Bayesian Hierarchical Model Assessment of Public Health Surveillance Systems in Ethiopia,

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Abstract

Public health surveillance systems are crucial for monitoring infectious diseases in developing countries like Ethiopia. However, their effectiveness can vary significantly across different regions and time periods. The methodology involves the use of a Bayesian hierarchical model to analyse data from multiple regions within Ethiopia, accounting for varying levels of reporting accuracy and regional characteristics. A key finding is that the surveillance system in the northern highlands demonstrated higher detection rates compared to other regions (35% vs. 20%), indicating potential regional disparities in disease monitoring effectiveness. The Bayesian hierarchical model provides a robust framework for evaluating public health surveillance systems, highlighting areas where improvements are needed based on regional performance metrics. Based on the findings, targeted interventions to enhance reporting accuracy and capacity should be prioritised in regions with lower detection rates. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Geographic Variation, Bayesian Hierarchical Models, Methodological Evaluation, Public Health Surveillance, Quantitative Analysis, Spatial Statistics*

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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