



# Bayesian Hierarchical Model for Measuring Cost-Effectiveness in Community Health Centres Systems: A Case Study in Kenya

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## Abstract

This study evaluates the cost-effectiveness of community health centres in Kenya through a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse data from multiple health centers. Uncertainty quantification was achieved using robust standard errors. Within the study period, there was a significant reduction in patient wait times by approximately 20% across participating centers, with confidence intervals indicating this trend is statistically reliable. The Bayesian hierarchical model effectively captured variability between centers and provided actionable insights for improving service delivery. Health policy makers should consider the findings to optimise resource allocation and improve service quality in community health centres. Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Kenya, Bayesian Hierarchical Model, Cost-Effectiveness Analysis, Community Health Centres, Epidemiology, Methodological Evaluation, Quantitative Research*

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