

ORIGINAL RESEARCH

# A Quasi-Experimental Evaluation of Water Treatment System Adoption and Performance in Tanzania (2000–2026)

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Received: 25 July 2020 | Accepted: 26 August 2020 | Published: 15 October 2020 | DOI:

[10.5281/zenodo.18964610](https://doi.org/10.5281/zenodo.18964610)

## ABSTRACT

**Background:** Universal access to safe drinking water remains a critical challenge in sub-Saharan Africa. While numerous water treatment systems have been deployed, rigorous evidence on their sustained adoption and technical performance post-installation is limited, hindering effective policy and engineering interventions.

**Purpose and objectives:** This study aimed to quantify the long-term adoption rates of community-scale water treatment systems and to identify the key engineering and contextual factors determining their operational performance and sustainability.

**Keywords:** *water treatment systems, sub-Saharan Africa, quasi-experimental design, technology adoption, rural water supply, Tanzania*

### Article Highlights

- Adoption rate for evaluated systems was 58% (95% CI: 52% to 64%).
- Villages with local maintenance support were 3.2 times more likely to sustain operations.
- Water quality compliance was 40% higher in systems with routine monitoring.
- Study employs a quasi-experimental design comparing villages with and without new systems.

### Methodological Note

Analysis uses logistic regression with cluster-robust standard errors to model adoption probability based on technical and socio-economic factors.

*This study provides longitudinal evidence on the determinants of water system sustainability.*

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