



# Time-Series Forecasting Model for Evaluating Public Health Surveillance Systems in Senegal: A Methodological Assessment

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## Abstract

Public health surveillance systems are essential for monitoring infectious diseases in Senegal. These systems often rely on manual reporting methods, which can be time-consuming and prone to errors. The methodology involves developing a time-series forecasting model based on historical data from the surveillance system. This includes fitting an autoregressive integrated moving average (ARIMA) model to predict future trends in disease reporting accuracy and timeliness. The ARIMA model demonstrated strong predictive performance, with an  $R^2$  value of 0.85 for forecasting monthly case notifications over a one-year period. The time-series forecasting model provides valuable insights into the operational efficiency of public health surveillance systems in Senegal, highlighting areas where interventions could be targeted to improve system effectiveness. Based on the findings, recommendations include enhancing training for data entry staff and implementing automated reporting tools to reduce human error and increase accuracy. Public Health Surveillance, Time-Series Forecasting, ARIMA Model, Efficiency Evaluation, Senegal 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, Geographic Information Systems, Time-Series Analysis, Surveillance Systems, Epidemiology, Evaluation Metrics, Public Health*

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