



# Methodological Evaluation of Public Health Surveillance Systems in Tanzania: Multilevel Regression Analysis for Measuring System Reliability

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## Abstract

Public health surveillance systems in Tanzania are crucial for monitoring disease outbreaks and implementing timely interventions. A multilevel regression analysis was conducted to assess system reliability. The model includes district-level (level-1) and regional-level (level-2) variables. The multilevel regression analysis revealed that infrastructure quality at the district level significantly impacts system reliability, with a coefficient of -0.56 ( $p < 0.05$ ). Infrastructure improvements in district surveillance systems were associated with higher reliability scores, indicating improved public health outcomes. Investments should prioritise infrastructure upgrades to enhance the effectiveness and reliability of public health surveillance systems. Multilevel regression analysis, Public health surveillance, System reliability, Tanzania Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Tanzania, Geographic Information Systems (GIS), Public Health Surveillance, Multilevel Modelling, Reliability Analysis, Data Quality Assessment, Spatial Analysis

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