

# Methodological Evaluation and Time-Series Forecasting for District Hospital System Reliability in Tanzania

*A Systematic Review*

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## ABSTRACT

**Background:** District hospital systems in Tanzania face persistent challenges in resource allocation and service delivery due to unpredictable demand and systemic constraints. System reliability, defined as the consistent provision of intended healthcare services, is critical for public health outcomes but remains difficult to quantify and forecast effectively.

**Purpose and objectives:** This systematic review evaluates methodological approaches used to assess district hospital system reliability in Tanzania, with a specific objective to synthesise and critique time-series forecasting models applied in this context. It aims to identify robust methodological frameworks and gaps in current predictive analytics.

**Methodology:** A systematic search of multiple electronic databases was conducted following PRISMA guidelines. Studies were screened against pre-defined inclusion criteria focusing on methodological designs and quantitative models for forecasting healthcare system performance metrics. Quality assessment was performed using a modified Cochrane risk-of-bias tool for methodological evaluations.

**Keywords:** *district hospitals, Tanzania, health systems reliability, time-series forecasting, resource allocation, Sub-Saharan Africa, methodological evaluation*

### Article Highlights

- Identifies predominant reliance on ARIMA models for forecasting bed occupancy and drug stock-outs.
- Reveals critical omission of uncertainty quantification in most existing methodological applications.
- Advocates for integrating exogenous variables into hybrid models for improved forecasting.
- Highlights urgent need for capacity building in advanced statistical modelling for researchers.

### Core Methodological Gap

The review finds a narrow focus on basic statistical techniques, with widespread lack of rigorous validation and uncertainty analysis in forecasting models.

*This review synthesises and critiques methodological approaches to forecasting district hospital system reliability in Tanzania.*

## 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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