



Methodological Assessment and Cost-Efficiency Analysis of Water Treatment Facilities in Nigerian Municipalities Using Difference-in-Differences Models

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Abstract

Nigerian municipalities often face challenges in providing adequate water treatment facilities, leading to poor hygiene conditions and health outcomes. A DiD model was applied to analyse pre- and post-intervention data from municipal water supply records, focusing on changes in water quality indicators before and after facility upgrades. The model estimates the impact of these interventions by comparing municipalities that upgraded with those that did not. The DiD analysis revealed a statistically significant improvement in water treatment efficiency in intervention municipalities ($p < 0.05$), indicating an effective methodological approach for assessing such systems. This research provides robust evidence on the impact of upgrading water treatment facilities, contributing to better public health outcomes in Nigerian communities. Policy recommendations include prioritising investment in upgraded facilities and monitoring ongoing improvements to ensure sustained benefits. Water Treatment Facilities, DiD Model, Cost-Efficiency Analysis, Nigerian Municipalities The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Nigerian, Sub-Saharan, DiD, Econometrics, Water Supply, Infrastructure, Efficiency

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