



Methodological Evaluation of District Hospital Systems in Tanzania Using Multilevel Regression Analysis for System Reliability Assessment

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Abstract

District hospitals in Tanzania play a critical role in healthcare provision but face challenges related to system reliability and sustainability. A meta-analysis approach was employed to aggregate data from multiple studies on district hospitals in Tanzania. Multilevel regression models were used to assess system reliability, accounting for both hospital-level and district-level variations. The multilevel regression analysis revealed that factors such as funding levels (effect size: -0.45, $p < 0.01$) and healthcare workforce availability (effect size: +0.32, $p < 0.05$) significantly influenced system reliability, with moderate to strong effects. The multilevel regression models effectively captured the hierarchical structure of district hospital systems, providing robust insights into their performance and areas needing improvement. District health authorities should prioritise funding for essential services and workforce development initiatives to enhance system reliability. District hospitals, reliability assessment, multilevel regression analysis, healthcare systems in Tanzania Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Sub-Saharan, Health Systems, Multilevel Modelling, Reliability Analysis, Hierarchical Regression, System Assessment*

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