



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

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## Abstract

Public health surveillance systems are crucial for monitoring infectious diseases in Tanzania. Despite their importance, adoption rates and effectiveness vary among different regions. A Bayesian hierarchical model was applied to analyse survey data collected from various districts in Tanzania. The model accounts for spatial and temporal dependencies among regions. The analysis revealed significant differences in adoption rates between urban and rural areas, with an estimated average adoption rate of 72% across all regions. This study provides evidence that supports the need for targeted interventions to improve surveillance system adoption in underserved regions. Public health officials should prioritise resource allocation towards improving access and training in less adopted areas to enhance overall system effectiveness. Bayesian hierarchical model, public health surveillance systems, Tanzania, adoption rates Treatment effect was estimated with  $\text{text}\{logit\}(\pi) = \beta_0 + \beta^{-1} p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Sub-Saharan, Bayesian, Hierarchical, Model, Adoption, Surveillance, Methodology*

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