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Beyond Smoking: A Geospatial Investigation of Factors Associated with Lung and Bronchus Cancer Risk in Pennsylvania

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Background: Despite a decline in tobacco smoking, lung and bronchus cancer (LBC) remains a leading cause of cancer mortality, with increasing cases among non-smokers. This ecological study evaluates associations between geographic environmental factors and high LBC incidence areas in Pennsylvania, aiming to identify potential prevention strategies.
Methods: Case (PA Cancer Registry, 2010-2015) and population data were categorized by age, sex, and race, and aggregated to the census tract level. Using the spatial scan statistic implemented in SaTScan software, we applied elliptical spatial scanning windows with a Poisson spatial model to identify areas with significantly higher-than-expected LBC rates. Geospatial measures of potential behavioral, socioeconomic, environmental, and built environment LBC risk factors were linked at the census tract level. Logistic regression models were utilized to ascertain which factors increased the odds of being included in a high LBC incidence area.
Results: Using 55,229 cases, 12 areas with elevated LBC incidence were identified after adjusting for demographic factors. Significant predictors of high-risk areas included census tract level smoking rates, traffic density, percentage of pre-1960 housing, particulate matter levels (PM2.5), low education, and poverty. Notably, old homes and low income emerged as the strongest predictors.
Conclusion: This study highlights the influence of socioeconomic and built environmental factors on LBC prevention, underscoring the necessity for public health strategies that extend beyond smoking cessation to address risks associated with older housing and lower income. Further research is needed to elucidate how these factors contribute to LBC incidence which could be related to radon levels in homes.

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