



Methodological Evaluation of Public Health Surveillance Systems in Tanzania Using Time-Series Forecasting Models

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Abstract

Public health surveillance systems play a crucial role in monitoring disease prevalence and controlling outbreaks in Tanzania. However, their effectiveness can be improved through enhanced analytical tools. The study utilised ARIMA (AutoRegressive Integrated Moving Average) model to forecast future trends based on historical disease incidence data. Uncertainty was assessed through robust standard errors, ensuring reliable predictions. ARIMA forecasts showed a significant upward trend in malaria prevalence over the next six months, with an estimated increase of 15%. The ARIMA model demonstrated high predictive accuracy for clinical outcomes, providing valuable insights for public health planning and resource allocation. Implementing regular model updates and validating model performance through real-time surveillance data will enhance the system's effectiveness in outbreak management. 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: *Sub-Saharan, African, Surveillance, Systems, Mortality, Prediction, Modelling, Analysis*

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