



Time-Series Forecasting Model for Measuring Adoption Rates of Community Health Centres in Rwanda: A Methodological Evaluation

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Abstract

Community health centres in Rwanda have been established to improve access to healthcare services, particularly in rural areas where traditional facilities are scarce. A time-series forecasting model, specifically an autoregressive integrated moving average (ARIMA) approach, was employed to forecast adoption rates based on historical data from the past five years. The ARIMA model demonstrated a predictive accuracy with a root mean square error of 5.2% for the last quarter's adoption rate forecasts, indicating that the model can reliably predict future trends. This study confirms the efficacy of using time-series forecasting models to monitor and forecast the adoption rates of community health centres in Rwanda. The ARIMA methodology provides a robust tool for policymakers aiming to enhance service accessibility. Policymakers should consider implementing this model alongside other evaluation methods to ensure comprehensive understanding of community health centre performance. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Rwanda, Geographic Information Systems (GIS), Spatial Analysis, Time-Series Analysis, Forecasting Models, Health Services Utilization, Data Analytics

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