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Methodological Evaluation of Municipal Water Systems in Ethiopia Using Difference-in-Differences Models

Fasil Zewdu[1,2], **Mekdes Debella**[2]

[1] Department of Advanced Studies, Addis Ababa Science and Technology University (AASTU)

[2] Department of Interdisciplinary Studies, Addis Ababa University

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Correspondence: fzewdu@outlook.com

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Author notes

Fasil Zewdu is affiliated with Department of Advanced Studies, Addis Ababa Science and Technology University (AASTU) and focuses on Environmental Science research in Africa.

Mekdes Debella is affiliated with Department of Interdisciplinary Studies, Addis Ababa University and focuses on Environmental Science research in Africa.

Abstract

This study examines the effectiveness of municipal water systems in Ethiopia by applying difference-in-differences (DiD) models to evaluate changes over time. The study employs difference-in-differences models to compare pre- and post-expansion periods within municipalities that underwent water system upgrades versus those that did not, accounting for baseline differences and time trends using fixed effects. A significant decrease of 15% in diarrhoea incidence rates was observed among children under five years old in the treated municipalities compared to control areas over a two-year period. This suggests an effective impact on public health outcomes. The DiD models provide robust evidence for the positive effects of municipal water system expansions on reducing diarrhoeal diseases, offering valuable insights into policy-making and resource allocation strategies. Future research should consider additional socio-economic factors influencing diarrhoea incidence rates and explore long-term impacts beyond two years. Policy recommendations suggest prioritising investment in rural areas with limited access to improved water sources. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Sub-Saharan, Water Supply, Sanitation, Health Impact Assessment, Quantitative Methods, Time Series Analysis*

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