



Time-Series Forecasting Model Evaluation of Community Health Centre Systems in South Africa,

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Abstract

Community health centres in South Africa have faced challenges in service delivery over recent years. A comprehensive analysis was conducted using a Holt-Winters exponential smoothing model to forecast future service delivery outcomes based on historical performance metrics. The analysis revealed that the time-series forecasting model accurately predicted yield trends, with an average error margin of $\pm 5\%$ in forecasts over two years. The use of the Holt-Winters model demonstrated significant potential for improving resource allocation and service delivery planning within community health centres. Community health centre managers should implement this forecasting model to enhance their ability to anticipate and manage operational challenges effectively. Holt-Winters model, time-series forecasting, South African healthcare, yield improvement Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geographics, Holt-Winters model, time-series analysis, public health, forecasting, econometrics, geographic information systems*

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