

Examining Role of Environmental Pollution, Healthcare Access, and Social Vulnerability in Asthma Emergency Department Visits in Allegheny County, Pennsylvania

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Background/Objective

Nationally, Black children are four times as likely to visit the emergency room for asthma problems relative to white children. (3)

In Allegheny County, Black children are also disproportionately more likely to have asthma relative to white children.

Emergency department (ED) visits for asthma are considered preventable and an unnecessary cost to the healthcare system. Children's ED visits for asthma have increased in the U.S.

Aim:
Explore the role of environmental pollution, healthcare access, and social vulnerability in relation to asthma ED visits in Allegheny County, PA

RESULTS: MAPS & SPATIAL ANALYSIS (QGIS, GEODA)

Map 1: Environmental Pollution Associated with Asthma-related Events in Children (<18) in Allegheny County

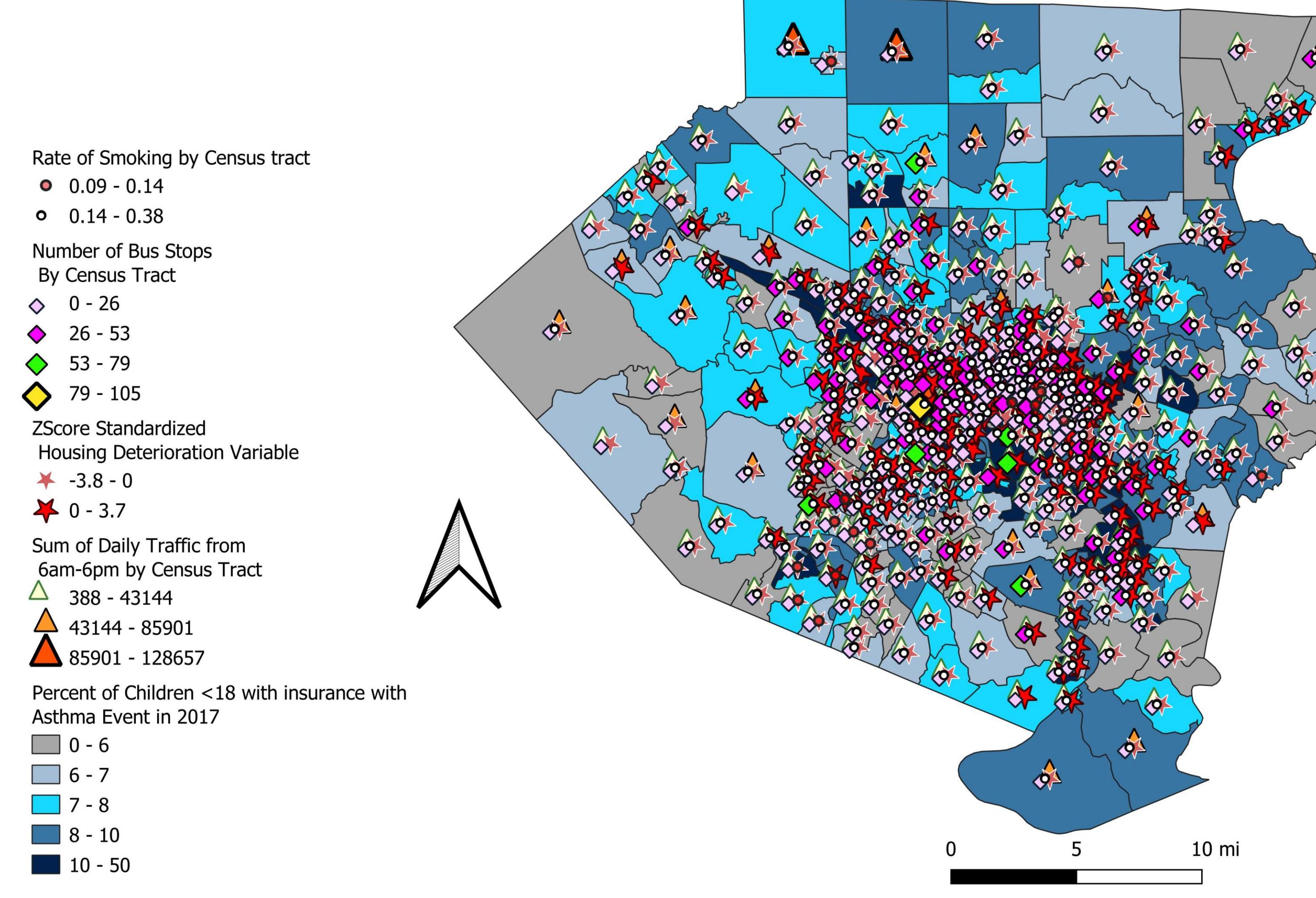


Table 1: Linear Regression of Environmental Pollution Associated with Percent Asthma ED Visits in Children (<18)

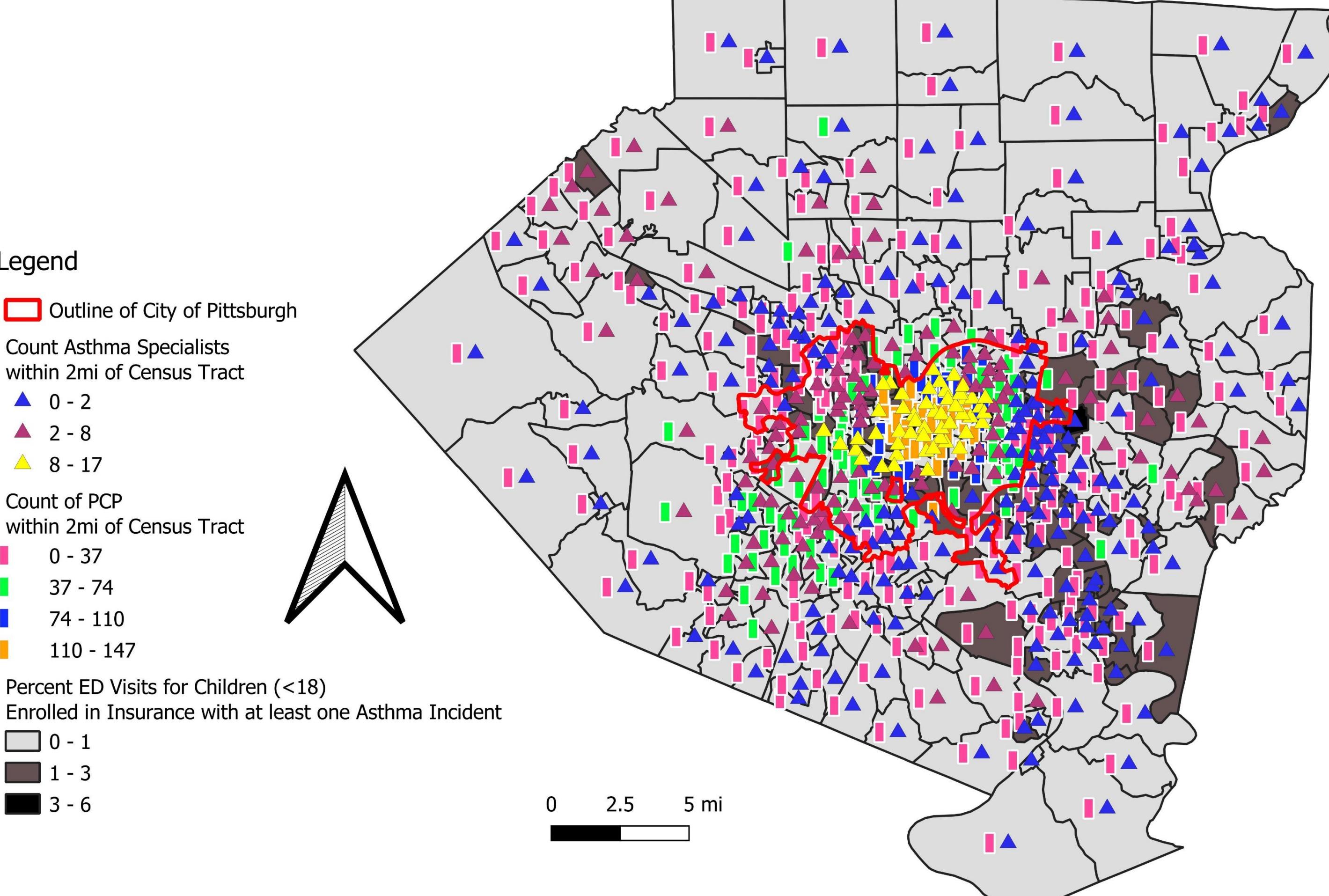
Dependent Variable:	Percent Asthma ED Visits
Covariates	β coefficients
Number of Bus Stops	0.006*
Neighborhood Vulnerability Z Score	0.09**
Smoking Rate	2.97**
Sum of Traffic	<0.001 *
Model Fit:	$R^2 = 0.21$ Moran's I (error)=5.48 **

