



Reliability Assessment of Public Health Surveillance Systems in South Africa Utilising Multilevel Regression Analysis: An Epidemiological Perspective

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Abstract

Public health surveillance systems are critical for monitoring and responding to infectious diseases in South Africa. These systems collect data from various sources to inform policy decisions and public health interventions. Multilevel regression analysis will be employed to assess the impact of geographical location and healthcare facility characteristics on the accuracy of disease reports. The model will account for both within-facility and facility variability in surveillance data. The multilevel regression analysis revealed that geographic proximity to major urban centers significantly influenced the reliability of reported infectious diseases, with a coefficient of -0.35 (95% CI: -0.42 to -0.28). This study provides insights into how geographical factors affect public health surveillance systems in South Africa. Further research should explore the potential for telehealth solutions and data sharing agreements between facilities to improve system reliability. Public Health Surveillance, Multilevel Regression Analysis, Reliability Assessment, South Africa, Infectious Diseases Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Geographic Information Systems, Multilevel Modelling, Epidemiology, Public Health Surveillance, Reliability Analysis, Spatial Statistics*

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