

Methodological Evaluation and Yield Optimisation of Public Health Surveillance Systems in Uganda

A Multilevel Regression Analysis

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ABSTRACT

Background: Public health surveillance systems in sub-Saharan Africa are critical for disease control but often operate suboptimally, with poorly quantified yield. Methodological rigour in evaluating these systems, particularly for measuring intervention impact, remains underdeveloped.

Purpose and objectives: This intervention study aimed to methodologically evaluate a structured enhancement package for district-level surveillance and quantify its effect on case reporting yield using a robust multilevel modelling framework.

Keywords: *Public health surveillance, Sub-Saharan Africa, Multilevel modelling, Health systems evaluation, Uganda, Disease control, Intervention yield*

Article Highlights

- Intervention increased confirmed disease reports by 84% (IRR 1.84, 95% CI 1.51–2.24).
- Multilevel modelling revealed 31% of variance attributable to differences between districts.
- Standardised protocols, training, and feedback loops formed the core enhancement package.
- Study employed a stepped-wedge cluster trial across 12 Ugandan districts.

Methodological Insight

The analysis used a three-level random intercepts model to account for clustering at district and facility levels, providing robust estimates of the intervention effect on surveillance yield.

This study offers a replicable framework for evaluating and strengthening public health surveillance.

ABSTRACT-ONLY PUBLICATION

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