



Methodological Evaluation of Community Health Centres Systems in Ethiopia Using Multilevel Regression Analysis for Risk Reduction Measurement

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Abstract

Community health centres (CHCs) in Ethiopia provide essential healthcare services to underserved populations. However, their effectiveness and sustainability are often questioned due to varying system performance across different regions. A mixed-method approach was employed, combining quantitative data from CHC records and qualitative insights through interviews with healthcare workers. Multilevel regression models were used to analyse the impact of various system components on service delivery outcomes. Multilevel regression analysis revealed significant effects of financial support ($\beta = -0.56$, $p < 0.01$) and staff training programmes ($\beta = 0.42$, 95% CI: [0.23, 0.61]) on improved service quality. The findings suggest that systematic improvements in financial resources and professional development for healthcare personnel can substantially enhance the efficiency of CHCs in Ethiopia. Investment in sustainable funding mechanisms and targeted training programmes should be prioritised to support ongoing operational effectiveness of CHCs. 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, multilevel modelling, community health centres, regression analysis, risk assessment, Ethiopia, geographical variation*

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