



A Methodological Evaluation and Cost-Effectiveness Analysis of Public Health Surveillance Systems in Kenya

A Multilevel Regression Modelling Approach.

Wanjiku Mwangi¹

¹ Egerton University

Correspondence: wmwangi@yahoo.com

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Author notes

Wanjiku Mwangi is affiliated with Egerton University and focuses on Medicine research in Africa.

ABSTRACT

Background: Public health surveillance systems are critical for disease control, yet their methodological evaluation, particularly regarding cost-effectiveness, remains underdeveloped in many resource-limited settings. There is a pressing need for robust analytical frameworks to guide investment and optimisation of these systems.

Purpose and objectives: This intervention study aimed to methodologically evaluate the cost-effectiveness of existing public health surveillance systems in Kenya and to develop a modelling framework for identifying the most efficient configurations for future investment.

Keywords: *Public health surveillance, Cost-effectiveness analysis, Multilevel modelling, Sub-Saharan Africa, Kenya, Health systems evaluation, Epidemiological methods*

Article Highlights

- Multilevel regression modelling reveals poor marginal cost-effectiveness in higher expenditure tiers.
- System fragmentation emerges as a key thematic driver of surveillance inefficiency.
- Analysis advocates for prioritising integrated, community-based surveillance components.
- Provides a robust analytical framework for periodic system evaluation and strategic planning.

Methodological Insight

The study employs a two-level hierarchical model to analyse cost-effectiveness across facilities and counties, quantifying uncertainty with 95% confidence intervals.

This evaluation offers a critical framework for optimising surveillance investments in resource-limited settings.

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