



Methodological Evaluation of Public Health Surveillance Systems in South Africa Using Time-Series Forecasting Models to Assess Reliability

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Abstract

Public health surveillance systems play a critical role in monitoring infectious diseases such as influenza and tuberculosis (TB). In South Africa, these systems are essential for early detection and control of outbreaks. We employed a time-series forecasting model, specifically an ARIMA (AutoRegressive Integrated Moving Average) model, to analyse surveillance data from two key diseases: influenza-like illness (ILI) and TB. Model parameters were estimated using historical data from South Africa's National Institute for Communicable Diseases (NICD). The ARIMA(1,0,1) model provided a good fit for both ILI and TB surveillance data, with residuals within the ± 2 standard deviation range. Our findings suggest that the public health surveillance systems in South Africa have moderate reliability when using time-series forecasting models. Further research is needed to enhance system performance and accuracy. Public health officials should consider refining reporting protocols and increasing data collection frequency for improved disease surveillance. Treatment effect was estimated with $\text{text}\{logit\}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, TB surveillance, time-series analysis, forecasting models, reliability assessment, public health, epidemiology*

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