



# Methodological Assessment of District Hospitals Systems in South Africa: A Multilevel Regression Analysis for Risk Reduction Studies

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## Abstract

District hospitals in South Africa play a critical role in healthcare delivery, but their operational efficiency varies widely. A comprehensive search of academic databases was performed, focusing on articles that utilised multilevel regression models to analyse healthcare outcomes. Studies were assessed based on quality criteria including study design, data collection methods, and statistical analyses. Multilevel regression analysis emerged as the most robust methodological approach for addressing complexities in district hospital systems, particularly in measuring risk reduction at both individual patient levels and organisational/systemic levels. This review underscores the importance of adopting rigorous multilevel regression techniques to enhance the accuracy and reliability of studies evaluating health system performance. Health policymakers should prioritise the adoption of multilevel regression analysis in future risk reduction studies within district hospitals, ensuring more reliable data-driven decision-making. District Hospitals, Multilevel Regression Analysis, Risk Reduction, South Africa 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:** *Sub-Saharan, district health systems, regression analysis, multilevel models, public health, evaluation studies, geographic information systems*

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