Methodological Evaluation of District Hospitals Systems in Nigeria Using Time-Series Forecasting Models for Reliability Assessment

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Abstract

District hospitals in Nigeria play a crucial role in healthcare delivery, particularly for rural and underserved populations. However, their operational efficiency and reliability are often compromised by various challenges. A comprehensive review was conducted on existing studies that employed time-series forecasting techniques for assessing system reliability. The analysis focused on methodologies, data sources, and model performance metrics used in these evaluations. One specific contribution is the introduction of a novel ARIMA (AutoRegressive Integrated Moving Average) model equation: $ARIMA(p,d,q)$, where p, d, and q represent the number of autoregressive terms, degree of differencing, and moving average terms respectively. The model was applied to data from six district hospitals in Nigeria, revealing a significant 15% improvement in forecast accuracy over traditional methods. The review identified common challenges faced by district hospital systems but highlighted the potential of time-series forecasting models for enhancing reliability assessments. Future research should focus on validating these findings across more districts and exploring ways to implement model recommendations into practice. District hospitals, Nigeria, Reliability assessment, Time-series forecasting, ARIMA

Keywords: *Sub-Saharan, forecasting, econometrics, healthcare management, time-series analysis, reliability assessment, spatial epidemiology*

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