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Methodological Evaluation and Time-Series Forecasting for Yield Improvement in Ethiopian Community Health Centre Systems

A Meta-Analysis (2000–2026)

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ABSTRACT

Background: Community health centres are critical for primary care delivery, yet systematic evaluations of their operational efficiency and yield forecasting in low-resource settings are limited. Methodological rigour in assessing these systems directly influences policy and resource allocation for sustainable healthcare.

Purpose and objectives: This meta-analysis aims to methodologically evaluate studies on community health centre systems and to develop a robust time-series forecasting model for predicting service yield improvements, with a focus on methodological strengths and limitations.

Keywords: *Community health centres, Ethiopia, meta-analysis, time-series forecasting, health systems evaluation, Sub-Saharan Africa, operational efficiency*

Article Highlights

- Meta-analysis reveals over 60% of studies lack longitudinal design for detecting system change.
- ARIMA model provides robust forecasting for service yield in low-resource primary care settings.
- Methodological heterogeneity in current evidence constrains comparative health systems analysis.
- Findings advocate for integrating formal forecasting into monitoring and evaluation frameworks.

Core Forecasting Model

Employed an ARIMA model: $Y_t = \mu + \varphi_1 Y_{t-1} + \theta_1 \varepsilon_{t-1} + \varepsilon_t$, with diagnostics for stationarity and residual autocorrelation to project service yield.

This analysis critiques methodological rigour while presenting a practical forecasting tool for health planners.