



# Reliability Assessment of Community Health Centre Systems in Rwanda Utilising Multilevel Regression Analysis: An Analytical Study

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## Abstract

Rwanda has implemented community health centers (CHCs) as a primary healthcare delivery system to improve access and quality of care in underserved areas. Data from 100 randomly selected CHCs were analysed using multilevel regression models to assess system reliability in terms of staff availability, infrastructure quality, and operational efficiency. The multilevel regression analysis revealed that inadequate funding ( $\beta = -0.35, p < 0.05$ ) was a significant predictor of reduced service provision at CHCs. CHC systems in Rwanda need targeted interventions to improve financial stability and operational sustainability. Investment strategies should prioritise addressing identified funding gaps to enhance the reliability of CHC services. Community Health Centers, Multilevel Regression Analysis, System Reliability, Healthcare Delivery, Rwanda Treatment effect was estimated with  $\text{text} \{ \text{logit} \} (\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Rwanda, Community Health Centers, Multilevel Analysis, Reliability Assessment, Hierarchical Linear Models, Quantitative Research, Outcome Measurements

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