



# Bayesian Hierarchical Model for Measuring Clinical Outcomes in Emergency Care Units of Senegal: A Methodological Evaluation

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## Abstract

Emergency care units in Senegal have seen a growing demand for clinical services, necessitating improved systems to ensure patient safety and efficacy. A Bayesian hierarchical model will be employed to analyse data collected from Senegalese emergency care units. This approach allows for the estimation of patient-specific probabilities while accommodating variability across different units. The analysis revealed a significant variance (direction: higher) in clinical outcome measures among units, with a proportion (theme: 20%) of outcomes falling outside expected thresholds, indicating areas needing intervention. This study underscores the importance of adopting robust statistical models to enhance emergency care unit performance and patient safety. Implementing targeted interventions based on identified clinical outcome variances will be crucial for improving service quality in Senegalese emergency care units. Emergency Care, Clinical Outcomes, Bayesian Hierarchical Model, Senegal Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *African geography, Bayesian inference, Hierarchical modelling, Outcome assessment, Precision medicine, Quantitative methods, Statistical analysis*

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