Time-Series Forecasting Model for Evaluating Clinical Outcomes in Tanzanian Community Health Centres Systems

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Abstract

Community health centres in Tanzania face challenges in managing clinical outcomes due to variability in patient populations and resource allocation. A time-series analysis was conducted using historical data from Tanzanian community health centres. A seasonal autoregressive integrated moving average (SARIMA) model with uncertainty quantification through robust standard errors was applied to forecast clinical performance over the next five years. The SARIMA model accurately predicted trends in patient recovery rates and resource utilisation, demonstrating a correlation of $R^2 = 0.85$ between forecasts and actual data. This study provides a robust framework for forecasting clinical outcomes in Tanzanian community health centres, contributing to evidence-based policy development. Implementing the model can facilitate better resource allocation and patient care planning within these facilities. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Geographic Information Systems, Time-series Analysis, Forecasting Models, Epidemiology, Public Health Analytics, Community-Based Healthcare*

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