



Methodological Evaluation of Public Health Surveillance Systems in South Africa Using Multilevel Regression Analysis to Assess System Reliability

Nomsa Dlamini¹, Zola Nomonde¹, Sibusiso Mthethwa², Thabo Cele^{3,4}

¹ University of Pretoria

² Department of Epidemiology, North-West University

³ Department of Public Health, North-West University

⁴ African Institute for Mathematical Sciences (AIMS) South Africa

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Correspondence: ndlamini@outlook.com

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Author notes

Nomsa Dlamini is affiliated with University of Pretoria and focuses on Medicine research in Africa.

Zola Nomonde is affiliated with University of Pretoria and focuses on Medicine research in Africa.

Sibusiso Mthethwa is affiliated with Department of Epidemiology, North-West University and focuses on Medicine research in Africa.

Thabo Cele is affiliated with Department of Public Health, North-West University and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems in South Africa play a critical role in monitoring infectious diseases such as tuberculosis (TB). These systems are essential for early detection and control of outbreaks. A systematic literature review will be employed to analyse existing studies and reports from various sources related to public health surveillance systems in South Africa. Multilevel regression analysis will be used to evaluate the reliability of these systems, with robust standard errors accounting for intracluster correlation. Multilevel regression analysis revealed that the proportion of correctly identified cases within cluster-level units was significantly higher than expected by chance ($p < 0.05$), indicating improved system performance in TB surveillance. The multilevel regression method demonstrated its effectiveness in assessing the reliability of public health surveillance systems, providing valuable insights for improving their accuracy and efficiency. Public health officials should prioritise further validation of these findings through additional empirical research and integration of feedback mechanisms into system design to enhance overall performance. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, tuberculosis, surveillance, reliability, multilevel, analysis, geographic*

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