



Bayesian Hierarchical Model Assessment of Public Health Surveillance Systems in Kenya: Measuring Risk Reduction Enhancement

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Abstract

Public health surveillance systems in Kenya aim to monitor disease trends for early intervention and control measures. However, their effectiveness can be assessed through rigorous statistical methods. A Bayesian hierarchical model was applied to assess the surveillance system's impact on reducing disease risks. The model accounts for spatial and temporal variations in disease incidence, incorporating prior knowledge and data from various regions. The analysis revealed a significant reduction in disease risk by approximately 20% across surveyed areas when integrated with an effective surveillance strategy. This study provides evidence that Bayesian hierarchical models can effectively measure the impact of public health surveillance systems, offering insights for policy development and resource allocation. Public health authorities should prioritise the implementation and continuous improvement of surveillance systems to maximise their risk reduction potential. Bayesian Hierarchical Model, Public Health Surveillance, Kenya, Risk Reduction, Disease Control Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Kenyan, Bayesian, Hierarchical, Surveillance, Evaluation, Methodology, Epidemiology*

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