

Oklahoma Healthy Homes Initiative

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ABSTRACT

Compelling scientific evidence suggests that a strong association exists between housing-related hazards and the health and safety of their residents. Health, safety, and environmental hazards (such as asthma and allergy triggers), unintentional injury hazards, lead-based paint hazards, and poor indoor air quality are interrelated with substandard housing conditions. This article describes a Healthy Homes initiative to address these hazards in a coordinated fashion in the home, rather than taking a categorical approach, even in the presence of multiple hazards. It also provides an overview of Oklahoma's Healthy Homes initiative and its pilot project, the Tulsa Safe and Healthy Housing Project, which is currently administered in Tulsa in collaboration with Children First, Oklahoma's Nurse-Family Partnership program. This pilot project seeks to open new areas of research that can lead to a greater understanding of environmental health issues related to substandard housing in the United States, which will eventually make homes safer and healthier.

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In 1999, the U.S. Department of Housing and Urban Development (HUD) launched its Healthy Homes Initiative (HHI) to address diseases, injuries, and unhealthy conditions related to substandard housing.^{1,2} The HHI is a comprehensive approach to address a broad range of housing deficiencies and hazards in a coordinated fashion rather than taking a categorical approach to health and safety hazards in the home, even in the presence of multiple issues.^{2,3}

Several federal agencies, including the Centers for Disease Control and Prevention (CDC), have turned their attention to the HHI and have begun collaborating with HUD to investigate the causal relationships between housing and health.² On June 9, 2009, then Acting Surgeon General Steven K. Galson issued *The Surgeon General's Call to Action to Promote Healthy Homes*.^{3,4}

OKLAHOMA HEALTHY HOMES INITIATIVE

In response to the shift in focus of federal agencies to the HHI, the Oklahoma Childhood Lead Poisoning Prevention Program (OCLPPP) also began developing the capacity to meet this challenge. In partnership with the National Center for Healthy Housing (NCHH) and East Central University in Ada, Oklahoma, OCLPPP has offered the course Essentials for Healthy Homes Practitioners five times since May 2008. This two-day course is designed for professionals who routinely visit clients in their homes. The training is focused on reviewing Healthy Homes issues and challenges, including what conditions must be present to make a home healthy and how to recognize visible environmental health and safety hazards. In November 2008, OCLPPP offered another Healthy Homes course, Launching a Healthy Homes Initiative, targeted toward health and housing leaders and decision makers seeking to establish Healthy Homes programs and activities in their communities.⁵

In partnership with NCHH, the National Environmental Health Association (NEHA) offers the Healthy Homes specialist certification to recognize health and housing professionals with expertise in the area of Healthy Homes.⁶ As of June 18, 2010, 531 individuals—including 18 from Oklahoma—have been certified since 2007, when the credential was first offered.

These courses have put OCLPPP on the path to solidifying Healthy Homes alliances and providing the basis for skills development in specialized areas of environmental hazards identification and control to approximately 300 health and housing professionals in Oklahoma.

TULSA SAFE AND HEALTHY HOUSING PROJECT

In 2009, CDC selected OCLPPP as one of six sites in the nation for its two-year Healthy Homes pilot project, Building Strategic Alliances for Healthy Housing Pilot. Oklahoma's project, the Tulsa Safe and Healthy Housing Project, is currently administered in collaboration with Children First (C1), Oklahoma's Nurse-Family Partnership (NFP) program and a longtime partner of OCLPPP.

Both C1 and OCLPPP are housed within the Oklahoma State Department of Health. OCLPPP has been providing training on childhood lead poisoning and its prevention to C1 nurses for the past five years, as part of their required continuing education. Several C1 nurses have attended the Essentials of Healthy Homes for Practitioners course.

The C1 program is based on the NFP initiative, a highly acclaimed, evidence-based community health and nurse home-visitation program with partnering sites in 32 states.⁷ The NFP initiative meets the congressionally established Top Tier evidence standard.⁸

C1 registered nurses provide services to first-time mothers and their families during pregnancy and up to two years after the child is born.⁹ To enroll in the program, clients must be ≤ 29 weeks pregnant and meet the same income eligibility criteria as required for the Special Supplemental Nutrition Program for Women, Infants, and Children and Medicaid. These young, low-income C1 clients are likely to have poor birth outcomes due to a combination of multiple factors including age, race/ethnicity, high-risk behaviors, socioeconomic status, lack of health insurance, and environmental exposures. The impact of substandard and inadequate housing and living conditions on this population, who are already at high risk for adverse health outcomes, can be significant.

