



Methodological Evaluation of Public Health Surveillance Systems in Uganda Using Time-Series Forecasting Models for Cost- Effectiveness Assessment

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Abstract

Public health surveillance systems in Uganda are critical for monitoring disease outbreaks and guiding public health interventions. However, their cost-effectiveness is not well understood. A systematic review was conducted alongside a case study approach. Time-series forecasting models were employed to predict disease prevalence and resource allocation needs, with uncertainty quantified through robust standard errors. The model predicted a 15% reduction in healthcare costs over two years when optimised for surveillance coverage and specificity. Time-series forecasting models provided insights into cost-effectiveness but required further validation against real-world data. Further empirical testing is recommended to confirm the predictive accuracy of these models before implementation. Public health, Surveillance systems, Cost-effectiveness, Time-series forecasting Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, surveillance systems, public health, time-series analysis, forecasting models, cost-effectiveness, epidemiology*

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