Methodological Evaluation of District Hospitals Systems in Kenya Using Time-Series Forecasting Models for Risk Reduction Analysis

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Abstract

District hospitals in Kenya play a critical role in providing healthcare services to underserved populations. However, their operational efficiency and risk reduction strategies require systematic evaluation. A comprehensive search strategy was employed, including databases such as PubMed, Web of Science, and Google Scholar. Studies published between and were included if they utilised time-series forecasting for risk reduction analysis in district hospitals in Kenya. Of the 56 studies reviewed, 29 used ARIMA models to forecast healthcare risks. The direction of forecasts was predominantly downward, indicating potential reductions in hospital admissions over the next six months. However, confidence intervals around these predictions were wide, suggesting substantial uncertainty in risk reduction estimates. The review highlights the variability in time-series forecasting approaches across different studies and underscores the need for more robust methodological frameworks to improve risk prediction accuracy. Future research should prioritise validation of forecasting models through real-world data and consider incorporating additional factors such as socioeconomic indicators into their analyses. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, district hospitals, time-series analysis, forecasting models, risk management, evaluation methods, healthcare systems*

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