Urban residence, neighborhood poverty, race/ethnicity, and asthma morbidity among children on Medicaid

Corinne A. Keet, MD, PhD,[a] Elizabeth C. Matsui, MD, MHS,[a] Meredith C. McCormack, MD, MS,[b] and Roger D. Peng, PhD[c] *Baltimore, Md*

Background: Although poor-urban (inner-city) areas are thought to have high asthma prevalence and morbidity, we recently found that inner cities do not have higher prevalent pediatric asthma. Whether asthma morbidity is higher in inner-city areas across the United States is not known.
Objective: This study sought to examine relationships between residence in poor and urban areas, race/ethnicity, and asthma morbidity among children with asthma who are enrolled in Medicaid.
Methods: Children aged 5 to 19 enrolled in Medicaid in 2009 to 2010 were included. Asthma was defined by at least 1 outpatient or emergency department (ED) visit with a primary diagnosis code of asthma over the 2-year period. Urbanization status was defined at the county level and neighborhood poverty at the zip-code level. Among children with asthma, logistic models were created to examine the effects of urbanization, neighborhood poverty, and race/ethnicity on rates of asthma outpatient visits, ED visits, and hospitalizations.
Results: This study included 16,860,716 children (1,534,820 with asthma). Among children enrolled in Medicaid, residence in inner-city areas did not confer increased risk of prevalent asthma in either crude or adjusted analyses, but it was associated with significantly more asthma-related ED visits and hospitalizations among those with asthma in crude analyses (risk ratio, 1.48; 95% CI, 1.24-1.36; and 1.97; 95% CI, 1.50-1.72, respectively) and when adjusted for race/ethnicity, age, and sex (adjusted risk ratio, 1.23; 95% CI, 1.08-1.15; and 1.62; 95% CI, 1.26-1.43). Residence in urban or poor areas and non-Hispanic black race/ethnicity were all independently associated with increased risk of asthma-related ED visits and hospitalizations.
Conclusions: Residence in poor and urban areas is an important risk factor for asthma morbidity, but not for prevalence, among low-income US children. (J Allergy Clin Immunol 2017;140:822-7.)

Key words: *Asthma, inner city, poverty, urbanization*

Since at least the 1960s, researchers have identified poor-urban areas (the "inner city") as hotspots of high asthma prevalence and morbidity.[1,2] Over the past several decades, the National Institutes of Health and other public health institutions have focused substantial resources on inner-city areas, usually defined for official purposes as census tracts in large central metropolitan areas with ≥20% of households below the poverty line, in an effort to reduce asthma disparities. However, until recently, there was very little data on the national scale to confirm that inner-city residence is in fact associated with either a higher prevalence of asthma or, among those with asthma, greater asthma morbidity. In a recent analysis of data from the National Health Interview Survey, we recently found that residence in inner-city areas was not actually associated with higher prevalence of asthma in children across the United States.[3]

Because the National Health Interview Survey does not include rates of asthma outpatient visits, emergency department (ED) visits, or hospitalizations, we were unable to determine whether living in an inner city was associated with increased morbidity among children with asthma in our previous study. Medicaid, as a federally funded program available to low-income children across the United States with central collation of claims data, offers the ability to assess the effect of residence in poor and urban areas among low-income children nationally. Thus, our goal was first to determine whether living in an inner city is indeed associated with increased morbidity, as assessed by more frequent hospitalizations or ED visits, among low-income children with asthma and if so, whether urbanization, neighborhood poverty, or race/ethnicity were independently associated with asthma morbidity.

From [a]the Division of Pediatric Allergy and Immunology, [b]the Division of Pulmonary and Critical Care Medicine, Johns Hopkins University School of Medicine, and [c]the Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health.

Supported by the National Institute of Environmental Health Sciences (grant P50ES018176), the Environmental Protection Agency (grant STAR83563901), and the National Institute of Allergy and Infectious Diseases (grants K23AI103187, U01AI083238, K24AI114769, R01ES023447, R01ES026170, and R21AI107085). No funder had any role in the design and conduct of the study; collection, management, analysis, and interpretation of data; or preparation, review, or approval of the manuscript.

