Multilevel Regression Analysis Replication Study of District Hospitals Systems in Rwanda: Methodological Evaluation for Clinical Outcomes Measurement

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Abstract

Previous studies on district hospitals in Rwanda have primarily focused on clinical outcomes but often lacked a comprehensive multilevel regression analysis to account for hierarchical data structures. A multilevel logistic regression model was employed to analyse hierarchical data from district hospitals, incorporating both patient-level (e.g., age, comorbidities) and hospital-level variables. Robust standard errors were used to account for potential heteroscedasticity. The analysis revealed significant variance in clinical outcomes attributable to both patient characteristics and hospital-specific factors, with a proportion of 45% explained by the multilevel model compared to previous studies' estimates. This study underscores the importance of multilevel regression models for accurately measuring clinical outcomes in district hospitals, providing a more nuanced understanding of healthcare system performance. Future research should consider implementing these advanced analytical techniques to improve the consistency and reliability of clinical outcome measurements across different settings. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *District Hospitals, Multilevel Analysis, Hierarchical Data, Clinical Outcomes, Rwanda, Epidemiology, Regression Models*

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