



# Forecasting Efficiency Gains in Public Health Surveillance Systems Using Time-Series Models: A Methodological Assessment in Senegal

Ibrahima Ndiaye<sup>1,2</sup>, Seynabou Sow<sup>2,3</sup>, Mamy Diopaye<sup>4</sup>

<sup>1</sup> Université Alioune Diop de Bambey (UADB)

<sup>2</sup> African Institute for Mathematical Sciences (AIMS) Senegal

<sup>3</sup> Université Gaston Berger (UGB), Saint-Louis

<sup>4</sup> Department of Pediatrics, African Institute for Mathematical Sciences (AIMS) Senegal

**Published:** 22 November 2012 | **Received:** 30 August 2012 | **Accepted:** 16 October 2012

**Correspondence:** [indiaye@outlook.com](mailto:indiaye@outlook.com)

**DOI:** [10.5281/zenodo.18947907](https://doi.org/10.5281/zenodo.18947907)

## Author notes

*Ibrahima Ndiaye is affiliated with Université Alioune Diop de Bambey (UADB) and focuses on Medicine research in Africa.*

*Seynabou Sow is affiliated with African Institute for Mathematical Sciences (AIMS) Senegal and focuses on Medicine research in Africa.*

*Mamy Diopaye is affiliated with Department of Pediatrics, African Institute for Mathematical Sciences (AIMS) Senegal and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems in Senegal are crucial for monitoring disease prevalence and guiding control interventions. However, their efficiency can be improved through advanced forecasting methods. A comprehensive analysis was conducted using autoregressive integrated moving average (ARIMA) time-series models to forecast key indicators related to disease prevalence and intervention outcomes. The model's accuracy was assessed through root mean square error (RMSE) with a 95% confidence interval. The ARIMA model showed an RMSE of 12.3%, indicating that the forecasts were generally within 12.3% of actual values, suggesting reliable predictions for efficiency gains in surveillance systems. ARIMA models provided a robust method to forecast efficiency improvements in public health surveillance systems, offering insights into potential interventions and resource allocation. Public health officials should consider implementing ARIMA-based forecasting tools as part of routine system evaluations to enhance the accuracy and reliability of performance predictions. public health surveillance, time-series analysis, autoregressive integrated moving average (ARIMA), efficiency gains, Senegal Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, surveillance, forecasting, time-series, econometrics, sentinel, intervention effectiveness*

## ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

**Email:** [info@parj.africa](mailto:info@parj.africa)

Request your copy of the full paper today!

## SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We welcome your submissions!**

Join our community of African scholars and share your groundbreaking work.

**Submit at:** [app.parj.africa](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge