African Traditional and Complementary Medicine
(Medical focus)

Bayesian Hierarchical Model for Evaluating Efficiency Gains in Public Health Surveillance Systems in Senegal

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Abstract

Public health surveillance systems in Senegal are crucial for monitoring diseases and ensuring effective response strategies. However, their efficiency can vary significantly across different regions. We employed a Bayesian hierarchical model to analyse surveillance data from multiple regions, accounting for both within-region and region variations. This approach allows us to estimate the efficiency gains while accommodating heterogeneity in system performance. The analysis revealed significant differences in efficiency across Senegalese regions, with some areas showing substantial improvements (up to 30%) compared to others. These findings highlight the need for targeted interventions and resource allocation. Our Bayesian hierarchical model provided a nuanced understanding of surveillance system performance, enabling more informed decision-making at both regional and national levels. Based on our results, we recommend focusing on regions with lower efficiency to maximise overall public health outcomes through targeted support and data-driven improvements. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Model, Evaluation, Efficiency, Surveillance*

ABSTRACT-ONLY PUBLICATION

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