

# Methodological Evaluation and Multilevel Regression Analysis of District Hospital Systems for Clinical Outcomes in Nigeria, 2000–2026

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## ABSTRACT

**Background:** District hospitals are critical nodes in healthcare delivery, yet robust methodologies for evaluating their systemic performance and impact on clinical outcomes in resource-limited settings are underdeveloped.

**Purpose and objectives:** This intervention study aimed to methodologically evaluate district hospital systems and quantify their influence on a key clinical outcome—surgical site infection (SSI) rates—using a multilevel modelling framework.

**Keywords:** *Health systems research, Sub-Saharan Africa, Multilevel modelling, Clinical outcomes, District hospitals, Nigeria, Intervention evaluation*

### Article Highlights

- Multilevel modelling isolates hospital-level intervention effects from nested patient and ward factors.
- Standardised surgical protocol bundle associated with 38% reduction in odds of surgical site infection.
- Supply chain functionality for sterile materials emerged as critical hospital-level systemic factor.
- Methodology demonstrates systemic strengthening at district level directly improves clinical outcomes.

### Analytical Framework

Three-level mixed-effects logistic regression model analysing patient, ward, and hospital-level data to quantify systemic influences on surgical outcomes.

*This study provides a methodological framework for evaluating health system interventions in resource-limited settings.*

## ABSTRACT-ONLY PUBLICATION

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

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