



Methodological Evaluation of Water Treatment Facilities in Uganda: A Randomized Field Trial for Efficiency Gains

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Abstract

Water treatment facilities in Uganda are critical for ensuring safe drinking water supply, yet their efficiency varies significantly. A controlled experiment design was employed to evaluate three different water treatment processes under varying conditions. In one of the tested methods, there was a 15% reduction in chemical usage compared to conventional practices, indicating improved efficiency. The randomized trial demonstrated that certain modifications can lead to substantial gains in operational efficiency without compromising treatment quality. Suggested improvements include regular maintenance and training for operators to maximise the benefits of the tested methods. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African geography, randomized controlled trials, water treatment systems, statistical analysis, sustainability metrics, community participation, resource allocation

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