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Time-Series Forecasting Model for Evaluating Community Health Centre Systems in Ghana,

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Abstract

This longitudinal study aims to evaluate the performance of community health centres in Ghana over a decade, with a focus on forecasting future trends and identifying yield improvement. Data were collected through routine health records, including patient visits, service utilization rates, and service outputs such as consultations and vaccinations. A time-series forecasting model was developed using an autoregressive integrated moving average (ARIMA) technique to forecast yield improvements in the future. The ARIMA model demonstrated a high degree of accuracy with a mean absolute error (MAE) below 5% for predicting service outputs, indicating a reliable predictive capability. The findings suggest that systematic interventions could further enhance healthcare delivery. This study confirms the utility of time-series forecasting models in evaluating community health centre systems and identifies potential areas for system improvement based on historical data from Ghana's public health sector. Based on the model's predictive power, recommendations include targeted training for staff, expansion of service hours, and integration of digital health platforms to improve healthcare service delivery efficiency. Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Longitudinal Study, Community Health Centres, Time-Series Analysis, Forecasting Models, Methodology, Public Health Systems*

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