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### Development of an Index of Subsidized Housing Availability and its Relationship to Housing Insecurity

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## Development of an Index of Subsidized Housing Availability and its Relationship to Housing Insecurity

Kathryn T. Bailey,<sup>a\*</sup> John T. Cook,<sup>b</sup> Stephanie Ettinger de Cuba,<sup>c</sup> Patrick H. Casey,<sup>d</sup> Mariana Chilton,<sup>e</sup> Sharon M. Coleman,<sup>c</sup> Diana Becker Cutts,<sup>f</sup> Timothy C. Heeren,<sup>c</sup> Ruth Rose-Jacobs,<sup>b</sup> Maureen M. Black,<sup>g</sup> and Deborah A. Frank<sup>b</sup>

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Housing insecurity is a known threat to child health understanding predictors of housing insecurity can help inform policies to protect the health of young children in low-income households. This study sheds light on the relationship between housing insecurity and availability of housing that is affordable to low-income households.

We developed a county-level index of availability of subsidized housing needed to meet the demand of low-income households. Our results estimate that if subsidized units are made available to an additional 5% of the eligible population, the odds of overcrowding decrease by 26% and the odds of families making multiple moves decrease by 31%. Both of these are known predictors of poor child health outcomes. Thus, these results suggest that state and federal investments in expanding the stock of subsidized housing could reduce housing insecurity and thereby also improve the health and well-being of young children, including their families' food security status.

**Keywords:** housing availability; child health; low-income housing; food insecurity

### Introduction

Quality and stability of housing are known determinants of health. Poor housing conditions and a lack of stable housing have been associated with adverse child health outcomes (Cutts et al., 2011). Although the U.S. Department of Health and Human Services describes housing insecurity as including high housing costs in proportion to income, poor housing quality, unstable neighborhoods, overcrowding, and homelessness (Johnson & Meckstroth, 1998), there are no standard housing insecurity or housing instability measures used in the research literature. We have validated and published a measure of housing insecurity, defined as overcrowding (two or more people per bedroom and/or temporarily doubling up with another household because of financial difficulties), and/or moving more than once in the past year (Cutts et al., 2011). This housing insecurity indicator is associated with adverse impacts on health and development in very young children (ages 0–36 months). It is also associated with increased odds of household food

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insecurity (lack of access to enough nutritious food for active and healthy lives; Cutts et al., 2011; Coleman-Jenson, Nord, Andrews, & Carlson, 2012), and energy insecurity (lack of consistent access to sufficient household energy; Cook et al., 2008), both of which have been related to poor health and developmental risks among very young children (Cook et al., 2004; Cook et al., 2008; Pollack, Egerter, Sadegh-Nobari, Dekker, & Braveman, 2008).

In addition to correlates of this validated housing-insecurity indicator, households that are behind on rent payments are also at increased risk of these multiple hardships (housing, energy, and food insecurity). Compared with households that had not reported problems paying their rent or mortgage on time in the last year, households that were behind on rent or mortgage more frequently experienced food and/or energy insecurity, and made tradeoffs among housing, utilities, food, or other expenses to pay medical bills (Joyce et al., 2012). Children's HealthWatch researchers also found that, compared with stably housed households, those that were behind on rent also were more likely to include a mother who reported depressive symptoms, and caregivers who had to forgo needed health care to meet basic expenses (March et al., 2011).

On average, housing comprises households' single largest annual expenditure (U.S. Bureau of Labor Statistics, 2014). Based on the definition outlined by U.S. Department of Housing and Urban Development, housing is considered unaffordable when the monthly cost of housing and utilities together is greater than 30% of a household's monthly income (United States Housing Act of 1937, 1937). Households paying more than 30% of their monthly income for housing, whether for rent or mortgage, are described as cost-burdened, and households spending more than 50% of their monthly income on housing are described as severely cost-burdened. In 2010, households in the lowest income quintile spent on average 41.4% of their total expenditures on housing versus 15.8% on food (U.S. Bureau of Labor Statistics, 2010). Severely cost-burdened low-income households spend a third less on food, and half as much on pensions and retirement, as households paying an affordable share of their income for housing (Fernald, 2013). There are also inequities in housing cost burden among racial and ethnic groups. In 2012, racial and ethnic minorities disproportionately lived in severely cost-burdened households, with 27% of African American households and 24% of Hispanic households severely cost-burdened, compared with only 14% of white households (Alexander et al., 2014).

The number of cost-burdened households increased during and after the Great Recession, with cost burdens among renters increasing dramatically. In 2011, more than half of renters paid over 30% of their income for housing. More than 80% of renters with annual household incomes below \$15,000 were cost-burdened in 2011, comprising nearly 7.3 million households severely cost-burdened by spending more than half of their income on housing (compared with 5 million in 2001; Fernald, 2013).

