



Bayesian Hierarchical Model for Measuring Cost-Effectiveness in Community Health Centres Systems in Nigeria: A Longitudinal Study,

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Abstract

Bayesian hierarchical models are increasingly used in public health research to analyse complex data structures such as healthcare systems. A Bayesian hierarchical linear regression model is employed, accounting for spatial and temporal dependencies in CHC performance metrics. Uncertainty quantification is provided through robust standard errors. The analysis revealed significant variation in cost-effectiveness measures across different regions, with some CHCs demonstrating substantial improvements over time. Bayesian hierarchical models offer a flexible framework for assessing and improving the efficiency of community health centre systems in Nigeria. Policy recommendations include targeted interventions to enhance service delivery and resource allocation within identified high-performing centres. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Nigeria, Bayesian Hierarchical Model, Cost-Effectiveness, Longitudinal Study, Public Health, Regression Analysis, Spatial Statistics

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