joints & penetrations sealed, including air-tight sump covers			☐
	3.2	Corrosion-proof rodent/bird screens installed at all openings that cannot be fully sealed (e.g., attic vents)		☐	☐
HVAC	4.1	HVAC room loads calculated, documented; system design documented; coils matched			☐
	4.2	Duct system design documented & properly installed OR duct system tested (check box if tested) ☐	☐		☐
	4.3	No air handling equipment or ductwork installed in garage; continuous air barrier required in adjacent assemblies			☐
	4.4	Rooms pressure balanced (using transfer grills or jump ducts) as required OR tested (check box if tested) ☐	☐		☐
	4.5	Whole house ventilation system installed to meet ASHRAE 62.2 requirements			☐
	4.6	Local exhaust ventilation to outdoors installed for baths, kitchen, clothes dryers, central vacuum system, etc.			☐
	4.7	Central forced-air HVAC system(s) have minimum MERV 8 filter, no filter bypass, & no ozone generators			☐
	4.8	Additional dehumidification system(s) or central HVAC dehumidification controls installed (In warm-humid climates only)	☐		☐
Combustion Pollutants		**Combustion Source Controls**			
	5.1	Gas heat direct vented; oil heat & water heaters power vented or direct vented (Exceptions - see specifications)	☐		☐
	5.2	Fireplaces/heating stoves vented outdoors & meet emissions/efficiency standards/restrictions	☐		☐
	5.3	Certified CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720			☐
	5.4	Smoking prohibited in common areas; outside smoking at least 25' from building openings (Multi-family homes only)	☐	☐	☐
		Attached Garage Isolation			
	5.5	Common walls/ceilings (house & garage) air-sealed before insulation installed; house doors gasketed & closer installed	☐		☐
	5.6	Exhaust fan (minimum 70 cfm, rated for continuous use) installed in garage & vented to outdoors (controls optional)	☐		☐
Materials	6.1	Certified low-formaldehyde pressed wood materials used (i.e., plywood, OSB, MDF, cabinetry)		☐	☐
	6.2	Certified low-VOC or no-VOC interior paints & finishes used		☐	☐
	6.3	Carpet, adhesives, & cushion qualify for CRI Green Label Plus or Green Label testing program	☐	☐	☐
Final	7.1	HVAC system & ductwork verified dry, clean, & properly installed			☐
	7.2	Home ventilated before occupancy OR initial ventilation instructions provided for buyer		☐	☐
	7.3	Completed checklist & other required documentation provided for buyer		☐	☐

Rater/Provider:	Builder:
Company:	Company:
Signature:	Signature:

Guidance for Completing the Indoor airPLUS Verification Checklist:

1. Only ENERGY STAR qualified homes verified to comply with these specifications can earn the Indoor airPLUS label. See Indoor airPLUS Construction Specifications for full descriptions of the requirements, terms, exceptions, abbreviations, references, and climate map used in this checklist. Verification is not complete until this checklist is completed in full and signed.
2. Check one box per line. Check "N/A" for specifications that do not apply for specific conditions (e.g., climate) according to the Exceptions described in the Indoor airPLUS Construction Specifications. Check either "Builder" or "Rater" for all other items to indicate who verified each item. Items may be verified visually on site during construction, by reviewing photographs taken during construction, by checking documentation, or through equivalent methods as appropriate. If using a performance testing alternative to meet requirement 4.2 or 4.4, the box marked "Tested" must be checked and testing documentation must be provided in the Home Energy Rating System/Builder Option Package (HERS/BOP) file.
3. The rater who conducted the verification, or a responsible party from the rater's company, must sign the completed verification checklist. The builder must sign the checklist if any items in the "Builder" column are checked, and by so doing accepts full responsibility for verifying that those items meet Indoor airPLUS requirements.
4. The builder provides one copy of the completed and signed checklist for the buyer. The HERS/BOP provider or rater files a copy with HERS/BOP and ENERGY STAR documentation (e.g., Thermal Bypass Checklist) for the home.
5. The checklist may be completed for a batch of homes using a RESNET-approved sampling protocol when qualifying homes as ENERGY STAR. For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated.

Note: The Indoor airPLUS Construction Specifications are designed to help improve indoor air quality (IAQ) in new homes compared with homes built to minimum code. These measures alone cannot prevent all IAQ problems; occupant behavior is also important. For example, smoking indoors would negatively impact a home's IAQ and the performance of the specified Indoor airPLUS measures.

