

Children's Vulnerability to Unmanaged Asthma in the Phoenix Metropolitan Area

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ABSTRACT

The research identifies areas and groups that were most vulnerable to excess hospitalizations due to asthma in 2003 among children under 15 using Geographic Information Systems (GIS). Hospitalization data can be used to indicate unmanaged asthma, but not asthma prevalence or emergency room visits due to asthma. Preliminary findings indicate that Black and Hispanic White children are hospitalized at significantly higher rates than their proportion of the population suggests, whereas this was not the case for Non Hispanic White children. Regression analysis was then used to predict hospitalizations for Non Hispanic White, Black, and Hispanic White children using census variables at the zip code level.



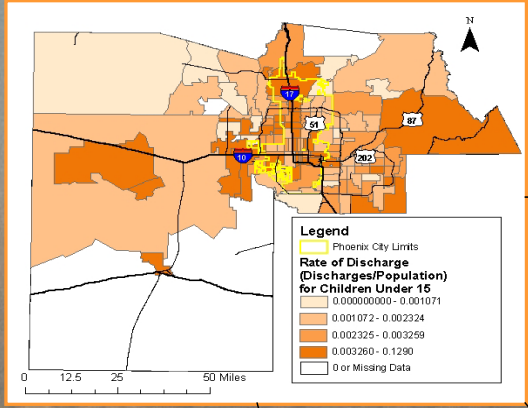
ASTHMA INFO

As the most common chronic respiratory disorder in the US, asthma is growing problem for children, especially for those living in the inner city (Teague and Bayer 2001). Asthma is a respiratory condition resulting in coughing, wheezing, and tightness in chest, thought to be caused by genetics interacting with social and environmental triggers (Hailon and Newacheck 2000). Studies have shown prevalence rates of 6-16% for asthma and/or undiagnosed breathing problems for children in US central cities (Maier et al. 1997; Donnelly et al. 1997; Joseph et al. 1996); according to a National study, 8.7% of children in the US had asthma in 2001 (Rudestam et al. 2004). Children are at a higher risk for developing asthma than adults, as they are more physiologically vulnerable to social environments (e.g., poverty and environmental exposures) (Hailon and Newacheck 2000). Relative to body size, they also have higher metabolic demands for oxygen putting them at increased risk (Landrign 2001). Asthma affects children in many ways: it can reduce ability to play, participate at school, construct meaningful social relationships, and sleep. It can result in school absences and emergency room visits and leads to obesity (Yu et al. 2001; Gilliland et al. 2000).

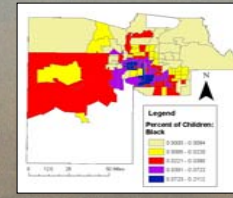
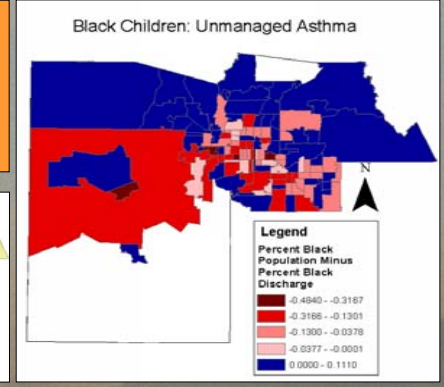
PHOENIX

Asthma is an important health concern in Phoenix which has the third highest rate of asthma-related deaths among the 100 largest cities in the United States. It is especially problematic for Phoenixians under the age of 21. Hospital discharge rates for children with asthma as primary diagnosis in Maricopa County are four times that of rates for all ages (Arizona Asthma Coalition 2003). It has been estimated that 12-25% of children in Arizona have asthma (ADHS 2003).

Asthma Hospitalization Discharge Rate for Children (Under 15) in Maricopa County at the Zip Code Level, 2003



At the county level, Black children are hospitalized at a rate greater than their proportion of the population would suggest (see T-test chart). Zip codes shaded **RED** indicate areas where the percentage of discharges for asthma is lower than one would expect given the percentage of Black children in the population. Zip codes shaded **RED** represent areas where the percentage of discharges is greater than one would expect given the percentage of Black children in the population. In general, it appears that unmanaged asthma is a greater problem for central city Black children. Black children also tend to reside in the central city (see below).



Which racial/ethnic groups are more vulnerable to unmanaged asthma?

Results from a Paired-Sample T-Test for 2003 Hospital Discharges, by Racial/Ethnic Group, from Asthma as Compared to Population at the Zip Code Level for Children (Under 15) in Maricopa County, AZ.

Racial/Ethnic Group for Children Under 15	Percentage of population in racial/ethnic group	Percent of total discharges assigned to racial/ethnic group	T	Sig.
Hispanic White	14.32%	26.48%	6.42	0.000*
Black	3.19%	10.12%	6.837	0.000*
Non Hispanic White	56.17%	56.52%	0.21	0.834

The T-test demonstrated that disproportionate numbers of Hispanic White and Black children suffer from unmanaged asthma. In other words, significantly higher percentages of Hispanic White and Black children are hospitalized than their proportion of the population would suggest. Whereas the percentage of Non Hispanic White children that suffer from unmanaged asthma is similar to the percentage of Non Hispanic White children in the population. This indicates an increased vulnerability to unmanaged asthma for Hispanic White and Black children. This phenomenon is not unique to the Phoenix area.

