



Bayesian Hierarchical Model Assessment of District Hospitals Systems in Kenya: A Yield Improvement Study

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Abstract

This study aims to evaluate the performance of district hospitals in Kenya by utilising a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse data from multiple district hospitals. The model accounts for spatial correlation and heterogeneity in hospital performance. Bayesian inference revealed a mean yield improvement of 15% with a 95% credible interval ranging from 8% to 23%, indicating significant variability across districts. The Bayesian hierarchical model demonstrates improved accuracy in measuring district-level hospital performance compared to traditional methods, highlighting the need for targeted interventions. District health managers should prioritise areas where yield improvement is most needed based on model predictions and implement evidence-based strategies. 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: *East Africa, Bayesian hierarchical models, district health systems, methodological evaluation, yield analysis, quantile regression, spatial statistics*

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