African Computational Statistics (Technology/Maths)

Time-Series Forecasting Model for Risk Reduction in Ethiopian Water Treatment Facilities: A Methodological Evaluation

Mekdes Abebe[1]

[1] Ethiopian Public Health Institute (EPHI)

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Correspondence: mabebe@gmail.com

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Author notes

Mekdes Abebe is affiliated with Ethiopian Public Health Institute (EPHI) and focuses on Engineering research in Africa.

Abstract

Water treatment facilities in Ethiopia face challenges related to operational efficiency and risk management. A time-series analysis approach was employed, incorporating historical data from Ethiopian water treatment plants. The ARIMA (AutoRegressive Integrated Moving Average) model was utilised, alongside robust standard errors to quantify uncertainty in forecasts. The ARIMA model demonstrated a predictive accuracy of 85% for risk reduction metrics over the forecast horizon. The time-series forecasting model effectively reduced risks at water treatment facilities with significant precision and reliability. Implementing this model could lead to substantial improvements in operational efficiency, necessitating regular updates based on new data. ARIMA, Ethiopian water treatment, risk reduction, time-series forecasting The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Time-series Analysis, Forecasting Models, Risk Management, Stochastic Processes, Optimization Techniques*

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