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Methodological Evaluation of Water Treatment Systems in South Africa

A Quasi-Experimental Design for Measuring Adoption Rates

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ABSTRACT

Background: Evaluating the real-world adoption of engineered water treatment systems is critical for assessing their public health impact and sustainability. Current assessments often rely on self-reported data, which can be unreliable and lack causal inference for factors influencing uptake.

Purpose and objectives: This short report presents a novel methodological framework for measuring household adoption rates of point-of-use water treatment technologies. The primary objective is to demonstrate a quasi-experimental design that isolates the causal effect of system deployment from confounding variables.

Keywords: *Water treatment, Quasi-experimental design, Technology adoption, Sub-Saharan Africa, Point-of-use systems, Sustainability assessment, Public health engineering*

Article Highlights

- Causal adoption rate measured 34 percentage points higher in intervention communities.
- Framework isolates deployment effect from confounding variables via difference-in-differences.
- Identified technical maintenance access as a primary moderator of sustained use.
- Methodology employs direct observation and residual chlorine testing over self-reporting.

Design Note

The study implements a quasi-experimental, pre-post intervention design with a non-equivalent control group across multiple rural communities.

This report presents a novel framework for causal estimation of technology adoption.

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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