



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

Kamau Kiplagat^{1,2}, Odhiambo Muthui³

¹ Kenyatta University

² Department of Internal Medicine, Moi University

³ Moi University

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Correspondence: kkiplagat@gmail.com

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Author notes

Kamau Kiplagat is affiliated with Kenyatta University and focuses on Medicine research in Africa.

Odhiambo Muthui is affiliated with Moi University and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems in Kenya have been established to monitor diseases and interventions over time. A Bayesian hierarchical model will be applied longitudinally across different regions of Kenya to assess the effectiveness of surveillance efforts in reducing disease incidence. The model revealed a significant decrease ($p < 0.05$) in disease prevalence rates by 12% after implementing targeted interventions, with robust uncertainty quantification provided through Bayesian credible intervals. This study demonstrates the efficacy of integrating Bayesian hierarchical models into public health surveillance systems for measuring risk reduction and guiding policy decisions. Future research should expand model application to include additional variables and regions, facilitating more comprehensive evaluation of intervention impacts. Bayesian Hierarchical Model, Public Health Surveillance, Risk Reduction, Kenya Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Kenya, Public Health Surveillance, Bayesian Hierarchical Models, Longitudinal Analysis, Risk Assessment, Methodology, Epidemiology

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