Families that lack affordable housing are more likely to move frequently, an aspect of housing insecurity associated with socioemotional problems among children, and long-term health consequences (Jelleyman & Spencer, 2008; Scanlon & Devine, 2001). Families living in unaffordable housing and families that are housing insecure have a higher prevalence of not being able to afford needed medical care and prescription medications, placing their children's health at greater risk (Ma, Gee, & Kushel, 2008; Pollack, Griffin, & Lynch, 2010). Adults in families experiencing housing instability are more likely to postpone medical care and use emergency rooms for nonemergency treatment, in response to competing demands on their limited resources, such as food and housing (Kushel, Gupta, Gee, & Haas, 2006).

In contrast, housing subsidies that provide financial assistance to make housing more affordable to low-income families have been associated with positive health outcomes in children (Baker, Zhang, & Howden-Chapman, 2010; Meyers et al., 2005; Meyers et al., 1995). Results from the Moving to Opportunity demonstration show that families that received Section 8 vouchers had improved physical and mental health, compared with control-group families living in inner-city public housing projects (Shroder, 2001). In addition, compared with similar households receiving no subsidy, households receiving housing assistance have higher odds of housing security (Sandel et al., 2014) and compared to households on a waitlist for subsidy, households receiving housing assistance have lower odds of food insecurity (March et al., 2009; Kirkpatrick & Tarasuk, 2011). These correlations are likely due to the fact that households have increased funds available to meet basic needs. This is also supported by other data; families living in cost-burdened households (i.e., spending more than 30% of income on housing) spent 39% less on food each month than noncost-burdened households did (Alexander et al., 2014).

Housing subsidies also are associated with lower odds of hospitalizations, iron-deficiency anemia, and undernutrition among children; these buffering effects manifest as better physical growth (Baker et al., 2010; Meyers et al., 2005; Meyers et al., 1995; Meyers, Rubin, Napoleone, & Nichols, 1993). In addition, families receiving Temporary Assistance for Needy Families (TANF) and a housing subsidy were less likely to forgo needed medical care than were families receiving TANF without a housing subsidy (Wang, Beecroft, Khadduri, Patterson, & Abt Associates Inc., 2003). Thus, housing subsidies can have a number of potentially positive impacts on families' well-being.

Despite strong evidence of health and other benefits from housing assistance, not nearly enough affordable housing is available to meet the continually rising need. Consequently, there is ongoing and growing concern about shortages of affordable housing units and housing subsidies in the United States (Alexander et al., 2014; Nelson, 2001). Although studies show that some affordable units are being incorporated into mixed-use buildings, these units are not nearly enough to meet the demand for affordable housing. Long waitlists for housing assistance force many families to seek unsubsidized rental housing units they can scarcely afford. Low-income children living in areas with greater availability of affordable housing (housing costs at or less than 30% of household income) fare better than similar children living in less affordable areas, although this association is greater for older children, and may be due to cumulative advantageous effects of longer residence in affordable housing (Harkness & Newman, 2005). Among the Fragile Families' longitudinal sample of primarily unmarried mothers, high housing prices are also shown to correlate with shared living arrangements such as doubling up with other family members, a known indicator of housing insecurity, compared with living alone (Curtis, 2007, 2011). In cities with high housing costs, the likelihood of homelessness with the birth of an ill child is further increased (Curtis, Corman, Noonan, & Reichman, 2013). In addition to family-level factors, macro factors, such as those related to housing affordability, are also associated with homelessness and doubling up. Fragile Families research found the availability of affordable housing units provided a buffer against housing instability, since availability is associated with a lower risk of being doubled up at the 3-year interview compared with the 1-year interview (Center for Research on Child Wellbeing, 2008).

Limited measures of availability of subsidized housing exist. Curtis (2007) measured subsidized housing as the number of available public housing units, certificates, Section 8 vouchers, and Low-Income Housing Tax Credit units under contract for a city, divided by the eligible city population. However, no existing index represents the availability of subsidized units for low-income families relative to the need for these units.

Despite a large and growing body of literature on child health and housing conditions, homelessness, and housing security, the research literature addressing relationships between housing affordability and housing insecurity is limited. We also find limited research on the relationships between housing affordability and child health. Thus, the purpose of this study is to shed light on the relationship between housing insecurity and availability of housing that is affordable to low-income households. We hypothesize that low-income households with very young children (under 3 years) living in cities with fewer subsidized housing units relative to the aggregate need will have higher rates of housing insecurity. In other studies, we explored the relationship between housing insecurity, housing subsidies, and child health, although child health outcomes are not included in this study (Cutts et al., 2014; Sandel et al., 2014). In this study, we explore how an increase in subsidized housing could impact housing insecurity.