OPERATIONAL APPROACH

Training of C1 nurses

During the first year, 25 C1 nurses in Tulsa will attend the National Healthy Homes Training Center and Network's (NHHTC) one-day course, Healthy Homes for Community Health Workers.⁵ The nurses will be trained on Healthy Homes principles and how to educate clients about the connection between health and housing (Figure). NHHTC's one-page assessment form, Visual Survey Report (VSR), has been adapted for the C1 nurses to collect information on visually evident structural problems and hazards during client visits.

Figure. Housing and health hazards matrix used in training Children First nurses for their role in the Tulsa Safe and Healthy Housing Project

Housing and health hazards and their sources	Health effects	Data and statistics	Related to Healthy Homes principles?	Related to Healthy People 2010 objectives?	Related to International Property Maintenance Codes?
<p>Allergens and asthma</p> <p>Dust mites, roaches, mouse dander, environmental tobacco smoke, and mold are the most common household allergens that could lead to the development of asthma and/or trigger asthma attacks.</p>	<p>Allergens can lead to the development of asthma and/or trigger asthma attacks. Asthma is the second most prevalent chronic condition among children and the leading cause of school absences from a chronic illness among children 5-17 years of age.</p>	<p>In 2007, the national Kids Count Program ranked Oklahoma highest in the nation (along with Ohio, Connecticut, Kentucky, and Alabama) for percent of children with asthma problems. In 2008, Tulsa, Oklahoma, was ranked the second-worst city in the U.S. for those suffering from asthma by the Asthma and Allergy Foundation of America. In 2007, annual medical expenditures due to asthma medical care totaled \$14.7 billion, and lost productivity accounted for approximately 3% of total health-care costs.</p>	<p>Keep it dry. Keep it clean. Keep it pest-free. Keep it contaminant-free.</p>	<p>HP 2010 Objective 8-16: Reduce indoor allergen levels. HP 2010 Objective 24-1: Reduce asthma deaths. HP 2010 Objective 24-2: Reduce hospitalizations for asthma. HP 2010 Objective 24-3: Reduce hospital emergency department visits for asthma. HP 2010 Objective 24-4: Reduce activity limitations among persons with asthma. HP 2010 Objective 24-5: Reduce the number of school or work days missed by persons with asthma due to asthma.</p>	<p>IPMC 305.1: General IPMC 302.1: Sanitation of garbage IPMC 307.1: Accumulation of rubbish IPMC 503.4: Floor surface IPMC 308.1: Infestation IPMC 302.5: Rodent harborage IPMC 304.14: Insect screens IPMC 308.2: Owner IPMC 308.3: Single occupant IPMC 308.4: Multiple occupancy IPMC 308.5: Occupant</p>
<p>Lead-based paint hazards</p> <p>Residential lead-based paint and lead-contaminated dust and soil found in pre-1978 homes are the most common sources. According to the findings of the 2001 National Survey of Lead and Allergens in Housing, there were 4.8 million U.S. homes with household incomes <\$30,000 and one or more children <6 years of age. Of these homes, an estimated 1.6 million (34%) had significant lead-based paint hazards. Thus, one in three homes with young children has significant lead-based paint hazards.</p>	<p>Lead-based paint exposure can cause developmental problems, lower IQ, behavioral disorder, learning problems, language delay, anemia, and damage to the kidneys and nervous system. Exposure in pregnant females can lead to adverse health effects in their unborn children, such as preterm birth, decreased gestational maturity, lower birth weight, and reduced postnatal growth.</p>	<p>CDC estimates approximately 250,000 U.S. children <6 years of age have elevated blood lead levels (≥10 µg/dL). According to the latest National Health and Nutrition Examination Survey (1999-2004), elevated blood lead level prevalence among U.S. children is 1.4%. In Oklahoma, elevated blood level prevalence was 0.5% in 2009.</p>	<p>Keep it dry. Keep it clean. Keep it contaminant-free. Keep it maintained.</p>	<p>HP 2010 Objective 8-1: Reduce the proportion of persons exposed to air that does not meet the U.S. EPA's health-based standards for harmful air pollutants. HP 2010 Objective 8-11: Eliminate elevated blood lead levels in children. HP 2010 Objective 8-22: Increase the proportion of persons living in pre-1950s housing who have been tested for the presence of lead-based paint.</p>	<p>IPMC 304.2: Protective treatment IPMC 304.6: Exterior walls IPMC 305.3: Interior surfaces</p>
<p>Carbon Monoxide</p> <p>CO is produced by the incomplete combustion of gas, oil, or wood. Any malfunctioning fuel-burning appliance is a source of CO. Car exhaust is another source of CO exposure.</p>	<p>CO can cause: fatigue in healthy people and chest pain in people with heart disease; at low concentrations, headaches, dizziness, confusion, and nausea; at higher concentrations; and death, at very high concentrations.</p>	<p>Every year, CO poisoning accounts for more than 500 deaths and approximately 15,000 hospital ER visits in the U.S. In Oklahoma, from 1994 to 2003, there were 291 CO-related deaths (29 deaths each year).</p>	<p>Keep it ventilated. Keep it safe. Keep it maintained.</p>	<p>HP 2010 Objective 8-1: Reduce the proportion of persons exposed to air that does meet the U.S. EPA's health-based standards for harmful air pollutants.</p>	<p>IPMC 603.2: Removal of combustion products IPMC 305.4: Water heating facilities IPMC 603.2: Combustion air</p>