Notes:

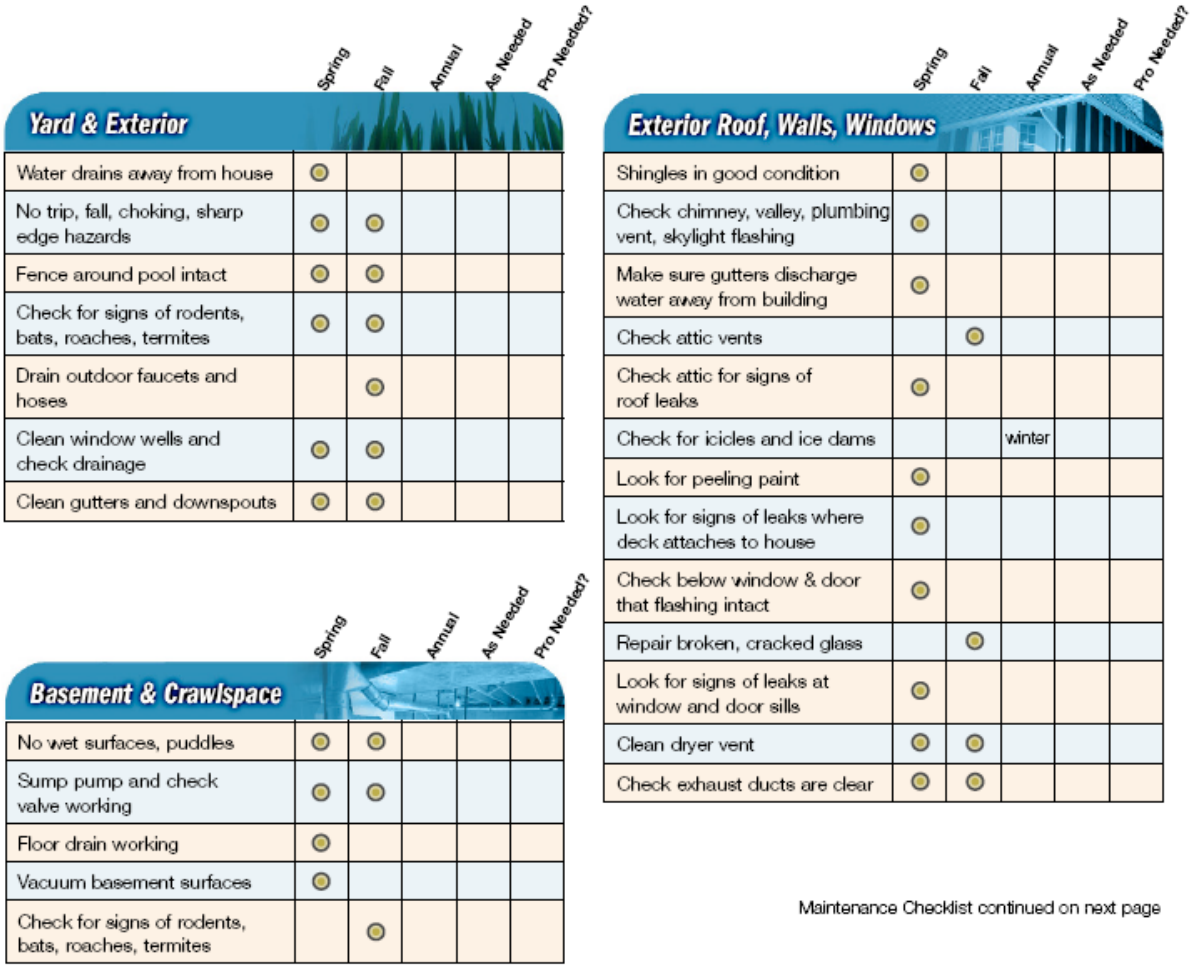
For further information on the Indoor airPLUS program, visit epa.gov/indoorairplus.

Qualified homes earn the Indoor airPLUS label. Place it next to the ENERGY STAR label.

All Indoor airPLUS qualified homes meet strict guidelines for energy efficiency set by ENERGY STAR, the nationally-recognized symbol for energy efficiency.

