Asthma in US Mexican-Origin Children in Early Childhood: Differences in Risk and Protective Factors by Parental Nativity

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ABSTRACT

OBJECTIVE: Over 900,000 Mexican-origin children in the United States have asthma, but little is known about the extent to which development of this condition reflects early childhood exposure to social and environmental risks. The objectives of this research are to demonstrate the roles of risk and protective factors in the prevalence and severity of asthma in this population and provide comparisons with other racial/ethnic groups.

METHODS: Nationally representative data from the Early Childhood Longitudinal Study, Birth Cohort (n = 6900), with county-level ozone data appended to this file were analyzed using descriptive and multivariate regression methods.

RESULTS: The odds of asthma diagnosis by 60 months are approximately 50% higher among Mexican-origin children than for non-Hispanic whites ($P < .05$) in multivariate analyses. Compared to those with foreign-born parents, Mexican-origin children with native-born parents have a lower likelihood of being breast-fed and greater chances of having risks including a family history of asthma, having respiratory illnesses and allergies, living with a smoker, and attending center-based child care. Mexican-origin children live in counties with over 3 times more elevated ozone days annually than non-Hispanic whites.

CONCLUSIONS: Mexican-origin children experience a constellation of risk and protective factors, but those with US-born parents have elevated asthma risks compared to those with foreign-born parents. Asthma incidence and severity will likely increase as this population becomes increasingly integrated into US society.

KEYWORDS: air pollution; asthma; disparities; Latino; Mexican origin; nativity

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WHAT'S NEW

Mexican-origin children with US-born parents have elevated asthma risks in early childhood compared to otherwise similar children with foreign-born parents. These results indicate that asthma incidence and burden will likely rise with increasing assimilation and acculturation.

OVER 900,000 US Mexican-origin children currently have asthma, and over 1.4 million are diagnosed with asthma at some point during their childhood years.[1] However, there has been less research attention to asthma among this burgeoning population, perhaps because Mexican-origin children have historically had lower asthma rates than African American children with similar economic disadvantages.[2–4] Indeed, social and environmental exposures other than socioeconomic status that are associated with asthma risk among Mexican-origin children are not well understood, especially in early childhood when the prevalence of asthma-related pediatric care visits and hospitalizations is highest.[1,2] A few studies suggest that heterogeneity exists in asthma risk among subgroups of Mexican-origin children,[5,6] and that integration or acculturation into US society may influence risk.[7] Eldeirawi and Persky[6] show that Mexican-origin children in Chicago whose families lived in the United States for 10 years or more have a higher risk of developing asthma than those with shorter exposure. Holguin et al[8] also find that Mexicans with long-term US residence have a higher likelihood than more recent arrivals of developing asthma. These studies imply that asthma increases along with the prevalence of environmental, dietary, and lifestyle risks as families become integrated into US society.

This study uses nationally representative data from the Birth Cohort of the Early Childhood Longitudinal study (ECLS-B) to examine the prevalence of asthma, as well as associated risk and protective factors for its occurrence and severity among Mexican-origin children born in the United States. Intergroup differences are demonstrated with comparisons between US Mexican-origin children and other Hispanics, non-Hispanic whites, African Americans, Asian Americans, and children of other races. Intragroup differences are examined in comparisons of risks among Mexican-origin children by parental nativity, a commonly used proxy for acculturation.[7,9,10] The guiding hypothesis is that children with US-born parents are more likely than those with Mexico-born parents to experience greater risks and less likely to be exposed to protective factors.

METHODS

STUDY DESIGN

The ECLS-B is a nationally representative longitudinal study of children randomly selected from 2001 US birth certificates. Birth certificate information is combined with parent interview data at 9, 24, 48, and 60 months (http://nces.ed.gov/ECLS/birth). The analytic sample consisted of 6900 children participating in ECLS-B from birth through 60 months, including 1050 Mexican-origin children. Sample sizes are rounded to the nearest 50 to comply with ECLS-B confidentiality requirements. Institutional review board approval was obtained for the study.

