

A Bayesian Hierarchical Modelling Approach to Clinical Outcome Measurement in Ugandan Emergency Care Systems

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ABSTRACT

Background: Emergency care systems in low-resource settings face significant challenges in measuring clinical outcomes due to fragmented data and heterogeneous patient populations. Robust methodological frameworks for outcome assessment are lacking, hindering system evaluation and improvement.

Purpose and objectives: This study aimed to develop and validate a novel Bayesian hierarchical model to measure clinical outcomes across diverse emergency care units, providing a methodological tool for system-level evaluation.

Keywords: *Bayesian hierarchical modelling, clinical outcomes, emergency care systems, low-resource settings, sub-Saharan Africa*

Article Highlights

- Novel Bayesian hierarchical model quantifies unit-level performance variation.
- Method accounts for patient risk and systemic factors in outcome assessment.
- Provides statistically coherent framework for heterogeneous care settings.
- Enables fairer comparisons between emergency units in low-resource contexts.

Core Model Specification

Bayesian hierarchical logistic regression: $\text{logit}(P(y_{ij}=1)) = \alpha_j + X_{ij}\beta$, with unit-specific intercepts $\alpha_j \sim N(\mu_\alpha, \sigma^2_\alpha)$.

This methodological advance enables more nuanced health system evaluation.

ABSTRACT-ONLY PUBLICATION

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