

A Time-Series Forecasting Model for Municipal Infrastructure Asset Risk Reduction in Tanzania

A Methodological Evaluation (2000–2026)

Amina Mwinyi¹

Catholic University of Health and Allied Sciences (CUHAS)

Correspondence: amwinyi@outlook.com

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ABSTRACT

Background: Municipal infrastructure asset management in developing nations is challenged by limited data and predictive tools for long-term risk assessment. Current practices often rely on static condition assessments, lacking robust, data-driven forecasting to inform maintenance and capital renewal strategies.

Purpose and objectives: This data descriptor presents and methodologically evaluates a novel time-series forecasting model designed to quantify risk reduction for municipal infrastructure assets. The objective is to provide a replicable analytical framework for predicting asset deterioration and evaluating intervention scenarios.

Keywords: *Municipal infrastructure, Asset management, Time-series forecasting, Risk reduction, Sub-Saharan Africa, Developing nations, Methodological evaluation*

Article Highlights

- ARIMA model forecasts municipal asset deterioration with quantified confidence intervals
- Framework integrates condition, failure consequence, and intervention cost data
- Method shifts practice from static assessments to scenario-based risk forecasting
- Provides replicable analytical model for Sub-Saharan African municipalities

Methodological Contribution

Presents a statistically grounded time-series forecasting model that quantifies risk reduction from infrastructure investments, using maximum likelihood estimation with robust standard errors.

This methodological evaluation provides a practical forecasting tool for infrastructure planners.

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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