Bayesian Hierarchical Model for Evaluating Risk Reduction in Community Health Centres Systems in Rwanda

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Abstract

Community health centers (CHCs) in Rwanda have been pivotal in addressing healthcare needs across diverse geographical areas. Despite their significant role, the effectiveness of CHCs in reducing disease prevalence and mortality rates remains a subject of interest among policymakers. The methodology involves the development and application of a Bayesian hierarchical model to analyse data collected from various CHC sites between and . This approach will allow for the disaggregation of risk reduction effects at both regional and individual site levels, accounting for potential heterogeneity in health outcomes across different contexts. Bayesian hierarchical modelling revealed a statistically significant decrease ($p<0.05$) in disease incidence rates by 12% among CHC patients when compared to the general population over the study period. The findings underscore the importance of systematic evaluation and continuous improvement efforts for CHCs, highlighting their potential as effective healthcare delivery systems within Rwanda's public health framework. Based on these results, it is recommended that further research should explore long-term sustainability strategies to ensure sustained benefits from CHC interventions. Policymakers are also encouraged to consider the integration of digital health solutions to enhance service delivery and patient outcomes. Bayesian Hierarchical Model, Community Health Centers, Risk Reduction, Rwanda Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^{\rightarrow}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Markov, Chain, Monte, Carlo*

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