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

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Abstract

Public health surveillance systems in Nigeria are critical for monitoring disease prevalence and guiding public health interventions. However, their effectiveness and cost-effectiveness remain underexplored. Time-series forecasting models were applied to historical data from Nigerian surveillance systems. Robust standard errors were used for uncertainty quantification, ensuring model reliability and interpretability. The analysis revealed consistent trends over five years with a forecast error margin of ±5% indicating moderate precision in predictions. Time-series forecasting provided valuable insights into the cost-effectiveness of surveillance systems but highlighted challenges in data quality and variability across regions. Enhanced data standardization and improved data collection methods are recommended to improve future forecasts and ensure more accurate cost assessments. Public health surveillance, Nigeria, Time-series forecasting, Cost-effectiveness assessment Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Nigerian, Geographic, Surveillance, Epidemiology, Forecasting, Cost-Benefit, Evaluation*