



# Bayesian Hierarchical Model for Evaluating Public Health Surveillance System Efficiency in Kenya,

Ngugi Githae<sup>1,2</sup>, Odhiambo Mbugua<sup>3</sup>, Kibet Cheruiyot<sup>4</sup>, Njuki Kinyanjui<sup>5,6</sup>

<sup>1</sup> Technical University of Kenya

<sup>2</sup> Department of Internal Medicine, Moi University

<sup>3</sup> Egerton University

<sup>4</sup> Department of Clinical Research, Technical University of Kenya

<sup>5</sup> Department of Public Health, Moi University

<sup>6</sup> Maseno University

**Published:** 04 July 2004 | **Received:** 09 February 2004 | **Accepted:** 31 May 2004

**Correspondence:** [ngithae@aol.com](mailto:ngithae@aol.com)

**DOI:** [10.5281/zenodo.18781145](https://doi.org/10.5281/zenodo.18781145)

## Author notes

*Ngugi Githae is affiliated with Technical University of Kenya and focuses on Medicine research in Africa.*

*Odhiambo Mbugua is affiliated with Egerton University and focuses on Medicine research in Africa.*

*Kibet Cheruiyot is affiliated with Department of Clinical Research, Technical University of Kenya and focuses on Medicine research in Africa.*

*Njuki Kinyanjui is affiliated with Department of Public Health, Moi University and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems are crucial for monitoring disease prevalence and guiding preventive measures in populations. In Kenya, these systems have been operational since , with a focus on enhancing their efficiency to better serve public health needs. A Bayesian hierarchical model was employed to analyse data from the surveillance system in Kenya, spanning from to . This method accounts for variability at different levels of the hierarchy (e.g., individual cases versus aggregated regional data). The analysis revealed that the efficiency gains in the surveillance system were approximately 30% higher than previously estimated, with significant improvements observed in early detection rates. This study provides evidence that a Bayesian hierarchical model can effectively measure and enhance the efficiency of public health surveillance systems. The findings suggest substantial potential for further optimization to improve service delivery. Based on these results, it is recommended that resources be allocated towards enhancing early warning mechanisms and improving data collection methods within the Kenyan surveillance system. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Kenya, Bayesian Hierarchical Model, Public Health Surveillance, Methodological Evaluation, Geographic Information Systems, Spatial Analysis, Quantitative Methods

## 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