



Methodological Evaluation of Community Health Centre Systems in Tanzania Using Multilevel Regression Analysis to Measure System Reliability

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Abstract

Community health centers in Tanzania play a crucial role in providing primary healthcare services to rural populations. However, their reliability and performance are subject to variability at both individual and organisational levels. Multilevel regression analysis was employed to account for the hierarchical structure within the data, including patients nested within healthcare facilities. The model accounts for both systematic and random effects. The multilevel regression revealed significant variation in service delivery reliability across different health centres (direction: higher reliability observed in urban centers). Multilevel regression analysis successfully identified factors that contribute to the variability of system performance at community health centre level. Health authorities should prioritise resource allocation and training programmes aimed at improving reliability among rural health centres. Community Health Centres, Multilevel Regression Analysis, System Reliability, Tanzania Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Tanzania, Geographic Dispersion, Multilevel Modelling, Variability Analysis, Healthcare Delivery Systems, Reliability Assessment, Regression Techniques

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