# Methodological Evaluation of Public Health Surveillance Systems in Nigeria Using Time-Series Forecasting Models for Cost-Effectiveness Analysis

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## Abstract

Public health surveillance systems in Nigeria are crucial for monitoring infectious diseases to prevent outbreaks and ensure effective interventions. However, their effectiveness varies across different regions, necessitating a methodological evaluation. A systematic literature review was conducted to assess the methodologies used in surveillance system evaluations. Time-series forecasting models were applied to forecast costs and benefits, with uncertainty quantified through robust standard errors. The analysis revealed that while some systems employed advanced statistical methods, others relied on simpler models leading to varied cost-effectiveness estimates. This study highlights the importance of adopting consistent methodologies for accurate cost-effectiveness assessments in public health surveillance. Standardisation of surveillance system methodologies is recommended to enhance comparability and reliability across different regions in Nigeria. Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^{\neg}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan African, Public Health Surveillance, Cost-Effectiveness Analysis, Time-Series Forecasting, Epidemiology, Geographic Information Systems, Spatial Data Analysis*

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