



Bayesian Hierarchical Model for Assessing System Reliability in Rwanda's District Hospitals: An Evaluation Framework

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Abstract

Bayesian hierarchical models are increasingly used in healthcare systems to assess reliability and efficiency of medical facilities. A Bayesian hierarchical model was applied to analyse data from district hospitals in Rwanda. This approach incorporates uncertainty and allows for hierarchical structure within hospital systems. The analysis revealed that the average system reliability score across all districts varied between 75% and 80%, with significant variability observed among individual hospitals. The study provides a robust framework to assess district hospital systems in Rwanda, emphasising the importance of hierarchical modelling for comprehensive evaluation. Future research should explore interventions that can improve system reliability scores within districts. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Rwanda, Hierarchical Modelling, Bayesian Methods, Reliability Assessment, District Hospitals, Methodology, Quantitative Analysis*

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