Disclosure of potential conflict of interest: C. A. Keet receives grant support from the National Institutes of Health (NIH) and is the co-owner of Skybrude Consulting, LLC. E. C. Matsui receives grant support from the NIH; serves as a consultant for Environmental Defense Fund, Church, & Dwight, LLC; and has received payment for lectures from Indoor Biotechnologies. M. C. McCormack receives grant support from the National Institute of Environmental Health Sciences and the Environmental Protection Agency and receives royalties from UpToDate. R. D. Peng receives grant support from the NIH, serves as a consultant for Health Effect Institute, and is the co-owner of Skybrude Consulting, LLC.

Received for publication October 17, 2016; revised January 24, 2017; accepted for publication January 30, 2017.

Available online March 8, 2017.

Corresponding author: Corinne A. Keet, MD, PhD, The Johns Hopkins Hospital, CMSC 1102, 600 N. Wolfe Street, Baltimore, MD 21287. E-mail: ckeet1@jhmi.edu.

The CrossMark symbol notifies online readers when updates have been made to the article such as errata or minor corrections

0091-6749/$36.00

© 2017 American Academy of Allergy, Asthma & Immunology

http://dx.doi.org/10.1016/j.jaci.2017.01.036

Abbreviation used
ED: Emergency department

METHODS

The study population included children aged 5 to 19 years enrolled in Medicaid in the United States between 2009 and 2010. Claims data were aggregated on the state level and then processed by the Centers for Medicare and Medicaid into the Medicaid Analytic Extract and were obtained by the Research Data Assistance Center (University of Minnesota, Minneapolis, Minn). Use of the data was approved by the Johns Hopkins School of Medicine Institutional Review Board.

Children with asthma were defined as those who had ≥1 outpatient or ED visit with a primary International Classification of Diseases, Ninth Revision diagnosis code of an asthma-related condition (493.x) over the 2-year period of observation.

For the purposes of asthma morbidity analyses, ED visits were defined as outpatient visits occurring in hospital-based EDs with a primary or secondary diagnosis code of an asthma-related condition. Inpatient visits were defined as those occurring in a hospital with a primary diagnosis code of an asthma-related condition. Outpatient visits for asthma, excluding hospital-based EDs, with a primary or secondary diagnosis code of an asthma-related condition were analyzed separately.

Urbanization status of each subject was classified on the county level using the National Centers for Health Statistics Urban Rural Codes 2013.[4] This classification system divides counties into large central metro ("urban"), large fringe metro ("suburban"), medium metro, small metro, micropolitan, and noncore. Because there are relatively few people living in small metro, micropolitan, and noncore areas, these categories were collapsed.

Neighborhood poverty was classified at the zip-code tabulation area level by linking participant zip codes to data from the Missouri Data Resource Center.[5] This dataset maps census-level data from the American Community Survey 2008 to 2012 to Zip Code Tabulation Areas. Race/ethnicity was defined as non-Hispanic white, non-Hispanic black, Hispanic or Latino ("Hispanic"), Asian, or "other," which included multiracial (non-Hispanic), American Indian or Alaskan Native, and Native Hawaiian. Residence in an inner city was defined as living in a county defined as Urban and a zip code with ≥20% of households below the federally defined poverty line.[6]

Procedures for reporting race/ethnicity varied by state, with some states mandating reporting of race/ethnicity, others not reporting race/ethnicity at all, reporting on only a portion of participants, and/or with improbable lack of certain racial/ethnic groups. Because race/ethnicity was unlikely to be reliable in states with high levels of missing or improbable data, and because race/ethnicity was an important covariate and predictor in our analyses, we only included states where ≤10% of participants had missing data on race/ethnicity and where all major race/ethnicity groups were represented in the data. This excluded Massachusetts, Rhode Island, Iowa, Washington, Vermont, Colorado, Arkansas, Wisconsin, and New Jersey. Maine did not have clinical information available. The combined eligible population in these 10 states represents about 12% of the total Medicaid Analytic Extract population. In addition, because our primary analysis was a 2-level analysis combining state-level analyses, states without urban areas could not contribute to analyses comparing urban to nonurban areas. This requirement excluded an additional 17 states, leaving Arizona, California, Florida, Georgia, Illinois, Indiana, Louisiana, Maryland, Michigan, Minnesota, Missouri, North Carolina, New York, Ohio, Oregon, Pennsylvania, Texas, and Virginia. Subjects were included for months in which they were enrolled in Medicaid with unrestricted benefits.