## Methods

### *Participants: The Children's HealthWatch Sample*

Between 2006 and 2008, the ongoing Children's HealthWatch study approached 14,197 caregivers of children younger than 36 months. This sample was drawn from Children's HealthWatch sites in five urban medical centers serving diverse, low-income populations in Baltimore, Maryland; Boston, Massachusetts; Little Rock, Arkansas; Minneapolis, Minnesota; and Philadelphia, Pennsylvania. The study design uses a time series of cross-sectional surveys of convenience samples from a sentinel population of vulnerable young children (ages 0–36 months). Trained interviewers conducted closed-ended surveys with caregivers accompanying children younger than 36 months seeking care at acute/primary care clinics or hospital emergency departments. Caregivers of critically ill or injured children were not approached. Potential participants were excluded if they did not speak English, Spanish, or (in Minneapolis only) Somali; were not knowledgeable about the child's household; were interviewed within the previous 6 months; lived out of state; or did not give consent to participate. Caregivers were approached in private settings. Institutional review board approval was obtained at each site prior to data collection and has been renewed annually.

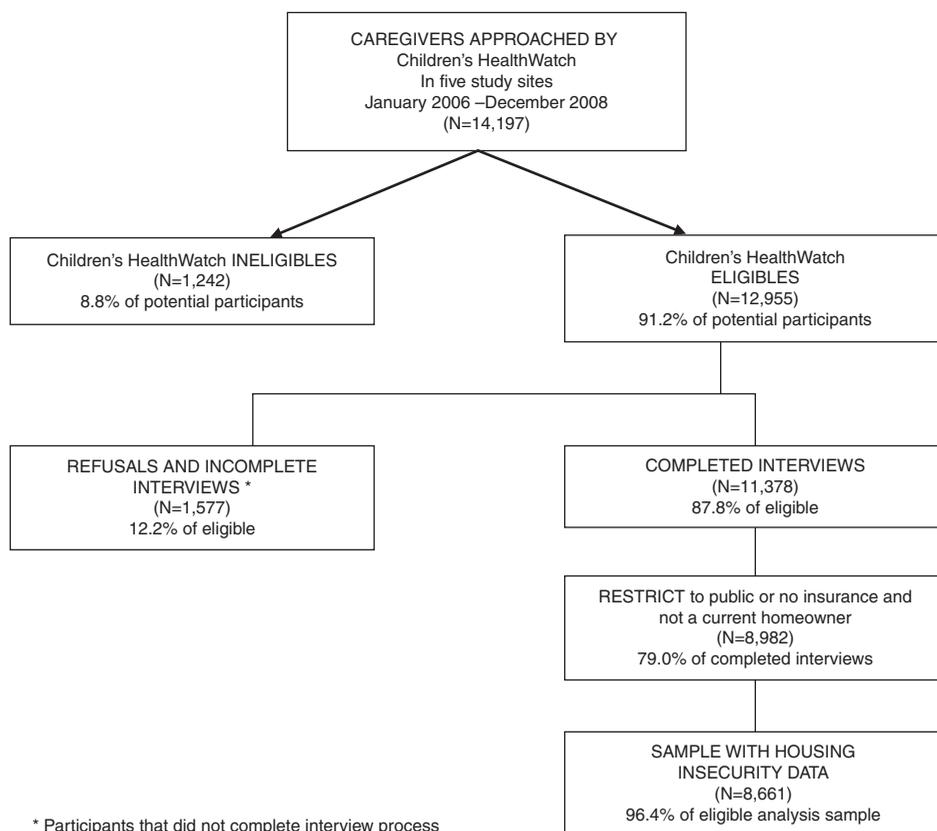
The Children's HealthWatch data set are comparable in many important measures to larger low-income young child populations of the United States. Nationally, about one in four low-income-eligible families receives some type of federal housing assistance (Sard, 2013); in our sample, we found the same rate, one in four, reported receiving a housing subsidy.

### *Analysis Sample*

Of the 14,197 caregivers who were approached, 1,242 (8.8%) were ineligible and 1,577 (12.2% of eligible participants) refused or were not able to complete the interview (see Figure 1).

Because this study focuses on housing insecurity and subsidized rental housing, we excluded homeowners since they are unlikely to participate in the rental market. The sample also excluded families of children with private health insurance, to further ensure a low-income sample. Also eliminated were interviews that had missing data on any of the variables of primary interest. This process yielded a final analytic sample of 8,661 interviews (96.4% of eligible participants without missing data).

Figure 1. Description of analytic sample selection for housing availability analyses.



