



Time-Series Forecasting Model for Measuring Cost-Effectiveness of District Hospitals in Uganda,

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Abstract

This study focuses on evaluating the cost-effectiveness of district hospitals in Uganda by forecasting time-series data. A hybrid ARIMA-GARCH model was employed for the analysis. The ARIMA component captures short-term dependencies in hospital expenditure data, while GARCH components account for volatility clustering. Model parameters were estimated using maximum likelihood estimation (MLE), with robust standard errors applied to quantify uncertainty. The forecasting model exhibited a 95% confidence interval of $\pm 10\%$, indicating that the predictions are reasonably stable and reliable over time. The hybrid ARIMA-GARCH model demonstrated its effectiveness in measuring cost-effectiveness, providing insights for policymakers aiming to improve district hospital systems. Policy recommendations include enhancing financial management practices and investing in preventive healthcare services to reduce costs and increase efficiency. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, African, Hospital, Systems, Econometrics, Time-Series, Forecasting, Modelling*

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