Bayesian Hierarchical Model for Evaluating Public Health Surveillance Systems in Kenya: A Methodological Assessment

Mwihaki Oluoch[1], Otombe Mucheleji[1,2], Okoth Ochieng[3], Kibii Mutua[4]

[1] Technical University of Kenya

[2] Kenya Agricultural and Livestock Research Organization (KALRO)

[3] Department of Public Health, Pwani University

[4] Department of Surgery, Kenya Medical Research Institute (KEMRI)

Author notes

Mwihaki Oluoch is affiliated with Technical University of Kenya and focuses on Medicine research in Africa.
Otombe Mucheleji is affiliated with Kenya Agricultural and Livestock Research Organization (KALRO) and focuses on Medicine research in Africa.
Okoth Ochieng is affiliated with Department of Public Health, Pwani University and focuses on Medicine research in Africa.
Kibii Mutua is affiliated with Department of Surgery, Kenya Medical Research Institute (KEMRI) and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems in Kenya are critical for monitoring disease outbreaks and ensuring timely interventions. A Bayesian hierarchical model was applied to assess surveillance system performance across different regions in Kenya. The model accounts for spatial and temporal variations in data. The model indicated that surveillance effectiveness varied significantly between regions, with some areas showing a 20% higher detection rate of infectious diseases compared to others. The Bayesian hierarchical model provides valuable insights into the performance variability of public health surveillance systems across Kenya's diverse geographical settings. Public health officials should prioritise resource allocation based on region-specific surveillance effectiveness data to optimise intervention strategies. Bayesian Hierarchical Model, Public Health Surveillance, Kenya, Spatial Analysis Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{-}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Kenya, Bayesian Hierarchical Model, Public Health Surveillance, Methodological Assessment, Geographic Information Systems, Spatial Analysis, Disease Outbreak Monitoring*

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