### ***Predictor: Subsidized Housing Availability Index (SHA Index)***

To represent variation in availability of subsidized housing units across geographic areas surrounding research sites, an index was developed using county-level census data from the U.S. Census Bureau. In addition, two separate data sets were incorporated. A Picture of Subsidized Households—2008 (U.S. Department of Housing and Urban Development, 2008) was used to identify housing subsidy units, and median income from the American Community Survey was used to weight each city's sample based on the racial/ethnic demographics of the Children's HealthWatch data set (U.S. Census Bureau, 2006–2008a). The resulting subsidized housing availability index (SHA index) characterizes existing subsidized units available to meet the needs of low-income households paying more than 30% of their income to rent. The index, which is expressed as a ratio or proportion, indicates the total number of subsidized units available in an area relative to the demand from low-income households with a head of household less than 62 years of age paying more than 30% of their income to rent.

In this study, availability is defined as the existence of subsidized housing units, and does not necessarily mean those units are vacant.<sup>1</sup> Subsidized housing units included public housing, Housing Choice Vouchers, and Section 8 New Construction and Moderate Rehabilitation.<sup>2</sup> The availability of subsidized housing units in each research site area is defined as the total number of subsidized housing units, including those currently occupied and those unoccupied and available for rent, in the county within which the site is located,

as follows:

$$\text{SHA}_{\text{Total, Site}} = \text{SHU}_{\text{Ocup, Site}} + \text{SHU}_{\text{Unocup, Site}}$$

where  $\text{SHA}_{\text{Total, Site}}$  = Total number of subsidized housing units available at each site;  
 $\text{SHU}_{\text{Ocup, Site}}$  = Total number of occupied subsidized housing units at each site;  
 $\text{SHU}_{\text{Unocup, Site}}$  = Total number of unoccupied subsidized housing units at each site.

We note, however, that since rent for all subsidized housing units is  $\leq 30\%$  of the occupant households' annual income, by definition, households paying  $> 30\%$  of annual income for rent are not living in subsidized housing, although they may be eligible. We also assume, for the purposes of this study, that if there are households reporting that they pay  $> 30\%$  of annual income for rent, all subsidized housing units are occupied (i.e.,  $\text{SHU}_{\text{Unocup, Site}} = 0$ ).<sup>3</sup> Thus, the total number of currently available subsidized housing units can be considered equivalent to the number of occupied units (i.e.,  $\text{SHA}_{\text{Total, Site}} = \text{SHU}_{\text{Ocup, Site}}$ ). Moreover, unmet need for subsidized housing units can be defined as the number of low-income households (annual median income  $< \$35,000$ ) currently paying more than  $30\%$  of their income on rent, as follows:

$$\text{UN}_{\text{Total, Site}} = \text{LIHHR} > 0.3Y_{\text{Total, Site}}$$

where  $\text{UN}_{\text{Total, Site}}$  = Total unmet need for subsidized housing units;  
 $Y$  = Annual household income;  
 $\text{LIHHR} > 0.3Y_{\text{Total, Site}}$  = Total number of low-income households paying more than  $30\%$  of annual income on housing (shelter and utilities) per year

The total demand for affordable housing from low-income households in each research site is calculated by summing the number of available subsidized housing units and the unmet need (based on 3-year average data from the American Community Survey for 2006–2008 [U.S. Census Bureau, 2006–2008a]), as follows:

$$\text{SHD}_{\text{Total, Site}} = \text{SHA}_{\text{Total, Site}} + \text{UN}_{\text{Total, Site}}, \text{ and}$$

$$\text{SHD}_{\text{Total, Site}} = \text{SHU}_{\text{Ocup, Site}} + \text{UN}_{\text{Total, Site}}$$

Where  $\text{SHD}_{\text{Total, Site}}$  = Total demand for subsidized housing units at each research site;  
 $\text{SHA}_{\text{Total, Site}}$  = Total number of subsidized housing units available at each site;  
 $\text{UN}_{\text{Total, Site}}$  = Total unmet need for subsidized housing units.

The SHA index is calculated by dividing the total number of affordable housing units available to low-income households (U.S. Department of Housing and Urban Development, 2008) by the total demand for affordable housing from low-income households, from the above, as follows:

$$\text{SHAI}_{\text{Site}} = \text{SHA}_{\text{Total, Site}} / \text{SHD}_{\text{Total, Site}}, \text{ and in practice in these data,}$$

$$\text{SHAI}_{\text{Site}} = \text{SHU}_{\text{Ocup, Site}} / \text{SHD}_{\text{Total, Site}}, \text{ because nearly all available units are occupied,}$$

where  $\text{SHAI}_{\text{Site}}$  = Subsidized housing availability index at each site.

The SHA index shows some variability across the five research sites, although no site has more than a third of the estimated units required to meet the demand for subsidized units (see Table 1).

### ***Outcome: Housing Insecurity***

We used four separate dichotomous housing insecurity outcome variables in this study: (a) households that moved two or more times in the year before the interview, described as

Table 1. Subsidized housing availability index by site.

