



# Replication Evaluation of Water Treatment Facilities in Rwanda: Methodological Insights from a Randomized Field Trial

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## Abstract

Water treatment facilities are critical in rural Rwanda to ensure safe drinking water. However, their efficiency varies significantly. A quasi-experimental design was employed with random assignment of villages to treatment or control groups. Data on water quality and usage patterns were collected over one year. Random assignment led to a statistically significant  $Y = \beta_0 + \beta_1 X + u$  where Y represents the treated village's improved water quality, X is the intervention (treatment), with robust standard errors of  $\pm 5\%$  suggesting moderate effect sizes. The replication confirms the initial findings and provides methodological insights for future evaluations in similar contexts. Further trials should consider additional factors such as socio-economic status and environmental conditions to enhance generalizability.

**Keywords:** Rwanda, Geographic Information Systems (GIS), Randomized Controlled Trials (RCTs), Water Quality Monitoring, Treatment Efficiency Models, Sampling Techniques, Data Analysis Methods

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