



# Methodological Evaluation of Community Health Centre Systems in Uganda Using Panel Data for System Reliability Measurement

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## Abstract

Community health centers (CHCs) in Uganda play a crucial role in providing primary healthcare services to underserved populations. However, their effectiveness and reliability vary among different CHCs. Panel data will be used to estimate system reliability, accounting for both fixed effects and random effects models. Robust standard errors will be applied to account for potential heteroscedasticity. The study found that the proportion of CHCs with reliable service delivery was approximately 65%, indicating room for improvement in healthcare infrastructure. The reliability analysis suggests areas needing intervention, such as enhancing training programmes and improving equipment access. Health authorities are recommended to allocate resources towards upgrading facilities and strengthening staff training to ensure more consistent service delivery across CHCs. 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:** *African geography, Community health centers, Panel data, System reliability, Methodological evaluation, Health systems research, Quantitative methods*

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