



Bayesian Hierarchical Model for Evaluating Efficiency Gains in Rwanda's Public Health Surveillance Systems

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Abstract

Public health surveillance systems in Rwanda have been established to monitor infectious diseases effectively. However, their efficiency remains a subject of debate and requires rigorous evaluation. A Bayesian hierarchical model was employed to analyse data from multiple surveillance sites across Rwanda. The model accounts for spatial and temporal variations in surveillance effectiveness. The analysis revealed significant variation in efficiency gains between different regions, with some areas showing no improvement over previous methods (direction: positive/negative; proportion: <20%; theme: regional disparities). This study provides a nuanced understanding of the current surveillance system's performance and highlights areas needing improvement. Specific recommendations for enhancing efficiency gains in Rwanda's public health surveillance systems are proposed based on findings. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Rwanda, Public Health Surveillance, Bayesian Hierarchical Model, Methodology, Evaluation, Efficiency, Quantitative Analysis*

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