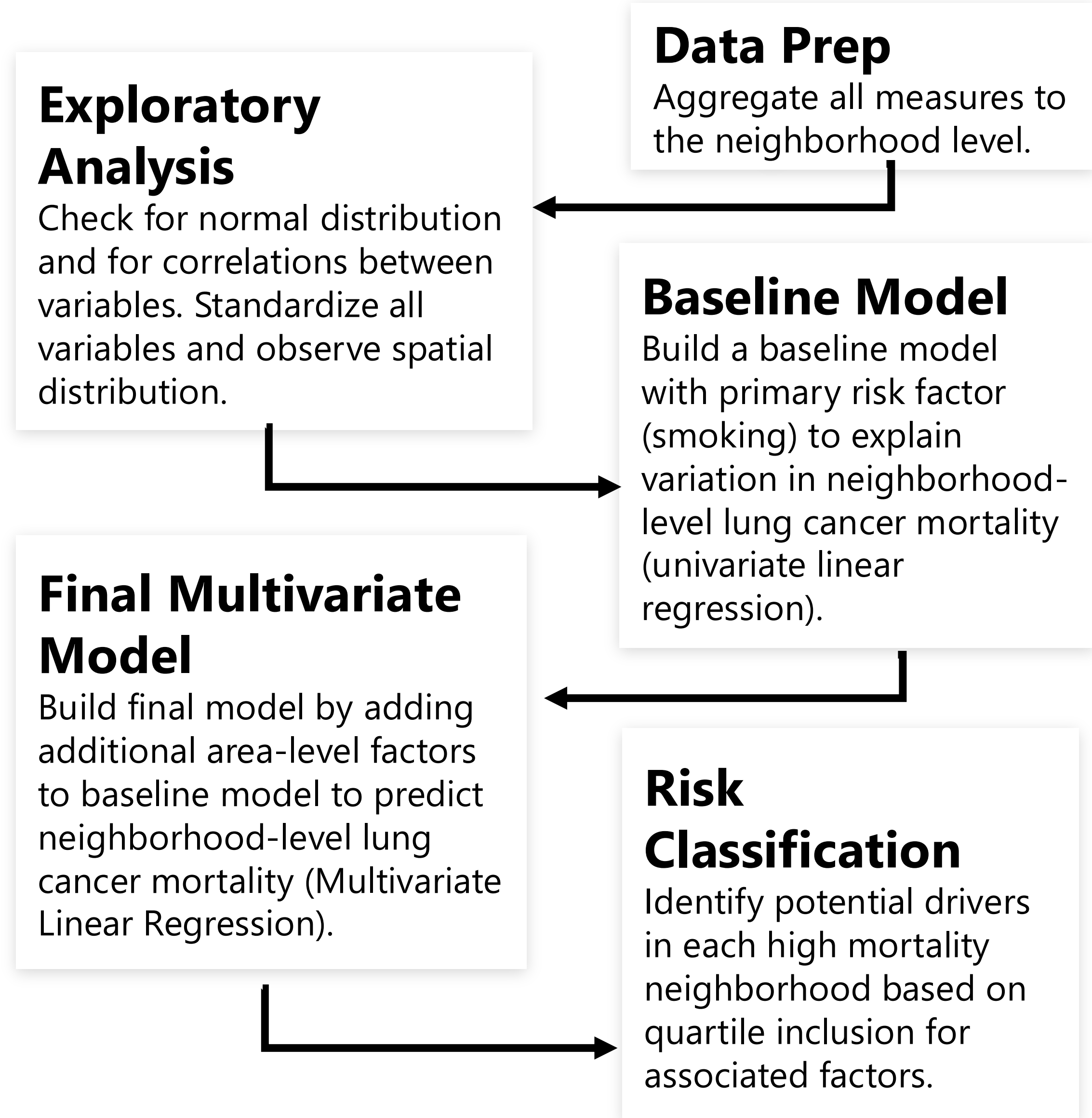


Purpose

Lung and bronchus cancer (LBC) rates have declined with decreases in tobacco smoking. However, LBC remains a primary cause of cancer deaths, and rates among non-smokers are increasing. Racial disparities in LBC exist across incidence, treatment, survival and mortality. Although radon and air pollution are known risk factors for LBC, screening guidelines and prevention efforts focus on smoking. This ecological study assesses whether environmental factors from existing data are associated with neighborhood-level LBC mortality rates in an urban setting.

