



Methodological Evaluation and Time-Series Forecasting of District Hospitals Systems in South Africa: Implications for System Reliability Analysis

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Abstract

District hospitals in South Africa play a critical role in healthcare delivery, yet their systems' reliability is subject to variability and uncertainty. The study employed systematic review methodologies to synthesize data from various district hospitals, including statistical models such as ARIMA for forecasting. Robust standard errors were used to account for model uncertainty. An empirical example showed that the average forecasted system reliability improved by 15% over a one-year period with the implemented time-series model. The time-series forecasting model demonstrated enhanced accuracy in predicting system reliability, offering valuable insights for healthcare policy and resource allocation. District hospital managers should consider implementing similar models to forecast their systems' performance and improve overall service delivery. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African healthcare, systematic review, time-series analysis, reliability assessment, district health systems, econometric models, geographic information systems*

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