



Bayesian Hierarchical Model for Evaluating Adoption Rates in Public Health Surveillance Systems in Tanzania

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Abstract

Public health surveillance systems in Tanzania are critical for monitoring disease prevalence and guiding intervention strategies. However, there is variability in their effectiveness across different regions. A Bayesian hierarchical model was employed to analyse data from multiple surveillance sites. The model accounts for both systematic and random effects, providing nuanced insights into system adoption across regions. The analysis revealed significant differences in adoption rates between urban and rural areas, with a median adoption rate of 75% across all surveyed sites. This study highlights the importance of regional-specific strategies to enhance the effectiveness of public health surveillance systems in Tanzania. Public health officials should prioritise implementation in underserved regions where adoption rates are notably lower than average. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Public Health Surveillance, Bayesian Hierarchical Model, Methodology, Evaluation, Adoption Rates, Geographic Variation*

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