African Tropical Medicine and Health

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

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Abstract

Public health surveillance systems in South Africa have been established to monitor disease trends and implement targeted interventions. However, their effectiveness remains under scrutiny. The methodology involves developing and applying a Bayesian hierarchical model to analyse surveillance data from South Africa's public health systems, focusing on trends in disease prevalence over time. A key finding is that the current surveillance system accurately identifies regions with high-risk factors but underestimates certain endemic diseases due to limited coverage areas. This highlights the need for expanding monitoring networks. The Bayesian hierarchical model provides a robust framework for understanding risk reduction in public health surveillance systems, offering insights into resource allocation and intervention strategies. Based on findings, recommendations include enhancing surveillance coverage in underrepresented regions and refining data collection methods to improve accuracy and comprehensiveness. Bayesian Hierarchical Model, Public Health Surveillance, Risk Reduction, South Africa Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African epidemiology, Bayesian statistics, hierarchical modelling, risk assessment, surveillance systems, meta-analysis, spatial analysis*

ABSTRACT-ONLY PUBLICATION

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