Research site	A: No. of low-income households living in existing subsidized housing stock <sup>a</sup> (SHU <sub>Ocup,Site</sub> )	B: The unmet need for subsidized housing <sup>b</sup> (LIHHR > 0.3Y <sub>Total,Site</sub> )	C (= A + B): total demand for or no. of subsidized units needed for low-income households (SHD <sub>Total,Site</sub> )	D (= A/C): index of relative availability of subsidized housing units to meet the need (SHAI <sub>Site</sub> = SHU <sub>Ocup,Site</sub> /SHD <sub>Total,Site</sub> )
<b>Baltimore, MD:</b> Baltimore City/County	19,848	51,210	71,058	0.28
<b>Boston, MA:</b> Suffolk County	30,219	60,439	90,658	0.33
<b>Little Rock, AR:</b> Pulaski County	7,299	24,685	31,984	0.23
<b>Minneapolis, MN:</b> Hennepin County	18,286	61,051	79,337	0.23
<b>Philadelphia, PA:</b> Philadelphia County	28,660	108,825	137,485	0.21

Note. LIHHR > 0.3 Y<sub>Total,Site</sub> = total number of low-income households paying more than 30% of annual income on housing per year. SHAI = subsidized housing availability index; SHD = subsidized housing demand; SHU = subsidized housing unoccupied.

<sup>a</sup> From *A picture of subsidized households—2008*, U.S. Department of Housing and Urban Development, 2008, <http://www.huduser.org/portal/picture2008/index.html>.

<sup>b</sup> U.S. Census Bureau, American Community Survey (2006–2008a). Retrieved January 1, 2011, from [http://www.census.gov/acs/www/about\\_the\\_survey/american\\_community\\_survey/](http://www.census.gov/acs/www/about_the_survey/american_community_survey/)

having multiple moves; (b) households whose members were temporarily living with other people because of economic difficulties (doubling up) or, using the U.S. Department of Housing and Urban Development definition, when there were more than two people per bedroom at the time of interview (Blake, Kellerson, & Simic, 2007), described as overcrowded; (c) households that reported being behind on rent payments at any time in the past year; and (d) currently homeless families. A separate model was estimated for each of the four housing insecurity outcome variables. If a household reported any one of these conditions, it was categorized as housing insecure in this study. Each of these four indicators of housing insecurity has been correlated with adverse child health outcomes (March et al., 2011; Weinreb, Goldberg, Bassuk, & Perloff, 1998; Wood, Valdez, Hayashi, & Shen, 1990). Housing-secure households were the referent group: no more than one move in the past year; no indication of overcrowding, or being behind on rent, or homelessness in the past year.

### Data Analysis

Each research site's SHA index was assigned to all participants interviewed at that site to create a site-level fixed-effect variable for subsidized housing availability. To test for association between the SHA index (a continuous predictor variable) and the four housing-insecurity (dichotomous outcome) variables, multiple logistic regression models using generalized estimating equations were employed to account for within-site clustering. Separate analyses were conducted for each of the four indicators of housing insecurity. The association between the SHA index and housing insecurity was examined by calculating the adjusted odds ratio describing the change in the odds of housing insecurity corresponding to a 0.05-unit (5%) increase in the SHA index. The analyses were adjusted

for the following potentially confounding variables: whether the mother was born in the United States, any adults employed in the household, and site-specific housing affordability. Comparing the background characteristics of two groups within the Children's HealthWatch data set—households living in subsidized housing and households renting without a subsidy—identified confounding variables; no other characteristics were significantly different. Housing availability is intricately linked to housing affordability. Therefore, to control for this as a covariate, an index of housing affordability was created using county-level housing cost burden (the ratio of estimated fair market rent for a two-bedroom rental unit [U.S. Department of Housing and Urban Development, 2012]) to area median income<sup>4</sup>) standardized by median income levels of each race and ethnicity subgroup (from the American Community Survey [U.S. Census Bureau, 2006–2008a]) in the analytic sample.

We performed all statistical analyses using SAS version 9.2 (SAS Institute, Cary, NC). In multivariate models, we report adjusted odds ratios, their 95% confidence intervals (CI) and two-tailed *p*-values. *P*-values of less than .05 were deemed statistically significant.

## Results

Housing stability varied from 30% in Minneapolis to 50% in Baltimore (see Table 2). Most participant caregivers were African American (56.6%) and/or Hispanic (28.8%); were not married (61.2%); and had no more than a high school diploma (43.0%) or had not graduated high school (33%; see Table 3). Eighty-three percent received Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) benefits, but at the time of interview only 51% received Supplemental Nutrition Assistance Program (SNAP—formerly food stamps) benefits, and 28% received Temporary Assistance for Needy Families. Twenty-six percent received a housing subsidy or lived in public housing (see Table 3). Seventeen percent of participants (1,036 of 5,976) did not have a housing subsidy at the time of interview, but were on the waiting list for one; the median reported time on a waitlist prior to receiving housing assistance was 13 months (range: 1–99 months). Forty percent of participants were securely housed. Considering our four indicators of housing insecurity, 29% were overcrowded, 25% had been behind on rent in the past year, 3% had made multiple moves in the past year, and 3% were currently homeless (see Tables 2 and 3).

