



Bayesian Hierarchical Model for Evaluating Risk Reduction in Public Health Surveillance Systems in Ethiopia

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Abstract

Public health surveillance systems in Ethiopia are crucial for monitoring disease prevalence and implementing effective interventions. A Bayesian hierarchical model was developed to analyse surveillance data from multiple regions in Ethiopia. The model accounts for spatial and temporal variations using Markov Chain Monte Carlo (MCMC) methods. The Bayesian hierarchical model revealed a 20% reduction in diarrheal disease incidence rates across the monitored areas, with significant uncertainty around these estimates due to limited data variability. The study underscores the effectiveness of public health surveillance and intervention strategies in reducing specific diseases in Ethiopia. Further research should explore scalability and cost-effectiveness of the identified risk reduction measures. Bayesian hierarchical model, Public health surveillance, Risk reduction, Ethiopia Treatment effect was estimated with $\text{text}\{logit\}(\pi) = \beta_0 + \beta^T p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Ethiopia, Public Health Surveillance, Bayesian Hierarchical Models, Spatial Analysis, Quantitative Risk Assessment, Intervention Evaluation, Geographic Information Systems

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