



Bayesian Hierarchical Model for Evaluating Risk Reduction in Public Health Surveillance Systems in Kenya

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Abstract

Public health surveillance systems in Kenya have been established to monitor diseases and implement interventions aimed at reducing morbidity and mortality. A Bayesian hierarchical model was utilised to analyse surveillance data across different regions in Kenya. This approach accounts for spatial heterogeneity and temporal trends within and between regions. The analysis revealed significant reductions in disease incidence rates by 15% in selected areas, with a posterior probability of this effect being greater than zero. The Bayesian hierarchical model provided robust estimates of the impact of surveillance systems on reducing disease risk in Kenya. Based on these findings, further targeted interventions and resources should be allocated to high-risk regions identified by the model. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Kenya, Bayesian hierarchical model, Public health surveillance, Methodological evaluation, Risk reduction, Geographic information systems, Spatial analysis

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