African Oceanography Studies (Earth Science focus)

Methodological Evaluation of Municipal Water Systems in Tanzania: A Randomized Field Trial for Risk Reduction Assessment

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Abstract

Municipal water systems in Tanzania face challenges such as contamination and inadequate infrastructure that increase risks to public health. A stratified random sampling design was employed across three regions with varying levels of system maturity. Water quality parameters were monitored using a validated standardised method, and data collected via self-administered questionnaires to assess user satisfaction and knowledge about water safety practices. Among the sampled systems, 72% showed improvement in water quality post-intervention, with statistically significant reductions ($p < 0.05$) in E. coli levels from baseline to post-trial. The randomized trial demonstrated that targeted interventions can effectively improve municipal water system performance and user satisfaction, thereby reducing health risks. Communities should be educated on safe water practices, while policymakers should prioritise funding for infrastructure upgrades in underserved areas. The empirical specification follows $Y = \vec{\beta}_{0+\beta} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Tanzania, Sub-Saharan, Sampling, Randomization, Infrastructure, Contamination, Risk Analysis*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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