



# Multilevel Regression Analysis of Public Health Surveillance Systems Efficiency in South Africa: A Methodological Evaluation

Sipho Maluleke<sup>1</sup>

<sup>1</sup> Stellenbosch University

**Published:** 24 June 2011 | **Received:** 17 January 2011 | **Accepted:** 02 May 2011

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

**DOI:** [10.5281/zenodo.18921565](https://doi.org/10.5281/zenodo.18921565)

## Author notes

*Sipho Maluleke is affiliated with Stellenbosch University and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems in South Africa play a critical role in detecting and responding to infectious diseases. However, their efficiency varies across different regions and levels of government. A multilevel regression model was employed to analyse data from various sources including district health information systems, national disease reporting databases, and government reports. The model accounted for both fixed effects (e.g., regional differences) and random effects (e.g., within-district variations). The analysis revealed significant heterogeneity in system performance across districts, with some regions showing up to a 20% improvement in detection rates when compared to the national average. Multilevel regression analysis provides valuable insights into the efficiency of public health surveillance systems and highlights areas for targeted intervention and resource allocation. Efforts should be directed towards enhancing data collection practices, increasing training opportunities for healthcare workers, and improving infrastructure in underperforming districts. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_{i,j}$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, Geographic Information Systems, Spatial Analysis, Hierarchical Modelling, Quantile Regression, Cluster Randomization, Precision Medicine*

## 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