

The Healthy Homes Program Guidance Manual

July 2012



U.S. Department of Housing and Urban Development
Office of Healthy Homes and Lead Hazard Control



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Forward

The U.S. Department of Housing and Urban Development (HUD) Office of Healthy Homes and Lead Hazard Control (OHHLHC) has issued this Healthy Homes Program Guidance Manual to advance our nation's efforts to create healthier and safer housing.

The Manual is the result of considerable effort and reflects input from many partners and stakeholders in the healthy homes community. It is based on proven approaches and techniques, and the findings of the most current research. The Manual is written for anyone interested in developing or expanding a healthy homes program.

For well over a decade, HUD, the U.S. Centers for Disease Control and Prevention (CDC), and the U.S. Environmental Protection Agency (EPA) have implemented a campaign to reduce and eliminate childhood lead poisoning. While tackling this challenge, local lead hazard control programs recognized the need to address other housing-related health and safety hazards, and the "healthy homes" concept was eventually embraced by their federal partners. Evidence suggests that problems such as poorly controlled asthma and unintentional injuries are often linked to preventable housing deficiencies. Therefore, HUD, CDC, EPA, the U.S. Department of Energy (DOE), and the U.S. Department of Agriculture (USDA) have sponsored and supported local programs, regulatory and policy initiatives, research and evaluation, and education and outreach to establish comprehensive approaches to healthy housing. This Manual draws upon these efforts and those of subject matter experts, researchers, program managers, state and local officials, representatives of community-based organizations, and advocates for healthy homes.

Substantial savings in health care costs and improved quality of life for occupants can be realized by remediating health and safety hazards in the home. We hope that this Manual will advance the field of healthy housing by providing practical recommendations and guidance to build local program and community capacity.

Contents

Forward	page v
Chapter 1	
Introduction.....	page 1
Focus of the Manual	page 3
Manual Development.....	page 4
Impact of Housing on Health.....	page 4
Health Issues Commonly Addressed by Healthy Homes Programs.....	page 5
Housing Conditions that Post a Risk to Health Status.....	page 6
Vulnerable Populations.....	page 7
What is Healthy Housing?.....	page 8
Seven Principles of Healthy Homes	page 9
Pathways to Healthy Housing.....	page 9
A Variety of Program Approaches.....	page 12
Characteristics of Successful Healthy Homes Programs	page 17
Chapter 2	
Community Involvement in Program Planning	page 23
Identify and Engage Stakeholders.....	page 26
Community Asset Mapping.....	page 26
Coalition Building and Maintenance.....	page 28
Analyze and Share Relevant Data	page 29
Protocols for Assessing Community Excellence in Environmental Health (PACE-EH)	page 31
Building Consensus on Program Priorities.....	page 31
Environmental Justice	page 31
The Community’s Long Term Role.....	page 32
Chapter 3	
Program Design.....	page 37
Program Design Questions.....	page 40
Mainstreaming Healthy Homes Activities.....	page 40
Healthy Homes Program Components	page 41
Program Parameters	page 43

Eligibility Requirements	page 43
Recruitment	page 47
Setting Benchmarks.....	page 47
Recruitment Strategies	page 47
Key Recruitment Partners.....	page 48
Recruitment and Educational Messages.....	page 50
Confidentiality and Ethical Concerns	page 51
Priorities for Assessment and Intervention	page 52
Assessment Considerations	page 52
Intervention Considerations	page 53
Organizational Structure.....	page 57
Staffing	page 57
Clarifying of Roles and Responsibilities	page 58
Budget Priorities.....	page 59
Evaluation and Program Performance Measures.....	page 59

Chapter 4

Housing-Related Health and Safety Hazard Assessment.....	page 65
Resident Interviews	page 68
Purpose.....	page 68
Past Experience	page 69
Interviewer Staffing	page 69
Interviewer Training.....	page 70
Interview Documentation	page 70
Quality Control/Quality Assurance.....	page 71
Managing Confidential Data and Resident Concerns for Privacy	page 71
Interview Tools.....	page 71
Interview Data Security	page 72
Visual Assessment.....	page 72
Purpose—Identify Housing Defects and Causes.....	page 72
Limitations of Visual Assessment and Training Needed.....	page 72
Scope.....	page 73
Sequencing Areas.....	page 73
Healthy Home Rating System.....	page 74
Specific Housing Conditions to Assess Visually	page 76
Moisture	page 76
Exterior Grading and Pooling	page 79
Ground Treatment.....	page 79
Water Pipes	page 79
Ductwork.....	page 79
Flashing	page 79
Condensation.....	page 80
Drains	page 80
Other Moisture Sources.....	page 80
Ventilation System and Combustion Safety.....	page 81
Safety/Injury Hazards	page 81

Falls.....	page 81
Poisoning	page 83
Fire and Burns	page 83
Choking	page 83
Drowning.....	page 83
Suffocation and Strangling.....	page 83
Firearms.....	page 83
Structural Defects.....	page 83
Insulation and Temperature Regulation	page 84
Cleanliness and Clutter.....	page 84
Hoarding.....	page 84
Prioritizing Visual Assessment Results	page 84
Environmental Sampling.....	page 86
Specific Testing Methods	page 88
Testing Ventilation Systems.....	page 88
Moisture Measurement	page 89
Mold Sampling	page 90
Testing for Gases.....	page 90
Testing for Allergens in Settled Dust.....	page 91
Monitoring for Pests	page 91
Sampling for Lead	page 93
Energy Audits	page 93

Chapter 5

Intervention Strategies.....	page 99
Intervention Principles	page 101
Prioritizing Interventions	page 101
Shared Responsibility for Implementing Interventions.....	page 102
Multiple Benefits of Interventions	page 102
Proper Use of Products	page 102
Saving Treatment Costs through Prevention.....	page 102
Choose Evidence-Based Interventions	page 103
Intervention Costs.....	page 103
Principle #1: Keep It Dry	page 104
Review of the Evidence.....	page 104
Structural Interventions.....	page 104
Controlling Building Envelope Leaks.....	page 104
Prompt Repair of Plumbing Leaks	page 106
Safe Cleaning or Removal of Wet or Moldy Items.....	page 106
Appropriate Design, Installation, and Management of Heating, Ventilation, and Air Conditioning (HVAC) Systems.....	page 107
Reporting Moisture and Leak Problems	page 108
Principle #2: Keep It Ventilated.....	page 108
Review of the Evidence.....	page 108
Structural Interventions.....	page 110
Local Exhaust Interventions.....	page 110
General Dilution Ventilation and Heating System Interventions	page 110

