



Bayesian Hierarchical Model for Evaluating Risk Reduction in Ghanaian District Hospital Systems

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Abstract

The healthcare systems in Ghana's district hospitals face challenges related to inefficiencies and resource allocation, particularly concerning risk reduction strategies. A Bayesian hierarchical model was employed to analyse data collected from district hospitals over two years. The model accounts for variability across different units and integrates expert knowledge to estimate risks accurately. The analysis identified that the implementation of risk reduction strategies led to a decrease in patient readmission rates by approximately 15% within one year, with significant reductions observed in surgical cases. Bayesian hierarchical models provide a robust framework for evaluating and implementing interventions aimed at improving healthcare outcomes in district hospitals. District hospital managers should consider adopting the Bayesian hierarchical model as part of their risk assessment protocols to enhance patient safety and resource management. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Africa, Bayesian, Model, Hierarchical, Epidemiology, Systems, Analysis*

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