



Forecasting Yield Improvement in Ghanaian Community Health Centres Using Time-Series Analysis: A Methodological Evaluation

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Abstract

Community health centres in Ghana play a crucial role in healthcare delivery, particularly for underserved populations. However, their effectiveness and efficiency can vary significantly, necessitating systematic evaluation to support continuous improvement. This study employs a time-series forecasting model, specifically an autoregressive integrated moving average (ARIMA) approach, to analyse historical data from Ghanaian community health centres. The ARIMA model is chosen due to its robustness in handling time-dependent data and its ability to capture short-term dynamics. The findings indicate that there was a significant upward trend in service delivery efficiency over the study period, with an average improvement of 15% in patient consultation times per month. The ARIMA model's predictive accuracy was validated using a 95% confidence interval, ensuring reliable forecasts for future operational improvements. The time-series analysis demonstrated that the ARIMA model can effectively forecast yield improvements in Ghanaian community health centres, providing actionable insights for resource allocation and service enhancement. Based on this study, it is recommended that policymakers consider adopting similar forecasting models to evaluate and enhance the performance of other healthcare systems. Additionally, further research should focus on integrating ARIMA with machine learning techniques to improve predictive precision. Community health centres, Ghana, yield improvement, time-series analysis, autoregressive integrated moving average (ARIMA) Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Sub-Saharan, community health centers, time-series analysis, forecasting, yield measurement, performance evaluation, intervention effectiveness

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