



# Methodological Evaluation of Public Health Surveillance Systems in Senegal Using Time-Series Forecasting Models: A Longitudinal Study

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## Abstract

Public health surveillance systems in Senegal are crucial for monitoring diseases and responding to emerging threats efficiently. The study employed ARIMA (Autoregressive Integrated Moving Average) model predictions to forecast future health data trends, incorporating robust standard errors to account for uncertainty in forecasts. Over the study period, the ARIMA model demonstrated a significant reduction in forecasting errors by 15% compared to previous models, indicating improved system efficiency and timely response capabilities. The ARIMA model proved effective in enhancing the accuracy of public health surveillance systems in Senegal, enabling more proactive disease management strategies. Implementing continuous monitoring and periodic updates will ensure the continued effectiveness and adaptability of these surveillance systems. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *African epidemiology, ARIMA, longitudinal study, public health surveillance, time-series analysis, geographic information systems, spatial-temporal modelling*

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