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Methodological Evaluation and Yield Optimisation of Water Treatment Systems in Kenya

A Randomised Field Trial

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ABSTRACT

Background: Inadequate access to clean water remains a critical challenge in many regions, with existing treatment infrastructure often underperforming. Systematic, evidence-based methodologies for evaluating and optimising the operational yield of such facilities are lacking, particularly in field settings.

Purpose and objectives: This case study aimed to methodologically evaluate the performance of communal water treatment systems and implement a randomised field trial to determine the efficacy of a targeted optimisation protocol for improving potable water yield.

Keywords: *Water treatment, Sub-Saharan Africa, Randomised controlled trial, Process optimisation, Sustainable Development Goals, Field evaluation, Yield improvement*

Article Highlights

- Randomised trial across 42 facilities shows significant yield improvement.
- Methodological framework provides replicable model for field evaluation.
- Linear mixed-effects model confirms treatment effect ($p < 0.001$).
- Findings support data-driven asset management for water infrastructure.

Study Design

A randomised controlled trial comparing a systematic optimisation protocol (hydraulic balancing, coagulant adjustment) against standard operation in communal water treatment systems.

This study presents a quantitative field evaluation with direct implications for operational management.

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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