



Methodological Evaluation of Municipal Water Systems in Ethiopia Using Quasi-Experimental Design

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Abstract

The municipal water systems in Ethiopia face challenges related to supply inefficiencies, which affect both public health and economic development. A quasi-experimental design was employed to assess the impact of various interventions on water system performance, utilising statistical models with robust standard errors for uncertainty quantification. Significant improvements were observed in water supply reliability and coverage in treated areas compared to control regions ($p < 0.05$). The quasi-experimental design successfully highlighted efficiency gains without requiring extensive empirical data, providing a scalable method for future evaluations. Further research should explore the scalability of this approach across different contexts and incorporate additional performance metrics. municipal water systems, efficiency evaluation, quasi-experimental design, robust statistics The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, water supply efficiency, quasi-experimental design, econometric analysis, public health metrics, socio-economic indicators, urban development strategies*

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