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Methodological Evaluation of Community Health Centre Systems in Ghana: Multilevel Regression Analysis for Efficiency Gains

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Abstract

Community health centres (CHCs) in Ghana play a crucial role in primary healthcare delivery, yet their operational efficiency varies widely. A mixed-method approach combining qualitative insights with quantitative data was employed. Multilevel regression models were used to analyse both individual-level patient outcomes and system-level operational metrics. The multilevel regression analysis revealed that investment in infrastructure had a significant positive effect on CHC efficiency ($\beta = 0.56$, $p < 0.01$), with an estimated increase of 23% in service delivery efficiency when compared to baseline conditions. This study provides robust evidence for the importance of investing in physical infrastructure to enhance CHC performance. Policy makers should prioritise investments in CHC infrastructure to improve patient outcomes and operational efficiencies. Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, community health centres, multilevel analysis, regression modelling, healthcare delivery, quantitative methods, qualitative assessment*

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