Time-Series Forecasting Model for Evaluating Efficiency Gains in Community Health Centres Systems in Kenya,

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Abstract

Community health centres in Kenya have implemented various systems aimed at improving healthcare delivery and efficiency. A comprehensive methodological framework was developed to assess system performance through time-series analysis. The model incorporates ARIMA (Autoregressive Integrated Moving Average) equations with robust standard errors to account for temporal dependencies and forecast future efficiency outcomes based on historical data. The forecasting model indicated a significant improvement in average efficiency scores from baseline to year five, with an estimated increase of 15% in service delivery efficiency across all centres, while maintaining stability in resource utilization. The study provides evidence that time-series forecasting models can be effectively utilised for monitoring and enhancing the performance of community health systems in Kenya. Based on findings, future research should explore scalability and replicability of these forecasting techniques across different regions and healthcare sectors to support policy development and resource allocation decisions. Community Health Centres, Efficiency Gains, Time-Series Forecasting, ARIMA Model Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^\frown p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, longitudinal analysis, forecasting models, econometrics, community health systems, efficiency measurement, time-series analysis*

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