African Medical Laboratory Immunology

Panel-Data Estimation for Assessing System Reliability in South African District Hospitals: A Methodological Evaluation

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Abstract

This study addresses the reliability assessment of district hospitals in South Africa, focusing on methodological improvements to enhance system performance evaluation. Panel-data estimation techniques were employed, utilising a mixed-effects regression model to analyse longitudinal hospital data from multiple districts. Robust standard errors were applied to account for potential heteroscedasticity and autocorrelation within the dataset. A significant proportion (35%) of hospitals exhibited system reliability issues across different regions, with varying degrees of performance variability over time. The mixed-effects regression model successfully identified systemic inefficiencies, providing a foundation for targeted interventions to improve hospital operations and patient care outcomes. District health authorities are encouraged to implement data-driven strategies based on the findings, focusing on resource allocation and quality improvement initiatives. Treatment effect was estimated with $text{logit}(\pi) = beta 0 + \vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Panel-data, District hospitals, Methodology, Reliability, South Africa, Health systems, Econometrics*

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