

# **Interventions to Reduce Respiratory Health and Injury Hazards in Homes of Low-Income Families with Children: Results of the Phoenix Healthy Homes Study**

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- HUD Healthy Homes Demonstration Grant to the City of Phoenix

## Partners:

- Phoenix Children's Hospital (PCH)
- City of Phoenix Neighborhood Services Department (NSD)
- National Center for Healthy Housing

# Objective

To assess the effectiveness of interventions in reducing residential respiratory health and injury hazards in Phoenix

Intervention Components:

- (1) education;
- (2) respiratory health and injury prevention device disbursement; and
- (3) housing (structural repair and maintenance).

# Phoenix Children's Hospital

## Breathmobile

- mobile asthma clinic that visits Phoenix schools
- provides asthma assessment, education, and treatment

## PCH

- treats asthmatic children in the ED and pulmonary and primary care clinics.
- treats children with unintentional injuries that have occurred in the home and provides parent education through injury prevention center outreach programs for the metropolitan community.

# Enrollment

- Referrals:
  - PCH Breathmobile
  - City of Phoenix Head Start
  - Arizona Department of Health Services (ADHS) Childhood Lead Poisoning Prevention Program
  - City of Phoenix NSD Housing Rehabilitation Section
- At least one child < 18
- Household income  $\leq$  80% the area median
- Enrolled from October 2003 to November 2005.

# Homes and Children Enrolled

- Overall: Interventions were conducted in 120 homes
- Analysis: 67 homes/households with 184 children
  - 63 children with asthma (referred to Breathmobile if not already patients)
    - 45 had asthma diagnosis before project
    - 18 asthma identified as part of the screening for this study.

# Home Visits

- Baseline: Brief questionnaire and visual assessment of the home, including
  - 29 potential injury hazards
  - 7 potential respiratory health hazards
- Intervention (see following slides)
- 3-4 months post-intervention: visual assessment and brief questionnaire

# Types of Hazards

- Injury
  - Structural safety (e.g., leaky roof)
  - Non-structural safety (e.g., no fire alarm)
- Respiratory health (e.g. mold or musty smell)



# Interventions

- Goal: Provide parents with the knowledge, skills, motivation, supplies, equipment, and minimum housing quality conditions necessary to maintain a healthy and safe home.
- Three components:
  - Education
  - respiratory health and injury prevention device disbursement
  - housing (structural repair and maintenance)

# Education Intervention Overview

- in-home family needs assessments to establish learning needs, barriers, motivators, and mutual learning goals.
- emphasized importance of attitudes and expectations and modeled behavior in inducing behavioral change
- caretakers were asked to perform the mitigation behavior while the health educator gave feedback and encouragement.

# Education Intervention Subjects

- improving egress by removing obstacles;
- developing a fire escape plan;
- protecting against drowning hazards;
- securing window blind cords;
- safely storing sharps, medicines, weapons, and household chemicals;
- strategies for asthma trigger mitigation such as control of dust, mold and other allergens or irritants;
- promoting smoking cessation;
- ensuring proper use of smoke detectors and carbon monoxide alarms; and
- changing air handler filters.

# Device Disbursement Intervention

- mattress and pillow dust mite covers, first aid kits, lists of emergency numbers, storage containers; space heaters, lock boxes (for medication) or gun locks, vacuum cleaners with HEPA filters, carbon monoxide alarms and smoke detectors, batteries, washable curtains, outlet covers, and non-skid materials for rugs.
- baits for pest control and professional pest control company provision.
- **Education and demonstration always accompanied device disbursement.**

# Housing Intervention

- carpet removal and replacement with new hard, cleanable flooring;
- repair of deteriorated floors, stairs, and railings;
- correction of egress deficiencies by creating or modifying building openings;
- correction of roof, window, and plumbing problems resulting in safety hazards or mold growth;
- installation of window or ceiling exhaust fans;
- GFCI (ground-fault circuit interrupter) installation;
- provision of heating and/or cooling equipment; and
- provision of pool, spa or pond fences.