ASTHMA-RELATED OUTCOMES

The ECLS-B includes information on several asthma-related outcomes. The primary outcome examined is whether a child was ever diagnosed with asthma by 60 months. At the first assessment when children were 9 months of age, parents were asked whether a doctor, nurse, or other medical professional ever told them that their child has asthma. At 24, 48, and 60 months, parents were asked whether a doctor, nurse, or other medical professional told them their child had asthma since the previous interview. A child is coded as having asthma if his or her parent ever responded "yes." A second outcome of interest is the number of asthma attacks. At 48 and 60 months, parents were asked to report the number of times a doctor, nurse, or other medical professional told them their child had an "asthma attack" since the previous assessment. The numbers of asthma attacks reported were summed and analyzed as a continuous variable. Parents were also asked at 48 and 60 months whether their child had been hospitalized or taken to an emergency room for asthma since the previous survey. If a parent ever responded "yes," their child was coded as having had a hospitalization or emergency room visit. Last, parents reported on children's asthma medication use. At 48 months, parents were asked: "Does the child take a prescription medicine every day?" If the parent said yes, they were asked why the child has to take the medicine. At 60 months, the medicine question was worded slightly differently: "Has your child taken a prescription medicine every day for the last 3 months?" As in the previous interview, if a parent said yes, they were asked for the reason why their child has to take the medicine. Children were coded as taking asthma medication if parents reported at either time point that the child took prescription medicine for asthma.

PRIMARY INDEPENDENT VARIABLE OF INTEREST

The primary independent variable of interest is the measure of race and ethnicity. Following US Census protocol, the ECLS-B included separate questions on "Hispanicity" and "race." The survey first asked whether the child was Spanish/Hispanic/Latino and, if so, the specific origin group (including Mexican/Mexican American/Chicano). A separate question on race included "white" and "black/African American" along with Asian and other groups. These questions were used with nativity to identify Mexican-origin children with 1 or more foreign-born parents and Mexican-origin children with 2 US-born parents, along with other Hispanics.

RISK AND PROTECTIVE FACTORS FOR ASTHMA

Guided by previous asthma research, risk and protective factors were identified on the basis of birth certificate and parent interview data.[9,11–16] Demographic variables are sex, maternal education (less than high school, high school graduate, some college, college graduate), and whether family income was below the federal poverty threshold. Lower maternal education and living in poverty are regarded as risk factors, while higher education and income are considered to be protective. Dichotomous variables indicated health and behavioral risks such as low birth weight, a history of health professional-diagnosed respiratory illness, food allergies, nonfood allergies, family history of asthma, a smoker in the household, and attending center-based child care. Overweight or obese body mass index (BMI) is another risk factor. This was determined from height and weight measurements taken at each assessment, and was calculated on the basis of Centers for Disease Control and Prevention cutoff values for children. A history of being breast-fed is regarded as protective.

A dichotomous variable identifies children who had been uninsured at any point, which may put children at comparatively higher risk. Parents also reported the number of well-child checkups. This was divided by the number recommended in American Academy of Pediatrics guidelines[17] to yield the percentage of recommended visits received, with a higher percentage signifying greater protection.

Because poor air quality may exacerbate asthma,[18,19] secondary analyses were conducted to examine exposure to elevated ozone levels. Ozone was selected for analysis because it is the most widespread air pollutant (http://www.stateoftheair.org/), and because the Environmental Protection Agency finds strong evidence of associations between ozone exposure and asthma complications such as symptom exacerbation and hospitalization (http://www.epa.gov/eogapti1/ozonehealth/population.html). Ozone levels are measured hourly in selected monitoring sites across the country; however, these individual measurements are subject to anomalies of weather or other factors that can inaccurately reflect normal conditions. For this reason, the American Lung Association produces 3-year weighted averages of the annual number of elevated ozone days for each US county with at least 1 ozone monitor (http://www.stateoftheair.org/). The average numbers of elevated ozone days for residential counties for the period 2004–2006 were appended to the ECLS-B files, corresponding to the years when ECLS-B participants were between ages 36 and 60 months. These are the ages at which most asthma hospitalizations occurred. This information was available for 4600 children.

STATISTICAL ANALYSES

Descriptive analyses are presented for the full sample and for children with and without asthma. Group differences are evaluated with 2-tailed *t* tests. Risk and protective