



# Time-Series Forecasting Model for Evaluating System Reliability in Ethiopian Community Health Centers: A Methodological Protocol

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## Abstract

Community health centers in Ethiopia face challenges related to system reliability due to resource constraints and operational inefficiencies. The study will employ an ARIMA (AutoRegressive Integrated Moving Average) model to forecast future system performance based on historical data from selected health centers. Uncertainty in forecasts will be quantified using robust standard errors. A preliminary analysis shows a positive correlation between the number of staff and patient satisfaction scores, indicating that adequate staffing is crucial for maintaining high service quality. The ARIMA model demonstrates promise as a tool for assessing system reliability in Ethiopian community health centers. Further research will validate its efficacy across different settings. Communities should advocate for increased investment and training programmes to enhance the workforce, thereby improving overall healthcare delivery. time-series forecasting, community health centers, Ethiopia, ARIMA model, system reliability Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Ethiopia, Geographic Information Systems, System Dynamics, Time Series Analysis, Reliability Engineering, Forecasting Models, Stochastic Processes

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