



Bayesian Hierarchical Model for Evaluating Risk Reduction in District Hospital Systems Over Time in South Africa,

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Abstract

This study aims to evaluate the effectiveness of district hospital systems in South Africa over a decade. A Bayesian hierarchical model was employed to analyse longitudinal data, accounting for variability across different districts and time periods. The model revealed an overall risk reduction of 15% in emergency response times, with significant improvements noted in rural areas. Bayesian hierarchical modelling provided robust insights into the effectiveness of district hospital systems over time. Further research should focus on implementing tailored interventions to address remaining challenges identified. District Hospitals, Risk Reduction, Bayesian Hierarchical Model, South Africa Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Sub-Saharan, Hierarchical, Bayesian, Epidemiology, Quantitative, Spatial Analysis*

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