African Medical Laboratory Immunology

Reliability Assessment of Public Health Surveillance Systems in Ghana via Bayesian Hierarchical Modelling

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Abstract

Public health surveillance systems are crucial for monitoring disease outbreaks and managing public health crises effectively. A Bayesian hierarchical model was employed to evaluate system performance across various regions in Ghana. This approach accounts for spatial variation and heterogeneity among different surveillance sites. The analysis revealed significant variability in system reliability between urban and rural areas, with a proportion of 0.75 in urban settings achieving optimal performance. Bayesian hierarchical modelling provided insights into the strengths and weaknesses of Ghana's public health surveillance systems, informing future improvements. Interventions to improve system reliability should prioritise regions with lower performance metrics, such as rural areas where only 25% achieved optimal results. public health surveillance, Bayesian hierarchical model, system reliability, Ghana Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

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