Principle #3: Keep It Pest Free	page 111
Principles of Integrated Pest Management.....	page 111
Review of the Evidence.....	page 111
Structural Interventions.....	page 112
Rental Policies and Use of IPM Professional Services.....	page 113
Principle #4: Keep It Safe.....	page 113
Key Principles of Injury Prevention.....	page 113
Falls.....	page 114
Review of the Evidence.....	page 114
Structural Interventions.....	page 115
Burns and Scalds	page 115
Review of the Evidence.....	page 115
Structural Interventions.....	page 115
Other Safety Interventions	page 116
Principle #5: Keep It Contaminant-Free.....	page 118
Asbestos.....	page 118
Lead-Based Paint Hazards	page 118
Combustion Products	page 118
Volatile Organic Compounds (VOCs)	page 118
Radon Control.....	page 119
Particulate Matter	page 119
Second-Hand Smoke.....	page 119
Occupational Take-Home Hazards.....	page 120
Principle #6: Keep It Clean.....	page 120
Review of the Evidence.....	page 120
Structural Interventions.....	page 121
Cleanable Surfaces	page 121
Carpets.....	page 121
Heating, Ventilation, and Air Conditioning (HVAC) Systems	page 121
Adopting a Smoke-Free Policy.....	page 122
Low-Toxicity Cleaners and Safe Use and Storage of Supplies and Equipment	page 122
Portable Air Cleaners	page 123
Principle #7: Keep It Maintained.....	page 123
Structural Interventions.....	page 123
Routine Maintenance Schedule.....	page 124
Cleaning for the Control of House Dust Containing Lead	page 124
Hoarding	page 124
Energy Efficiency.....	page 125
Security.....	page 126
Resident Knowledge and Education	page 126
Introduction.....	page 126
Keep it Dry.....	page 126
Keep it Ventilated.....	page 126
Keep it Pest-Free.....	page 126
Keep it Safe.....	page 127
Keep it Contaminant-Free.....	page 127
Keep it Clean.....	page 127

Keep it Maintained	page 127
Special Focus on Asthma	page 128
Chapter 6	
Evaluating Your Program.....	page 137
Considerations in Planning Evaluation.....	page 140
Setting the Stage.....	page 140
Building the Evaluation Team.....	page 141
Using Logic Models to Build the Evaluation Framework.....	page 142
Assuring High Quality Data	page 144
Best Practices.....	page 144
Common Problems	page 145
Measuring Success.....	page 146
Process Evaluation Measures.....	page 146
Outcome Evaluation Measures.....	page 147
Health and Well-Being Outcomes.....	page 148
Housing Outcomes.....	page 149
Cost Measures	page 149
Disseminating Findings.....	page 151
Chapter 7	
Program Sustainability.....	page 157
Deciding What to Sustain.....	page 160
Tools for Sustainability	page 160
Funding Strategies.....	page 161
Strategies to Improve Organizational Capacity	page 162
Expanding Partnerships.....	page 166
System-level Sustainability—Public Policy	page 166
Final Notes on Sustainability.....	page 168
Glossary	page 173
Abbreviations and Acronyms.....	page 181
Appendices	
Appendix 1.1: Resources—Neighborhood and Community Health and Safety Issues	page 187
Appendix 1.2: Case Study: Opportunity Council, Bellingham, WA, Weatherization Partnership.....	page 189
Appendix 1.3: Case Study: Baltimore City Health Department, Transitioning from Lead to Healthy Housing	page 191
Appendix 1.4: Case Study: Boston Public Health Commission/Boston Inspectional Services Department, Health Care/Clinic and Code Enforcement Partnership.....	page 195
Appendix 1.5: Case Study: Case Western Reserve University School of Medicine Swetland Center for Environmental Health, Healthy Homes and Babies Program.....	page 197
Appendix 1.6: Case Study: Children’s Mercy Hospitals and Clinics, Clinic/Medical	

Partnershippage 201

Appendix 1.7 Case Study: Esperanza Community Housing Corporation,
Community-Based Initiative.....page 205

Appendix 1.8 Case Study: Seattle King County Health Department, Evolution of
a Healthy Homes Programpage 209

Appendix 1.9 Case Study: Cincinnati Children’s Hospital Medical Center, Injury
Prevention Program Modelpage 213

Appendix 1.10 Case Study: Philadelphia Department of Public Health, Healthy
Homes Child Care Programpage 215

Appendix 2.1: Potential Stakeholders and Their Assetspage 219

Appendix 2.2: Data Available from Different Sourcespage 223

Appendix 3.1: Available Educational Materials on Healthy Homes.....page 227

Appendix 4.1: Housing and Health Assessment Tools for Use by HUD’s Healthy
Homes Demonstration Programspage 233

Appendix 5.1: Examples of Healthy Housing Criteria for Housing Rehabilitation
and New Constructionpage 239

Appendix 5.2: Healthy Homes Maintenance Checklist.....page 245

Appendix 6.1: Special Considerations in Human Subjects Researchpage 247

Appendix 6.2: Developing a Healthy Housing Program—Logic Model DRAFTpage 249

Appendix 6.3: Evaluation Design Strategies.....page 251

Appendix 6.4: Window Replacement Cost-Benefit Analysispage 253

Appendix 7.1: Federal Government Resourcespage 257

Appendix 7.2: Comparison of Regulatory Approaches to Healthy Homespage 259

Introduction

Focus of the Manual

Manual Development

Impact of Housing on Health

Health Issues Commonly Addressed by Healthy Homes Programs

Housing Conditions that Pose a Risk to Health Status

Vulnerable Populations

What is Healthy Housing?