Appendix 5.2
Healthy Homes Maintenance Checklist

The following information is also available at
http://www.nchh.org/Portals/0/Contents/Maintenance_Checklist2009.pdf



Yard & Exterior

	Spring	Fall	Annual	As Needed	Pro Needed?
Water drains away from house	●				
No trip, fall, choking, sharp edge hazards	●	●			
Fence around pool intact	●	●			
Check for signs of rodents, bats, roaches, termites	●	●			
Drain outdoor faucets and hoses		●			
Clean window wells and check drainage	●	●			
Clean gutters and downspouts	●	●			

Basement & Crawlspace

	Spring	Fall	Annual	As Needed	Pro Needed?
No wet surfaces, puddles	●	●			
Sump pump and check valve working	●	●			
Floor drain working	●				
Vacuum basement surfaces	●				
Check for signs of rodents, bats, roaches, termites		●			

Exterior Roof, Walls, Windows

	Spring	Fall	Annual	As Needed	Pro Needed?
Shingles in good condition	●				
Check chimney, valley, plumbing vent, skylight flashing	●				
Make sure gutters discharge water away from building	●				
Check attic vents		●			
Check attic for signs of roof leaks	●				
Check for icicles and ice dams			winter		
Look for peeling paint	●				
Look for signs of leaks where deck attaches to house	●				
Check below window & door that flashing intact	●				
Repair broken, cracked glass		●			
Look for signs of leaks at window and door sills	●				
Clean dryer vent	●	●			
Check exhaust ducts are clear	●	●			

Maintenance Checklist continued on next page

Interior Walls, Ceilings, Windows, Doors

	Spring	Fall	Annual	As Nee.	Pro Nee.
Check for signs of water damage			●		
Check operation of windows and doors	●				
Lubricate and repair windows and doors				●	

Plumbing, Fixtures and Appliances

	Spring	Fall	Annual	As Needed	Pro Needed?
Check washer hoses-connections			●		
Check dishwasher hoses for leaks			●		
Check toilet supply/shut-off valve			●		
Clean & check refrigerator drip pan-icemaker connections			●		
Check shower-tub surrounds for signs of damage			●		
Check traps and drains under sinks, tubs, showers for leaks			●		
Check hot water heater for leaks		●			
Check boiler for leaks		●			
Check water main/meter or well pump for leaks or sweating		●			
Check water main/meter or well pump for leaks or sweating		●			
Clean septic tank			2 yrs		
Check drain and supply time for leaks	●	●			
Check bath and kitchen fans operation	●	●			

HVAC Equipment - Replace filters

	Spring	Fall	Annual	As Needed	Pro Needed?
Warm air furnace (merv 8)		●			
Air conditioner (central air merv 8)	●				
Dehumidifier	●				
Outdoor air to return to heat recovery ventilation		●			

Appliances

	Spring	Fall	Annual	As Nee.	Pro Nee.
Clean kitchen range hood screens				●	
Clean dryer vents and screens	●				
Clean exhaust fan outlets and screens	●				
Clean outdoor air intakes and screens		●			
Clean air conditioning coils, drain pans	●				●
Clean dehumidifier coils, check operation	●				
Clean and tune furnaces, boilers, hot water heaters		●			●
Clean and tune ovens and ranges		●			●

Electrical Equipment

	Spring	Fall	Annual	As Needed	Pro Needed?
Check for damaged cords	●	●			
Test ground fault interrupters	●				
Test outlets for proper hot, neutral and ground			once		
Check smoke and CO alarms	●	●			

Garage

	Spring	Fall	Annual	As Needed	Pro Needed?
Ensure storage of fuel cans	●	●			
Proper operation of garage door safety shut-off	●	●			
Check for signs of water damage	●				
Check for signs of rodents, bats, roaches, termites	●	●			

Attic

	Spring	Fall	Annual	As Needed	Pro Needed?
Check for signs of rodents, bats, roaches, termites		●			
Check for water damage		●			
Ensure insulation in place		●			
Check that fans still exhaust to outdoors (check ductwork connections)			●		

Appendix 6.1
Special Considerations in Human Subjects Research

Since healthy homes programs affect human behavior and health as well as the condition of housing stock, evaluators should be familiar with special protections required under federal law whenever human subjects are involved in formal research activities. The U.S. Department of Health and Human Services (HHS) defines research and the protections of human subjects (45 CFR 46.102(d)) as:

> … a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge…Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains:
>
> (1) Data through intervention or interaction with the individual; or
>
> (2) Identifiable private information.

Common Rule. HHS oversees the protection of human subjects during the course of research via application of the "Common Rule" (45 CFR Part 46). Not all projects that collect information on individuals are subject to these protections.

Informed Consent. Clients have a reasonable expectation of privacy for their health information. They also have a reasonable expectation of knowing the results of any interventions performed on their homes and the potential effects on their health and wellbeing. There are many mechanisms to address these concerns. At a minimum, enrollment information should specify what data will be collected on the household, who will have access to the data, how the participant can get obtain the information, and how they can withdraw from the project. This information needs to be contained in the consent to participate in the project.

