

# Methodological Evaluation and Risk Reduction Forecasting for District Hospital Systems in Ghana

*A Time-Series Analysis, 2000–2026*

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## ABSTRACT

**Background:** District hospital systems in Ghana face persistent challenges in resource allocation and resilience planning. A systematic assessment of methodological approaches for evaluating these systems and forecasting future performance is required to inform evidence-based health policy.

**Purpose and objectives:** This review critically evaluates methodological frameworks used to assess district hospital system performance. Its primary objective is to propose and validate a time-series forecasting model designed to quantify future risk reduction in service delivery metrics.

**Keywords:** *Health systems strengthening, Sub-Saharan Africa, Time-series analysis, Risk assessment, District hospitals, Forecasting models, Ghana*

### Article Highlights

- Critiques reliance on cross-sectional designs for lacking longitudinal insight into system performance.
- Proposes a novel ARIMAX model incorporating climatic and economic covariates for forecasting.
- Finds prediction intervals narrow significantly when spatial dependencies are accounted for.
- Advocates for investment in longitudinal data infrastructure to enable pre-emptive interventions.

### Methodological Shift

The study demonstrates that time-series forecasting provides a superior framework for proactive health system management compared to static evaluations.

*This review validates a predictive model for district-level hospital planning in resource-constrained 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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