Bayesian Hierarchical Model Evaluation of Public Health Surveillance Systems in Nigeria,

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Abstract

Public health surveillance systems in Nigeria have been established to monitor and respond to emerging infectious diseases. However, their reliability and effectiveness vary across different regions. A Bayesian hierarchical model was developed to assess the reliability of surveillance systems. The model accounts for spatial heterogeneity and incorporates data from multiple regions over time. The model revealed significant differences in system performance across different geographic regions, with some areas showing higher accuracy rates than others (e.g., an average detection rate of 82% in North-Western Nigeria). The findings highlight the need for targeted interventions to improve surveillance systems in less effective regions. Public health authorities should prioritise system upgrades and training programmes in areas with lower performance metrics. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\, p\, X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African Geography, Public Health Surveillance, Bayesian Statistics, Hierarchical Modelling, Reliability Assessment, Epidemiology Models, Geographic Analysis*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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