



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

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## Abstract

Emergency care units (ECUs) in Ethiopia face challenges in measuring clinical outcomes due to variability across different settings. A Bayesian hierarchical model was developed and applied to data from several ECUs, accounting for both unit-specific and shared factors influencing patient outcomes. The model identified significant differences in mortality rates between units with higher variability observed in smaller facilities. The Bayesian hierarchical approach provided nuanced insights into clinical performance across different ECU settings, highlighting the need for targeted interventions to improve care quality. ECU managers should focus on reducing mortality rates in smaller units by implementing standardised protocols and training programmes. 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:** Ethiopia, Bayesian Hierarchical Models, Methodology, Clinical Outcomes, Emergency Care Units, Quantitative Methods, Data Analysis

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