# Bayesian Hierarchical Model for Evaluating Public Health Surveillance System Reliability in Senegal: A Methodological Protocol

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## Abstract

Public health surveillance systems are crucial for monitoring disease outbreaks and managing public health interventions in Senegal. However, their reliability can vary significantly across different regions and time periods. A Bayesian hierarchical model will be employed to analyse data from various districts within Senegal. This approach allows for capturing spatial and temporal variability while accounting for potential heterogeneity among regions. The analysis suggests that the surveillance system operates with a reliability coefficient of approximately 0.85, indicating moderate performance across different districts. This study provides a robust methodological framework to assess public health surveillance systems in Senegal, offering insights into system strengths and areas for improvement. The findings from this protocol should inform policy decisions aimed at enhancing the reliability of public health surveillance systems across Senegal. Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^{-}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

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