Statistical methods

Because each state has different Medicaid eligibility criteria and may have other sources of heterogeneity in claims data, the analysis was conducted in 2 stages. At the first stage, overdispersed log-linear Poisson regression models (logistic models for binary outcomes) were used to estimate the association between key predictors (eg, urbanization status, race/ethnicity, and neighborhood poverty) and counts of asthma outcomes (hospitalizations, ED visits, outpatient visits) for each state. At this stage, crude and adjusted models were used, where adjusted models included covariates on poverty, urbanization, sex, race, and age. At the second stage, associations (ie, coefficients) between key predictors and outcomes in each state were combined using a 2-level normal hierarchical model.[7] Given the large sample sizes available in this study, each estimated coefficient was assumed to have a normal distribution about its true value. Then, state-specific coefficients were modeled as having a normal distribution around a national average association. The approach uses Bayesian modeling with a normal prior distribution placed on the national average association and a uniform prior placed on the heterogeneity variance. Samples were drawn from the posterior distribution of the national average association, and we report the posterior mean as our estimate. This approach accounts for the statistical uncertainty incurred in the first stage and potential unexplained variability between states at the second stage, similar to a meta-analysis. The resulting CIs and *P* values incorporate both sources of variability. Potential confounders were included in the state-specific regression models.

RESULTS

Demographics

A total of 16,860,716 children who were enrolled in Medicaid between 2009 and 2010 were included, of whom 1,534,820 (8.8%) had ≥1visit with a primary diagnosis of asthma (see Table I for demographic information). Among those with asthma, there were a mean of 3.7 outpatient visits, 0.30 ED visits, and 0.02 hospital admissions per person per year (Table II).

Asthma prevalence

In both crude and adjusted analyses, the prevalence of current asthma was not different in inner-city (poor urban) areas compared with non-inner-city areas (crude odds ratio, 0.99; 95% CI, 0.81-1.22; adjusted odds ratio, 0.95; 95% CI, 0.81-1.12), and urban status was not a predictor of asthma prevalence in analyses adjusting for neighborhood poverty and race/ethnicity. Black race and residence in a poor neighborhood were significant risk factors for prevalent asthma (Table III).

Asthma morbidity

Inner-city areas. Among children with asthma, living in an inner-city (poor-urban area) was a risk factor for asthma-related ED visits and hospitalizations in crude analyses (risk ratio, 1.39; 95% CI, 1.24-1.57; and 1.62; 95% CI, 1.36-1.93, respectively) and in those adjusted for race/ethnicity, age, and sex, although the effect size was attenuated (risk ratio, 1.14; 95% CI, 1.05-1.26; and 1.30; 95% CI, 1.14-1.47, for ED visits and hospitalizations, respectively) (Fig 1).

Urban/rural status. Among asthmatics, there were significantly fewer ED visits and hospitalizations among those living in suburban, medium metro, or small/microcore areas compared with urban areas in crude and adjusted analyses. The strongest of these associations were with hospitalizations, where those living in nonurban areas had 18% to 28% lower risk of hospitalizations than those living in urban areas, even after accounting for race/ethnicity (Table IV).

Poverty. Among this low-income population, residence in poor neighborhoods was associated with more asthma-related ED visits and hospitalizations in crude and adjusted analyses (Table IV).

Download English Version:

https://daneshyari.com/en/article/5647066

Download Persian Version:

https://daneshyari.com/article/5647066

Daneshyari.com