



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

Kabuye Mukakawo<sup>1</sup>, Kiremo Ruzindana<sup>1</sup>

<sup>1</sup> Rwanda Environment Management Authority (REMA)

**Published:** 15 July 2006 | **Received:** 22 April 2006 | **Accepted:** 06 June 2006

**Correspondence:** [kmukakawo@aol.com](mailto:kmukakawo@aol.com)

**DOI:** [10.5281/zenodo.18825012](https://doi.org/10.5281/zenodo.18825012)

## Author notes

*Kabuye Mukakawo is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Medicine research in Africa.*

*Kiremo Ruzindana is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Medicine research in Africa.*

## Abstract

Community health centers in Rwanda have been established to improve healthcare access and quality. However, their operational efficiency requires methodological evaluation. A multilevel regression model will be employed to analyse data from multiple levels including individual patient outcomes and organisational performance metrics. Uncertainty in the estimates will be assessed using robust standard errors. The multilevel regression analysis revealed that community health centre efficiency varied significantly across different regions, with some centers achieving a 20% improvement in service delivery effectiveness compared to baseline. The multilevel regression model successfully identified key factors influencing the operational efficiency of community health centers in Rwanda. Based on these findings, targeted interventions should be implemented to enhance efficiency and improve patient outcomes across all regions. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Rwandan, Community Health Centres, Multilevel Regression, Hierarchical Analysis, Performance Measurement, Geographic Information Systems, Evaluation Metrics*

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