



Bayesian Hierarchical Model Assessment of Emergency Care Unit Systems in Senegal,

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Abstract

This case study evaluates the effectiveness of emergency care unit systems in Senegal, focusing on clinical outcomes. A Bayesian hierarchical model was employed to analyse data from emergency care units across Senegal. The model accounts for variability in patient outcomes within and between units, incorporating prior knowledge and current observations to estimate the impact of various factors on clinical results. The analysis revealed a significant improvement ($p < 0.05$) in patient recovery rates when patients arrived at emergency care units within two hours post-injury compared to those who waited longer, highlighting the importance of timely intervention. The findings support the efficacy of the current system and underscore the need for continuous monitoring and potential improvements based on model predictions. Continuous quality improvement efforts should focus on enhancing patient triage processes and increasing awareness about the critical importance of prompt treatment in emergency care settings. Bayesian hierarchical models, emergency care units, clinical outcomes, Senegal Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, Bayesian hierarchical modelling, Clinical outcomes assessment, Epidemiology, Health systems evaluation, Logistic regression, Multilevel analysis*

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