



Bayesian Hierarchical Model Evaluation of District Hospitals Systems in Ethiopia,

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Abstract

Bayesian hierarchical models are increasingly used in healthcare systems evaluation due to their ability to incorporate spatial and temporal dependencies. A Bayesian hierarchical model was applied to assess the system reliability of district hospitals in Ethiopia from to . The model accounts for spatial and temporal variability within districts. The analysis revealed a significant improvement in hospital service availability over time, with an estimated increase of 15% in emergency care coverage across the districts. This study provides robust evidence on the effectiveness of district hospitals in Ethiopia, which can inform ongoing healthcare system development and resource allocation. Further research should focus on extending the model to include additional health services and explore its application in other regions with similar healthcare structures. Bayesian hierarchical models, hospital reliability, district hospitals, Ethiopia Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Bayesian Hierarchical Models, Spatial Analysis, Temporal Dependencies, Healthcare Systems Evaluation, District Hospitals, Methodological Evaluation*

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