



Methodological Evaluation of Municipal Water Systems in Kenya Using Difference-in-Differences Models for Reliability Measurement

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Abstract

Municipal water systems in Kenya face challenges such as unreliable supply and maintenance issues. A Difference-in-Differences approach was employed to assess system performance changes before and after intervention periods. Uncertainty around estimated effects is quantified with robust standard errors. The DiD analysis revealed a statistically significant improvement in water supply reliability ($p < 0.05$) following the implementation of new maintenance protocols. This study provides empirical evidence on system reliability improvements through targeted interventions, contributing to policy recommendations for enhancing municipal water systems. Policy makers should consider implementing similar DiD models in other regions with underperforming water systems. Difference-in-Differences, Municipal Water Systems, Reliability Measurement, Kenya Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda |V\theta rV\theta| 2^2$, with performance evaluated using out-of-sample error.

Keywords: Kenyan, GIS, spatial analysis, econometrics, time-series, stochastic models, reliability assessment

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