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Bayesian Hierarchical Model for Assessing the Cost-Effectiveness of Public Health Surveillance Systems in Nigeria: An Analytical Study

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Abstract

Public health surveillance systems are crucial for monitoring infectious diseases in Nigeria. However, their cost-effectiveness remains under-researched. A Bayesian hierarchical model was employed to analyse data from multiple surveillance sites, accounting for spatial and temporal variations. The precision of estimates was quantified through robust standard errors. The model revealed significant heterogeneity among different regions with respect to cost-effectiveness metrics, suggesting the need for tailored interventions. This study provides a novel framework for evaluating public health surveillance systems in Nigeria and highlights the importance of considering regional variations. Policy-makers should prioritise investments in surveillance infrastructure based on local data and model outputs. Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Cost-effectiveness, Epidemiology, Surveillance, Model_Selection*

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