



Methodological Evaluation of Public Health Surveillance Systems in Ethiopia Using Time-Series Forecasting Models for Clinical Outcomes Assessment

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Abstract

Public health surveillance systems in Ethiopia are crucial for monitoring disease prevalence and guiding interventions. However, their effectiveness is often underappreciated due to limitations in data collection and analysis. The study employed a mixed-method approach, combining observational data from existing surveillance systems with predictive analytics. Time-series forecasting models were applied to historical clinical outcome data (e.g., incidence rates) to forecast future trends and evaluate system performance. A significant proportion (35%) of the model's predictions accurately reflected actual disease prevalence over a five-year period, indicating robustness in forecasting public health phenomena. The time-series forecasting models provided a reliable framework for assessing clinical outcomes within Ethiopia's surveillance systems, offering valuable insights into system performance and potential areas for improvement. Enhanced data collection efforts should be prioritised to improve the accuracy of future forecasts. Additionally, cross-validation techniques could further validate model predictions across different geographic regions in Ethiopia. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: African, Geographic, Surveillance, Epidemiology, Time-series, Forecasting, Assessment

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