



A Methodological Review and Time-Series Forecasting Model for the Cost-Effectiveness of District Hospital Systems in Ethiopia, 2000–2026

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ABSTRACT

Background: District hospitals are critical for delivering essential health services in Ethiopia, yet systematic methodological reviews of their cost-effectiveness are lacking. Existing evaluations often fail to integrate longitudinal financial and health outcome data into robust forecasting frameworks.

Purpose and objectives: This review critically appraises methodological approaches for assessing cost-effectiveness in the Ethiopian district hospital system and develops a novel time-series forecasting model to project future trends.

Keywords: *Cost-effectiveness analysis, Health systems research, District hospitals, Sub-Saharan Africa, Time-series forecasting, Methodological review, Ethiopia*

Article Highlights

- Identifies methodological gaps in longitudinal, system-level cost-effectiveness analysis for Ethiopian district hospitals.
- Develops a novel ARIMA forecasting model integrating historical administrative data with exogenous population and financing variables.
- Projects gradual efficiency gains (15-20% by mid-2020s) but highlights wide confidence intervals ($\pm 8\%$) due to data quality

Forecasting Model Note

The ARIMA model incorporates exogenous variables for population growth and health financing. Forecast reliability is heavily contingent on addressing underlying data volatility in historical administrative records.

This study bridges methodological critique with practical forecasting for health system planning.

<p>issues.</p> <ul style="list-style-type: none">• Advocates for standardised data collection to improve the reliability of dynamic health system planning tools.	
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