African Information Science Research (LIS focus)

Time-Series Forecasting Model for Evaluating Cost-Effectiveness of Community Health Centres in Ethiopia,

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Abstract

This case study evaluates the cost-effectiveness of community health centers in Ethiopia by applying a time-series forecasting model. A time-series forecasting model was developed using historical data from community health centers in Ethiopia. The model incorporates autoregressive integrated moving average (ARIMA) techniques to predict the number of patients served and associated healthcare expenses over a five-year period, accounting for seasonal variations and trends. The ARIMA model predicted an annual increase of approximately 5% in patient numbers with a corresponding decrease of around 3% in total costs per year, indicating potential cost savings if operational improvements are implemented. The findings suggest that by adopting the proposed forecasting model, community health centers can better manage their resources and improve service delivery efficiency, thereby enhancing cost-effectiveness. Community health centers should prioritise resource management strategies informed by the forecasted data to optimise patient care and minimise costs. Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Monte Carlo simulation, cohort analysis, regression analysis, predictive modelling, geographic information systems*