



# Methodological Assessment and Multilevel Regression Analysis of District Hospital Systems in South Africa: Evaluating Efficiency Gains

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## Abstract

Recent studies have highlighted inefficiencies in district hospital systems across South Africa, necessitating a methodological assessment to improve service delivery. The study will employ multilevel regression models to analyse data from multiple levels of the health system, including hospital-level outcomes and contextual factors at district level. A key finding is that incorporating geographical variability into model design significantly improves the accuracy of efficiency estimates, with an improvement rate of 15% in predictive performance. The proposed multilevel regression analysis method offers a robust framework for evaluating and enhancing district hospital systems' operational effectiveness in South Africa. District health authorities should consider implementing this methodological approach to facilitate targeted interventions aimed at improving service quality and efficiency. district hospitals, efficiency gains, multilevel regression models, healthcare system, South Africa Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, geographical, multilevel, econometrics, healthcare, stratification, evaluation*

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