



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

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## Abstract

Rural clinics in Tanzania often face challenges related to resource allocation and patient outcomes, necessitating robust methods for evaluating clinical performance. A time-series forecasting model was developed to predict clinical outcomes based on historical data from multiple rural clinics. The model incorporates ARIMA (AutoRegressive Integrated Moving Average) methodology, accounting for seasonal and trend components of the data. The model demonstrated a predictive accuracy with an  $R^2$  value of 0.75 across all clinics evaluated, indicating moderate to strong correlation between forecasted outcomes and actual clinical measures. This study provides a validated method for monitoring and improving clinical performance in rural Tanzanian settings through timely forecasting. The findings suggest implementing the model as a routine tool for assessing clinic effectiveness and guiding resource allocation decisions. Rural clinics, Tanzania, clinical outcomes, time-series analysis, ARIMA Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_{it}$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Rural health systems, Tanzania, time-series analysis, forecasting models, clinical outcomes, resource allocation, epidemiology*

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