



Methodological Evaluation of Public Health Surveillance Systems in Nigeria: Time-Series Forecasting for System Reliability Assessment

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Abstract

Public health surveillance systems in Nigeria are critical for monitoring infectious diseases such as malaria and tuberculosis. A comprehensive search of peer-reviewed journals, grey literature, and conference proceedings was conducted. Methodological rigor, data quality, and model performance were assessed using a time-series forecasting model with uncertainty quantification. The analysis identified a trend in methodological improvements over the last decade but noted variability in data quality across different regions. While Nigeria's public health surveillance systems have improved in methodology, consistent data collection and validation are essential for reliable system performance. Enhanced data standardization protocols and regular model recalibrations should be implemented to ensure robust system reliability. Public Health Surveillance, Time-series Forecasting, Reliability Assessment, Nigeria Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, Public health surveillance, Time-series analysis, Epidemiology, Reliability assessment, Data quality, System metrics*

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