

REPLICATION STUDY

Replication of a Randomised Field Trial for Pathogen Reduction Diagnostics in Nigerian Water Treatment Systems

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ABSTRACT

Background: Pathogen reduction in decentralised water treatment is a critical public health engineering challenge in many regions. A prior randomised field trial proposed a diagnostic protocol for evaluating treatment efficacy, but its methodological robustness and transferability to different operational contexts required verification.

Purpose and objectives: This study aimed to replicate the original trial's methodology to assess its reliability and generalisability for evaluating pathogen reduction in small-scale treatment facilities. The objective was to test whether the diagnostic framework produced consistent, actionable data under varied field conditions.

Keywords: *Replication study, Randomised field trial, Pathogen reduction, Decentralised water treatment, Sub-Saharan Africa, Water safety diagnostics, Public health engineering*

Article Highlights

- Replication trial confirms methodological soundness but reveals significant outcome variability.
- E. coli reduction was 15 percentage points lower than original study estimates.
- Operational factors like pre-filter maintenance are major moderators of diagnostic efficacy.
- Risk assessments require calibration to local management practices, not just protocol.

Methodological Note

The study employed a generalised linear mixed model with facility-level random effects to account for multi-site variability, using robust standard errors for inference.

This replication underscores the contextual nature of field-based engineering diagnostics.

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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