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Bayesian Hierarchical Model Assessment of Community Health Centre Systems in Senegal,

Abdoulaye Diouf[1], **Mariama Sylla**[2]

[1] Department of Epidemiology, Cheikh Anta Diop University (UCAD), Dakar

[2] Department of Epidemiology, Université Alioune Diop de Bambey (UADB)

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Correspondence: adiouf@yahoo.com

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Author notes

Abdoulaye Diouf is affiliated with Department of Epidemiology, Cheikh Anta Diop University (UCAD), Dakar and focuses on Medicine research in Africa.

Mariama Sylla is affiliated with Department of Epidemiology, Université Alioune Diop de Bambey (UADB) and focuses on Medicine research in Africa.

Abstract

This case study evaluates the performance of community health centers in Senegal over a decade-long period. Bayesian hierarchical modelling was employed to analyse data from multiple sites representing community health centers across Senegal. The model accounts for variability within and between regions, providing a nuanced understanding of system performance over time. An initial analysis revealed that the average yield improvement rate varied significantly among different regions, ranging from a low of 5% in rural areas to a high of 12% in urban centers. This heterogeneity highlights the need for tailored interventions based on regional specifics. The Bayesian hierarchical model effectively captured the complex interdependencies within and between health centre systems, offering insights into potential yield improvements through targeted strategies. Policy recommendations include prioritising resource allocation towards regions with lower yield improvement rates to maximise overall system efficiency. Additionally, continuous monitoring of regional performance is essential for sustained improvements. Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African Geography, Bayesian Hierarchical Models, Community Health Systems, Methodological Evaluation, Spatial Analysis, Statistical Modelling, Yield Improvement*