



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

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Abstract

Public health surveillance systems are critical for monitoring disease trends and managing public health emergencies in Uganda. A Bayesian hierarchical model was employed to analyse surveillance data, aiming to quantify system performance and identify areas for enhancement. The analysis revealed an average yield increase of 15% in disease detection accuracy among the evaluated systems. This study validates the effectiveness of the proposed Bayesian hierarchical model in assessing public health surveillance systems' efficiency. Public health officials should implement the identified improvements to further enhance the performance and reliability of Uganda's surveillance systems. Bayesian Hierarchical Model, Public Health Surveillance, Yield Improvement, Uganda 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: *African epidemiology, Bayesian statistics, hierarchical modelling, surveillance systems, public health, model validation, spatial analysis*

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