



Bayesian Hierarchical Model Assessment of District Hospitals System Reliability in South Africa,

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Abstract

This study evaluates the reliability of district hospitals in South Africa by applying a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse the performance of district hospitals across multiple sites. The model accounts for spatial variability and heterogeneity in hospital systems. The analysis revealed that the average system reliability varied significantly between districts, with some areas showing a decline over time. Bayesian hierarchical models provide a robust framework to understand and quantify system performance at district levels, enhancing decision-making for healthcare resource allocation. District health authorities should prioritise interventions in regions identified as having lower reliability to improve overall service delivery. district hospitals, Bayesian hierarchical model, system reliability, South Africa Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *District, Hierarchical, Bayesian, Medicine, Reliability, Modelling, Africa*

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