



Bayesian Hierarchical Model for Evaluating System Reliability in District Hospitals of Senegal: A Meta-Analysis

Amadou Diop¹, Ibrahima Guindo^{2,3}, Seynabou Sarr⁴

¹ African Institute for Mathematical Sciences (AIMS) Senegal

² Université Alioune Diop de Bambey (UADB)

³ Department of Pediatrics, African Institute for Mathematical Sciences (AIMS) Senegal

⁴ Council for the Development of Social Science Research in Africa (CODESRIA), Dakar

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Correspondence: adiop@outlook.com

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Author notes

Amadou Diop is affiliated with African Institute for Mathematical Sciences (AIMS) Senegal and focuses on Medicine research in Africa.

Ibrahima Guindo is affiliated with Université Alioune Diop de Bambey (UADB) and focuses on Medicine research in Africa.

Seynabou Sarr is affiliated with Council for the Development of Social Science Research in Africa (CODESRIA), Dakar and focuses on Medicine research in Africa.

Abstract

District hospitals in Senegal face challenges in maintaining system reliability due to varying levels of equipment, staff expertise, and financial resources. A Bayesian hierarchical model was applied across multiple districts to assess system performance. The model accounts for variability between hospitals while estimating overall system reliability. The analysis revealed significant variation in system reliability among the studied districts, with some showing a 20% improvement potential through targeted interventions. This study demonstrates the effectiveness of Bayesian hierarchical models in evaluating hospital systems and highlights specific areas for intervention to enhance reliability. District health authorities should prioritise resource allocation and training programmes based on the findings to improve system performance. Bayesian Hierarchical Model, District Hospitals, System Reliability, Senegal Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

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

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