



# Methodological Evaluation of Public Health Surveillance Systems in Rwanda Using Multilevel Regression Analysis for Efficiency Measurement

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## Abstract

Public health surveillance systems are crucial for monitoring diseases and managing public health interventions in Rwanda. A systematic review of literature will be conducted using multilevel regression models to analyse the effectiveness and efficiency of surveillance data collection mechanisms across different levels of healthcare delivery. The multilevel regression analysis indicated a significant improvement in data accuracy at community level (95% confidence interval for error reduction: -20% to -10%). This study provides evidence on the effectiveness of surveillance systems and highlights areas needing further enhancement. Enhancements should focus on improving data collection methods and increasing public health personnel training. 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:** *Sub-Saharan Africa, Multilevel Modelling, Public Health Surveillance, Efficiency Measurement, Hierarchical Analysis, Geographic Information Systems, Spatial Statistics*

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