Background characteristics of participants who reported living in subsidized housing at the time of the interview and of those who reported renting without a subsidy were compared. Mothers of children in households renting without a subsidy were more frequently born outside the United States, and these households with a subsidy frequently had at least one employed adult in the household.

Table 2. Descriptive measure of housing insecurity and subsidized housing availability (SHA) index in the five research sites, 2006–2008

Site ( <i>n</i> = 8,661)	Stable housing <i>n</i> (%)	Behind on rent <i>n</i> (%)	Overcrowded <i>n</i> (%)	Multiple moves <i>n</i> (%)	Homeless <i>n</i> (%)	SHA index
Boston, MA, <i>n</i> = 2,083	868 (42)	521 (25)	478 (23)	45 (2)	171 (8)	0.33
Baltimore, MD, <i>n</i> = 1,484	760 (51)	268 (18)	419 (28)	27 (2)	10 (< 1)	0.28
Minneapolis, MN, <i>n</i> = 2,113	641 (30)	545 (26)	818 (39)	67 (3)	42 (2)	0.23
Little Rock, AR, <i>n</i> = 1,285	524 (41)	409 (32)	274 (21)	73 (6)	5 (< 1)	0.23
Philadelphia, PA, <i>n</i> = 1,696	661 (39)	438 (26)	504 (30)	80 (5)	13 (< 1)	0.21

In unadjusted analyses, a 5% increase in the SHA index translated into statistically significant reductions in the odds of overcrowding (Odds Ratio (OR) = 0.83; 95% CI [0.69; 0.99];  $p = .04$ ) and multiple moves (OR = 0.63; 95% CI [0.50; 0.80]  $p \leq .001$ ; Table 4). Unexpectedly, in the unadjusted analysis, a 5% increase in the SHA index was positively associated with homelessness (OR = 2.21; CI [1.31, 3.71]  $p < .01$ ), although this result was not statistically significant after adjusting for covariates.

In analyses adjusted for mothers' foreign-born status, any employed adults in the household, and the fixed-effect site-specific housing affordability variable, overcrowding (adjusted odds ratio (AOR) = 0.74; 95% CI [0.61, 0.90]  $p = .003$ ) and multiple moves (AOR = 0.69; 95% CI [0.53, 0.90]  $p = .01$ ) remained significantly associated with the SHA index (see Table 4). Having been behind on rent was also negatively associated with

Table 3. Descriptive characteristics and housing insecurity of participants, 2006–2008

Characteristic	Overall ( $n = 8,661$ )
<i>Site</i>	
Baltimore, MD	1,484 (17.1%)
Boston, MA	2,083 (24.1%)
Little Rock, AR	1,285 (14.8%)
Minneapolis, MN	2,113 (24.4%)
Philadelphia, PA	1,696 (19.6%)
<i>Caregiver</i>	
US born	6,377 (73.8%)
Married/partnered	3,349 (38.8%)
Employed	3,347 (38.7%)
Age, mean ( <i>SD</i> )	25.3 (5.7)
<i>Ethnicity</i>	
Asian	90 (1.0%)
Black	4,878 (56.6%)
Hispanic	2,484 (28.8%)
White	1,107 (12.8%)
Native American	66 (0.8%)
<i>Educational level</i>	
None/elementary/some high school	2,841 (33.0%)
High school	3,702 (43.0%)
Technical school/college graduate/master's degree	2,058 (23.9%)
Any employment in household	6,568 (76.3%)
<i>Participation in benefit programs</i>	
WIC	7,156 (83.0%)
SNAP	4,443 (51.5%)
TANF	2,420 (28.0%)
Current subsidized housing	2,128 (26.3%)
<i>Insurance status</i>	
Public insurance	8,241 (96.0%)
No insurance	347 (4.0%)
<i>Housing status</i>	
Securely housed	3,454 (40%)
Overcrowded	2,493 (29%)
Behind on rent	2,181 (25%)
Multiple moves	292 (3%)
Homeless	241 (3%)

Note. *SD* = standard deviation. SNAP = Supplemental Nutrition Assistance Program (formerly food stamps). TANF = Temporary Assistance for Needy Families. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Table 4. Results of unadjusted and adjusted logistic regression analysis simulating a 5% increase in availability of subsidized housing.

