



Methodological Evaluation of District Hospitals Systems in Rwanda: Panel Data Estimation for System Reliability Measurement

Hakainde Kanyesigiro¹, Kizito Nkubi^{1,2}, Gatwirire Karuzi^{3,4}

¹ University of Rwanda

² Department of Pediatrics, African Leadership University (ALU), Kigali

³ Department of Surgery, African Leadership University (ALU), Kigali

⁴ Department of Clinical Research, Rwanda Environment Management Authority (REMA)

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Correspondence: hkanyesigiro@gmail.com

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Author notes

*Hakainde Kanyesigiro is affiliated with University of Rwanda and focuses on Medicine research in Africa.
Kizito Nkubi is affiliated with Department of Pediatrics, African Leadership University (ALU), Kigali and focuses on Medicine research in Africa.
Gatwirire Karuzi is affiliated with Department of Surgery, African Leadership University (ALU), Kigali and focuses on Medicine research in Africa.*

Abstract

Rwanda's district hospitals play a critical role in its health system, but their performance varies significantly across regions and over time. Panel data analysis was employed to assess system reliability. The study utilised a mixed-effects model with robust standard errors to account for temporal and spatial dependencies within the dataset. Analysis revealed that hospital bed availability (20-35% of capacity) significantly impacts patient wait times, suggesting underutilization as a critical issue in maintaining optimal service delivery reliability. The identified factors contribute to system inefficiencies, indicating the need for targeted interventions and resource allocation strategies within Rwanda's district hospitals. Implementing data-driven management practices and improving bed utilization could enhance overall system reliability and patient care quality. 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: Rwandan, District Hospitals, Panel Data, Time Series, Econometrics, Health Systems, Reliability Analysis

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