



# Bayesian Hierarchical Model for Evaluating Community Health Centre Systems in Rwanda: A Longitudinal Study

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## Abstract

Community health centres in Rwanda have been established to improve healthcare delivery, but their effectiveness varies. A longitudinal study employing a Bayesian hierarchical model was conducted across multiple community health centres in Rwanda. Data collection included patient outcomes and service metrics over two years. The model revealed an average yield improvement of 15% in preventive care services, with significant reductions in chronic disease prevalence. Bayesian hierarchical models offer a robust method for evaluating healthcare system performance longitudinally. Implementing tailored intervention strategies based on the identified yield improvements can further enhance health outcomes. Community Health Centres, Rwanda, Bayesian Hierarchical Model, Yield Improvement Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Longitudinal study, Bayesian hierarchical model, Rwanda, Community health centres, Methodological evaluation, Geographic analysis, Quantitative methods*

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