



Bayesian Hierarchical Model for Evaluating System Reliability in District Hospitals in Kenya 2008

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Abstract

The reliability of healthcare systems in district hospitals across Kenya is a critical concern for effective patient care and resource allocation. A Bayesian hierarchical linear regression model was employed to assess the impact of multiple covariates on system reliability. Data from 20 district hospitals were analysed, with measures collected annually from 2005 to 2007. The analysis revealed significant variability in system reliability across different districts and over time, with some facilities showing a stable performance pattern while others exhibited erratic trends. Bayesian hierarchical modelling provided nuanced insights into the systemic factors affecting hospital reliability, offering tailored recommendations for improvement. District health authorities should prioritise interventions targeting facilities with persistent system failures to enhance overall healthcare delivery. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Kenya, District Hospitals, Hierarchical Modelling, Bayesian Statistics, Reliability Analysis, Linear Regression, Methodology

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