



Methodological Evaluation of Public Health Surveillance Systems in South Africa: Multilevel Regression Analysis for Risk Reduction Studies

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Abstract

Public health surveillance systems in South Africa are crucial for monitoring diseases such as HIV/AIDS and tuberculosis (TB). However, their effectiveness can vary significantly at different levels of implementation. Multilevel regression models will be employed to analyse data from multiple sources including clinics, districts, and provinces. The models will account for both direct effects (e.g., clinic-level interventions) and indirect effects (e.g., district-level policies). The multilevel analysis revealed significant variation in risk reduction effectiveness across different levels of surveillance systems. This study provides a robust framework to assess the impact of public health surveillance at various administrative levels, offering insights for improving system efficacy. Policy makers should prioritise interventions that address both direct and indirect effects identified through this analysis. 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: African epidemiology, multilevel modelling, public health surveillance, risk assessment, regression analysis, spatial statistics, geographic information systems

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