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Methodological Evaluation of Community Health Centres Systems in South Africa Using Time-Series Forecasting Models for Clinical Outcomes Assessment

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Abstract

Community health centres (CHCs) play a crucial role in addressing healthcare needs within South Africa's diverse and resource-limited settings. Clinical data from 10 CHCs over a five-year period were analysed. Time-series forecasting models, specifically ARIMA (p,d,q) with $\hat{\{Y\}}\{t+1\}=phi\,0+\sum\{i=1\}^{\{d\}}phii\delta^{i}(\hat{\{Y\}}t-mut)+\sum\{j=1\}^{\{q\}}Phijepsilon_{t-j}$, were employed to predict future clinical outcomes. The ARIMA models showed a significant correlation ($R^2>0.75$, $p<0.001$) between predicted and actual patient recovery times, indicating the effectiveness of forecasting in measuring CHC performance. Time-series forecasting models provide reliable insights into clinical outcomes within CHCs, enhancing their operational efficiency and resource allocation strategies. CHCs should implement robust data collection systems and regularly update their forecasting models to ensure accuracy and responsiveness to evolving health needs.

Keywords: *African geography, community health centres, time-series analysis, forecasting models, clinical outcomes, resource-limited settings, epidemiology*

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