Institutional Review Board. The Institutional Review Board (IRB) process represents further protection for clients. The IRB addresses data privacy, assures participant protection, sets standards for recruitment and retention, and requires that all program documents and procedures be reviewed by third parties with no direct interest in the outcome of the research. IRBs are usually attached to academic institutions but can also be housed at health departments, hospitals, and health insurance companies. If your project includes an academic partner to conduct third-party evaluation, they can facilitate preparation of the IRB application and support the approval process. It is important to note that many IRBs are more familiar with medical research and may need to be educated on public and community health interventions and evaluation.

The IRB review process includes expedited reviews for studies that involve minimum risk to human subjects, which usually describes healthy homes programs. In general, expedited reviews take between one and three months while full reviews can take longer. The recruitment, enrollment and informed consent forms are at the heart of much of the IRB review. Programs should take the time to understand their IRB's requirements for consent and to build in time for approval as a part of project "start up."

Health Insurance Portability and Accountability Act. If health-related data are collected, healthy homes programs will also need to determine what data will be shared internally, with program partners, the community at large, and with funders. Health Insurance Portability and Accountability Act (HIPAA) data protection requirements are likely to apply to any projects where health departments, health care providers, or health insurance agencies are involved. In many cases, these agencies will have their own required policies and training for data protection. (See Alliance for Healthy Homes. Overcoming Barriers to Data-Sharing Related to the HIPAA Privacy Rule: A Guide for State and Local Childhood Lead Poisoning Prevention Programs. June 2004. http://www.afhh.org/res/res_pubs/HIPAA_CLPPP_June_2004.pdf).