Housing insecurity outcomes	Unadjusted odds ratio (0.05-unit increase in SHA index) [95% CI]	P-value	Adjusted odds ratio (0.05 unit increase in SHA index) [95% CI]	P-value
Behind on rent	0.85 [0.69, 1.04]	.12	0.86 [0.97, 1.03]	.09
Overcrowded	0.83 [0.69, 0.99]	.04	0.74 [0.61, 0.90]	.003
Multiple moves	0.63 [0.50, 0.80]	<.001	0.69 [0.53, 0.90]	.01
Homeless	2.21 [1.31, 3.71]	.003	1.71 [0.85, 3.42]	.13

Note: CI = confidence interval. SHA = subsidized housing availability. Adjusted for mothers' foreign-born status, any household employment, and site housing affordability index (fair market rent/area median income).

the SHA index, although the association was not statistically significant ( $p = .09$ ). Homelessness was positively associated with the SHA index, but was not statistically significant ( $p = .13$ ). In practical terms, based on a 5% increase in the SHA index, these results indicate that for every 50 additional subsidized housing units added per 1,000 low-income households paying more than 30% of income for housing, the five locations studied could expect, on average, a 26% decrease in odds of overcrowding, and a 31% decrease in odds of multiple moves among low-income households with young children receiving housing support compared with those not receiving support (see Table 4).

## Discussion

These findings suggest that making subsidized housing available to an additional 5% of eligible households predicts a significant decrease in the odds of some forms of housing insecurity. For example, in Little Rock, where we found 7,299 subsidized units occupied by low-income households and 24,685 low-income households paying more than 30% of their income in rent, an increase of 1,337 subsidized units would make subsidized housing available to an additional 5% of eligible households (a 5% increase in the SHA index). This change would correspond to an estimated decrease in the odds of overcrowding of 26%, and a decrease in the odds of multiple moves of 31% (see Table 5). An increase of subsidized units to make subsidized housing available to an additional 5% of eligible households across all five sites would be estimated to reduce the risk of overcrowding from 29% to 23%, and the risk of multiple moves from 3% to 2%. In practical terms, given the associations of housing insecurity with poor child health and development outcomes, these

Table 5. Estimated number of subsidized housing units required to increase the availability of subsidized housing units for eligible families by 5%, and thereby reduce the odds of overcrowding by 26% and the odds of multiple moves by 31%.

Research site	Subsidized housing stock (2008)	Households income-eligible for units	Total no. of affordable units needed for low-income households	No. of subsidized units needed for 5% SHAI increase
Baltimore, MD	19,848	51,210	71,058	3,601
Boston, MA	30,219	60,439	90,658	4,231
Little Rock, AR	7,299	24,685	31,984	1,337
Minneapolis, MN	18,286	61,051	79,337	3,928
Philadelphia, PA	28,660	108,825	137,485	7,086

Note. SHAI = subsidized housing availability index.

results suggest that state and federal investments in expanding the stock of subsidized housing could improve housing security and thereby also improve young children's health and development, and their household's food security status (see [Table 5](#)).

Housing is linked to household economic well-being and community stability in multiple ways. The analyses presented here suggest that relatively small improvements in meeting housing needs can have a notable impact on reducing housing insecurity among households with young children. The harmful health and development impacts on children associated with housing insecurity can have serious adverse effects on whether they realize their potential, including readiness to learn, academic success, educational attainment, and ability to become productive members of the workforce and civil society.

There is an urgent national need for the expansion of evidence-based housing policies that reduce housing insecurity. Several potentially viable policy solutions are available to help secure stable and adequate funding for affordable housing. One such innovation is the housing trust fund model. The housing trust fund approach has been successful and sustainable at both state and city levels in several locations (Dastur, Anderson, & Brooks, 2011). The Philadelphia Housing Trust Fund provides a local source of funding for housing programs, including homelessness prevention, housing rehabilitation, and development of affordable housing. Although small, the Philadelphia Housing Trust Fund is a relatively stable, dedicated source of funding financed by a percentage of home sales revenue (Chrystie, Reyes, Sonsino-Lewis, & O'Dwyer, 2011). In 2013, the Arkansas Housing Trust Fund was allocated \$500,000 to create pilot housing options in each of the state's four congressional districts, and to provide assistance to households earning no more than 80% of the area median income (Housing Trust Fund Project, 2013). Although clearly an insufficient amount of money, this was a very significant first step toward a sustainable solution.

On the federal level, a funding source for the National Housing Trust Fund was finally approved at the end of 2014, six years after the National Housing Trust Fund's creation, and funds will begin to be disbursed in 2016 (U.S. Department of Housing and Urban Development, 2014). Fannie Mae and Freddie Mac are projected to provide several hundred million dollars per year for financing of affordable housing construction nationwide. Due to the 2008 collapse of U.S. financial markets, funding for the National Housing Trust Fund had been suspended. Ensuring stable, steady funding for the National Housing Trust Fund will be critical to growing the supply of affordable housing in the U.S., as will continued support for other subsidy-based programs that directly assist low-income families in affording housing.

