# Bayesian Hierarchical Model in Evaluating Clinical Outcomes Across Rural Clinics Systems in Nigeria

**Chidera Nnamdi**[1,2]**, Nnaemeka Chinedu**[2,3]**, Uche Ifunanya**[3,4]

[1] University of Nigeria, Nsukka

[2] University of Abuja

[3] Ladoke Akintola University of Technology (LAUTECH), Ogbomoso

[4] Department of Public Health, University of Abuja

**Author notes**

*Chidera Nnamdi is affiliated with University of Nigeria, Nsukka and focuses on Medicine research in Africa.*
*Nnaemeka Chinedu is affiliated with University of Abuja and focuses on Medicine research in Africa.*
*Uche Ifunanya is affiliated with Department of Public Health, University of Abuja and focuses on Medicine research in Africa.*

## Abstract

Clinical outcomes in rural clinics across Nigeria have been assessed through various methodologies over time. However, a comprehensive and methodologically rigorous evaluation is lacking, particularly regarding data consistency and robustness. A Bayesian hierarchical model was employed to aggregate and analyse clinical outcome data from multiple rural clinics. This approach allows for the estimation of average effect sizes while accounting for variability between clinics and individual clinic-specific effects. Bayesian hierarchical modelling revealed that clinics in the southwestern region had significantly higher patient recovery rates compared to other regions, with a confidence interval of [0.85, 1.15]. The Bayesian hierarchical model provided insights into the variability and performance consistency across different rural clinic systems. Further research should focus on evaluating long-term effects and potential interventions based on identified regional differences. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\neg} p\,X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, Bayesian, Hierarchical, Random Effects, Meta-Analysis, Quantitative Synthesis, Spatial Statistics*

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