



Methodological Evaluation of Municipal Water Systems in Ghana Using Difference-in-Differences Models for System Reliability Assessment

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Abstract

Municipal water systems in Ghana are facing challenges related to reliability due to varying levels of investment and operational inefficiencies. A DID model was applied to assess the impact of infrastructure investments and operational changes over time. Data from to were analysed for nine municipalities. The analysis revealed that an investment increase by 10% in municipal water systems led to a 7% improvement in system reliability, with a robust standard error of ± 2 percentage points. This study provides evidence that targeted investments can significantly enhance the reliability of municipal water systems. Municipal authorities should prioritise investment and maintenance activities for improved water service delivery. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, water stress, econometrics, treatment effects, randomized experiments, spatial analysis, time series*

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