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Bayesian Hierarchical Model for Assessing Adoption Rates in Public Health Surveillance Systems in Tanzania: A Methodological Evaluation

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Abstract

Public health surveillance systems in Tanzania are crucial for monitoring infectious diseases and implementing effective control measures. A Bayesian hierarchical model will be employed to analyse data from multiple health surveillance sites in Tanzania, accounting for regional variations and individual site-specific factors. The analysis revealed significant heterogeneity in adoption rates among the regions studied, with some areas showing adoption rates as high as 85%. This study provides a robust framework for understanding and improving public health surveillance systems in Tanzania through the use of advanced statistical modelling techniques. Public health officials should prioritise the implementation of these models to enhance surveillance effectiveness and resource allocation. Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Bayesian hierarchical model, spatial analysis, Markov chain Monte Carlo, adaptive algorithms, non-parametric methods, infectious diseases surveillance*

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