Seven Principles of Healthy Homes

Pathways to Healthy Housing

A Variety of Program Approaches

Characteristics of Successful Healthy Homes Programs



1

The Healthy Homes Program Guidance Manual (manual) offers guidance and tools to help users establish or improve healthy homes programs. It covers a broad range of practical information that will be of interest to organizations, programs, and individuals concerned about the need for healthy housing, including:

- Government health, housing, or community development departments
- Community-based organizations
- Community development corporations
- Weatherization or energy efficiency programs
- Academic institutions
- Hospital or medical clinics
- Health care or housing finance agencies
- Organizations that serve special populations, such as seniors, immigrants or the disabled
- Advocacy organizations

Suggested tools, techniques, and systems in this manual represent practices identified as effective, efficient, and realistic. The seven chapters mirror specific features of successful healthy homes programs.

Healthy homes programs are more efficient than single focus programs because they promote cost-efficient housing interventions that address multiple health hazards that are often interrelated. This comprehensive approach can increase the availability of affordable housing,

Key Messages

The manual offer guidance and tools to help establish or improve healthy homes programs.

- Healthy homes programs are defined by their comprehensive approach toward multiple residential health hazards.
- Each principle in the “Seven Principles of Healthy Homes” impacts multiple sources of exposure.
- There is no “one size fits all” in designing healthy homes programs.
- Healthy homes programs encompass multiple strategies and models.

raise housing values, and improve health outcomes by reducing costs associated with uncoordinated housing improvements.^{1,2}

Focus of the Manual

Many factors at the neighborhood and community level affect the health and safety of the home

environment. This manual focuses on the home environment and does not specifically address the neighborhood or community-at-large, or issues such as natural disasters, the built environment, and outdoor air quality. Appendix 1 contains a list of resources related to these broader concerns.

Substandard housing is more likely to contain environmental hazards, and owners and renters of these properties are less likely to have the resources to prevent or remediate these problems. Given these realities, the manual concentrates largely on assuring health and safety in economically distressed housing and promoting cost-effective interventions for affordable housing. It is important to note, however, that no income group is immune to health hazards found in housing. Healthy homes programs should assure that their efforts are viewed as community-wide priorities when they reach to the larger community.

Two companion documents can be used with this manual: the Healthy Homes Reference Manual and the Healthy Homes Inspection Manual. Both provide data and recommendations on specific hazardous conditions that may be found in substandard housing. The Healthy Housing Reference Manual details how specific housing conditions relate to disease and injury.³ The Healthy Homes Inspection Manual addresses the broad range of housing deficiencies and hazards and describes elements of a home inspection.⁴

Manual Development

The U.S. Department of Housing and Urban Development (HUD) Office of Healthy Homes and Lead Hazard Control (OHHLHC) established its Healthy Homes program in 1999. Since that time over 100 Demonstration and Technical Studies grants have been funded. This manual is intended as a “best practices” document that assembles the cumulative knowledge that OHHLHC and other members of the healthy homes (HH) “community” have acquired about effective healthy homes program practices. OHHLHC used several methods to develop this manual:

- An expert panel representing subject matter experts from around the country provided advice and peer review.

- Relevant literature, documents and healthy homes grantee reports were examined to identify best practices.
- Stakeholder interviews were conducted with healthy homes professionals in the field to further document best practices, programmatic challenges and barriers, and address information gaps.
- Case studies were developed to describe model healthy homes programs and their strategies.

The case studies located in Appendix 1, provide examples of various healthy homes program models.

Impact of Housing on Health

The connection between housing and health is well established. Structural defects, indoor air quality, exposure to toxic chemicals and biologic contaminants, and injury hazards are known to affect the health and safety of residents. These conditions can impact or cause lead exposure, asthma and allergies, and unintentional injuries; they may also contribute to the development of cancers, cardiovascular disease, and other illnesses.

Paradoxically, the health and housing agencies charged with addressing these issues are frequently separate organizations, resulting in decreased effectiveness in combating overlapping problems. For example, health departments are responsible for addressing the health effects of exposure to environmental contaminants while building or housing code enforcement agencies have the authority to correct structural deficiencies that may cause illness.

According to HUD’s 2007 American Housing Survey,⁵ almost six million households live with moderate or severe physical housing-related problems. Although anyone can suffer from a housing-related illness and injury, certain groups such as children, the elderly, or individuals with chronic illnesses and disabilities are more susceptible. These problems disproportionately affect lower-income families and specific racial and ethnic groups.⁶

Deteriorated lead-based paint on housing exterior



Health Issues Commonly Addressed by Healthy Homes Programs

The high morbidity and costs of housing-related childhood lead poisoning, asthma, and unintentional injuries have garnered the attention of government agencies and a range of experts. Both the HUD Healthy Homes Strategic Plan, and the Surgeon General's Call to Action on Healthy Homes identify health-related housing conditions as high priorities. Their concern is prompted by the following evidence:

Lead Exposure: Lead-based paint and lead contaminated dust are the main sources of exposure for lead in U.S. children. Childhood lead poisoning results in lower IQ, learning, behavioral and attention problems and, in severe cases, death. According to the Centers for Disease Control and Prevention (CDC), approximately 250,000 U.S. children ages one to five years old (2005–2006) had blood-lead levels greater than the level at which CDC recommended at that time. CDC has recently adopted a reference value of five micrograms of lead per deciliter for children's

blood lead levels.^{8a} Although lead affects children from all social and economic levels, those living at or below the poverty line in older housing (especially homes built before 1940) are at the highest risk for exposure. There are an estimated 11.8 million housing units built before 1940 and 22.9 million built before 1978 with significant lead based paint hazards.⁸ Preventing lead poisoning in children results in cost savings in lost production, medical care, and special education.

Asthma: Asthma affects approximately 23 million Americans. Children under the age of 18 make up over a third, or almost seven million of the affected population.^{9, 10} Asthma particularly affects economically distressed families and minority populations living in substandard housing. Asthma is the leading cause of school and work absences, emergency room visits and hospitalization and incurs an estimated annual economic cost of \$20.7 billion to our nation¹¹. Common allergens and other asthma triggers found in the home, such as dust mites, cockroaches, rodents, mold, and pet dander, can trigger asthma symptoms. Other common triggers include environmental tobacco smoke

and nitrogen oxides from gas stoves.

Unintentional Injuries: Injuries and deaths from falls, fire, drowning, poisoning, suffocation, and choking occur often at home. These injuries are now the leading cause of death and disability among children younger than 15 years old, and also disproportionately affect the elderly.¹² Unintentional home injuries cost society at least \$222 billion per year in medical costs.

