

A Multilevel Regression Protocol for Evaluating District Hospital System Efficiency in Uganda

A Methodological Framework for Health Systems Research

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ABSTRACT

Background: District hospitals are critical nodes in Uganda's health system, yet persistent inefficiencies constrain service delivery and resource use. Existing efficiency analyses often fail to account for the hierarchical structure of health systems and contextual factors at district and facility levels, limiting the utility of findings for policy.

Purpose and objectives: This protocol details a methodological framework for a multilevel regression analysis to evaluate the technical efficiency of district hospital systems. The primary objective is to quantify the influence of facility-level inputs and district-level contextual factors on efficiency, isolating variations attributable to different administrative levels.

Keywords: Health systems research, District hospitals, Sub-Saharan Africa, Multilevel modelling, Technical efficiency, Uganda, Resource allocation

Article Highlights

- Two-stage design: DEA for efficiency scores, then hierarchical linear modelling.
- Explicitly models both hospital-level inputs and district-level contextual factors.
- Aims to quantify the proportion of efficiency variation attributable to district systems.
- Framework designed for actionable evidence in decentralized health management.

Core Statistical Model

Efficiency_{ij} = $\beta_0 + \beta_1 X_{ij} + \varepsilon_{ij}$, where $\beta_0 = \gamma_{00} + \gamma_{01} Z_j + u_{0j}$. (i = hospitals, j = districts; X = hospital covariates, Z = district covariates).

This paper presents a methodological protocol; empirical results are anticipated from future application.

ABSTRACT-ONLY PUBLICATION

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