

## **Stable Homes Make Healthy Families - Children's HealthWatch, 2017**

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### **Methods**

Maternal and child health-related costs and child educational costs attributable to housing instability in 2016 were estimated using adjusted odds ratios (AORs) from the association between the dyad's outcomes living in stable housing with those living with one adverse housing condition, expressed as either behind on rent or mortgage in the previous year, moved two or more times in the previous year, or being current homeless or having a history of homelessness in the child's lifetime (henceforth housing instability).<sup>1</sup>

To transform odds ratios (OR) in relative risk ratios (RR) the following formula was used:  $RR = OR / [(1 - Po) + (Po * OR)]$ ,<sup>2</sup> where RR is the relative risk ratio, OR is the odds ratio, and Po is the proportion of the unexposed (stable housing) who develop the outcome, or become cases (housing instability). Those probability ratios were then translated into population attributable fractions (PAFs) expressing the proportion of the total prevalence of the disease in the population attributable to housing instability.  $PAF = Pe (RR - 1) / [Pe (RR - 1) + 1] * 100\%$ ,<sup>3</sup> where PAF is the excess population attributable fraction of disease in the population considered to result from the presence of the exposure variable or condition (i.e., housing instability), RR is the relative risk ratio calculated as above, and Pe is the proportion of controls (i.e., housing stability) who were exposed.

Results for each disease or condition attributable to housing instability were then applied to a subset of women in fertile age between 18 to 44 years, or children under 18 years-old. In addition, results were combined with data on annual expenditures for treatment of individuals with the condition, to estimate the total annual direct costs of treatment for all individuals with the condition, described in details below.

### **Costs related to inpatient hospital stays by children attributable to housing instability**

Data on the number of non-neonatal, non-pregnancy-related inpatient hospital stays by children younger than 18 years old were obtained from the 2012 Agency for Healthcare Research & Quality's Healthcare Cost & Utilization Project (HCUP). In sequence, average mean costs per inpatient hospital stay by age group were added to estimate expenditures for inpatient hospital stays among children attributable to housing instability from both the HCUP National Inpatient Database<sup>4</sup> and the HCUP Kids' Inpatient Database.<sup>5</sup> Price index series were used to adjust the price of various healthcare services from 2012 to 2016.<sup>6</sup>

### **Costs related to mother's hospitalizations, ambulatory visits, dental procedures and medication utilization, and children's ambulatory visits, dental procedures and medication utilization derived from fair/poor health status attributable to housing instability**

Data on mothers' perception of their and their child's health as "excellent, good, fair, or poor" and its association with housing instability was assessed,<sup>1</sup> and its results allowed for the estimation of an attributable fraction. Data from wave 10 of the Survey of Income and Program Participation (SIPP) 2008

Panel, gathered in 2011, was used to estimate excess costs of healthcare services by women (ages 18 years to 44 years old) and children (ages 0-17 years) with reported “fair or poor” health status attributable to housing instability. Data on mean per person expenditures on various healthcare services, adjusted by age and health status, from the Medical Expenditure Panel Survey (MEPS), was used to estimate excess expenditures on three types of ambulatory health services as follows: office-based medical provider visits, hospital outpatient visits and emergency department visits. Data from these sources were also used to estimate excess expenditures for dental care visits and prescription medications, as well as excess expenditures for hospital inpatient stays among adults, attributable to housing instability. Data from both MEPS and HCUP were inflated from 2014 to 2016 dollars using CPI-U.

### **Costs related to treatment of depression in adults attributable to housing instability**

Given that data on depression treatment was not available for the year 2016, but was available for the years 1999 and 2009,<sup>7</sup> it was possible to calculate the number of women treated for depression for the 10-year period. Assuming a constant annual increase rate, an exponential growth function was used to estimate the number of women treated for depression in 2016. Then, expenditures for treatment of depression in adults by type of service (ambulatory treatments and prescription drugs) was calculated for all women treated for depression in 2016 using MEPS.<sup>7</sup> In addition, treatment for depression can be done through inpatient hospital stays. Thus, cost of inpatient hospital stays with primary diagnosis stated as depression was added to the calculation.<sup>8</sup> The total cost of each type of treatment for depression in women was inflated from 2014 to 2016 dollars using the appropriate CPI-U for Medical Care and Prescription Drugs and for Hospital Services.

### **Costs related to lost work time and productivity among employed adults due to depression attributable to housing instability**

We used data from a specific publication that estimated the cost of work and productivity loss due to depression.<sup>9</sup> Then, the attributable fraction for the proportion of people diagnosed with depression attributable to housing instability was calculated using the formula described previously. Data from the National Bureau of Labor Statistics (BLS) on labor force participation and employment rates was obtained to estimate the total costs of lost work time and productivity, adjusted to 2016 dollars using the Employment Cost Index.

### **Cost of special education in children attributable to housing instability**

To calculate costs of special education in children given the report of two or more concerns using the Parents’ Evaluation of Developmental Status (PEDS),<sup>1</sup> an inclusion of an additional pathway to the chain of logic was needed. PEDS is a developmental screening test, thus the positive predictive value of the indicator (PEDS) in reference to the outcome (special education) was assessed. Both these measures combined enabled us to estimate the number of diagnosed children that seek and receive special education, attributable to housing instability. Using the National Health Interview Survey (NCHS, 2015)<sup>10</sup> prevalence of children receiving special education or early intervention services in the US, and the total cost of education in the US, we could build costs of special education in public primary and secondary schools attributable to housing instability.

**References:**

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