African Family Medicine

Methodological Evaluation of District Hospitals Systems in Tanzania: Time-Series Forecasting Model for Cost-Effectiveness Analysis

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Abstract

This study evaluates the operational efficiency of district hospitals in Tanzania, focusing on the need for methodological improvements to enhance cost-effectiveness analysis. A time-series forecasting model was constructed using historical cost data from Tanzania's district hospitals. The model employs an autoregressive integrated moving average (ARIMA) approach to forecast costs with robust standard errors estimated at ±5%. The analysis revealed a significant upward trend in hospital costs, with a projected increase of 20% over the next five years if current expenditure patterns continue. Variability is estimated at ±10% based on historical data variability and model assumptions. Despite initial cost pressures, there are opportunities to optimise resource utilization through targeted interventions, particularly in areas such as medical supplies and staff training. District health authorities should prioritise preventive healthcare initiatives and invest in more efficient supply chain management systems. Enhanced monitoring of hospital performance metrics is also recommended for better decision-making. Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Geographic Information Systems (GIS), Health Economics, Time Series Analysis, Forecasting Models, Cost-Effectiveness, Data Mining*

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