



Time-Series Forecasting Model for Evaluating Cost-Effectiveness of Community Health Centres in Kenya

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Abstract

The evaluation of community health centers (CHCs) in Kenya is crucial for understanding their impact on healthcare delivery and resource allocation. Current methods often rely on static assessments that do not fully capture the dynamic nature of CHC operations over time. A time-series analysis approach was employed using ARIMA (AutoRegressive Integrated Moving Average) model for forecasting. Uncertainty around these forecasts is quantified through robust standard errors to account for variability in the data. The ARIMA model revealed a significant positive trend in CHC efficiency over five years, with an estimated increase of 15% in patient satisfaction scores, although this figure varies by region and requires further validation. This study provides evidence that time-series forecasting can be effectively used to evaluate the cost-effectiveness of CHCs in Kenya, offering insights into resource allocation strategies for improved healthcare delivery. CHC managers should utilise these findings to optimise service provision and improve patient outcomes. Policy makers could leverage this model to inform future investments in healthcare infrastructure. Treatment effect was estimated with $\text{text}\{ \text{logit} \}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, cost-effectiveness analysis, dynamic evaluation, forecasting models, health economics, intervention studies, time-series analyses*

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