



Methodological Evaluation of Public Health Surveillance Systems in Ethiopia Using Time-Series Forecasting Models

Yonas Gebrehiwot¹, Negusie Weldu², Fasil Tessema^{2,3}, Mulu Gebru¹

¹ Jimma University

² Ethiopian Institute of Agricultural Research (EIAR)

³ Department of Clinical Research, Mekelle University

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Correspondence: ygebrehiwot@outlook.com

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Author notes

Yonas Gebrehiwot is affiliated with Jimma University and focuses on Medicine research in Africa.

Negusie Weldu is affiliated with Ethiopian Institute of Agricultural Research (EIAR) and focuses on Medicine research in Africa.

Fasil Tessema is affiliated with Ethiopian Institute of Agricultural Research (EIAR) and focuses on Medicine research in Africa.

Mulu Gebru is affiliated with Jimma University and focuses on Medicine research in Africa.

Abstract

This study addresses a current research gap in Medicine concerning Methodological evaluation of public health surveillance systems systems in Ethiopia: time-series forecasting model for measuring clinical outcomes in Ethiopia. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A mixed-methods design was used, combining survey and interview data collected over the study period. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of public health surveillance systems systems in Ethiopia: time-series forecasting model for measuring clinical outcomes, Ethiopia, Africa, Medicine, longitudinal study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Longitudinal Studies, Time-Series Analysis, Public Health Surveillance, Epidemiology, Spatial Data Science*

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