There are several other federal programs that support affordable housing for families. In 2012, the federal government supported more than 4.8 million households (4.9 million in 2014) through subsidized housing programs, such as the Housing Choice Voucher Program (commonly known as Section 8 vouchers), project-based rental assistance, and public housing units (Bolton & Bravve, 2012; Center on Budget and Policy Priorities, 2014; Rice & Sard, 2009). These public infrastructure programs benefit many vulnerable low-income children since, on average, over a quarter of the families receiving federal housing assistance are families with children (Center on Budget and Policy Priorities, 2009). However, the funding for these programs is not guaranteed; despite their importance for child health and family economic stability, they are chronically underfunded—both vouchers for families, and support for maintenance and repair of infrastructure.

Subsidized housing programs require stable and adequate funding to be effective. The Philadelphia Housing Trust Fund is unique because its resources come from home sales. Since this mechanism is linked to local markets, it greatly reduces the risk of complete elimination of funding, which may be more likely with the National Housing Trust Fund, but

it also means there is some fluctuation in the fund as home sales rise and fall. Housing trust funds are funded through various mechanisms and are creative and important solutions, but should not be used to justify the exclusion of other dedicated funding for subsidized housing that is not subject to changes in local markets. Each city must find the combination of policy interventions that works best to maximize its high-quality affordable housing stock. Existing evidence shows that innovative avenues to fund subsidized housing can improve the health of our nation's most vulnerable children and families.

### Limitations

There are several limitations in this research that should be considered when interpreting the results of this study. Available data on the number of subsidized units in each geographical area are limited since there is no comprehensive data set of subsidized housing units potentially available to families with children. A single subsidized housing unit may also have multiple subsidies. To address this issue, we compared a variety of different combinations of exclusive housing subsidies, and chose a combination that was available to and primarily served low-income families. In estimating the numbers of subsidized housing units available in our research areas, we excluded subsidies that were targeted to elderly and disabled populations. In attempting to accommodate multiple subsidies, we may have underestimated the number of subsidized units available. Additionally, our analysis is based on five communities, which therefore provides just five values for the SHA index. Moreover, these values are held constant over time. Unmeasured characteristics also exist in each city. We adjusted for housing affordability in each city to accommodate for the diversity of housing markets; however, this measure is unable to control for all characteristics that vary by city.

The Children's HealthWatch data are from a cross-sectional sentinel sample and are not necessarily nationally representative, although they are drawn from five geographically and ethnically diverse urban areas. Because this study draws from a sentinel sample measuring select populations of households with young children from low-income backgrounds interviewed in emergency departments and hospital-based clinics, their children may already be at elevated risk for developmental and health concerns, and it is probable that these are households with a lower prevalence of housing security than the general population, thus conclusions may not be generalizable to more privileged or rural populations, or to households without young children. However, because this study is from five sites across the country, it does represent predominantly urban, low-income families with young children, with implications for families within urban settings (Bassuk, Rubin, & Lauriat, 1986). In addition, we excluded severely ill or injured children, so most of the highest risk households were not included in this study.

Limitations also exist in the measure used to represent housing affordability as a covariate in the analysis. Family housing-cost burden, the ratio of housing costs to income, is the most frequently used household measure of housing affordability; however, this measure is faulted for its susceptibility to family choices that can also affect outcomes (Hulchanski, 1995). Although not a perfect measure, for this study, we chose city-level housing cost burden, weighted to match the income characteristics of the analytic population at each site, since it is the best measure of housing affordability available for our study population.

### Conclusion

If housing policies are guided by documented successes, and sustainable funding sources are developed, significant improvements in the health of vulnerable young children would

likely result. Housing programs that increase the availability of affordable housing for families with young children could potentially reduce housing insecurity and improve the health and well-being of this most vulnerable subpopulation. Accurate, accessible data on housing subsidies are needed to effectively target housing support programs and carry out evidence-based policymaking. Maintaining stable and adequate funding for federal housing programs is crucial for supporting low-income families in the United States and for protecting the health and development of at-risk children.

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### Notes

1. The data set from *A picture of subsidized households—2008* (U.S. Department of Housing and Urban Development, 2008) reported occupancy rates above 90% for each of the subsidized housing types included in our analysis.
2. The Section 8 New Construction housing type included 202/6 projects, which are housing subsidies for elderly only. To eliminate these units, units with a head of household over 62 years were subtracted from the Section 8 New Construction subtotal.
3. This is also supported by the existence of extensive lengthy waiting lists for subsidized housing in all research site areas.
4. 2006–2008 County-level income data by race and ethnicity from the U.S. Census Bureau's Small Area Income and Poverty Estimates were used (U.S. Census Bureau, 2006–2008b).

### Notes on Contributors

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