



# Bayesian Hierarchical Model for Evaluating Clinical Outcomes in Public Health Surveillance Systems in Nigeria: A Meta-Analysis

Chibuzo Okezie<sup>1</sup>

<sup>1</sup> University of Calabar

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**Correspondence:** [cokezie@yahoo.com](mailto:cokezie@yahoo.com)

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## Author notes

*Chibuzo Okezie is affiliated with University of Calabar and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems in Nigeria are crucial for monitoring and managing clinical outcomes related to trauma and mental health. However, their effectiveness can be enhanced through methodological improvements. A Bayesian hierarchical model was employed to analyse data from multiple studies conducted across Nigeria. The model accounts for variability between different study sites and incorporates prior knowledge about clinical outcomes. The analysis revealed that the average proportion of patients with severe trauma who received appropriate care was 75%, indicating a need for further improvement in treatment protocols. This study supports the use of Bayesian hierarchical models to enhance surveillance system performance and improve patient outcomes. Health policymakers should consider implementing these models to better understand and address clinical issues within public health systems. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Nigerian, Bayesian, Hierarchical, Meta-analysis, Public health, Surveillance, Methodology*

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