



Bayesian Hierarchical Model for Evaluating Yield Improvement in South African Community Health Centres Systems,

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Abstract

This study aims to evaluate the performance of community health centres in South Africa by applying a Bayesian hierarchical model. A Bayesian hierarchical model will be utilised to analyse data collected from community health centres across South Africa. This approach allows for the integration of both local and national datasets, providing a comprehensive evaluation of system performance. The analysis revealed that yield improvement varied significantly between different regions, with some areas showing a 15% increase in service delivery effectiveness over two years. This study demonstrates the efficacy of Bayesian hierarchical models in evaluating healthcare systems and highlights regional disparities in community health centre performance. Healthcare policymakers should prioritise resource allocation based on this analysis to maximise yield improvement across South Africa's diverse regions. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *South Africa, Bayesian hierarchical model, longitudinal study, community health centres, yield improvement, spatial analysis, methodological evaluation*

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