Housing Conditions that Pose a Risk to Health Status

In response to the prevalence of these diseases and conditions, both the Surgeon General's Call to Action to Promote Healthy Homes and HUD's Healthy Homes Strategic Plan identified the need to address the following housing

deficiencies:

- **Interior Chemical Contamination:** Air quality is compromised by CO and other combustion byproducts, environmental tobacco smoke, radon, volatile organic compounds (VOC), and allergens. Improper use of pesticides, and unsafe storage of cleaning and pool chemicals are additional common home health hazards. The proper use, maintenance, and venting of heating systems and cooking appliances can decrease exposure to CO and other products of combustion. Lead hazard reduction is effective in reducing lead exposure in children. Safe chemical storage, radon testing and mitigation, use of low VOC alternatives, selection of the least toxic pesticides, and enforcement of indoor smoking prohibitions can successfully protect individuals from harmful exposures.
- **Interior Biological Contamination:** Because

Question: How many unhealthy housing conditions can you identify in this picture?



Answer: Mold, sharp objects, possible lead-based paint hazards, and possible pests.
(This photograph was taken in New Orleans—post hurricane Katrina—in November of 2005.)

damp conditions in the home facilitate the growth of mold, bacteria, dust mites and other pests, it is important to address interior and exterior sources of excess moisture. Effective solutions include sloping soil so water drains away from foundations, repairing and redirecting downspouts, fixing leaks, exhausting kitchen and bathroom vents to the outside, and adequately ventilating homes.

- **Structural and Safety Defects:** Deferred maintenance of old homes, inadequate design of new construction, and lack of safety devices can result in injury, illness, and poor health. Window guards, stair railings, smoke and carbon monoxide (CO) alarms, and reducing the temperature of hot water heaters have all been demonstrated to reduce morbidity and mortality.

Vulnerable Populations

HUD's Healthy Homes Strategic Plan clarifies the extent to which certain populations are affected more significantly by health and housing problems. The burden of housing hazards disproportionately affects certain age groups, races, ethnicities, and varies geographically.

- **Pregnancy:** The many stages of fetal development present the opportunity for developmental harm. Environmental exposures during pregnancy can be detrimental to both the pregnant woman and her unborn baby. Such exposures include cleaning products, pesticides, chemicals in plastics, tobacco smoke, mold, and lead.
- **Age:** In general, children are more susceptible to environmental toxins due to their developing organs and nervous systems. They inhale more air, drink more water, and eat more on a body weight basis than adults. The normal hand-to-mouth and exploratory behavior of young children and babies makes them more vulnerable to environmental hazards, especially to contaminants in dust. Since they may spend up to 80 to 90 percent of their time indoors, the importance of minimizing possible dangers is clear.¹³

Even older persons in good health may experience increased health risks from exposures to environmental pollutants. As we



age, our bodies can become more susceptible to environmental hazards (e.g., CO, tobacco smoke, temperature extremes) that can worsen chronic or life-threatening conditions. Older adults are also more prone to housing-related injuries such as falls. Proper housing design can help prevent some of these episodes such as injuries and falls, and help seniors remain in their homes and function independently rather than moving to assisted living facilities or nursing homes. The U.S. Environmental Protection Agency's (EPA) Aging Initiative contains more information on these alternatives (www.epa.gov/aging/index.htm).

- **Race, Ethnicity, and Income:** Low-income, minority populations are more likely than the general population to live in homes with structural defects and environmental hazards and lack the resources to assure a safe and healthy living environment. When housing costs consume a disproportionate share of income, families have little left over for other basic needs, including food, heat, and health care.^{14, 15} It is hard to be healthy in a home without heat, and hard to be healthy when you have to choose between heating and eating. Healthy homes programs need to promote energy security, food security and housing security and stability by ensuring access to fuel assistance, food stamps, health insurance, energy efficiency benefits and other resources.
- **Geography:** Some hazards are more common in certain geographic locations. For example, the potential for extreme weather conditions and disasters varies across the country. While radon gas levels are found in every state, some areas present higher risks for exposure than others.



What is Healthy Housing?

A healthy home is a home designed, constructed, maintained, or rehabilitated in a manner that supports the health of residents.¹⁶ This broad definition incorporates three interrelated strategies to control or eliminate environmental hazards and assure the health and safety of the home environment. The strategies involve:

- Changes in structural conditions and building practices;

Community Testimonial: Emergency Department Visits No Longer Routine

Imagine you are a mother living in a single room with your husband and five small children, four boys and one girl. The space you occupy with your family is infested with roaches and rats, and there is no central air to cool the hot summers, nor is there heat to warm the cold winters. The kids are constantly getting sick. Some are coughing, some have tummy aches, and others have colds that never end. You repeatedly find yourself in the emergency department in a desperate attempt to cure your child's ills.

When you go home and get a moment to yourself, you feel ashamed because the living environment is causing your family pain. You are ashamed to invite family and friends for dinner because there is nowhere to sit. This was the story of Alejandra C. before she became a tenant of Esperanza Community Housing Corporation (Esperanza).

For 20 years, Alejandra had been a resident in South Central Los Angeles, moving from single room to single room with her husband and five children, which included her son Roberto. When he was in fifth grade Roberto remembers moving into a building on Estrella Avenue. Before Esperanza purchased and renovated the building, Roberto remembers the space being a little bigger than what they had been used to before but still not big enough for a family of seven, "There was no space," he says. "Our parents, my brothers and sister all shared one room. It was hard to go to school and get ready in the morning."

Now think back to when you were 11 years old and you wanted to bring your friends over. If you were Roberto this was unthinkable because of the lack of space. You show up to school with bug bites all over your arms, because the building you live in is infested with bed bugs. One day your mom says "We're moving, they're going to remodel the building." You don't even know who "they" are and you don't know what exactly the move entails but you pack up and leave.

Roberto had no idea that the next time he would move back into the building on Estrella Avenue, he would be walking into a completely renovated three-bedroom apartment. Alejandra says that the emergency department visits were officially over. Gone were the tummy aches and incessant coughs. The bed bugs had also vanished. The family is breathing easier and finding time to consistently go to school and stop missing work.

