



# Methodological Evaluation of Regional Monitoring Networks in Ghana Using Difference-in-Differences for Efficiency Assessment

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## Abstract

Regional monitoring networks are crucial for ensuring environmental safety and public health in Ghana. However, their effectiveness can be assessed through rigorous methodological evaluations. A DiD approach was employed to compare pre- and post-monitoring periods for different regions. The study utilised time-series data from particulate matter measurements across five districts. An analysis of the difference-in-differences model revealed a statistically significant improvement in air quality monitoring effectiveness, with reductions in particulate matter levels by approximately 15%. The DiD method provided robust evidence for efficiency gains in regional monitoring networks in Ghana, contributing to more effective environmental management strategies. Further studies should explore the scalability and cost-effectiveness of similar monitoring systems across other regions in Ghana. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, econometric, panel data, spatial analysis, efficiency frontier, randomized controlled trials, impact assessment*

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