African Geriatrics and Gerontology

Forecasting Adoption Rates in Ethiopian District Hospitals Using Time-Series Modelling: A Methodological Evaluation

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Abstract

In Ethiopia, district hospitals play a crucial role in primary healthcare delivery. However, their adoption rates of new medical technologies and practices vary significantly across regions. A comprehensive time-series analysis was conducted, employing a seasonal autoregressive integrated moving average (SARIMA) model, to forecast adoption rates based on historical data from three randomly selected district hospitals in Ethiopia over a five-year period. The uncertainty around the forecasts is quantified using robust standard errors. The SARIMA model demonstrated an R-squared value of 0.78 and a confidence interval for the mean squared error (MSE) at ±12%, indicating moderate accuracy and reliability in forecasting adoption rates across different time periods. This study confirms the effectiveness of SARIMA models in forecasting adoption rates, providing a robust methodological framework for healthcare policymakers to anticipate future needs and allocate resources efficiently. Healthcare authorities should consider implementing these forecasting models as part of their strategic planning processes to enhance resource allocation and improve service delivery. Ethiopia, district hospitals, time-series analysis, SARIMA model, adoption rates Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Spatial Analysis, Time Series, Epidemiology, Predictive Modelling, Healthcare Delivery Systems*

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