*p value <0.05

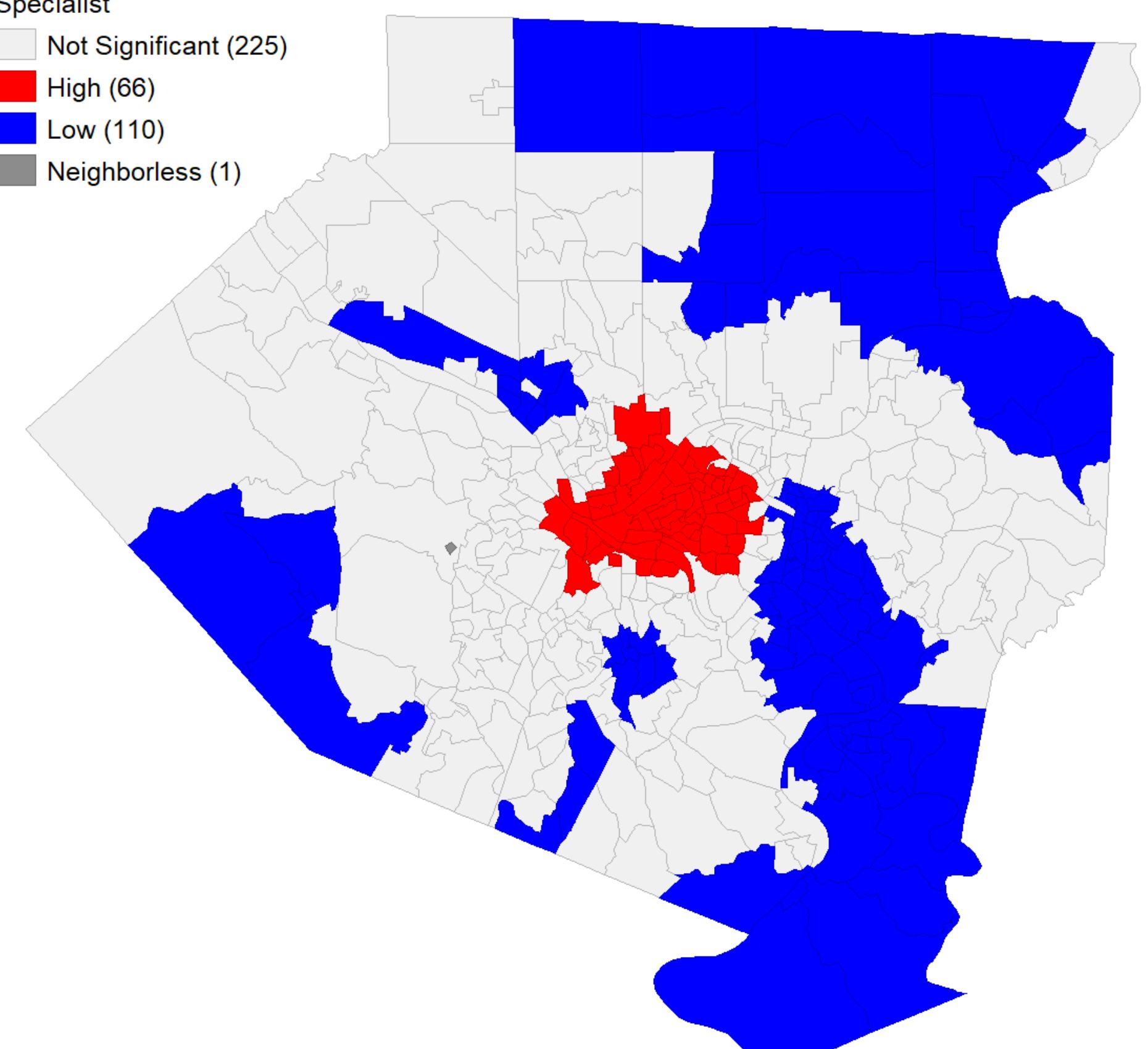
**p value <0.01

(Queen Matrix Contiguity)

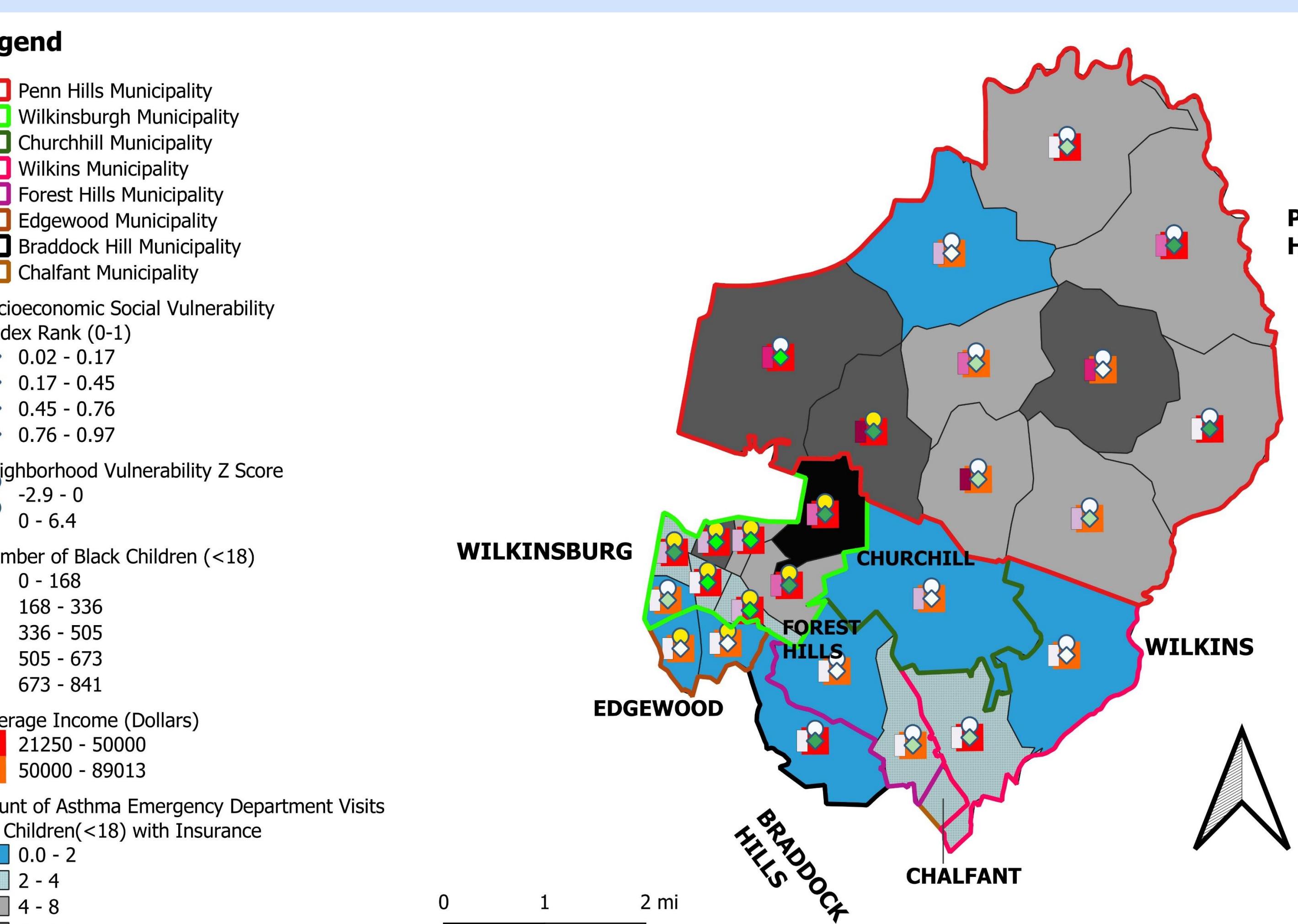
Map 2: Relationship between Access to Primary Care Physicians and Asthma Specialists, and Asthma Emergency Department Visits in Allegheny County