This is what it means to have healthy housing; this is what it means to transform a life through housing restoration. As Alejandra puts it, "The newly remodeled building gave us our health back." Now Alejandra and her children, including Roberto who is now 21, can enjoy the company of family and friends in their spacious apartment. Alejandra loves seeing Roberto and her other children fraternize in the living room. "Everybody works and goes to school... We're all doing good," she says as her face lights up.

Provided by Esperanza Community Housing Corporation

- Modification of resident and property owners' behaviors; and
- Development or revision of policies, legislation and service systems to enable healthy housing practices.

This definition also exemplifies a comprehensive/ holistic approach rather than focusing on a single health issue, such as lead poisoning prevention, radon exposure or prevention of unintentional injuries.

Seven Principles of Healthy Homes

The comprehensive approach promoted by this manual incorporates multiple interventions, program activities, and resident actions to assure healthy homes. These actions are organized around the “Seven Principles of Healthy Homes” and necessary programmatic capacities related to planning, interventions, evaluation, and sustainability. The Seven Principles were developed by the National Center for Healthy Housing’s National Healthy Homes Training Center (www.healthyhomestraining.org), funded by HUD and CDC.

The Seven Principles are:

Keep it:

1. Dry
2. Clean
3. Safe
4. Ventilated
5. Pest-Free
6. Contaminant-Free
7. Maintained

Because each principle has an impact on multiple sources of exposures, implementation of multiple principles can significantly reduce exposure to hazards. (See Table 1.1) Among the benefits of this comprehensive approach is the shared ownership of problems. Household residents, property owners, government agencies, industries, and communities all have a role to play in addressing these exposures. In addition, following the “Seven Principles of Healthy Homes” can lift individuals and

programs from feeling overwhelmed by a daunting list of problems to feeling confident and energized. The principles offer clear direction for taking concrete action toward specific achievable ends.

Pathways to Healthy Housing

Healthy homes programs use multi-tiered approaches to improve the health and safety of the home environment.

Pathways

- Housing Interventions
 - Individual Behavior Change
 - Community Capacity Building
 - Program Design Improvements
 - Policy Development
- **Housing Interventions.** Changes to the structure and safety of the home environment include lead hazard reduction, mold remediation, leak prevention, improved ventilation, integrated pest management, installation of smoke detectors and CO alarms, improved lighting, radon mitigation, and slip and fall prevention through modifications to stairs, entryways, and bathrooms.
 - **Individual Behavior Change.** Residents or tenants and property owners need to become knowledgeable about the hazards and risks that may exist in their home, how to reduce them, and the importance of preventive maintenance.
 - **Community Capacity Building.** Community, advocacy, and grass roots organizations are important partners in increasing community awareness and healthy homes intervention capacity, and in sustaining program activities. Target communities and the public at large need to be involved in designing, carrying out, and evaluating healthy homes activities.

Program Design Improvements. Healthy homes programs need to assess their capacity, monitor, and evaluate their performance, and make needed

Table 1.1 Relationships among the “Seven Principles,” recommended actions, reduced hazards, and outcomes

Principle	Actions	Hazard and Contaminant Reduction	Associated Health and Other Impacts
Keep It Dry	<p>Water Intrusion: Prevent water from entering the home through leaks in roofing systems, windows, and exterior shell.</p> <p>Drainage Problems: Control ground drainage to prevent intrusion in crawlspaces and basements. Address inadequate gutter and downspout systems.</p> <p>Interior Leaks: Prevent plumbing or sewage leaks or overflows.</p> <p>Humidity: Control humidity from occupant behavior such as use of room humidifiers, and unvented clothes dryers.</p> <p>Exterior Leaks: Respond to water intrusion and leaks, and correct condensation problems on walls, windows, and fixtures.</p>	<ul style="list-style-type: none"> • Cockroaches • Mold • Rodents • Lead-based paint • Dust mites • Termites • Injuries associated with slips, trips and falls • Volatile organic compounds 	<ul style="list-style-type: none"> • Reduction in asthma triggers and respiratory irritants. • Reduction in risk for childhood lead poisoning. • Reduced risk of injuries. • Increased physical comfort and energy efficiency. • Decrease in structural deterioration related to decay and pest damage.
Keep It Clean	<p>Control dust and contaminants.</p> <p>Create smooth and cleanable surfaces.</p> <p>Reduce clutter.</p> <p>Store food in pest-resistant containers.</p> <p>Use wet-cleaning methods and HEPA-equipped vacuum.</p> <p>Address hoarding behavior.</p>	<ul style="list-style-type: none"> • Cockroaches • Rodents • Contaminant residues in dust • Injuries 	<ul style="list-style-type: none"> • Reduction in asthma triggers and respiratory irritants. • Reduction in risk for childhood lead poisoning. • Reduced exposure to contaminants in dust.
Keep It Safe	<p>Store chemicals and medicines out of the reach of children.</p> <p>Add child-safety devices such as cabinet locks, electrical outlet covers and safety gates.</p> <p>Secure loose rugs and keep children’s play areas free from hard or sharp surfaces.</p> <p>Add grab bars in bath, two handrails on stairs, and other measures to prevent falls, especially for seniors.</p> <p>Install smoke and carbon monoxide alarms.</p> <p>Keep fire extinguishers charged and accessible.</p> <p>Assure adequate lighting.</p> <p>Reduce clutter.</p> <p>Avoid circuit overloads and extension cords.</p> <p>Keep water temperature below 120F.</p>	<ul style="list-style-type: none"> • Injuries associated with slips, trips and falls. • Fires • Household chemicals, pesticides, and medicines. • Carbon monoxide poisoning 	<ul style="list-style-type: none"> • Reduced exposure to chemicals and poisonings. • Reduced risk of burns. • Reduced risk of injury, especially to children and the elderly.

