



Methodological Evaluation of Regional Monitoring Networks in Senegal Using Difference-in-Differences for Clinical Outcomes Measurement,

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Abstract

Environmental monitoring networks have been established in Senegal to assess regional pollution levels and their health impacts. However, there is a need to evaluate the effectiveness of these networks in detecting changes in clinical outcomes over time. A difference-in-differences approach was employed, comparing pre- and post-monitoring periods within different geographical areas that had varying levels of network coverage. This method allowed for the analysis of potential confounding factors such as regional characteristics and temporal trends. The DiD model revealed a statistically significant reduction in reported respiratory issues ($p < 0.05$) among regions with active monitoring networks compared to those without, indicating their effectiveness in detecting environmental health risks. This study provides empirical evidence supporting the utility of regional monitoring networks for improving early detection and management of clinical outcomes related to environmental pollution in Senegal. The findings suggest that enhanced investment in network infrastructure could further improve health surveillance, particularly in regions with limited coverage. Future studies should also explore additional indicators to broaden their scope. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, environmental epidemiology, monitoring networks, regional impact assessment, quasi-experimental design, spatial analysis, temporal correlation*

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