

CASE STUDY

A Multilevel Regression Analysis of Water Treatment System Adoption in Kenya

A Methodological Case Study (2000–2026)

Wanjiku Mwangi¹

¹ Kenya Medical Research Institute (KEMRI)

Correspondence: wmwangi@gmail.com

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ABSTRACT

Background: Understanding the drivers of technology adoption in infrastructure projects is critical for sustainable development. In Kenya, the uptake of advanced water treatment systems has been variable, with existing studies often failing to account for the hierarchical structure of influencing factors, from national policy to community-level characteristics.

Purpose and objectives: This case study presents a methodological evaluation of applying multilevel regression analysis to measure adoption rates of engineered water treatment facilities. Its objective is to demonstrate the analytical framework's utility in isolating and quantifying the influence of factors at different organisational levels.

Keywords: *Water treatment systems, Kenya, Multilevel regression analysis, Technology adoption, Sub-Saharan Africa, Infrastructure engineering, Sustainable development*

Article Highlights

- Applies a three-level hierarchical linear model to water treatment adoption data.
- Quantifies how county-level governance moderates facility-level factors.
- Demonstrates a framework for partitioning variance across contextual layers.
- Recommends multilevel modelling for future engineering policy assessments.

Methodological Insight

The analysis specifies a multilevel model to isolate influences from individual facilities, administrative counties, and regional blocs, using restricted maximum likelihood estimation.

This study presents a methodological template for analysing clustered infrastructure data.

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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