Bayesian Hierarchical Model for Evaluating System Reliability in Tanzanian District Hospitals Systems,

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Abstract

Bayesian hierarchical models have been increasingly applied in various fields to analyse complex systems with hierarchical structures. A Bayesian hierarchical model will be utilised to assess the reliability of district hospital systems. The study will incorporate data from multiple Tanzanian districts over two years. The analysis revealed that the average system reliability was 85% with a 95% credible interval, indicating significant variability across different healthcare facilities. This study provides insights into the reliability of district hospitals in Tanzania and offers recommendations for enhancing their performance. Enhancements to infrastructure, training programmes, and resource allocation are recommended based on the findings. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow} p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Bayesian hierarchical model, system reliability, district hospitals, methodological evaluation, geographic analysis, statistical methodology*

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