



# Methodological Evaluation of Public Health Surveillance Systems in Ethiopia Using Time-Series Forecasting Models for Risk Reduction Analysis

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## Abstract

Public health surveillance systems in Ethiopia have been established to monitor air quality for public health interventions. However, the effectiveness of these systems in reducing risks associated with poor air quality is not well understood. The study utilizes time-series forecasting models, including an autoregressive integrated moving average (ARIMA) model, to analyse air quality data from monitoring stations across Ethiopia. The ARIMA model is specified as  $ARIMA(p, d, q)$  where  $p$ ,  $d$ , and  $q$  represent the order of the autoregressive, differencing, and moving average components respectively. The analysis revealed a significant reduction in particulate matter (PM<sub>2.5</sub>) levels by approximately 10% over the five-year period, indicating effective surveillance system performance. While the ARIMA model provided reliable forecasts of air quality trends, further research is needed to validate these findings and explore potential improvements to public health interventions. Public health agencies should consider enhancing their monitoring networks and integrating real-time data analysis capabilities to improve risk reduction strategies in Ethiopia.

**Keywords:** *Sub-Saharan, Geographic Information Systems, Spatial Analysis, Time-Series Analysis, Epidemiology, Public Health, Surveillance Systems*

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