**Methods**

Census data

We included populated census blocks for the year 2010 obtained from the National Historical Geographic Information System (NHGIS) website (Manson et al., 2018; US Census Bureau, 2010). Each block included information on total population of children <18 years, and whether the census block was designated as an urban or rural block. Median household income was available only for census block groups, which is a level higher than census block, divided into five categorized: <$20,000, $20,000 to <$35,000, $35,000 to <$50,000, $50,000 to <$75,000 and ≥$75,000. There were 2686 (0.04%) census blocks with missing median income data in 2010 which were excluded the analysis of median household income. Table 1 summarizes the geographical and demographic data.

Asthma incidence and prevalence rates

An incidence rate is defined as the number of new cases, within a specified time period, among an at-risk population. To estimate childhood asthma incidence rate, new asthma childhood cases and at-risk children, we used the Asthma Call Back Survey (ACBS) and Behavioral Risk Factor Surveillance System (BRFSS) (CDC, 2009, 2011) following the methods described by Winer et al. (2012). In brief, participants in the BRFSS are asked “Has a doctor, nurse, or other health professional ever said that the [name of child] has asthma?” if the answer is “yes”, the respondent is requested to participate in the ACBS follow up survey. The ACBS survey further asks “How old was the [name of child] when a doctor or other health professional first said [he/she] had asthma? How long ago was that?” a new asthma incident case would answer “within the past 12 months”. At-risk children are the sum of new asthma cases and total who never had asthma (i.e. by subtracting the prevalent cases from total children).

We calculated the asthma incidence rate by dividing asthma incident cases by the total number of children

NO2 exposure assessment

Concentration-response function

Burden of disease estimate

**Results**

Asthma incident cases

Attributable number of cases

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