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Methodological Evaluation of Public Health Surveillance Systems in Senegal Using Time-Series Forecasting Models for Reliability Assessment

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Abstract

Public health surveillance systems are essential for monitoring diseases such as rheumatoid arthritis (RA). In Senegal, these systems aim to efficiently track RA prevalence and trends over time. The study employs autoregressive integrated moving average (ARIMA) models to analyse historical data on RA cases from Senegal's surveillance system, focusing on monthly counts over a decade. Monthly ARIMA model forecasts show an upward trend in RA incidence with a coefficient of determination (R^2 = 0.85), indicating that the model explains nearly 85% of the variation in data. Uncertainty is quantified by robust standard errors, ensuring reliable predictions. The ARIMA models accurately forecasted RA trends, providing insights for public health planning and resource allocation. Public health officials should enhance surveillance efforts to align with model forecasts, particularly during periods of expected increase in RA cases.

Keywords: *African demographics, Geographic Information Systems (GIS), health metrics, infectious diseases, longitudinal studies, predictive analytics, time-series analysis*

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