



# Time-Series Forecasting Model for Evaluating District Hospitals Systems in South Africa,

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## Abstract

In South Africa, district hospitals play a crucial role in healthcare delivery, especially for underserved populations. A longitudinal study employing a time-series forecasting model to evaluate hospital systems' performance. The model includes an autoregressive integrated moving average (ARIMA) equation with robust standard errors for uncertainty quantification. The ARIMA model identified a consistent decline in patient waiting times by approximately 10% over the five-year period, indicating system improvements despite challenges. This study validates the effectiveness of ARIMA models in forecasting hospital system reliability and suggests further refinement for broader application. District health authorities should consider implementing similar forecasting methods to enhance resource allocation and patient care. district hospitals, time-series analysis, forecasting, South Africa, healthcare systems Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Geographic, Sub-Saharan, Public Health, Time-series, Forecasting, Evaluation, Methodology*

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