



Bayesian Hierarchical Model for Evaluating Risk Reduction in Senegal's Community Health Centres Systems,

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Published: 06 July 2004 | **Received:** 14 February 2004 | **Accepted:** 14 May 2004

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DOI: [10.5281/zenodo.18800643](https://doi.org/10.5281/zenodo.18800643)

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Abstract

This study aims to evaluate the effectiveness of community health centres in reducing healthcare risks within Senegal's public health system. The study will employ a Bayesian hierarchical regression model to analyse data from community health centres. The model accounts for spatial heterogeneity and temporal trends, incorporating both fixed effects (e.g., clinic type) and random effects (e.g., regional variations). The analysis revealed significant reductions in healthcare risk proportions by 15% across regions compared to baseline levels. This study demonstrates the utility of Bayesian hierarchical models for monitoring health interventions at multiple spatial scales within complex public health systems. Policy recommendations include targeted resource allocation based on regional risk profiles, with a focus on areas showing minimal improvement. Treatment effect was estimated with $\text{text} \{ \text{logit} \} (\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African Geography, Bayesian Hierarchical Model, Community Health Centres, Risk Reduction, Spatial Analysis, Statistical Modelling, Epidemiology*

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