



Quasi-Experimental Evaluation of Water Treatment Facilities in South Africa: A Methodological Assessment of Risk Reduction Efforts

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Abstract

Water treatment facilities in South Africa are critical for ensuring safe drinking water supplies. However, their effectiveness varies across different regions and over time. A mixed-method approach combining quantitative data analysis with qualitative insights to assess the efficacy of water treatment systems in reducing health risks associated with contaminated water sources. Analysis revealed a significant reduction ($p < 0.05$) in diarrheal disease incidence among households near newly installed, well-maintained water treatment facilities compared to those without such facilities, indicating effective risk mitigation strategies. The quasi-experimental design proved robust in isolating the impact of water treatment systems on health outcomes, offering a reliable method for future research and policy implementation. Further studies should explore longer-term impacts and scalability of these interventions across diverse environmental settings. Policymakers could leverage this approach to prioritise funding and resource allocation for high-risk areas. 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: *Sub-Saharan, sanitation, randomized control trial, econometric analysis, intervention evaluation, spatial statistics, qualitative methods*

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