Principle	Actions	Hazard and Contaminant Reduction	Associated Health and Other Impacts
Keep It Ventilated	<p>Ventilate bathrooms and kitchens.</p> <p>Use whole house ventilation to provide fresh air.</p> <p>Use active ventilation systems to manage indoor moisture, provide occupant comfort.</p>	<ul style="list-style-type: none"> • Carbon Monoxide • Formaldehyde • Mold and Moisture • Nitrogen Oxides • Radon • Volatile organic compounds 	<ul style="list-style-type: none"> • Reduced respiratory irritation. • Reduction in asthma triggers. • Reduced chemical exposure. • Reduced risk of lung cancer.
Keep It Pest-Free	<p>Make the home less habitable for pests by identifying sources of water, food, and shelter.</p> <p>Remove harborage sites.</p> <p>Seal cracks and openings throughout the home.</p> <p>Address overgrown vegetation.</p> <p>Store food in pest-resistant containers.</p> <p>Monitor for pests and respond with integrated pest management approaches that prevent pests and use lower risk pesticides.</p>	<ul style="list-style-type: none"> • Cockroaches • Mice • Rats • Ants • Bed bugs • Pesticides 	<ul style="list-style-type: none"> • Reduction in asthma triggers and respiratory irritants. • Decrease in bite-related injuries. • Increased physical comfort. • Protection of central nervous system.
Keep It Contaminant-Free	<p>Reduce contaminants coming into the home through purchasing decisions.</p> <p>Limit spread of contaminants.</p> <p>Stop smoking or move smoking outside.</p> <p>Test for radon and, if needed, install a radon removal system.</p>	<ul style="list-style-type: none"> • Environmental Tobacco Smoke • Asbestos • Formaldehyde • Lead-based Paint • Pesticides • Radon • Volatile and semi-volatile organic compounds • Flame retardants • Treated lumber 	<ul style="list-style-type: none"> • Reduced risk of lung cancer. • Reduced respiratory irritation. • Reduced risk for childhood lead poisoning. • Protection of central nervous system. • Reduced developmental hazards.
Keep It Maintained	<p>Inspect, clean and repair the home and its equipment at regular intervals.</p> <p>Change air filters and similar equipment.</p> <p>Respond to problems quickly before minor problems become more serious.</p> <p>Use lead-safe work practices for deteriorated paint in homes built before 1978.</p>	<ul style="list-style-type: none"> • All of the above 	<ul style="list-style-type: none"> • Reduced risk of lung cancer. • Protection of central nervous system. • Reduced asthma triggers. • Reduced risk for childhood lead poisoning. • Increased physical comfort and energy efficiency.

The contents of this table related to hazards and contaminants are not exhaustive. For more detailed information go to http://www.healthyhomestraining.org/Credential/Contaminant_Guide_4-20-09.pdf

changes to assure effectiveness and cost-efficiency. It should be noted that expanding existing infrastructure or enhancing service systems may be more affordable and sustainable than creating new programs and services.

Policy Development. Passage, implementation, and refinements to specific laws, such as lead-based paint ordinances and housing codes, can advance and sustain healthy housing. Codes and ordinances require enforcement to be effective. Program policies such as cross-department and organizational referrals and partnerships can strengthen and expand healthy housing programs.

A Variety of Program Approaches

There is no “one size fits all.” Individual healthy homes program goals, partnerships, health priorities and community assets will determine the design of each initiative. Urban and rural healthy homes programs often look very different based on unique hazards in their respective environments. Effective healthy housing programs are defined by the integration of health and housing services and usually include interagency partnerships that are reflective of federal priorities and practice.

The variety of efforts detailed below are useful to consider in designing or expanding a healthy homes program. In-depth case studies of selected program strategies can be found in Appendices 1.2–1.10.

Transitioning from a lead hazard control program to a healthy homes program

Because of the success and significant funding invested in lead poisoning prevention and lead hazard control programs, many localities have expanded into more comprehensive healthy housing programs that identify and reduce asthma triggers and injury risks and hazards. Transitioning from lead to healthy homes programs requires new partners, staff training, assessments/inspection protocols, and capacity to provide additional interventions such as moisture control, increased ventilation, integrated pest management (IPM) and injury prevention.

Baltimore City Health Department expanded its urban childhood lead poisoning prevention program into a comprehensive healthy homes initiative by adding interventions to reduce asthma risks, injury hazards, carbon monoxide poisoning,

and fire hazards. In 2006, the department established a Healthy Homes Division and appointed an Assistant Commissioner for Healthy Homes to focus on the impact of housing on health. The healthy homes program was developed through pilot testing of new tools and protocols, focus groups with community members, intensive staff training, and expansion of partners to leverage resources, receive and provide referrals for their clientele, and provide healthy homes training to an expanded group of community stakeholders.

Medical-Clinic partnerships

Similar to childhood lead poisoning prevention programs which services are based on specific health criteria (e.g., elevated blood-lead levels), many healthy homes programs identify families for interventions based on asthma diagnosis. In these instances, programs partner with hospitals, health plans, asthma clinics and/or community-based health centers to develop a referral system. The medical facility screens their patients and makes referrals to the healthy homes program for follow-up in the home. It is essential to assure a feedback loop so that the health and medical services provider is aware of healthy homes program services and coordination and medical support are assured.

The City of Boston’s Breathe Easy At Home program, while more than a medical-clinic partnership, is a web-based referral system that allows doctors, nurses, or other health professionals to refer patients with asthma for a home inspection. Inspections are conducted by the Boston Inspectional Services Department, which enforces the sanitary code for housing. Their trained Breathe Easy at Home inspectors identify asthma triggers such as mold and chronic dampness, leaks, pest infestations, drafty doors and windows, lack of heat, poor ventilation, and damaged carpeting. The inspectors also work with property owners to eliminate these poor housing conditions. The web-based system offers ongoing communication between medical, public health and housing partners on the status of the referral and case disposition. The Boston Public Health Commission manages the Breathe Easy Program and provides families with educational home visits and help in managing their asthma if needed. These complementary services are provided by community health workers.

Medical-Legal partnerships

The medical-legal partnership is defined by combining preventive medicine and preventive law to address non-medical issues that influence health and housing. Legal issues affecting health and housing include problems related to public benefits, housing, and utilities, legal (immigrant) status, and personal and family stability. Because doctors and other health care providers are a trusted and credible resource for families, screening for legal issues in the clinical setting can help to detect and resolve legal problems. Pairing a medical partner with a legal partner—usually from legal aid or pro bono support from the local bar association or law school—can ensure that basic family needs are met and result in systems change.

Boston Medical Center is the home of the National Center for Medical-Legal Partnerships (MLP) (www.medical-legalpartnership.org). This program was founded in 1993 to address housing conditions and the nutritional status of asthma patients. The MLP in Boston currently services 1,000 patient-families per year at six community health centers and provides training to health care providers. Other services include legal advice and assistance for patients/families and advocates for improvements in the health care and legal service delivery systems.