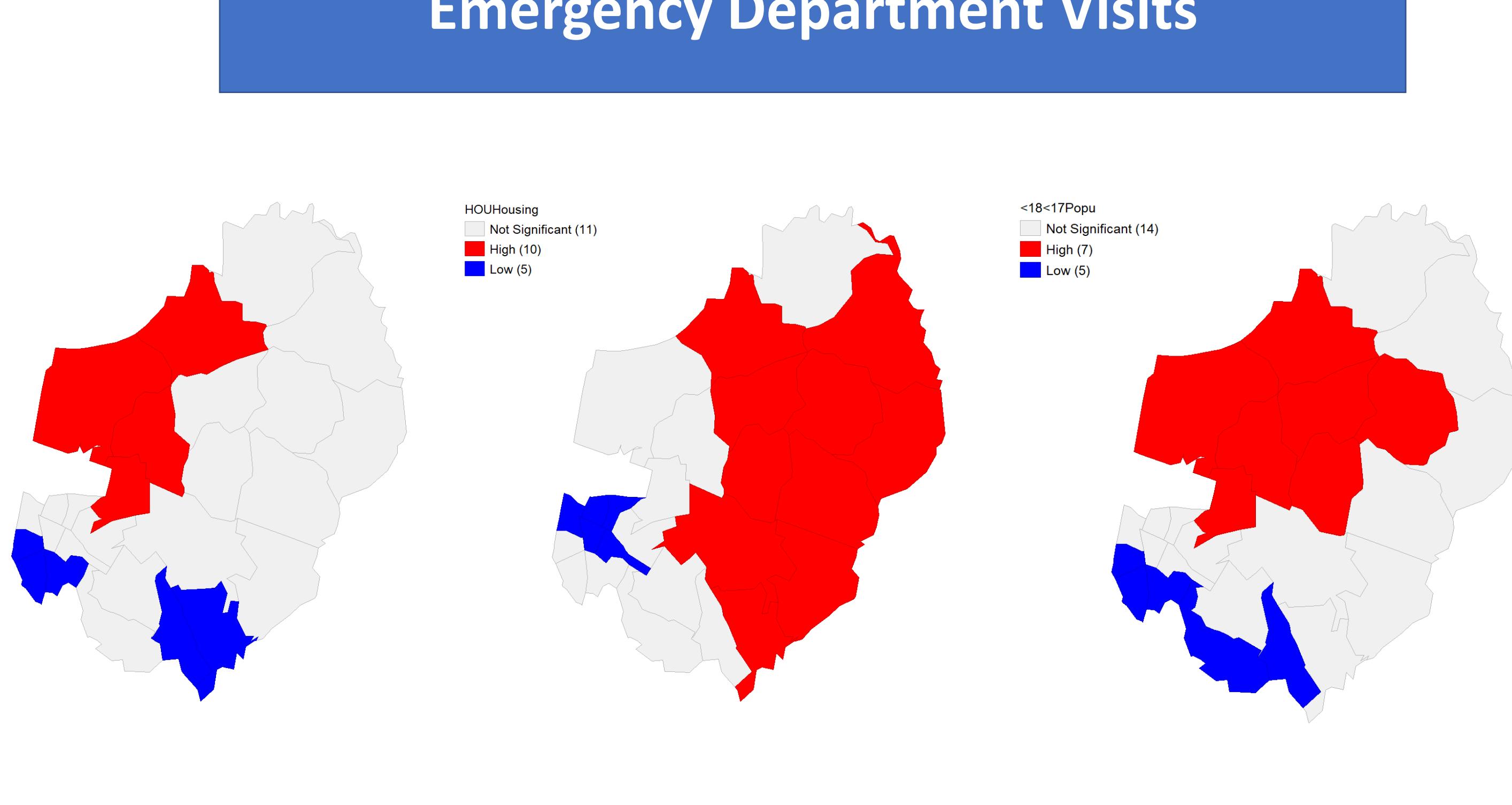
Map 3: Local G* Cluster Map of Count of Specialists in Allegheny County



