African Agricultural Biotechnology (Applied Science/Tech)

# Cost-Effectiveness Evaluation of Public Health Surveillance Systems in Ethiopia Using Time-Series Forecasting Models

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## Abstract

Public health surveillance systems are critical for monitoring disease outbreaks in Ethiopia, where infectious diseases pose significant public health challenges. A time-series forecasting model was employed, incorporating ARIMA (AutoRegressive Integrated Moving Average) methodology to analyse historical data from surveillance systems in Ethiopia. Robust standard errors were used for inference based on the uncertainty associated with the forecasts. The analysis revealed a significant upward trend in disease incidence over the past five years, indicating an increasing need for resources and improved operational efficiency in surveillance efforts. The time-series forecasting model demonstrated the potential to predict future resource needs accurately, contributing to more cost-effective public health interventions in Ethiopia. Based on these findings, recommendations include optimising surveillance networks, enhancing early warning systems, and investing in training for local health workers to improve detection rates of infectious diseases. Public Health Surveillance, Time-Series Forecasting, ARIMA Model, Cost-Effectiveness, Disease Detection Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *Ethiopia, Geographic Information Systems (GIS), Public Health Surveillance, Time-Series Analysis, Forecasting Models, Cost-Benefit Analysis, Epidemiology*

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