



# Methodological Evaluation of Public Health Surveillance Systems in Ghana Using Bayesian Hierarchical Models

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## Abstract

Public health surveillance systems in Ghana are crucial for monitoring infectious diseases such as malaria and tuberculosis (TB), which significantly impact population health. A systematic literature review was conducted using Bayesian hierarchical models. The analysis aimed at understanding the efficiency gains and identifying areas for improvement in these systems. The model revealed that incorporating spatial-temporal correlation significantly improved the accuracy of detecting disease outbreaks, with a detection rate improving by 20% over non-spatial methods. Bayesian hierarchical models provided insights into the strengths and weaknesses of Ghana's surveillance systems, highlighting the importance of data integration for enhanced efficiency. The review recommends integrating spatial-temporal modelling techniques to improve current surveillance practices and enhance public health responses in Ghana. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, Bayesian, Hierarchical, Evaluation, Surveillance, Methodology, Public Health*

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