Map 4: Role of Vulnerability in Regions with High and Low Asthma ED Visits



Map 5-7: Local G* Cluster Maps of Communities with High and Low Asthma Emergency Department Visits



Map 5 : ED Visits

Map 6 : Neighborhood Vulnerability Z Score

Map 7 : Black Children (<18)

FINDINGS

Map 1: Environmental Pollution and Asthma Events

- Factors of environmental pollution are clustered in the City of Pittsburgh: there are more bus stops, traffic, and neighborhood pollution (higher ranks of older houses, poor houses, and housing vulnerability)

Map 2: Healthcare access and Asthma ED Visits

- ED visits are high in the City of Pittsburgh and regions outside of the City
- Asthma specialists are significantly higher than average in the City of Pittsburgh and lower than average outside of the City

Map 4: Role of Vulnerability in Regions with High and Low Asthma ED Visits

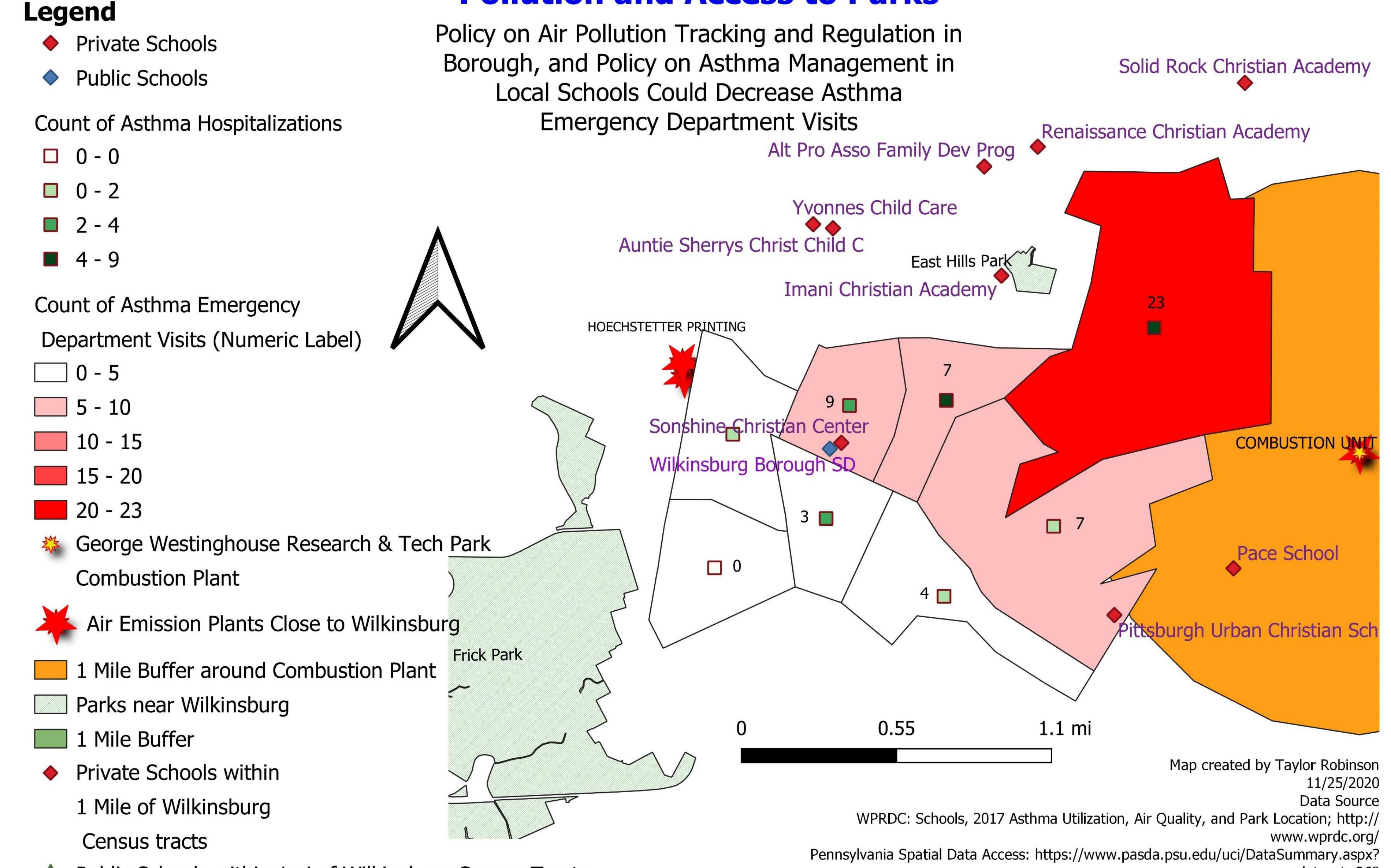
- Areas with higher than average ED visits have higher than average Black children, lower income, higher social vulnerability, and lower neighborhood pollution