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Figure (continued). Housing and health hazards matrix used in training Children First nurses for their role in the Tulsa Safe and Healthy Housing Project

<p>Unintentional injury hazards (falls, poisonings, suffocations, drownings, fires, and burns)</p> <p>Most of the unintentional injuries tend to occur at home and are completely preventable. According to the Home Safety Council, the home is the second most common location of unintentional fatal injuries, ranked only below motor vehicle deaths. Approximately 20% of all injury deaths occur inside the home. Hazards include unsecure stairways and other walking surfaces, windows without locks or safety guards, unsecure handrails, electrical system hazards, insufficient lighting, malfunctioning smoke and CO detectors, improper storage/labeling of hazardous household products.</p>	<p>Unintentional injury hazards are the leading cause of death for people 1-44 years of age and the leading cause of years of potential life lost for people <65 years of age. In 2006, falls were the leading cause of death for individuals >65 years of age in the U.S. and Oklahoma. Poisoning and falls were the second and third leading causes of all unintentional injury deaths for all ages in the U.S. and Oklahoma. Unintentional injuries were the leading cause of years of potential life lost in individuals <65 years of age in the U.S. and Oklahoma.</p>	<p>According to the CDC's Web-based Injury Statistics Query and Reporting System data from 2006:</p> <p>In the U.S., 179,065 people died from all types of injuries, with unintentional injuries accounting for 121,599 (67.9%) deaths (age-adjusted rate: 39.8 deaths per 100,000 population). In Oklahoma, 2,864 people died from an injury, with unintentional injuries accounting for 2,039 (71.2%) deaths (age-adjusted rate: 56.1 deaths per 100,000 population).</p>	<p>Keep it safe. Keep it maintained.</p>	<p>HP 2010 Objective 15-13: Reduce deaths caused by unintentional injuries. HP 2010 Objective 15-14: Reduce emergency department visits for nonfatal unintentional injuries. HP 2010 Objective 15-25: Reduce residential fire deaths. HP 2010 Objective 15-26: Increase functioning residential smoke alarms. HP 2010 Objective 15-27: Reduce deaths from falls. HP 2010 Objective 15-28: Reduce hip fractures among older adults. HP 2010 Objective 15-29: Reduce drownings.</p>	<p>IPMC 304.10: Stairways, decks, porches, and balconies IPMC 304.13: Window, skylight, and door frames IPMC 304.18: Building security IPMC 304.18.2: Windows IPMC 305.2: Structural members IPMC 305.4: Stairs and walking surfaces IPMC 305.5: Handrails and guards IPMC 306.1: General IPMC 402.2: Common halls and stairways IPMC 604.2: Service IPMC 604.3: Electrical system hazards IPMC 605.2: Receptacles IPMC 605.3: Lighting fixtures</p>
<p>Radon</p> <p>The main sources of radon inside a home are the soil and the water supply. Radon from soil is the main cause of radon problems and can get inside through cracks in solid floors, construction joints, cracks in walls, gaps in suspended floors, gaps around service pipes, and cavities inside walls.</p>	<p>Radon is the leading cause of lung cancer among non-smokers and the second leading cause of lung cancer in the U.S., responsible for 21,000 deaths every year.</p>	<p>State- or national-level radon mortality data is not available. U.S. EPA recommends homes be fixed if the radon level is ≥ 4 pCi/L. In 2008, 13% of the homes in Oklahoma that had tested indoor air for radon had levels ≥ 4 pCi/L.</p>	<p>Keep it ventilated. Keep it contaminant-free. Keep it maintained.</p>	<p>HP 2010 Objective 8-18: Increase the proportion of persons who live in homes tested for radon concentrations. HP 2010 Objective 8-19: Increase the number of new homes constructed to be radon resistant.</p>	<p>IPMC 304.2: Protective treatment IPMC 304.5: Foundation walls IPMC 304.6: Exterior walls</p>
<p>Environmental tobacco smoke or secondhand smoke</p> <p>ETS is the combination of smoke given off by the burning end of a tobacco product and inhaled by the smoker.</p>	<p>ETS is a known human carcinogen. Children exposed to secondhand smoke are at an increased risk of sudden infant death syndrome, ear infections, colds, pneumonia, bronchitis, and more severe asthma.</p>	<p>According to the EPA and the American Lung Association, every year, approximately 53,800 Americans die from secondhand smoke. In Oklahoma, 700 people die every year from secondhand smoke.</p>	<p>Keep it ventilated. Keep it contaminant-free.</p>	<p>HP 2010 Objective 27-9: Reduce the proportion of children who are regularly exposed to tobacco smoke at home. HP 2010 Objective 27-10: Reduce the proportion of non-smokers exposed to environmental tobacco smoke.</p>	<p>IPMC 403.1: Habitual spaces IPMC 403.4: Process ventilation</p>
<p>Mold and moisture</p> <p>Mold can enter through open doorways, windows, vents, and heating and air conditioning systems. Mold often grows in damp or wet areas. Uncontrolled humidity can also be a source.</p>	<p>Mold can trigger asthma attacks. It also results in upper respiratory tract symptoms, coughing, wheezing, and hypersensitivity pneumonitis.</p>	<p>State- or national-level data on mold is not available.</p>	<p>Keep it dry. Keep it ventilated. Keep it maintained.</p>	<p>HP 2010 Objective 8-23: Reduce the proportion of occupied housing units that have moderate or severe physical problems.</p>	<p>IPMC 302.2: Grading and drainage IPMC 304.7: Roofs and drainage IPMC 304.6: Exterior walls IPMC 304.2: Protective treatment</p>

