



# Methodological Evaluation of District Hospitals' Systems in Rwanda Using Multilevel Regression Analysis to Assess System Reliability,

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## Abstract

This study aims to evaluate the operational systems of district hospitals in Rwanda during a specific period. A multilevel regression analysis was employed to evaluate the systems of district hospitals in Rwanda. The model incorporates both fixed effects (district-level factors) and random effects (hospital-level variability). The analysis revealed significant hospital-to-hospital variation in system performance, with some outliers showing higher reliability than expected based on their district. Multilevel regression provides a robust framework for understanding the complex interplay of district-level factors and hospital-specific variables affecting system reliability. Future studies should consider integrating more detailed data sources to improve model accuracy and extend findings across different health systems in Rwanda. district hospitals, multilevel regression, system reliability, healthcare administration Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *District Hospitals, Rwanda, Multilevel Models, Health Systems, Reliability, Hierarchical Analysis, Quality Assessment*

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