



Methodological Evaluation of Public Health Surveillance Systems in Tanzania: A Randomized Field Trial on Cost-Effectiveness

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Abstract

Public health surveillance systems play a critical role in monitoring diseases and managing outbreaks in Tanzania. However, their effectiveness and cost-effectiveness are not well understood. A mixed methods approach was employed: quantitative data were collected via surveys, while qualitative insights were gathered from interviews. Statistical models including logistic regression for predictive analysis and bootstrapping for uncertainty quantification were used. In the randomized field trial, a proportion of 72% showed significant improvement in detection rates when using the proposed surveillance system compared to baseline practices. Uncertainty in cost-effectiveness estimates was within $\pm 10\%$ based on bootstrap resampling. The study demonstrates that tailored public health surveillance systems can enhance disease detection and management, with a marginally cost-effective proposition. Public health authorities should consider implementing the recommended enhancements to improve surveillance practices in Tanzania. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Geographic Information Systems, Qualitative Inquiry, Quantitative Analysis, Mixed Methods, Evaluation Framework, Cost-Benefit Analysis*

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