



# Bayesian Hierarchical Model Assessment of Community Health Centre Reliability in Rwanda's Healthcare Systems,

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## Abstract

Community health centres in Rwanda's healthcare systems have a critical role in providing essential services to underserved populations. A Bayesian hierarchical model was employed to analyse data collected from community health centres across Rwanda, aiming to measure system performance in terms of service delivery and patient satisfaction. The analysis revealed that the reliability score for community health centres varied significantly by region, with scores ranging from 0.65 to 0.82, indicating a moderate level of reliability overall. Bayesian hierarchical models can effectively assess the performance and reliability of community health centre systems in Rwanda's healthcare infrastructure. Further research is recommended to identify specific factors contributing to variations in reliability scores across different regions. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta^T X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Rwanda, Bayesian Hierarchical Models, Community Health Centres, Methodological Evaluation, Reliability Assessment, Spatial Statistics, Geographic Information Systems

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