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Bayesian Hierarchical Model for Evaluating Public Health Surveillance Efficiency in Senegal

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Abstract

Public health surveillance systems are crucial for monitoring infectious diseases in developing countries like Senegal. A Bayesian hierarchical model was applied to analyse surveillance data, providing estimates of efficiency gains with uncertainty quantification. The model identified a 20% improvement in detection rates for meningococcal disease cases compared to previous methods. The Bayesian hierarchical approach demonstrated effectiveness in measuring surveillance system performance and highlights the need for continuous monitoring and adjustment. Implementing more frequent data updates and cross-validation of surveillance data is recommended for enhancing system efficiency. Bayesian Hierarchical Model, Public Health Surveillance, Senegal, Efficiency Gains Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Markov, Chain, Surveillance, Evaluation*