



Methodological Evaluation and Time-Series Forecasting Model for Efficiency Gains in Ethiopian District Hospitals Systems,

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Abstract

This study evaluates the efficiency of Ethiopian district hospitals over a five-year period, focusing on methodological improvements and forecasting models. A comprehensive review of existing methods for evaluating health system performance was conducted. A novel time-series forecasting model incorporating robust standard errors was developed and applied to Ethiopian district hospitals data, focusing on efficiency gains over a five-year period. The time-series forecasting model indicated an average annual improvement in hospital efficiency by about 15%, with significant reductions in operational costs. The findings support the effectiveness of the implemented interventions and highlight the benefits of using advanced statistical models for evaluating health system performance. Continued use of time-series forecasting models is recommended to monitor and enhance hospital efficiency, alongside further methodological refinements and stakeholder engagement. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Sub-Saharan, Methodology, Efficiency, Forecasting, Evaluation, District Hospitals*

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