

# A Methodological Evaluation and Time-Series Forecasting Model for Risk Reduction in Kenyan District Hospital Systems

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## ABSTRACT

**Background:** District hospital systems in Kenya face persistent operational risks, including stock-outs of essential medicines and medical supplies, which compromise service delivery. Existing risk assessment frameworks often lack predictive capacity, relying on retrospective analyses that limit proactive intervention.

**Purpose and objectives:** This study aimed to develop and methodologically evaluate a time-series forecasting model designed to predict critical resource shortfalls, with the objective of providing a tool for pre-emptive risk reduction in hospital supply chains.

**Keywords:** *Health systems research, Sub-Saharan Africa, Time-series analysis, Risk reduction, District hospitals, Essential medicines, Operational research*

### Article Highlights

- Evaluates a novel ARIMA model for predicting hospital supply chain shortfalls.
- Demonstrates a 32% average reduction in unanticipated medicine stock-outs.
- Provides a tool for proactive, data-driven health system management.
- Offers a methodological framework adaptable for integrated disease surveillance.

### Core Methodology

Intervention study implementing an ARIMA time-series forecasting model, evaluated via rolling-origin forecasts and 95% prediction intervals.

*This study presents a statistically robust tool for pre-emptive risk reduction.*

## 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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