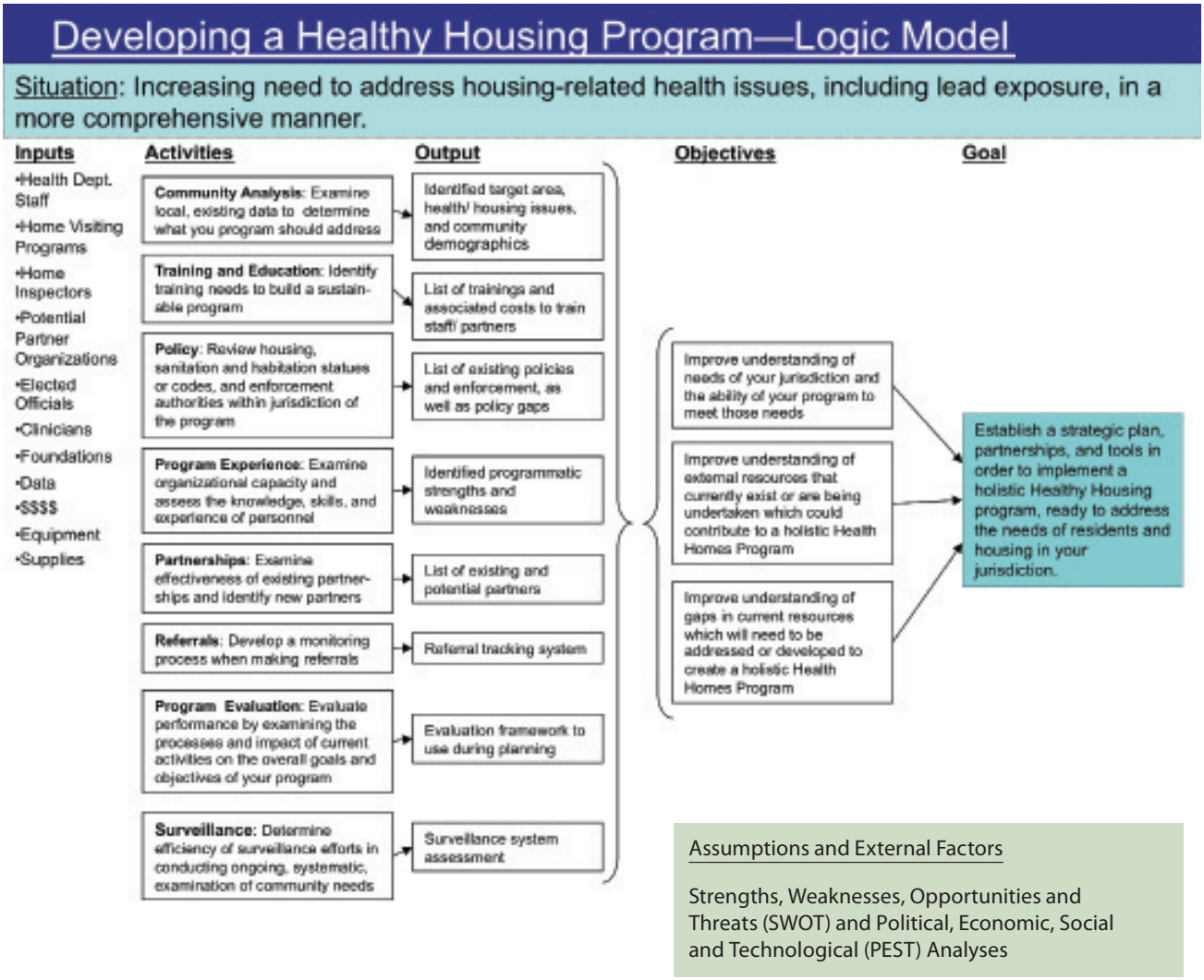
Resources

- HHS's Office of Human Research Protections provides a variety of guidance materials on application of the Common Rule, including decision charts for individual projects. See

http://www.hhs.gov/ohrp/humansubjects/guidance/decisioncharts.htm

- As a matter of good practice, all healthy homes project staff should undergo training on the protection of human subjects. Free training can be found at http://ohrp-ed.od.nih.gov/CBTs/Assurance/login.asp.
- The Agency for Healthcare Research and Quality (AHRQ) has developed a toolkit for informed consent in research that poses minimum risk: http://www.ahrq.gov/fund/informedconsent/

Appendix 6.2
Developing a Healthy Housing Program—Logic Model



Appendix 6.3
Evaluation Design Strategies

One-group design

This design assesses people and/or housing units after the program has been completed based on assumptions of what the conditions were before the program began; there is no comparison with people who did not receive services. This design is least robust and provides the least evidence that the changes observed were the result of the program. Outcome data can be derived from health records and interviews.

Pre/post design

This design includes assessment of individuals and housing units prior to the implementation of interventions. Differences in health status and housing condition are quantified by comparing conditions at baseline and post-intervention. While preferable to a one-group design, the Asthma Health Outcomes Project reports that programs using this design, without a comparison group, were more likely to report positive, but possibly unreliable results due to biases such as the test itself, participant maturation and other confounding factors.

Time series design

This design includes a series of measurements on key health or housing outcomes and conducts measurements at periodic intervals from the beginning to the end of the program (often including more than one post-intervention measurement). Time series seeks to document the persistence of program effects.

Comparison group design

The use of a comparison (control) group that did not receive program services results in the ability to measure impact without the high cost and complexity of a randomized controlled trial. A comparison group should be carefully selected to ensure that they are as similar to the intervention group as possible in all ways except for participation in the interventions. With demographic and other data on participants in both groups, statistical modeling can be used to control for small differences between the groups.

Appendix 6.4
Window Replacement Cost-Benefit Analysis

Introduction

Cost-benefit analysis is an important tool for justifying program expenditures and can influence funding decisions made by federal, state, and local governments and foundations. Program activities are more likely to receive ongoing and/or increased funding if there is clear evidence that program benefits exceed program costs.

Regulatory analysis and academic studies have shown that window replacement combined with paint repair and lead-safe work practices yield public and private benefits that far exceed the costs of interventions.[1] Window replacement, mainly to increase energy-efficiency, appears to explain a significant part of the decline in lead paint hazards in older homes from 1990–2000.[2] New windows combined with home maintenance and reinvestment could explain why older homes in high-income neighborhoods are much less likely to have lead paint hazards than similar-age homes in low-income neighborhoods.

Lead-safe window replacement results in:

- Long-term energy savings when Energy Star windows are used to replace old, single-pane windows;
- Elimination of lead hazards; and
- Lower lead dust levels through specialized post-intervention cleaning and clearance testing.

[1] U.S. Department of Housing and Urban Development, 1999, Economic Assessment of the Final Rule on Lead-Based Paint, Office of Lead Hazard Control, Washington DC; Nevin R. (2009) Energy-efficient housing stimulus that pays for itself (2010), Energy Policy 38:4–11; Nevin, R. and D. Jacobs. (2006), Windows of opportunity: lead poisoning prevention, housing affordability, and energy conservation, Housing Policy Debate 17(1), 185–207; Nevin, R., D. Jacobs, M. Berg, J. Cohen, (2008), Monetary benefits of preventing childhood lead poisoning with lead-safe window replacement, Environmental Research 106, 410–419.

[2] Jacobs, D. and R. Nevin (2006), Validation of a 20-year forecast of U.S. childhood lead poisoning: Updated prospects for 2010, Environmental Research, 102 (3), 352–364.

Net Benefits of Lead-Safe Window Replacement

Lead safe window replacement costs, annual energy savings, and related market value benefits vary by housing unit size and the number of windows replaced. Lead hazard reduction benefits vary by age of housing and the average number of young children living in the housing unit each year.