T-test results are depicted spatially for each of the 3 groups...

Source: Hospital Discharge Data for Maricopa County, 2003 and Bureau of the Census, 2000
 *p<0.05

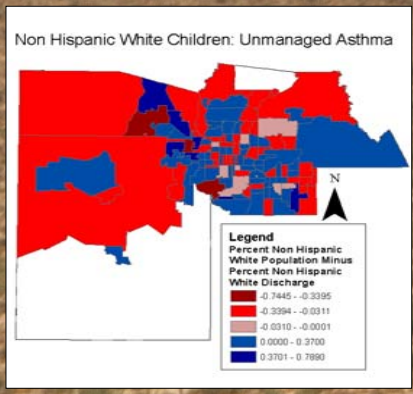
What predicts unmanaged asthma? Do the predictors vary for different racial/ethnic groups?

Regression Equations predicting % Discharge (2003) From Asthma For All Children, Hispanic White Children, Black Children and Non Hispanic White Children using 2000 Census Data.

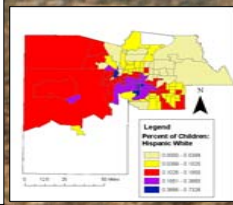
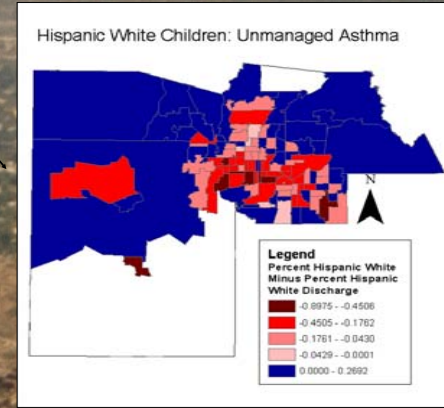
Independent Variable	All Children	Hispanic White Children	Black Children	Non Hispanic White Children
Age	0.000	0.000	0.000	0.000
Female	0.000	0.000	0.000	0.000
Hispanic White	0.000	0.000	0.000	0.000
Black	0.000	0.000	0.000	0.000
Non Hispanic White	0.000	0.000	0.000	0.000
Year (reference)	0.000	0.000	0.000	0.000
Year (reference)	0.000	0.000	0.000	0.000
Year (reference)	0.000	0.000	0.000	0.000

While the model predicting discharges for all children under 15 is not significant, models predicting percent discharge for Black, Hispanic White and Non Hispanic White children were significant. The percentage of households without a vehicle was a significant predictor for all three groups of children. Percent of owner occupied housing and the median year of housing stock were significant predictors for Black children. These independent variables are relevant to unmanaged asthma for a number of reasons. Poverty is important because families living in poverty may lack the primary care necessary to successfully manage asthma. Age of housing stock is relevant because older homes tend to exacerbate asthma symptoms by increasing asthma triggers (e.g., cockroaches, mice, dust, mold, etc.). Having a vehicle is also important for regularly managing asthma. Renting a home/apartment versus owning one is also important because renters are less able to manipulate their home environments to reduce asthma triggers, such as removing old carpets.

At the county level, Non Hispanic White children are hospitalized at a rate similar to their proportion of the population. The T-test for this relationship was insignificant. Zip codes shaded **RED** indicate areas where the percentage of discharges for asthma is lower than one would expect given the percentage of Non Hispanic white children in the population. Zip codes shaded **RED** represent areas where the percentage of discharges is greater than one would expect given the percentage of Non Hispanic White children in the population. Small percentages of Non Hispanic White children reside in the central city (see below).



At the county level, Hispanic White children are hospitalized at a rate greater than their proportion of the population would suggest (see T-test chart). Zip codes shaded **RED** indicate areas where the percentage of discharges for asthma is lower than one would expect given the percentage of Hispanic White children in the population. Zip codes shaded **RED** represent areas where the percentage of discharges is greater than one would expect given the percentage of Hispanic White children in the population. As is similar for Black children, it appears that unmanaged asthma is a greater problem for central city Hispanic White children. Hispanic White children also tend to reside in the central city (see below).



Future Plans

The work presented on this poster represents preliminary analyses for an dissertation. From here, I plan to continue the spatial analysis in more depth, looking at asthma, air quality, traffic, demographics and the location of health care centers. To better understand how the findings presented in this poster play out in lived experience, I am conducting in-depth interviews with caretakers of children with asthma. My study is comparative, looking at households in both South Phoenix (historically minority area) and Ahwatseth (upper middle class enclave). An environmental justice frame and a social vulnerability lens helps generate my approach.

Study Area: South Phoenix and Ahwatseth

