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Time-Series Forecasting Model for Evaluating Clinical Outcomes in Rural Clinics of Senegal: A Methodological Assessment

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Abstract

Rural clinics in Senegal face challenges in managing patient flow and clinical outcomes due to limited resources and remote locations. A time-series forecasting model was developed using historical data from seven rural clinics. The model incorporates ARIMA (Autoregressive Integrated Moving Average) to predict future trends in patient admissions and treatment durations, accounting for seasonal variations and external factors such as weather and public holidays. The forecasted trend showed a significant decrease in the number of patients requiring emergency care over the next year by approximately 15% compared to the previous year's actual data, indicating potential improvements in preventive healthcare measures. While preliminary results suggest promising outcomes, further validation is required through real-world implementation and longitudinal studies. Implementing the model for resource planning could lead to more efficient use of existing facilities, thereby improving patient care in rural Senegalese clinics. Rural Clinics, Time-Series Forecasting, ARIMA Model, Clinical Outcomes, Resource Allocation Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, rural health systems, time-series analysis, forecasting models, predictive analytics, resource allocation, clinical outcomes assessment*

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