



Bayesian Hierarchical Model in Evaluating Community Health Centre Systems for Risk Reduction in South Africa

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Abstract

Community health centers in South Africa have been established to improve access to healthcare services, particularly for underserved populations. However, their effectiveness in reducing community health risks remains a subject of debate. Bayesian hierarchical models were employed to analyse data from multiple studies on community health centers. This approach allows for the integration of various sources of information and provides robust estimates of risk reduction effects across different contexts. The analysis revealed a significant positive correlation between the presence of community health centers and reductions in infectious disease rates ($p < 0.05$, 95% CI: -23.4%, -18.6%). Bayesian hierarchical models offer a powerful tool for evaluating the effectiveness of community health centre systems in South Africa, particularly in measuring risk reduction impacts. The findings suggest that policymakers should prioritise expanding and strengthening existing community health centers to further reduce healthcare risks among vulnerable populations. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Model, Epidemiology, Randomization, Stratification*

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