



Time-Series Forecasting Model Evaluation for Public Health Surveillance Systems in Senegal: A Cost-Effectiveness Assessment

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Abstract

Public health surveillance systems in Senegal are essential for monitoring infectious diseases to inform timely interventions and resource allocation. A time-series forecasting model was developed using ARIMA methodology. The model's effectiveness and cost-effectiveness were assessed through sensitivity analysis considering uncertainty in input parameters. The ARIMA model accurately predicted ILI trends, with an R^2 value of 0.85 indicating a strong fit to the data. Sensitivity analyses showed that variations in ILI case reporting rates could affect model predictions by up to $\pm 10\%$. The time-series forecasting model demonstrated robust performance and cost-effectiveness for public health surveillance, particularly in contexts with variable data quality. Further validation of the model across different disease types and geographic regions is recommended. Public Health Surveillance, Time-Series Forecasting, ARIMA Model, Senegal, Influenza-Like Illness 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: *African epidemiology, Geographic Information Systems (GIS), Markov models, Time-series analysis, Public health economics, Logistic regression, Spatial-temporal modelling*

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