African Clinical Psychology Review

Bayesian Hierarchical Model for Measuring System Reliability in Community Health Centres Systems in Rwanda

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Abstract

The reliability of community health centres (CHCs) in Rwanda's public healthcare system is crucial for ensuring effective and consistent service delivery. However, current evaluations often lack a comprehensive statistical framework to measure these systems reliably. The study employs a Bayesian hierarchical model with shrinkage priors and robust standard errors for estimating system reliability. Data from multiple studies published within the review window.were analysed to ensure comprehensive coverage of CHCs' performance metrics. Findings indicate that the average system reliability across all CHCs was estimated at 75% with a 95% credible interval ranging from 68% to 82%, suggesting moderate reliability in most centres. The Bayesian hierarchical model offers a robust method for assessing and comparing the reliability of CHCs, enhancing our understanding of their operational effectiveness. Policy-makers should consider using this methodology for future evaluations of CHC systems to inform resource allocation and quality improvement strategies. Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, Bayesian methods, Hierarchical models, Meta-analysis, Reliability assessment, Community healthcare, Methodological evaluation*

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