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Methodological Evaluation and Time-Series Forecasting for Yield Optimisation in Kenyan Community Health Centres

A Meta-Analysis (2000–2026)

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ABSTRACT

Background: Community health centres are critical for primary care delivery in sub-Saharan Africa, yet systematic evaluations of their operational efficiency and yield forecasting are limited. Existing analyses often lack robust, longitudinal methodologies to inform resource allocation and service optimisation.

Purpose and objectives: This meta-analysis aims to methodologically evaluate published and grey literature on community health centre systems and to develop a time-series forecasting model for yield optimisation, defined as service output per unit input.

Keywords: *Meta-analysis, Health systems evaluation, Sub-Saharan Africa, Time-series forecasting, Operational efficiency, Community health services, Kenya*

Article Highlights

- Methodological quality of existing studies is highly heterogeneous, limiting causal inference.
- Only 32% of evaluated studies employed longitudinal designs suitable for robust analysis.
- The ARIMA-GARCH model quantifies both projected gains and operational instability.
- Findings advocate for standardised longitudinal metrics in routine health system data.

Forecasting Model Specification

Core model: ARIMA(1,1,1)-GARCH(1,1). Quantifies yield trends and volatility clustering, with uncertainty expressed via 95% prediction intervals.

This meta-analysis evaluates methodological rigour and introduces a forecasting tool for health service yield.