



Bayesian Hierarchical Model for Measuring Efficiency Gains in Kenyan District Hospitals Systems

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Abstract

Efficiency gains in healthcare systems are critical for improving patient outcomes and resource allocation in developing countries like Kenya. A Bayesian hierarchical model was applied to data from Kenyan district hospitals to estimate efficiency gains and identify potential interventions. The model accounts for hospital-specific variability and incorporates external factors affecting performance. The analysis revealed a 15% average increase in efficiency across the sampled districts, with notable improvements in resource utilization and patient care metrics, particularly in surgical procedures and laboratory services. Bayesian hierarchical modelling provided nuanced insights into district hospital efficiencies, highlighting specific areas for targeted interventions to enhance service delivery. District health authorities should prioritise training programmes for healthcare professionals and investments in essential equipment to align with the identified efficiency gains. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Kenya, Bayesian Hierarchical Model, District Hospitals, Methodological Evaluation, Resource Allocation, Efficiency Metrics, Healthcare Systems

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