



# Methodological Evaluation of District Hospitals Systems in Rwanda Using Panel Data for System Reliability Measurement

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## Abstract

Rwanda's district hospitals are pivotal in providing healthcare services across the country. However, their operational efficiency and reliability need evaluation to improve service delivery. A mixed-methods approach incorporating statistical analysis was employed. Panel data from 10 districts were analysed to estimate reliability parameters, employing time-series regression models. Among the evaluated hospitals, Hospitals A and B showed an average system reliability of 85% within a confidence interval of (74%, 96%). The study validated the effectiveness of panel data estimation in measuring hospital system reliability. The findings underscore the need for consistent monitoring and improvement strategies. Implementing regular maintenance checks, enhancing staff training programmes, and promoting continuous quality improvement initiatives are recommended to further enhance system reliability. Treatment effect was estimated with  $\text{text}\{logit\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *District Hospitals, Panel Data, Health Systems, Evaluation Metrics, Quantitative Research, Geographic Medicine, Service Delivery Enhancements*

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