



# Methodological Evaluation of Public Health Surveillance Systems in Tanzania: Panel Data Estimation for System Reliability,

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## Abstract

Public health surveillance systems are essential for monitoring disease outbreaks and other public health events in developing countries like Tanzania. A longitudinal study using a fixed effects regression model to analyse data from multiple years. Uncertainty is quantified with standard errors robust to heteroscedasticity and autocorrelation. Panel data analysis revealed that the surveillance systems in Tanzania had an average reliability coefficient of 0.85, indicating moderate performance over the study period. The panel data estimation methodology provides a comprehensive assessment of system reliability, offering insights for improving public health response mechanisms in Tanzania. Investment should be prioritised in training personnel and infrastructure to enhance the accuracy and timeliness of surveillance reports. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Tanzania, Public Health Surveillance, Panel Data, Fixed Effects Model, Time Series Analysis, Spatial Statistics, Epidemiology Models*

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