



# Bayesian Hierarchical Model Evaluation of Public Health Surveillance Systems in Uganda: A Methodological Review

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## Abstract

Public health surveillance systems are crucial for monitoring disease prevalence and guiding public policy in Uganda. Bayesian hierarchical models will be used to analyse surveillance data, with a focus on model evaluation using robust standard errors and confidence intervals. The analysis revealed significant variation in cost-effectiveness across different regions of Uganda, highlighting the need for targeted interventions. This review underscores the importance of Bayesian hierarchical models in optimising public health resources to improve surveillance efficiency and effectiveness. Policy makers should prioritise model validation and regional specificity when implementing surveillance systems. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *African geography, Bayesian inference, Hierarchical modelling, Public health surveillance, Cost-effectiveness analysis, Epidemiology methods, Quantitative epidemiology*

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