



Bayesian Hierarchical Model for Measuring Reliability in Public Health Surveillance Systems in Uganda

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Abstract

Public health surveillance systems play a critical role in monitoring disease outbreaks and ensuring timely interventions. A Bayesian hierarchical model was applied to assess the reliability of healthcare data collected from various regions across Uganda over two years. The model accounts for spatial and temporal variability. The analysis revealed a significant proportion ($p < 0.05$) of underreporting in surveillance reports, suggesting areas requiring enhanced reporting mechanisms. Bayesian hierarchical modelling provided robust estimates of system reliability with high precision, offering insights into improving public health surveillance effectiveness. Enhanced training for data collectors and improved IT infrastructure are recommended to address identified issues. Public Health Surveillance, Bayesian Hierarchical Model, Reliability Measurement, Uganda 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: African, Hierarchical, Bayesian, Evaluation, Surveillance, Methodology, Reliability

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