Table 1 shows average costs (per housing unit), benefits, and annual energy savings resulting from lead-safe window replacement in three homes of different sizes and types. This is followed by an explanation of how each average cost and benefit was determined and how specific lead and/or healthy homes programs can collect and track data to determine how their local program's costs and benefits compare to these average values.

Window replacement costs and market value benefits: Window replacement costs and the associated average increase in a home's market value are from Remodeling Magazine's annual "Cost vs. Value"[3] estimates. These are based on U.S. Department of Housing and Urban Development estimates from 1999 for replacing seven windows in an 800 ft^2 attached home, and Remodeling Magazine's estimates to replace 16 windows in 1993 and 10 windows in 2005 (Alfano, 2001–2005), all updated to 2005 dollars. The cost estimates include contractor and supplier labor, material, overhead, and profit. The average cost per window when a program engages in a large volume purchase may be lower than this retail cost. Higher home market values associated with new energy-efficient windows are mainly due to a 15 percent to 25 percent reduction in energy bills, an average increase in home value of $20 for every dollar per year in energy bill savings, and an appearance value of about $100 per window.[4]

[3] Alfano, S., Cost vs. Value Reports, Remodeling Online.

[4] Nevin, R. and G. Watson (1998), Evidence of rational market valuations for home energy efficiency, Appraisal Journal 66:401–09; Nevin, R., H. Gazan, C. Bender (1999), More evidence of rational market values for home energy efficiency, Appraisal Journal 67:454–60.

Table 1 Lead-Safe Window Replacement Costs, Benefits, and Energy Savings

	800 ft² Attached 7 Windows	1200 ft² Detached 10 Windows	1800 ft² Detached 16 Windows
Costs			
Window Replacement	$6,118	$9,684	$15,494
Weighted Average Interior Paint Stabilization	$146	$146	$146
Weighted Average Exterior Paint Stabilization	$291	$291	$291
Specialized Cleanup	$386	$510	$510
Lead Dust Clearance Testing	$175	$219	$219
Average Cost	$7,116	$10,850	$16,660
Annual Energy Savings (15%–25%)	$130–216/yr	$194–324/yr	$292–486/yr
Market Value Benefits			
Windows	$5,485	$8,681	$13,890
Weighted Average Interior Paint Stabilization	$144	$144	$144
Weighted Average Exterior Paint Stabilization	$270	$270	$270
Average Market Value Benefit	$5,899	$9,095	$14,304
Average Lead Hazard Reduction Benefit			
Weighted Average in Pre-1940 Housing	$6,847	$6,847	$6,847
Weighted Average in 1940–1959 Housing	$2,847	$2,847	$2,847
Weighted Average in 1960–1977 Housing	$632	$632	$632

Any lead or healthy homes program can track their own data on window replacement costs (including labor, material, and overhead) and develop comparable market value benefit estimates as follows:

- Obtain data on the average annual energy bill for each upgraded home (total annual cost for electricity, natural gas, and/or fuel oil);
- Assume that replacing single-pane windows with Energy Star windows reduces annual energy bills by 20 percent;
- Multiply that annual energy savings by 20, and add $100 per window replaced to estimate market value benefit.

Paint stabilization costs and market value benefits: Regulatory analysis shows that approximately 95 percent of the cost of lead-safe paint stabilization is recovered through an increase in a home's market value. Lead and/or healthy homes programs can track their own cost information through contractor estimates or invoices (per housing unit) for this portion of the scope of work. This cost can be multiplied by 0.95 to develop a comparable market value benefit estimate.

Cleanup and clearance testing costs: The average cost for lead dust cleanup and clearance testing assumes whole-house cleanup and testing. Lead and healthy home's programs can track their own data on cleanup and clearance testing costs through documenting contractor cost estimates and/or invoices for this portion of the work, inspector clearance testing costs based on time and materials, and laboratory analysis costs.

Lead hazard reduction benefits: The health benefit of lead-safe window replacement is based on extensive regulatory analysis and research quantifying the value of increased average lifetime earnings associated with the prevention of preschool lead exposure. This benefit reflects the average loss of IQ due to lead exposure, and associated losses in education attainment and earnings.

These benefits vary by the age of housing because lead paint hazards are more common in older housing. The benefit calculation also reflects the savings in pre-intervention risk assessment costs by using single-pane windows as a presumption of lead hazards. Almost all pre-1940 homes with single-pane windows have lead paint on window surfaces and/or lead dust hazards. Therefore, lead-safe window replacement in pre-1940 homes with single-pane windows almost always yields lead hazard reduction benefits for current and future resident children.

About 40 percent of 1940–1959 homes and 10 percent of 1960–1979 homes with single-pane windows have lead paint on window surfaces. This means 60 percent of 1940–1959 homes and 90 percent of 1960–1979 homes with single-pane windows are less likely to have lead paint hazards, reducing the average lifetime earnings benefit of lead safe window replacement in these homes, although the benefits still exceed the costs. Lead safe window replacement in these homes still yields energy savings and market value benefits, including the market benefit of routine paint repair as needed.

Conducting Cost-Benefit Analysis

Table 2 illustrates how programs can track their program costs and benefits by collecting data on each home upgraded with lead-safe window replacement. These costs are based on collecting cost information for window replacement, paint stabilization, lead- dust cleaning, and clearance testing in each upgraded home. In summary:

- The benefit of window replacement in each home would equal $100 per window plus a 20 percent reduction in that home's average annual energy bill compared to the year prior to window replacement.
- The benefit of paint repair/stabilization in each home equals 95 percent of paint repair costs.
- The benefit of lead hazard reduction in each home equals $6,847 in a pre-1940 home, $2,847 in a home built from 1940–1959, and $632 in a home built from 1960–1977.

When the costs of window replacement, paint stabilization and lead dust cleanup are tracked for each home that is treated as a part of your lead or healthy homes program, costs-benefit analysis can be conducted as demonstrated in Table 2.

Table 2 Program-Specific Lead-Safe Window Replacement Costs and Benefits

Costs	
Window Replacement: Actual Installed Cost	$
Paint Stabilization: Actual Cost	$
Cleanup and Lead Dust Clearance Testing: Actual Cost	$
Total Cost = A	$ Sum of all homes
Market Value Benefits	
Windows Market Benefit = $100/window +	
(20% of the previous year annual energy bill) x 20)	$
Paint Stabilization Market Benefit = 95% of Actual Cost	$
Total Market Value Benefit = B	$ Sum of all homes
Lead Hazard Reduction Benefits	
Pre-1940 units multiplied by $6,847	$
1940–1959 units multiplied by $2,847	$
1960–1977 units multiplied by times $632	$
Applicable Lead Hazard Reduction Benefit = C	$ Sum of all homes
Net Benefits: B + C - A	$

Appendix 7.1
Federal Government Resources

EPA/CDC/ATSDR Federal Grants Guide for Community Environmental and Public Health Activities

The U.S. Environmental Protection Agency (EPA), U.S. Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) are collaborating to achieve community environmental and health goals through a Memorandum of Understanding signed in July 2007. By leveraging their knowledge and resources, the three agencies' goal is to maximize the help they offer communities, state governments and tribes. EPA/CDC/ATSDR Federal Grants Guide for Community Environmental and Public Health Activities, is a comprehensive document that provides information on funding in support of healthy homes activities.

http://www.epa.gov/air/care/documents/EPA_CDC_ATSDR_Grants_Guide_web_061708.pdf

U.S. Department of Housing and Urban Development (HUD)

Office of Healthy Homes and Lead Hazard Control (OHHLHC): HUD's OHHLHC established its Healthy Homes Program in 1999 in response to a congressional directive to protect children and their families from housing-related health and safety hazards. The Healthy Homes Initiative builds upon HUD's Lead Hazard Control programs by supporting efforts that address a variety of environmental health and safety concerns. OHHLHC grants focus on demonstrating and researching low-cost, effective home hazard assessment and intervention methods as well as public education.

http://www.hud.gov/offices/lead/hhi/index.cfm

Community Planning and Development: HUD's Community Development Block Grant (CDBG) program funds local governments to undertake a wide range of activities intended to create suitable living environments, provide decent affordable housing and create economic opportunities, primarily for persons of low and moderate income. CDBG and HOME Investment Partnership-funded housing programs are required to evaluate and reduce lead based paint hazards and comply with the federal lead-safe housing rule. Many jurisdictions use a percentage of these funds to support minor home repair, building inspection/code compliance, energy efficiency, public health and community capacity building initiatives.

http://www.hud.gov/offices/cpd/communitydevelopment/programs/

U.S. Centers for Disease Control and Prevention (CDC)

Grant Funding: CDC supports healthy homes initiatives through two grant programs:

- Building Capacity in Environment Healthy Service Delivery and
- Building Strategic Alliances for Healthy Housing Pilot.

http://www.cdc.gov/HealthyHomes/ByAudience/Programs_Comprehensive.html

Training: Through a cooperative agreement, CDC is the primary funder of the National Healthy Homes Training Center and Network (Training Center) operated by the National Center for Healthy Housing. The Training Center brings together public health and housing practitioners to promote practical and cost-effective methods for making homes healthier. It also serves as a forum for exchanging information on new research and best practices.

