

Traffic Exposure and Breast Cancer Mortality by Area of Residence: Incorporating Clinical and Socioeconomic Data

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Abstract. Incorporating clinical and environmental data holds promise for monitoring vulnerable populations at the community level. This spatial epidemiology study explores the link between traffic-related air pollution and breast cancer mortality in Seoul, using public socioeconomic and clinical data from Samsung Medical Center's registry (N=6,089). Traffic and socioeconomic status were collected from official sources and integrated for spatial analysis. The findings revealed a significant association between adult breast cancer mortality and districts with high road density, NO₂ emissions, and family income ($p < 0.05$). Significant spatial autocorrelation of residuals was observed (Moran's I test $p < 0.001$).

Keywords. Social determinants of health, breast cancer, spatial analysis, traffic exposure

1. Introduction

Social determinants of health have a significant impact on reducing cancer burden and improving quality of life, but collecting and analyzing data on them is challenging [1]. This study aimed to examine the association between traffic-related air pollution and breast cancer by linking public socioeconomic data and the breast cancer registry through electronic health records. This novel integrated approach for investigating multi-

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dimensional social determinants of health surrounding breast cancer in Seoul, South Korea.

2. Methods

This study on breast cancer patients from 2010-2020 at Samsung Medical Center, Seoul, used de-identified data from the breast cancer registry. Socioeconomic variables were collected from public sources integrated with administrative spatial clusters. To assess the association between traffic-related air pollution and breast cancer death rate, a multivariate regression was employed, correcting for spatial autocorrelation. Predictions for breast cancer mortality utilized urban arterial road density, NO₂ emission, and socioeconomic characteristics such as family income. The study was approved by the Institutional Review Board of the Samsung Medical Center, Seoul, South Korea (IRB No. SMC 2021-02-119).

3. Results

The clinical dataset extracted to evaluate the mortality rate from Samsung Medical Center's breast cancer registry through a clinical data warehouse (N=6,089). Traffic and socio-economic status related variables are collected from multiple data sources. Integrated and aggregated datasets were analyzed at the spatial level of Seoul metropolitan city, based on the 25 Gu administrative boundary. The findings revealed a significant association between adult breast cancer mortality and districts characterized by higher major road density, NO₂ emission, and family income ($p < 0.05$). The spatial autocorrelation of the residuals was statistically significant, as indicated by Moran's I test ($p < 0.001$).

4. Conclusions

Integrating clinical and socioeconomic data has potential to assess breast cancer risk with stratification by socioeconomic and clinical factors. This study explored the linkage between individual hospital and population-level data using South Korea's geocode system, finding a significant positive association between lower SES, higher traffic exposure, and breast cancer mortality in Seoul.

References

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