



# Bayesian Hierarchical Model for Evaluating Cost-Effectiveness in District Hospitals Systems, South Africa

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## Abstract

District hospitals in South Africa face challenges in resource allocation and service delivery efficiency. A Bayesian hierarchical regression model was employed to analyse data from various district hospitals across South Africa, incorporating uncertainty in cost estimates with credible intervals. The analysis revealed significant differences in cost-effectiveness among districts, highlighting the need for targeted interventions. Bayesian statistical methods provided a nuanced understanding of hospital systems' performance and resource allocation challenges. District hospitals should prioritise evidence-based resource distribution strategies to enhance service delivery efficiency. district hospitals, cost-effectiveness, Bayesian hierarchical model, South Africa Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_p$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *District Hospitals, Hierarchical Models, Bayesian Statistics, Cost-Effectiveness Analysis, Resource Allocation, Epidemiology, Regression Analysis*

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