



# Time-Series Forecasting for System Reliability Evaluation in Ethiopian District Hospitals: A Methodological Assessment

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## Abstract

Ethiopian district hospitals play a critical role in healthcare delivery across the country. However, their operational efficiency and reliability are often under-researched, leading to an inadequate understanding of system performance. The analysis employs a multiple linear regression model to forecast system reliability. Robust standard errors are used to assess model uncertainty. A significant proportion ( $p < 0.05$ ) of the variance in hospital performance is explained by time-series data, indicating strong predictive power for future reliability evaluations. The study validates the efficacy of time-series forecasting models for system reliability assessment in Ethiopian district hospitals. These findings suggest that further research should focus on validating these methods across different districts and healthcare systems. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Ethiopia, District Hospitals, Methodology, Time-Series Analysis, Reliability Assessment, Forecasting Models, System Evaluation

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