# Clinical Outcomes in Rural Clinics Systems Over Time in Rwanda: A Multilevel Regression Analysis

**Ingabira Bizimana**[1,2]**, Kwegyiragwa Mukawanda**[1,2]

[1] Rwanda Environment Management Authority (REMA)

[2] African Leadership University (ALU), Kigali

**Correspondence:** ibizimana@aol.com

**Author notes**

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

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

## Abstract

This study addresses a current research gap in Medicine concerning Methodological evaluation of rural clinics systems in Rwanda: multilevel regression analysis for measuring clinical outcomes in Rwanda. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A mixed-methods design was used, combining survey and interview data collected over the study period. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of rural clinics systems in Rwanda: multilevel regression analysis for measuring clinical outcomes, Rwanda, Africa, Medicine, longitudinal study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Treatment effect was estimated with $text\{logit\}(\pi)=beta\,0+\beta^{\cdot}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *Rwanda, Geographic Disparities, Multilevel Modelling, Rural Health Systems, Outcome Evaluation, Community Health Centers, Data Analysis*

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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