Methods

Measure	Description	Source
Lung Cancer Mortality	Age-adjusted lung cancer deaths per 100,000 residents, 2012-2016, aggregated to the neighborhood level	Pennsylvania State Cancer Registry
Smoking rate	Percentage of the neighborhood population who currently smoke	PHMC Southeastern Household Health Survey
Radon	Average pCi/L for basements	Pennsylvania Department of Environmental Protection
Diesel Particulate Matter	Ambient concentrations of diesel particulate matter per cubic meter	Environmental Justice Index 2022, CDC
PM 2.5	Ambient concentrations of particulate matter 2.5 micrometers or smaller per cubic meter	Environmental Justice Index 2022, CDC
Superfund site proximity	Average number of Superfund sites within a 2-mile radius, converted to natural log units.	U.S. Environmental Protection Agency Facility Registry Service (FRS) via DiversityDataKids.org
Traffic density	High Volume Roads (Proportion of tract's area within 1-mi buffer of high-volume road or highway)	Environmental Justice Index 2022, CDC
Construction work	Percent of employed individuals aged 16 and older working in construction	American Community Survey, U.S. Census
Non-Hispanic Black population	Percent of residents who identify ethnically and racially as non-Hispanic Black	American Community Survey, U.S. Census



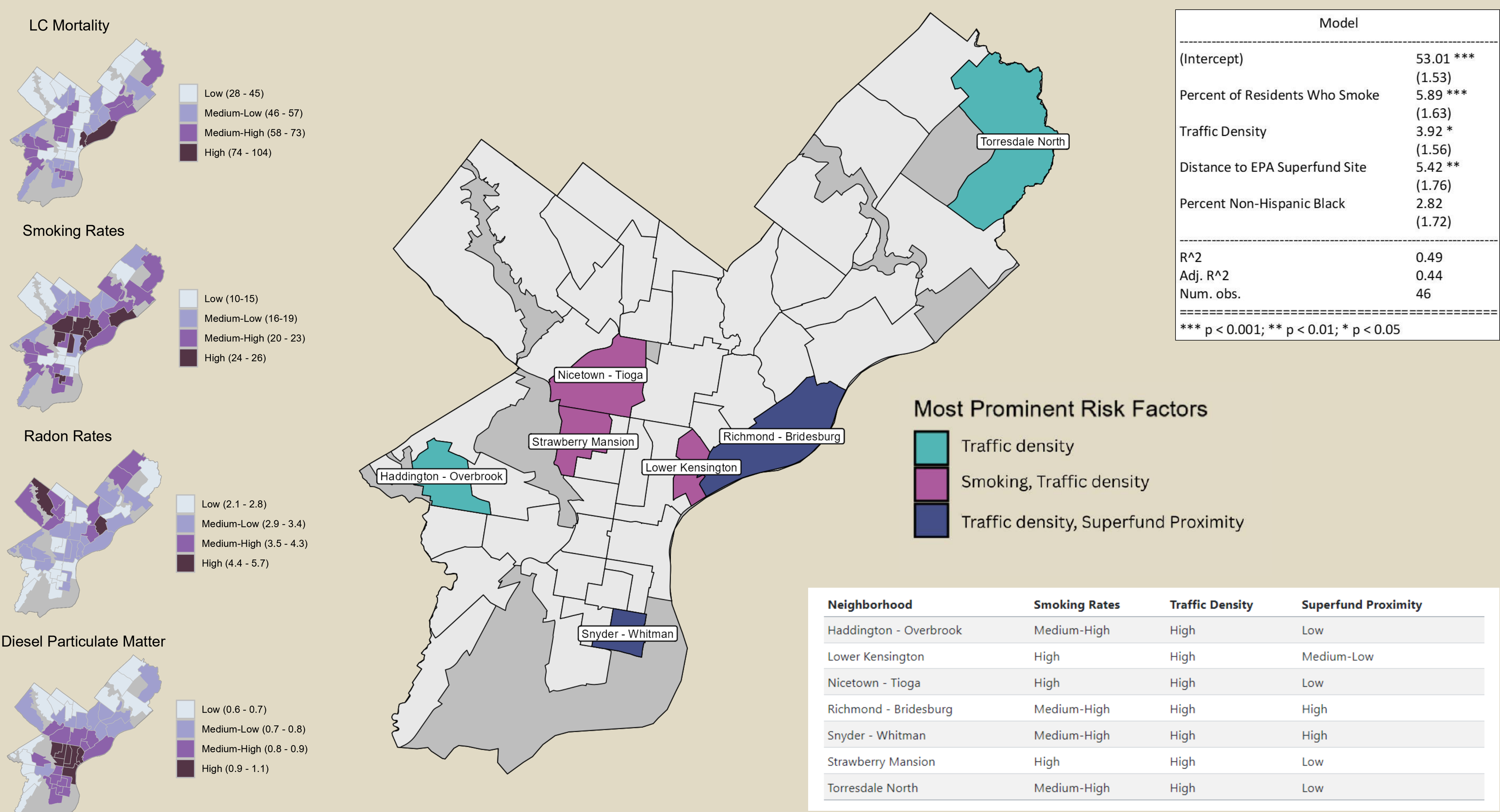
From Smoking to Superfund Sites: An Ecologic Investigation into Associations between Environmental Factors and Lung Cancer Mortality Rates in Philadelphia