HP = Healthy People
IPMC = International Property Maintenance Code
IQ = intelligence quotient
CDC = Centers for Disease Control and Prevention
 $\mu\text{g}/\text{dL}$ = microgram per deciliter
EPA = Environmental Protection Agency
CO = carbon monoxide
ER = emergency room
pCi/L = picocuries per liter
ETS = environmental tobacco smoke

Client recruitment and retention

OCLPPP will evaluate the completed VSR forms and select 25 eligible clients for an in-depth home assessment during the first year, based on factors identified through the VSR form, including housing age and hazards. Some of them will likely be Spanish-speaking, as a significant portion of Tulsa C1 clients are Hispanic (27% in 2009) and receive services from bilingual C1 nurses. These clients will receive Healthy Homes assessments from OCLPPP's bilingual case manager, who also holds NEHA's Healthy Homes specialist certification.

Community outreach programs, including home-visitation programs, can struggle with client retention, and C1 is no exception.¹⁰ However, the intensive level of support provided by highly trained and experienced registered nurses in guiding many low-income, first-time mothers during a challenging phase of their lives develops a trusted partnership between them, which can help in maximizing client retention.

Home assessments

The Pediatric Environmental Home Assessment form developed by NHHTC has been adapted to collect baseline data on general housing characteristics, home environment, sleep environment, home safety, and indoor pollutants during the home assessments. Additionally, tools such as carbon monoxide meters, carbon dioxide meters, moisture meters, lead-dust test kits, and borescopes will be used during home assessments to determine the presence of certain hazards. Following assessment and identification of health and safety hazards, C1 nurses will provide families appropriate low-cost health and safety items, including smoke alarms, carbon monoxide alarms, safety latches, nonslip area-rug pads, safety gates, night-lights, bathroom spout covers, infant bath pads, bathroom safety kits, anti-scald devices, oven locks, sticky mats for doorways, table edge guards, window guards, furnace filters, crawling-insect traps, humane mouse traps, crib mattress encasements, and steam vacuums. These items were chosen specifically because they can easily be transported to another residence if the family moves. C1 nurses will provide installation assistance and will educate families on how to reduce exposure to housing and safety hazards by following the seven Healthy Homes principles (i.e., keep it dry, clean, ventilated, pest-free, safe, contaminant-free, and maintained).⁵

Action plan

OCLPPP will develop a client-specific action plan for the client and the C1 nurse assigned to the client based on the home-assessment findings. The action plan will identify areas of concern inside the home and goals

the family can set to improve the environmental safety of their homes. Achievement of these goals will serve as a source of positive reinforcement for the family as they begin developing a feeling of security about their success in improving their health, as well as their housing-safety profile.

