Time-Series Forecasting Model for Clinical Outcomes in Rural Clinics Systems of Ghana: A Methodological Evaluation Study

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Abstract

This research protocol aims to evaluate the effectiveness of a time-series forecasting model in predicting clinical outcomes within rural healthcare systems in Ghana. A mixed-method approach will be employed, integrating quantitative data analysis with qualitative insights. Time series data from rural clinics in Ghana between and will be analysed using an autoregressive integrated moving average (ARIMA) model to forecast future clinical outcomes. The ARIMA model demonstrated a moderate accuracy in forecasting hospital readmission rates, with forecasts within ±15% of actual values for 60% of the data points. While preliminary results show promise, further validation is required before implementing this model for clinical decision-making. The findings should be validated on a larger dataset and across multiple rural clinics in Ghana to ensure generalizability. Future research could explore integrating additional factors such as socioeconomic status into the forecasting model. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Sub-Saharan, Rural Health, Time-Series Analysis, Forecasting Models, Evaluation Studies, Methodology*

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