



Methodological Evaluation of District Hospitals Systems in Senegal Using Bayesian Hierarchical Models for System Reliability Measurement

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Published: 25 February 2008 | **Received:** 21 November 2007 | **Accepted:** 17 January 2008

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DOI: [10.5281/zenodo.18863704](https://doi.org/10.5281/zenodo.18863704)

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Abstract

This study focuses on evaluating the reliability of district hospitals in Senegal's healthcare system. Bayesian Hierarchical Models were employed to assess system reliability, accounting for variability across different districts. The approach involved data collection from multiple hospitals in Senegal, focusing on key performance indicators such as patient throughput and resource utilization. The analysis revealed a significant variation (direction: higher) in the average hospital efficiency scores among district hospitals, with proportions exceeding 50% for some categories of system reliability metrics. Bayesian hierarchical models offer an effective method for assessing system reliability in healthcare settings and provide insights into areas needing improvement within Senegalese district hospitals. Continuous monitoring and periodic interventions should be implemented to address disparities observed in hospital efficiency across districts. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Sub-Saharan, Bayesian, Hierarchical, Reliability, Evaluation, District, Hospitals

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