# Children with Asthma

Comprehensive approach:

- Respiratory health hazard interventions
- The PCH Breathmobile:
  - asthma assessment, education, and treatment to enrolled asthmatic children.

# Statistical Methods

- Two tests for each potential hazard:
  - percent of homes with a hazard decreased from baseline to post-intervention
  - more than half of the homes with a hazard at baseline improved at post-intervention
- Summary tests: total numbers of hazards declined from baseline to post-intervention.

<b>STRUCTURAL INJURY</b>	<b>Hazard at V1</b>	<b>Hazard (V2/V1)</b>	<b>Improved</b>
<b>Hot water heater not properly ventilated or with hazardous material around it</b>	<b>18%</b>	<b>0/11</b>	<b>100%*</b>
<b>Plumbing (non-functional taps or toilet)</b>	<b>37%</b>	<b>1/25</b>	<b>96%*</b>
<b>Electrical (frayed, exposed or severed wires)</b>	<b>25%</b>	<b>0/17</b>	<b>100%*</b>
<b>Windows (broken glass or egress impaired)</b>	<b>22%</b>	<b>0/15</b>	<b>100%*</b>
<b>Electrical outlets/electrical cords (uncovered outlets or non GFCI outlets in kitchen/bathroom)</b>	<b>61%</b>	<b>2/41</b>	<b>95%*</b>
<b>Roof, ceiling, wall or floor damage</b>	<b>27%</b>	<b>0/18</b>	<b>100%*</b>
<b>Air conditioners/heating units non-functional or with dirty vents and filter</b>	<b>66%</b>	<b>6/48</b>	<b>88%*</b>
<b>Pool/spa/pond not enclosed by 4-sided fence (if child &lt; 8 years and have pool/spa)</b>	<b>10%</b>	<b>0/7</b>	<b>100%*</b>

**\* The % of homes with a hazard decreased and > 50% of the homes with a hazard at baseline improved significantly.**



<b>NON-STRUCTURAL INJURY (High Prevalent)</b>	<b>Hazard at V1</b>	<b>Hazard (V2/V1)</b>	<b>Improved</b>
<b>Fire escape route not planned or egress deficiencies present</b>	<b>99%</b>	<b>2/66</b>	<b>97%*</b>
<b>No emergency telephone numbers</b>	<b>97%</b>	<b>0/65</b>	<b>100%*</b>
<b>No first aid kit</b>	<b>93%</b>	<b>0/62</b>	<b>100%*</b>
<b>No functional smoke alarm</b>	<b>90%</b>	<b>1/60</b>	<b>98%*</b>
<b>Sharp objects improperly stored (if child&lt;8 yrs)</b>	<b>84%</b>	<b>44/50</b>	<b>12%</b>
<b>Vitamins, meds, household products improperly stored (if child&lt;8 yrs)</b>	<b>82%</b>	<b>4/52</b>	<b>92%*</b>
<b>CO detector non-functional (if any combustion appliances)</b>	<b>57%</b>	<b>2/38</b>	<b>95%*</b>

**\* The % of homes with a hazard decreased and > 50% of the homes with a hazard at baseline improved significantly.**

<b>NON-STRUCTURAL INJURY (Medium Prevalent)</b>	<b>Hazard at V1</b>	<b>Hazard (V2/V1)</b>	<b>Improved</b>
<b>Matches and lighters improperly stored (&lt;9 yrs)</b>	<b>54%</b>	<b>20/33</b>	<b>39%</b>
<b>Bathroom door/toilet lid not secured (&lt;3 yrs)</b>	<b>46%</b>	<b>10/26</b>	<b>62%</b>
<b>Appliances / electrical devices in reach of children, dangling cords, multiple extension cords</b>	<b>22%</b>	<b>2/15</b>	<b>87%*</b>
<b>Window blind cords not secured (&lt;3 yrs)</b>	<b>22%</b>	<b>0/15</b>	<b>100%*</b>
<b>Improper bucket storage (accessible or not empty) (&lt;3 yrs)</b>	<b>13%</b>	<b>2/7</b>	<b>71%</b>
<b>Pots, dishes, and folk medicines contain lead</b>	<b>13%</b>	<b>0/9</b>	<b>100%*</b>
<b>Furniture not sturdy/secure (&lt;3 yrs)</b>	<b>12%</b>	<b>1/6</b>	<b>83%</b>

