Bayesian Hierarchical Model for Measuring Clinical Outcomes in Emergency Care Units of Ethiopia

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Abstract

Emergency care units in Ethiopia are crucial for managing acute health conditions but face challenges in standardising clinical outcomes. A Bayesian hierarchical model was developed to analyse data from 10 hospitals in Ethiopia. The model incorporates random effects at both hospital and site levels to account for variability. The model revealed significant variation in clinical outcomes between different hospitals, with some units achieving up to a 25% higher success rate in stabilising patients compared to others. The Bayesian hierarchical model provided insights into the performance of emergency care units and highlighted areas for improvement through targeted interventions. Implementing the identified improvements could enhance patient outcomes and operational efficiency across all hospitals, with a particular focus on lower-performing sites. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow} p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Hierarchical Models, Bayesian Statistics, Clinical Outcomes, Emergency Medicine, Methodology, Statistical Methods*

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