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# Comparative Field Trial of Water Treatment Systems in Ghana

*Methodological Evaluation and Adoption Metrics (2000–2026)*

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## ABSTRACT

**Background:** Universal access to potable water remains a critical challenge in sub-Saharan Africa. While numerous water treatment technologies have been deployed, systematic comparative data on long-term adoption and performance under real-world conditions is scarce, hindering evidence-based policy and engineering design.

**Purpose and objectives:** This study aimed to methodologically evaluate and compare the sustained adoption rates and operational efficacy of three prevalent community-scale water treatment systems—biosand filters, ceramic pot filters, and chlorination dispensers—through a longitudinal randomised field trial.

**Keywords:** *Water treatment technologies, Sub-Saharan Africa, Randomised field trial, Adoption metrics, Methodological evaluation, Ghana*

### Article Highlights

- Ceramic filters showed superior long-term adoption (68%) versus biosand (52%) and chlorination (41%).
- Adoption odds ratio for ceramic filters versus chlorination was 3.05 ( $p < 0.001$ ).
- Maintenance accessibility and perceived taste were key determinants of sustained use.
- Study employed mixed-effects logistic regression across 120 rural communities.

### Methodological Note

Cluster-randomised controlled trial with adoption modelled via:  $\text{logit}(p_{ij}) = \beta_0 + \beta_1 T_{ij} + \beta_2 X_{ij} + u_j$ , where  $p_{ij}$  is adoption probability.

*This trial provides longitudinal evidence for technology selection in rural water interventions.*

## **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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