



# Methodological Evaluation of Water Treatment Facilities in Nigeria: A Randomized Field Trial on System Reliability

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## Abstract

Water treatment facilities in Nigeria face significant challenges in ensuring reliable water supply for domestic and industrial purposes. A controlled experiment was conducted to assess the effectiveness of different water treatment systems in Nigeria. Random assignment ensured unbiased comparison among facilities. The analysis revealed that varying water quality inputs significantly impacted system reliability, with a notable difference observed between treated and untreated input waters ( $p < 0.05$ ). This study provides empirical evidence on the critical role of input water quality in determining system reliability for water treatment facilities. Investment decisions should prioritise systems designed to handle variable input conditions, particularly for areas with fluctuating water sources. Water Treatment, System Reliability, Nigeria, Randomized Field Trial 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:** *Water Scarcity, Sub-Saharan Africa, Methodology, Quality Assurance, Randomized Trials, System Reliability, Treatment Processes*

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