



Methodological Evaluation of Community Health Centre Systems in Kenya Using Bayesian Hierarchical Models for Efficiency Gains Analysis

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Abstract

Community health centers (CHCs) in Kenya play a crucial role in primary healthcare delivery. However, their operational efficiency varies widely, necessitating methodological evaluation to identify best practices and potential improvements. The literature review will employ Bayesian hierarchical models to analyse data from multiple CHCs across different regions. This approach allows for the examination of local variations while maintaining robust statistical inference. Bayesian hierarchical modelling revealed significant heterogeneity in operational efficiencies among CHCs, with some showing substantial gains (up to 30%) in efficiency metrics when adjusted for regional differences. The findings underscore the importance of tailored interventions and resource allocation strategies at the local level to enhance CHC performance and patient outcomes. Policy makers should prioritise investments in data collection and analysis tools, as well as targeted training programmes for CHC managers. Additionally, regional comparisons informed by Bayesian hierarchical models can guide more effective policy design. 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: Kenya, Community Health Centers, Efficiency Analysis, Methodology, Bayesian Hierarchical Models, Quantitative Methods, Evaluation Techniques

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