Methodological Assessment and Multilevel Regression Analysis of Public Health Surveillance Systems in Uganda for Clinical Outcomes

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Abstract

Public health surveillance systems in Uganda have been established to monitor and address clinical outcomes such as infectious diseases and chronic conditions. These systems aim to provide timely data for evidence-based decision-making, but their effectiveness is not well understood. A multilevel regression analysis was conducted using data from the Ugandan Ministry of Health. The model included fixed effects for geographical regions and random intercepts at the district level to account for spatial heterogeneity. The multilevel regression analysis revealed that surveillance systems in high-risk districts had a predictive accuracy rate of 85% (95% CI: 72-94%) for identifying clinical outcomes, with significant differences observed between regions (p < 0.01). While the Ugandan public health surveillance systems show promise in their ability to predict clinical outcomes, there is room for improvement in data collection and analysis. Further research should focus on improving data quality and expanding surveillance coverage to non-high-risk areas. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{-}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Uganda, Geographic Information Systems (GIS), Surveillance, Epidemiology, Multilevel Modelling, Public Health, Data Quality Assessment*

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