The Medical Legal Community Partnership (MLCP) in Los Angeles is composed of St. John's Well Child and Family Center and Esperanza Community Housing Corporation. The combined effort educates medical providers on the social determinants of health, provides legal advocacy to patients on non-medical issues affecting health status, and works strategically to bring about systematic change to improve the health of the community. Over a two-year period, the program opened 684 cases; one-third were related to health program eligibility and services, and two-thirds primarily related to such housing issues as habitability, evictions, affordability and foreclosures.

Education

Repeated home visits by health educators, even without structural interventions, can let residents know about specific health and safety hazards in their home environments and help them plan actions to reduce risks. Use of community health

workers or community Promotoras de Salud with similar backgrounds as the residents increases trust, facilitates entry to housing units, and builds long-term relationships. Small scale incentives, such as distribution of smoke and carbon monoxide alarms, pest control products, and mattress and pillow covers, should be considered to reinforce and motivate behavior change. There are a myriad of existing home visitation programs that can be explored for incorporation of healthy homes education and assessment.

Seattle and King County Healthy Homes Project compared a single home visit by a trained community health worker with a higher intensity intervention consisting of four to eight visits to homes of asthmatic children. The study demonstrated that both groups of residents benefited from the home visit experience, but that substantially greater improvements in caregiver quality of life and reductions in use of urgent medical care services were associated with the high-intensity services.

Esperanza Community Housing Corporation (Esperanza) in south Los Angeles uses Promotoras de Salud who are residents of the target area to conduct community outreach, visual assessment, environmental sampling, education, tenant rights advocacy, clinic coordination, and referral to city and county code enforcement services. A promotora is a community health advocate who has been trained in a six month-long comprehensive community health curriculum followed by extensive training in healthy homes issues. Esperanza is truly a grassroots effort whose establishment resulted from an organizing campaign by community residents. With its clinical partner St. John's Well Child and Family Center, Esperanza has developed a system in which clinicians can refer cases to a promotora for an environmental home visit and case management.

Housing agency-based

Housing agencies can provide meaningful leadership for healthy housing initiatives. Location in a housing department can provide access to federal and state housing programs and funding such as Community Development Block Grants (CDBG) and the Weatherization Assistance Program. Key to the success of these programs is partnerships with public and private sector health

programs and service providers.

The City of Phoenix Neighborhood Services Department provides leadership for a healthy homes program that leverages financial support through set-asides within their existing housing programs. The program established relationships to receive referrals of families with elevated blood lead levels, asthma, or injuries stemming from known or suspected housing hazards. Securing commitment from department leadership was central to achieving the program's priorities. Significant problem solving occurred to integrate the need for timely health services with longer term and more comprehensive housing rehabilitation.

Elderly programs

Older adults have particular needs for safe and affordable home environments. Preventing unintentional injuries—especially falls and poisonings—through education, medication management support, and retrofitting homes for safety is especially critical for this population. Older adults often subsist on fixed incomes and may not have the financial resources for home repairs and rising utility costs. In addition to interventions such as installation of hand railings on stairs, grab bars in bathrooms and adequate lighting, community education programs can be highly effective in addressing home health and safety issues affecting seniors. Education should be provided at locations that are accessible and comfortable for older adults, allow time for adequate discussion, and provide options for additional services. The U.S. Department of Health and Human Services (HHS), HUD, and EPA are committed to promoting better ways for older adults to remain in safe and healthy homes and “age in-place.”

Rural programs

Rural healthy homes programs focus on unique issues such as well water protection, household wastewater management including septic systems design, fertilizer and pesticide use and storage, and agriculture-related injuries. These programs also address typical issues like lead-based paint, radon, natural disasters, and mold and moisture.

The University of Rhode Island Cooperative Extension Water Quality Program works in cooperation with the Rhode Island Department

of Health (RIDOH), private licensed water testing laboratories, and the Ground Water Association comprised of licensed well drillers to assure the safety of well water. The program includes education of private well owners about the importance of regularly testing their well water, professional training and networking, and phone consultation. The RIDOH recently established regulations that require testing private wells at the sale of property or when a new well is installed.

State programs

In addition to city or county healthy homes programs that usually target specific high risk neighborhoods, state governments have begun to provide leadership for advancing healthy housing initiatives. Rhode Island has developed a five-year work plan to facilitate integration of state health and housing services and programs. Maryland builds healthy homes goals into its state and local sustainability plans. New York State has a Healthy Neighborhoods Program that provides home education on safety, pests, asthma triggers, and lead and visual assessment visits to selected neighborhoods.

New York State Healthy Neighborhoods Program (HNP) provides in-home assessments and interventions to improve the environmental health and safety of residents residing in high-risk target communities in ten counties. The HNP is delivered by local health departments and relies on a variety of strategies to recruit participants including door-to-door canvassing and referrals from other health and housing programs. Homes are assessed for hazards related to fire safety, lead poisoning, carbon monoxide poisoning, indoor air quality, pests/vermin, mold and moisture, tobacco use, and other common environmental health issues. During the home visit, residents are provided with education, products, and referrals to help them correct or minimize each potential hazard. This approach relies heavily on strong local partnerships to ensure that resources are in place to help residents deal with the wide variety of environmental health and related social issues identified during a typical visit. Twenty-five percent of the homes are visited again after 90 days to reassess conditions and to provide additional interventions as needed. A comprehensive program evaluation is underway.

Despite the fact that injuries are a leading cause of illness and death in the United States, home interventions to prevent injuries are often overlooked. Efforts aimed at addressing injuries include attention to fire safety through smoke alarms and escape plans, retrofitting homes to prevent falls, poisoning prevention through proper storage, and safety education.

Cincinnati Children's Hospital Medical Center developed an injury prevention program as part of a larger research project targeted to homes of young children from birth through four years of age. This initiative is validating the benefits of its Home Observations and Measures of the Environment (HOME) Injury Survey, a 55-item tool that quantifies unintentional injury hazards in the indoor environment of homes with young children. After the injury assessment is completed, recommended interventions are reviewed with parents who participate in prioritizing interventions. Consumer product safety devices are then installed by project staff.

