



# Bayesian Hierarchical Model for Risk Reduction in Community Health Centres Systems, Nigeria

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## Abstract

The study aims to evaluate community health centres (CHCs) in Nigeria, focusing on their effectiveness in reducing patient risk factors. A longitudinal study design was employed to track patient data from multiple CHCs across Nigeria. A Bayesian hierarchical model was constructed using patient-level risk factors, including age, socioeconomic status, and health literacy, as predictors of outcomes such as disease incidence and mortality rates. The model revealed a statistically significant reduction in disease incidence by 20% among patients who received routine CHC services compared to those not receiving services (95% credible interval: [18%, 23%]). This study provides evidence that Bayesian hierarchical models can effectively measure risk reduction in community health systems, offering a robust method for evaluating CHCs' impact. The findings suggest the need to expand CHC services and integrate them into existing healthcare infrastructures to maximise their benefits. Bayesian Hierarchical Model, Community Health Centres, Risk Reduction, Nigeria Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Geographic, Sub-Saharan, Community Health Centres, Longitudinal Study, Bayesian Hierarchical Model, Risk Factors, Methodology*

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