Future Directions

- Poisson Regression of covariates and ED/Asthma event count or improving model fit for linear regression
- Analyzing other covariates such as air quality, locations of air monitors, confirmed list of asthma specialists, and other aspects of indoor air pollution
- Targeting high-risk municipalities, such as Wilkinsburg, for tailored asthma interventions to reduce asthma ED visits

POLICY RECOMMENDATIONS

Map 4: Analyzing Asthma Burden in Wilkinsburg in Relation to Air Pollution and Access to Parks



Map created by Taylor Robinson
11/25/2020
Data Source
Policy on Air Pollution Tracking and Regulation in Borough, and Policy on Asthma Management in Local Schools Could Decrease Asthma Emergency Department Visits

WPRDC: Schools, 2017 Asthma Utilization, Air Quality, and Park Location; <http://www.wprdc.org/>

Pennsylvania Spatial Data Access: <https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=208>

Asthma Utilization, Poor Housing, Parks, Private Schools, Public Schools, Old Housing, Municipality Areas, Primary care Providers, Smoking, Bus Count, Smoking Rate, Traffic: WPRDC, <http://www.wprdc.org/>

Neighborhood Vulnerability Z Standardized Poor Housing + CDC Social Vulnerability Index: <http://www.cdc.gov/socialdeterminants/>

Specialists: http://www.medicredit.com/med_exposure/pittsburgh.aspx

2014 Number of Black Children and Average Income: 2017 Census

(1)Patel, S., & Chambers, P., & Desheimer, J. W. (2016). Asthma-related emergency department use: current perspectives. Open access emergency medicine. *8*, 47-55. <https://doi.org/10.2147/OAMJ.S60973>

(2)Nath, J. B., & Hsia, R. Y. (2015). Children's emergency department use: current perspectives. Open access emergency medicine. *7*, 47-55. <https://doi.org/10.2147/OAMJ.S60973>

(3)Office of Minority Health. (n.d.). Retrieved November 29, 2020, from <https://minorityhealth.hhs.gov/areas-of-focus/asthma.aspx>

(4)Asthma. (n.d.). Retrieved November 29, 2020, from <https://www.alleghenycounty.us/Health-Department/Programs/Air-Quality/Asthma.aspx>