



# Bayesian Hierarchical Model for Evaluating Clinical Outcomes in Rural Kenyan Health Clinics Systems

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## Abstract

Clinical outcomes in rural Kenyan health clinics have been underperforming due to a lack of standardised data collection and analysis methodologies. A Bayesian hierarchical model was constructed to analyse clinical data from multiple rural Kenyan health clinics. This model accounts for clinic-specific variability and allows for inference across different clinics. The model identified a significant improvement in diagnostic accuracy when incorporating clinic-level covariates, with an estimated increase of 15% in correct diagnoses per clinic. The Bayesian hierarchical model successfully captured the heterogeneity among rural Kenyan health clinics and provided actionable insights for improving clinical practices. Implementing the model requires training healthcare providers on data analysis techniques and ensuring regular updates to clinic-specific parameters based on evolving local conditions. Bayesian Hierarchical Model, Clinical Outcomes, Rural Health Clinics, Kenya Treatment effect was estimated with  $\text{text}\{logit\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Kenya, Bayesian Hierarchical Models, Methodology, Rural Health Systems, Clinical Outcomes Analysis, Quantitative Methods, Geographic Information Systems

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