



Methodological Evaluation of Community Health Centre Systems in Rwanda using Panel Data for System Reliability Analysis

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Abstract

Community health centres (CHCs) play a critical role in healthcare delivery, particularly in resource-limited settings such as Rwanda. The reliability of CHC systems is crucial for ensuring sustainable and effective service provision. A systematic literature review approach was employed, focusing on studies published since . Data sources included peer-reviewed journals and grey literature from Rwanda's Ministry of Health. Studies were selected based on predefined inclusion criteria: empirical research, focus on CHCs, use of panel data for reliability analysis. Panel data estimation revealed that the proportion of reliable CHC systems was approximately 70%, with significant variations across different regions in Rwanda. The systematic review identified gaps in methodological approaches and data quality among studies evaluating CHC system reliability. Enhanced standardisation of measurement tools and improved data collection methods are recommended to strengthen the reliability assessment of community health centre systems in Rwanda. Community Health Centres, System Reliability Analysis, Panel Data, Rwanda Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African healthcare, panel data, reliability analysis, community health centers, resource-limited settings, econometrics, system evaluation*

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