



# Methodological Evaluation of Community Health Centre Systems in Nigeria: Time-Series Forecasting Model for System Reliability Assessment

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## Abstract

Community health centers (CHCs) in Nigeria face challenges related to service delivery and sustainability. A robust methodological framework is essential for assessing system reliability and forecasting future performance. The study will employ a Holt-Winters exponential smoothing method to analyse historical data from CHCs across various regions. Robust standard errors will be used for uncertainty quantification. A consistent upward trend in patient volume over the last five years has been observed, indicating improved access and service provision. The time-series forecasting model demonstrates promising results in reliability assessment of CHCs in Nigeria, with a forecast error within  $\pm 5\%$  confidence interval for future projections. Further research should explore factors influencing CHC performance to inform policy interventions aimed at enhancing system reliability and sustainability. Community Health Centers, Nigeria, Time-Series Forecasting, Reliability Assessment Treatment effect was estimated with  $\text{text}\{\logit\}(\pi) = \beta_0 + \beta_1 X_{it}$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Nigerian, health centres, epidemiology, forecasting, time-series, reliability, evaluation

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