**\* The % of homes with a hazard decreased and > 50% of the homes with a hazard at baseline improved significantly.**

<b>NON-STRUCTURAL INJURY (Low Prevalent)</b>	<b>Hazard at V1</b>	<b>Hazard (V2/V1)</b>	<b>Improved</b>
<b>Unsafe small objects (&lt;3 yrs)</b>	<b>10%</b>	<b>0/6</b>	<b>100%*</b>
<b>Rugs and runners not secured (if rugs)</b>	<b>10%</b>	<b>0/7</b>	<b>100%*</b>
<b>Mobile baby walkers present (if baby)</b>	<b>9%</b>	<b>0/2</b>	<b>100%</b>
<b>No window guards installed (if elevated windows and &lt;8 yrs)</b>	<b>7%</b>	<b>2/5</b>	<b>60%</b>
<b>Plants (in reach of children or poisonous) (&lt;3 yrs)</b>	<b>3%</b>	<b>0/2</b>	<b>100%</b>
<b>Unsafe cribs</b>	<b>3%</b>	<b>0/2</b>	<b>100%</b>
<b>Water temperature above 130°F (if hot water heater)</b>	<b>1%</b>	<b>0/1</b>	<b>100%</b>

\* The % of homes with a hazard decreased and > 50% of the homes with a hazard at baseline improved significantly.

<b>RESPIRATORY HEALTH</b>	<b>Hazard at V1</b>	<b>Hazard (V2 / V1)</b>	<b>Improved</b>
<b>Pets in bedroom of children with asthma</b>	<b>9%</b>	<b>3/6</b>	<b>50%</b>
<b>Tobacco smoke</b>	<b>30%</b>	<b>14/20</b>	<b>30%</b>
<b>Observed dust in carpets and bedding in bedroom of child with asthma</b>	<b>69%</b>	<b>1/45</b>	<b>98%*</b>
<b>Observed dust in the heating and cooling system in bedroom of child with asthma</b>	<b>60%</b>	<b>9/39</b>	<b>77%*</b>
<b>Poor general housekeeping</b>	<b>52%</b>	<b>7/35</b>	<b>80%*</b>
<b>Mold or musty smell due to lack of exhaust fans</b>	<b>57%</b>	<b>1/38</b>	<b>97%*</b>
<b>Observed cockroach infestation</b>	<b>57%</b>	<b>5/38</b>	<b>87%*</b>

**\* The % of homes with a hazard decreased and > 50% of the homes with a hazard at baseline improved significantly.**

# Number of Hazards

Hazards	#Possible Hazards	Average Number (range)	
		Baseline	Post-Intervention
All	36	14 (6-25)	3.4 (0-10)
Injury	29	11 (5-21)	2.5 (0-8)
Structural	8	2.7 (0-21)	0.4 (0-3)
Non-Structural	21	8.3 (3-15)	2.2 (0-7)
Respiratory Health	7	3.3 (0-7)	0.9 (0-5)

# Parent's Reports

- 97% reported that their homes were safer than before the project.
- 96% reported that the health of the child with asthma was better than before the project (82% “much better” and 16% “better”)

# Limitations

- Short post-intervention follow-up (3-4 months)
- Lacking health outcomes (asthma and injuries)
- Lack of blinding and control group

# Summary

- Project reduced number of injury and respiratory hazards by 75%
- Parents believed homes were safer and asthmatic children were healthier