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Model	
(Intercept)	53.01 *** (1.53)
Percent of Residents Who Smoke	5.89 *** (1.63)
Traffic Density	3.92 * (1.56)
Distance to EPA Superfund Site	5.42 ** (1.76)
Percent Non-Hispanic Black	2.82 (1.72)
R ²	0.49
Adj. R ²	0.44
Num. obs.	46

*** p < 0.001; ** p < 0.01; * p < 0.05

Discussion

- Cigarette smoking alone explained 28% of the neighborhood-level variation in LBC mortality rates. A final multivariate model (R-square value 0.44) included traffic density, distance to superfund sites, and smoking.
- The proportion of residents who were Non-Hispanic Black was not significant. Had it been significant, it would suggest that the model is missing a factor related to racial disparities.
- Of the seven neighborhoods that have higher LBC mortality rates than the city overall, two were in the highest quartile for traffic density only, three had high smoking rates and traffic density, and two were close to superfund sites and traffic density.
- Radon and fine particulate matter, while known risk factors for LBC, were not significant predictors at the neighborhood level—potentially due to limitations in available data.
- Despite limitations, findings suggest that smoking cessation programs alone may be insufficient to reduce the burden of LBC in Philadelphia. Additional studies using individual-level data focused on factors related to the built environment may be warranted.
- In response to this analysis, a community-engaged project was launched to collaboratively assess environmental cancer risks and raise awareness at the local level. A complementary policy initiative is underway to identify and address policy gaps related to environmental exposures.
- Cross-sector partnerships have been strengthened through this work, including collaboration between Temple University's Office of Sustainability, Fox Chase Cancer Center, the Network for Public Health Law, and 10 community organizations.
- This project demonstrates how geospatial analysis can inform action-oriented solutions. Beyond mapping, geospatial tools can support community-engaged interventions, promote interdisciplinary collaboration, and guide environmental policy advocacy.