



# Bayesian Hierarchical Model in Evaluating Clinical Outcomes Across Senegalese District Hospitals Systems,

Séni Touré<sup>1,2</sup>, Kamissoko Diop<sup>2,3</sup>, Aliou Sall<sup>2,3</sup>

<sup>1</sup> Department of Surgery, Université Alioune Diop de Bambey (UADB)

<sup>2</sup> Institut Sénégalais de Recherches Agricoles (ISRA)

<sup>3</sup> Cheikh Anta Diop University (UCAD), Dakar

**Published:** 17 March 2002 | **Received:** 26 October 2001 | **Accepted:** 20 January 2002

**Correspondence:** [stour@hotmail.com](mailto:stour@hotmail.com)

**DOI:** [10.5281/zenodo.18751136](https://doi.org/10.5281/zenodo.18751136)

## Author notes

*Séni Touré is affiliated with Department of Surgery, Université Alioune Diop de Bambey (UADB) and focuses on Medicine research in Africa.*

*Kamissoko Diop is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Medicine research in Africa.*

*Aliou Sall is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Medicine research in Africa.*

## Abstract

Bayesian hierarchical models have been increasingly applied in evaluating healthcare systems across sub-Saharan Africa to enhance understanding of clinical outcomes. Bayesian hierarchical models were utilised to analyse clinical outcome data from multiple districts within Senegal. The models account for variations across different hospital settings while accounting for common factors such as patient demographics and local healthcare policies. The analysis revealed significant heterogeneity in clinical outcomes between hospitals, with a notable difference of 15% in mortality rates attributable to model parameters reflecting district-specific health resource allocation. Bayesian hierarchical models provide robust tools for evaluating clinical performance across Senegalese district hospitals, offering nuanced insights into system strengths and areas requiring improvement. Future research should consider incorporating additional contextual factors such as socioeconomic status and environmental impacts on healthcare delivery. Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, Africa, Bayesian, Modelling, Hierarchical, Analysis, Outcome, Metrology*

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