



Bayesian Hierarchical Model for Assessing Cost-Effectiveness of Community Health Centres in South Africa: A Methodological Evaluation

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Abstract

Community health centres (CHCs) play a crucial role in healthcare delivery in South Africa, particularly for underserved populations. A Bayesian hierarchical model was employed to estimate the cost-effectiveness ratio (CER) of CHCs in South Africa. The model accounts for heterogeneity across different regions by incorporating latent variables that capture geographical variations. The estimated CER suggests a marginal improvement in health outcomes per unit cost, indicating potential cost savings and better resource allocation within the healthcare system. This study provides evidence on the effectiveness of Bayesian hierarchical models for assessing CHC systems' cost-effectiveness. The methodological insights can inform policy decisions aimed at optimising resource distribution in South Africa's healthcare landscape. Further research should explore longitudinal data to enhance model accuracy and robustness, particularly in regions with high disease prevalence. Bayesian hierarchical models, community health centres, cost-effectiveness analysis, South Africa Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Sub-Saharan, Hierarchical, Bayesian, Evaluation, Methodology, Cost-effectiveness*

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