Spatial Regression Techniques for Assessing Spatial Autocorrelation with Air Pollution and Lung Cancer Incidence

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A notable finding is that Kerala's capital Thiruvananthapuram has shown an increasing trend in lung cancer incidence. Long-term exposure to air pollution is a significant environmental risk factor for lung cancer. This study investigated the spatial association between lung cancer incidence and exposure to air pollutants in Thiruvananthapuram, Kerala, India. Male lung cancer data of age group >60 years (2017-2019) from Population-Based Cancer Registry (PBCR) Thiruvananthapuram and air pollution data from Kerala State Pollution Control Board were used in this study. Spatial regression models [Spatial Lag Model (SLM) and Spatial Error Model (SEM), were utilized to explore the global and local association between lung cancer and air pollutants with Ordinary least square (OLS) model as a benchmark. The PBCR results showed that the overall lung cancer incidence rate was 111 per 10^5 males (>60 years), whereas the spatial distribution map revealed that 48% of the study area had an incidence rate greater than 150. In this study, PM2.5 was significantly correlated with lung cancer, and it is consistent across the results of OLS, SLM, and SEM models. SLM was identified as best model that predicted 52% variation in lung cancer incidence. This study explores the effectiveness of spatial regression techniques for dealing spatial autocorrelation and provides insight into the influence of exposure to air pollution on lung cancer incidence.