

Spatio-Temporal Risk Analysis of Cancer to Assessed Environmental Exposures in Coimbatore, India

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Abstract : Epidemiologic studies conducted over several decades have provided evidence to suggest that long-term exposure to elevated ambient levels of particulate air pollution is associated with increased mortality. Air quality risk management is significant in developing countries and it highlights the need to understand the role of ecologic covariates in the association between air pollution and mortality. Several new methods show promise in exploring the geographical distribution of disease and the identification of high risk areas using epidemiological maps. However, the addition of the temporal attribute would further give us an in depth idea of the disease burden with respect to forecasting measures. In recent years, new methods developed in the reanalysis were useful for exploring the spatial structure of the data and the impact of spatial autocorrelation on estimates of risk associated with exposure to air pollution. Based on this, our present study aims to explore the spatial and temporal distribution of the lung cancer cases in the Coimbatore district of Tamil Nadu in relation to air pollution risk areas. A spatio temporal moving average method was computed using the CrimeStat software and visualized in ArcGIS 10.1 to document the spatio temporal movement of the disease in the study region. The random walk analysis performed showed the progress of the peak cancer incidences in the intersection regions of the Coimbatore North and South taluks that include major commercial and residential regions like Gandhipuram, Peelamedu, Ganapathy, etc. Our study shows evidence that daily exposure to high air pollutant concentration zones may lead to the risk of lung cancer. The observations from the present study will be useful in delineating high risk zones of environmental exposure that contribute to the increase of cancer among daily commuters. Through our study we suggest that spatially resolved exposure models in relevant time frames will produce higher risks zones rather than solely on statistical theory about the impact of measurement error and the empirical findings.

Keywords : air pollution, cancer, spatio-temporal analysis, India

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