http://www.nchh.org/Training/National-Healthy-Homes-Training-Center.aspx

Single Issue Programs: The CDC also advances healthy homes through single issue programs that provide funding, training and technical assistance. These include:

- Asthma Control;
- Carbon Monoxide Poisoning Prevention;
- Air Pollution and Respiratory Health;
- Injury Prevention;
- Healthy Aging;
- Environmental Health Services; and
- Smoking and Health.

http://www.cdc.gov/healthyhomes/ByAudience/Programs_SingleIssue.html

U.S. Environmental Protection Agency (EPA)

Grant Funding: The EPA funds healthy homes through the following grant programs.

- Community Action for a Renewed Environment (CARE) Program http://www.epa.gov/care
- Environmental Education Grant Program www.epa.gov/enviroed
- Environmental Justice Collaborative Problem-Solving Program http://www.epa.gov/compliance/environmentaljustice/grants/ej-cps-grants.html
- Environmental Justice Small Grants Program http://www.epa.gov/compliance/environmentaljustice/grants/ej-smgrants.html
- State Indoor Radon Grant Program http://epa.gov/radon/sirgprogram.html

National Childhood Asthma Media Campaign: EPA has developed media materials, including Public Service Announcements, video news releases, fact sheets and tips for managing asthma. Local healthy homes programs, in partnership with local media, can use the media campaign materials to raise awareness in their jurisdictions.

United States Department of Agriculture (USDA)

The Healthy Homes Partnership is a network of state coordinators that provide information about home health hazards and steps that can be taken to avoid them. The initiative is a partnership between the USDA and HUD.

http://www.csrees.usda.gov/nea/family/in_focus/housing_if_healthyhomes.html

U.S. Department of Energy

The U.S. Department of Energy's (DOE) Weatherization Assistance Program (WAP) provides energy efficiency improvements to low income homes using the most advanced technologies and diagnostic testing protocols available in the housing industry. The energy conservation resulting from the efforts of states and local agencies decreases the cost of energy for families in need while ensuring the health and safety of their homes. WAP programs use advanced technologies, such as blower door directed air sealing that help ensure that sufficient building ventilation remains following air sealing. The incorporation of combustion safety testing, pressure diagnostics, and moisture mitigation under the umbrella of energy-related building science creates healthier homes. The WAP, operating in all 50 states, the District of Columbia, U.S. Territories, and Native American Tribes, comprises the largest group of home energy upgrade experts in the country (see: http://www1.eere.energy.gov/wip/wap.html).

DOE's Weatherization Plus Health initiative, implemented by the National Association for State Community Services Programs (NASCSP), is a national effort to comprehensively and strategically coordinate resources to improve the energy efficiency, health, and safety of low income homes. Weatherization Plus Health facilitates essential connections between energy efficiency and healthy home programs (see: http://nascsp.org/Healthy-Homes/776/Weatherization-Plus-Health.aspx?iHt=47).

Appendix 7.2
Comparison of Regulatory Approaches to Healthy Homes

	Housing/Property Maintenance Code	Health/ Sanitation Code	Landlord-Tenant Law	Product Standards	Hazard Management Law
National Requirements	Yes, for federally-assisted housing No, for other housing	No	Lead disclosure and fair housing	Yes, for specific products and general standards.	Yes for specific hazards such as lead, asbestos, and pesticides.
State Requirements	Several states	Several states	Most States	Yes, for pesticides. All must be consistent with federal.	Generally yes for specific hazards in addition to federal such as carbon monoxide and radon.
Local Requirements	Common except in rural areas	Common but limited scope	Common in large urban areas	Uncommon	Larger community for specific hazards in addition to federal and state.
Current National Models	Yes, International Property Maintenance Code (IPMC)	No	Yes, Uniform Residential Landlord and Tenant Act (URLTA)	Industry Consensus Standards	Federal government and some associations issue guidelines to address specific hazards.
For More Information	http://www.healthyhomes training.org/Codes/HQS.htm http://www.healthyhomes training.org/Codes/IPMC.htm	http://www.healthyhomes training.org/Codes/APHA.htm	http://www.healthyhomes training.org/Codes/URLTA.htm	http://www.healthyhomes training.org/Codes/Product_Stds.htm	http://www.healthyhomes training.org/Codes/Hazard_Stds.htm http://www.healthyhomes training.org/Codes/EPA_RRP.htm

http://www.healthyhomestraining.org/Codes/Code_Table.htm