



Bayesian Hierarchical Model for Evaluating Efficiency Gains in Uganda's District Hospitals Systems,

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Abstract

This study aims to evaluate the efficiency gains in Uganda's district hospitals systems through a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse the efficiency gains in district hospitals. This approach accounts for both within-hospital variability and district differences. Efficiency gains varied significantly across districts, with some showing improvements of up to 35% in resource utilization, indicating substantial potential for system optimization. The Bayesian hierarchical model provides a robust framework for understanding district hospital efficiency dynamics and offers insights into policy interventions aimed at enhancing service delivery. This study recommends the implementation of targeted training programmes and standardised operational protocols to achieve consistent improvement in healthcare service quality across all districts. 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: *African geography, Bayesian hierarchical models, Efficiency measurement, Methodology, Quantitative analysis, Statistical inference, System evaluation*

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