



# Methodological Evaluation of Community Health Centre Systems in Ethiopia Using Multilevel Regression Analysis for Efficiency Gains,

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## Abstract

Community health centers in Ethiopia are pivotal to healthcare delivery, yet their efficiency varies significantly across different settings. A longitudinal study design was employed to analyse data from multiple years. Multilevel regression models were utilised, incorporating contextual variables and patient-level outcomes. The multilevel model showed a significant proportion ( $p < 0.05$ ) of variability in efficiency attributable to both centre-specific factors and regional characteristics. This study underscores the importance of considering nested data structures for accurate efficiency measurement in community health centers. Further research should explore potential interventions aimed at improving identified inefficiencies, such as resource allocation or training programmes. 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 geography, community health centres, longitudinal studies, multilevel analysis, regression models, efficiency measures, geographic variation*

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