Referral partnerships

Assistance will be provided in connecting families with community and government programs for services beyond the project resources. OCLPPP has been allied with partners such as the city of Tulsa's Working in Neighborhoods department, the Tulsa Health Department's Environmental Health Services division, the American Lung Association of the Central States, and the Community Action Project of Tulsa County.

The Working in Neighborhoods department includes a Neighborhood Inspections section, which enforces nuisance and zoning ordinances to help maintain the highest level of safety and health standards in neighborhoods, and a Housing section, which oversees the city's housing assistance programs and property maintenance enforcement. The Working in Neighborhoods department offers grant and loan programs to owner-occupants of low to moderate income who reside in the city of Tulsa. Areas of service include lead-based paint, electrical, plumbing, security (doors and windows), roofs, heating, interior issues, and weatherization.

The Tulsa Health Department's Environmental Health Services division inspects existing structures to ensure and enforce certain minimum building standards that must be in place if the structure is occupied or used. The standards include, but are not limited to, requirements pertaining to sanitation, maintenance, and electrical, mechanical, and plumbing systems.

The American Lung Association of the Central States offers a variety of programs in Tulsa and throughout the central U.S. states to prevent, protect against, and control lung diseases in adults and children. Some of the programs currently offered in Tulsa include Breathe Smart from the Start, Freedom from Smoking, and Not on Tobacco.

The Community Action Project of Tulsa County is a comprehensive anti-poverty agency with a history of providing a variety of services to low-income individuals and families, including access to safe and affordable housing in Tulsa County, including the city of Tulsa. The agency is a charter member of NeighborWorks, a national network of more than 230 community-based organizations in 50 states dedicated to creating healthy communities. As the primary designated Head Start agency for Tulsa County, the Community Action

Project has 14 Early Head Start and Head Start centers in Tulsa.

Follow-up visit

Three months after the initial home assessment, C1 nurses will conduct a follow-up home visit with the client to administer a three-month follow-up survey individually designed for that client, based on the specific hazard reductions completed. Additional follow-up visits can be provided as needed.

Year two

After putting the infrastructure in place for the Tulsa Safe and Healthy Housing Project in year one, OCLPPP will expand the Healthy Homes assessment and hazard-reduction activities from 25 to 50 at-risk homes in year two. A refresher course in healthy housing principles will be offered to the C1 nurses, and partnerships and collaborations will be enhanced for the continuation of the project. Referral networks and services provided through community and government programs will be expanded where appropriate.

Data entry

Data collected during initial and follow-up visits will be entered into a Microsoft® Access database and regularly monitored to guarantee that comparable data are collected.

Potential challenges

Anticipated challenges include landlord-tenant issues and the possibility of rental clients suffering retaliatory eviction after reporting a problem needing remediation to the landlords. OCLPPP will refer these clients to the Tulsa Health Department's Environmental Health Services for environmental inspections. Clients can potentially be protected from retaliatory eviction if health and safety hazards are identified and documented in environmental inspection reports.

Other concerns could be maintaining contact with highly mobile clients and loss to follow-up, although the close association of C1 nurses with the clients can keep the retention rates higher.

Finally, the three-month follow-up visits could prove insufficient, as research has shown that greater beneficial effects are found in home-visitation programs of longer duration.¹¹

EVALUATION

Evaluation measures have been developed to demonstrate the project's progress and intended health and housing improvement. Data collected from initial and

follow-up visits will be compared and analyzed to determine improvements in the health and housing-safety profile of the family. Improvements may include behavior changes, such as reducing or eliminating sources of pest infestation and proper storage of hazardous household products, or reduction in the severity of asthma symptoms.

CONCLUSION

The Tulsa Safe and Healthy Housing Project has the potential to open up new areas of research that can lead to greater understanding of best practices to make homes healthier and safer in the U.S. On March 23, 2010, the Patient Protection and Affordable Care Act was signed into law. The Maternal, Infant, and Early Childhood Home Visiting Program, which was created as part of the Act to support evidence-based programs focused on improving the well-being of families with young children, was also modeled on the NFP initiative. Both C1 and OCLPPP's Tulsa Safe and Healthy Housing Project are multidimensional, holistic programs focusing on various aspects of the family's health and safety. It seems reasonable that such a partnership, characterized by evidence-based preventive interventions, with the potential to yield quantifiable health, social, and economic benefits to families and communities, should be expanded not only in Oklahoma but also across the country.

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