

A Multilevel Regression Protocol for Evaluating District Hospital System Reliability in South Africa

A Methodological Framework

Thandiwe Nkosi¹

University of KwaZulu-Natal

Correspondence: tnkosi@hotmail.com

Received: 24 May 2023 | Accepted: 26 August 2023 | Published: 19 October 2023 | DOI:

[10.5281/zenodo.18956778](https://doi.org/10.5281/zenodo.18956778)

ABSTRACT

Background: District hospitals are critical nodes in the South African healthcare system, yet their operational reliability is poorly quantified. Current evaluations often lack methodological rigour in accounting for the hierarchical structure of health systems and the multifactorial nature of service delivery failures.

Purpose and objectives: This protocol details a methodological framework to evaluate the reliability of district hospital systems. The primary objective is to develop and validate a multilevel regression model that identifies facility- and system-level determinants of reliability, measured as the consistency of core service provision against mandated standards.

Keywords: District health systems, Multilevel modelling, Health systems research, South Africa, Operational reliability, Methodological framework, Regression analysis

Article Highlights

- Proposes a three-level hierarchical linear model for district hospital reliability analysis
- Operationalizes reliability through four domains: clinical services, infrastructure, staffing, supply chain
- Quantifies variance attribution between district-level systemic and facility-specific factors
- Provides validated modelling approach for routine health system diagnostics

Core Analytical Model

Three-level hierarchical linear model: $Y_{ijt} = \beta_0 + \beta X_{ijt} + u_j + v_k + \varepsilon_{ijt}$, where i , j , and k index time, hospital, and district respectively.

This paper presents a methodological protocol rather than empirical findings.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

REQUEST FULL PAPER

 **Email:** info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

 **Submit at:** app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge