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The impact of housing type on low-income asthmatic children receiving multifaceted home interventions

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ABSTRACT

Objectives: This study sought to evaluate whether government-assisted vs market-rate housing type influences the frequency of asthma symptoms or the quality of life scores among low-income urban children. In addition, the study sought to evaluate whether housing type influenced the success of in-home environmental and educational interventions in improving children's asthma symptoms or quality of life scores.

Study design: This was a before-and-after intervention design. Comprehensive health and environmental assessments and subsequent interventions were completed in 176 low-income households with 257 asthmatic children living in government-assisted housing and market-rate housing in Lowell, Massachusetts.

Methods: We collected environmental and health data with questionnaires at a baseline and a 12-month follow-up visit using the Children's Health Survey for Asthma and a walk-through environmental checklist. Education, tools to remove asthma triggers from the home, and home repairs and remediation were included in the interventions.

Results: As in other studies of multifaceted home interventions, there were significant improvements in all asthma symptoms, reductions in healthcare utilization related to asthma, and improvements in quality of life domains for children in both housing types. Environmental indices also improved from the baseline to the final assessment for both housing types. However, the housing type was an important factor in predicting a child's asthma status at the start of the study, with children living in government-assisted housing having significantly better physical health scores (76.8 of 100) and family emotional health scores (74.8 of 100) and fewer overnight hospital stays (mean of 0.02 in the previous 4 weeks) than children living in market-rate housing (67.6, 71.6, and 0.06, respectively). Examination of the change in the health status over the 1-year study period found that children living in market-

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rate housing had significantly larger reductions in the number of asthma attacks (0.43 in the previous 4 weeks versus 0.24 in assisted housing) and overnight hospital stays (0.06 in the previous 4 weeks versus 0.01 in assisted housing) and larger improvements in physical health quality of life scores (54% improved versus 25.5% in assisted housing).

Conclusions: Public assistance for low-income urban housing is associated with better health among children with asthma, and may influence the impact the in-home interventions have on health outcomes because children in market-rate housing have more prospects for improvement in their asthma-related health.

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Introduction

This intervention program targeted asthma, the most common chronic childhood disease. There are many known indoor environmental asthma triggers, including dust, pests, cigarette smoke, and pets. Children are particularly vulnerable to home hazards and may develop lifelong health problems because of their home environment.¹ Community health worker-led home interventions are known to decrease asthma triggers through environmental remediation and education, resulting in positive health outcomes.^{2–9} The federal government provided two grants that supported our intervention research from 2009 to 2014 in Lowell, Massachusetts. Lowell's asthma prevalence among school children (13.0%) is higher than the statewide average (10.9%).¹⁰ The local hospitalization rate for Lowell's asthmatic children is almost twice the state average for the composite years 2006–2008.¹¹ Almost half of the population comprises minorities, with 21.5% Asian and 11.2% of Puerto Rican descent, making up the largest subset of Hispanic residents.¹² Those of Puerto Rican descent have the highest asthma rate (16.6%), twice the rate of the general population (8.2%).¹³ The housing stock tends to be substandard, with the largest portion of housing units built before 1939.¹²

With regards to the children's health status or home asthma triggers, government-assisted housing (i.e. housing that is publicly owned and operated or government subsidized, privately owned/managed by a for-profit or non-profit entity) has rarely been compared with market-rate housing that is not government subsidized. However, children living in public housing in Baltimore were found to have asthma rates more than double the national average.¹⁴ Additionally, a parent-report questionnaire¹⁵ in New York City found that the housing type was associated with childhood asthma, and the highest asthma prevalence was found in public housing. The authors report that the association may have been related to high cockroach activity and unmeasured factors of housing quality such as poor ventilation and a lack of air conditioning. Nitrogen dioxide levels were higher in public housing units in Boston than in other residential units.¹⁶ A study interviewing families living in public and section 8 (government subsidized, privately owned) housing concluded that families living in section 8 housing had more control over their environments by being able to choose units with air conditioning and hard flooring, allowing better asthma management.¹⁷ Alternatively, the literature also shows some protective effects of public

housing.^{18,19} Families in public housing tend to move less often, while families that move often tend not to use preventive services for their children and are less likely to seek a regular primary care provider.¹⁸

To investigate the impact of housing type/subsidy status on the efficacy of home asthma interventions, this article takes advantage of the data collected during two childhood asthma intervention programs in a low-income urban setting. The methods and results of the first intervention program were previously published.²⁰ Although the protocols were similar in each program, the second program differed in that participant recruitment was limited to families living in public or federally assisted housing (the first program was not specific to housing type), and the community health workers had more discretion regarding the number of educational home visits needed. This study explores the question of whether the baseline health status of asthmatic children differs by the housing type or whether there are differences in the change in asthma health outcomes based on the housing type for families who receive multifaceted home environmental interventions.

Methods

Study design

This is a before-and-after observational study where the participants serve as their own control to compare pre-intervention and postintervention asthma symptoms and quality of life scores. We followed similar protocols in both studies.

Participants/recruitment

We targeted low-income children (area median income between 0% and 50%) with asthma using outreach through pediatricians, a community health center, and local community organizations. Participants had to reside in Lowell and have at least one doctor-diagnosed asthmatic child under the age of 15 years during the first study or under the age of 18 years during the second study. Informed consent forms in English, Khmer, or Spanish were obtained from each participating family. Families completing the study were given a gift card to a local grocery store. Human subjects approval was received from the University of Massachusetts Lowell Institutional Review Board.

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