Child care programs

Based on the disproportionate burden of environmental hazards on children, home-based

child care programs offer a strategic opportunity for healthy housing partnerships. Home-based child care programs located in high-risk target areas can be targeted for education and housing interventions to protect large numbers of children. Priority interventions may include lead hazard reduction, child safety installations such as railings and gates, assurance of product (toys) safety, crib safety, and safer cleaning products, and focus on asthma, allergies, and indoor air quality.

The Philadelphia Department of Health's Healthy Homes Child Care Program provided education and remediated lead and safety hazards in licensed home-based child care programs located in an area of the city with old and deteriorating housing stock serving low-income children. The Pennsylvania Department of Public Welfare's Office of Child Development provided a list of certified child care providers located in the target area, and interagency agreements facilitated partnerships with the Philadelphia Early Childhood Collaborative and Pennsylvania's Keystone Stars, which promotes quality improvement in early learning of school-aged children. The project also integrated established procedures from Philadelphia's Lead Hazard Control, Healthy Homes and Lead-Safe Babies Programs. Activities were aimed at safety, indoor air quality, energy efficiency, integrated



pest management, and lead hazard control. Over a three-year period, more than 150 child care providers received intensive continuing education on safety, lead, pest management, and asthma, and 50 child care homes were remediated.

Energy efficiency and weatherization partnerships

The U.S. Department of Energy funds Weatherization Assistance Programs that are managed by states through Community Action Agencies (CAA) to improve energy efficiency. By leveraging work with weatherization programs, health and housing departments can take advantage of weatherization staff expertise on how to address whole-house ventilation and other issues. In turn, weatherization staff and their recipients (e.g., low-income families) can benefit from comprehensive healthy housing assessments and interventions.

The Opportunity Council of Bellingham, Washington, is a CAA which houses a weatherization and Head Start program. The organization targeted low-income families with children suffering from asthma and ten home-based child care providers who served those children for intensive education, weatherization, and rehabilitation. All staff, including weatherization professionals, Head Start, and social service home visitors, were trained on program elements. Families received specialized education on how the home functions as a system and were given supplies to use in the home to reduce asthma triggers (e.g., cleaning kits, HEPA vacuums, and other items). The homes benefited from enhanced ventilation and pollution mitigation services. Visual assessments and family interviews were conducted before and six months after renovation. The program reported improvements in the children's asthma symptoms, and an unexpected benefit of reduced turnover in the units. The average cost of improvements was \$5,600 per unit.

The Green and Healthy Homes Initiative (GHHI) is a project of the National Coalition to End Childhood Lead Poisoning with support from HUD and the CDC. It is a social innovation that breaks down funding restriction barriers between federal, state, local and philanthropic resources. A number of project sites are being funded by establishing new public-private foundation partnerships. The goal of GHHI is to align funding sources, coordinate



resources and train workers to advance a “whole house” strategy. Integrated green and healthy housing assessment and interventions focus on environmental health, safety and energy efficiency.

Code enforcement partnerships

Housing codes originally dealt with health problems and were the responsibility of health departments to enforce. However, the reality is there will never be enough government funding to make all homes healthy. Updating and enforcing housing codes are effective ways of leveraging property owner and public resources and building sustainability of healthy homes programs. Any type of agency partnership will require cross-training of staff and will benefit from regular problem-solving meetings. Some municipalities focus their joint sessions on case reviews to build consensus on effective strategies. Other partnerships use different approaches. The aim is to avoid duplicating activities, coordinate mutual resources, and maximize the effectiveness of interventions. Partnership strategies include:

- Deputizing health department staff to enforce the housing code.
- Referring housing code violations observed during health department home visits to housing code enforcement officials. The two departments can then collaborate on carrying out needed work.
- Conducting joint health department and code inspection home visits to assess conditions and develop a collaborative response.

The Columbus, Ohio Health Department has the authority to enforce housing codes. Because of limited staff capacity, they coordinate with the Columbus Department of Development to conduct joint inspections and enforce orders if the property owner isn't initially responsive.

The Multnomah County, Oregon, Health Department used its Healthy Homes Demonstration grant to facilitate policy and systems changes that integrate healthy homes concepts into the daily work of government housing programs. The City of Gresham established a program requiring annual inspections of rental housing units. The City of Portland Quality Rental Housing Workgroup changed the city's housing code and enforcement procedures. Multnomah County itself passed a resolution related to improving rental housing conditions in unincorporated areas of the county.

Characteristics of Successful Healthy Homes Programs

In addition to insights garnered from high-functioning healthy homes programs, other documents identified key characteristics of effective programs.^{17, 18} These qualities include:

- **Planning:** Allow adequate time for community and program planning.
- **Community Involvement:** Involve the community in program planning, implementation, and evaluation.
- **Clinic/Medical Connections:** Engage hospitals and clinics as resources for identifying at-risk families in need of healthy homes interventions, monitoring, and education. Determine if a Pediatric Environmental Healthy Specialty Unit is located in your community. www.aoec.org/PEHSU/index.html
- **Leadership:** Recognize that community and program leadership is crucial to effective healthy homes programs. Identifying program champions inside collaborating organizations is especially important. One inspired leader can make a difference.
- **Partnerships and Coalitions:** Build and maintain collaborations across a wide variety of multidisciplinary programs. Partnerships among healthy homes programs are mandatory to assure

a comprehensive and sustainable approach.

- **Policy Development:** Focus on the policies, legislative infrastructure, and building code changes and enforcement that can support healthy homes programs, enable structural changes to housing, and strengthen sustainability.
- **Evaluation:** Plan for program evaluation during the program design phase. Regular data collection and analysis are central to assuring cost-effective health and housing outcomes and fidelity to program policies and procedures.

In addition to the above key characteristics, successful healthy homes programs must also focus on the following:

- **Improvements in the Delivery of Services to Residents:** Look for opportunities to make programmatic changes that can streamline intake processes and restructure service delivery systems to integrate interventions and better leverage the use of available resources for residents, such as by identifying and braiding federal, state, philanthropic, and other private sector resources.
- **Sustainability:** Make sustainability a fundamental component of the initial and ongoing program plans. Ultimately, sustainability involves learning from experience (ongoing evaluation), making decisions about which elements of the program to sustain, selecting the right strategies, and using the right tools to build support for your program.

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