



# Methodological Evaluation of Water Treatment Facilities in Nigeria: A Randomized Field Trial for Yield Improvement Research

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## Abstract

Water treatment facilities in Nigeria often struggle with yield inefficiencies, leading to insufficient water supply for communities. A randomized field trial was conducted across five regions in Nigeria, focusing on two types of water treatment facilities: sand filtration and activated carbon adsorption. Data collection included pre- and post-treatment water quality parameters and system operation logs. In the sand filtration systems, a significant increase ( $p < 0.05$ ) was observed in treated water yield from 60% to 78%, while in activated carbon adsorption systems, the yield improved by 24% (CI: 19-30). The randomized field trial methodology showed promising results for improving water treatment facility yields. Further trials should be conducted with a larger sample size and across more regions to validate these findings. Water Treatment, Yield Improvement, Sand Filtration, Activated Carbon Adsorption, Randomized Field Trial The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Water scarcity, African geography, Randomized trials, Treatment efficacy, Methodological design, Community impact, Yield measurement*

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