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Bayesian Hierarchical Model for Measuring Clinical Outcomes in Public Health Surveillance Systems in Kenya

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Abstract

Public health surveillance systems in Kenya have been established to monitor clinical outcomes but face challenges in data collection and analysis. A Bayesian hierarchical model will be applied to assess the variability of clinical outcome measurements within different surveillance sites. Uncertainty quantification will be provided through credible intervals. The model demonstrates significant heterogeneity in clinical measurement accuracy between sites, with some discrepancies exceeding ±10%. The Bayesian hierarchical approach offers a robust method for evaluating and improving public health surveillance systems in Kenya. Implementation of the proposed model should include regular calibration exercises to ensure consistent data quality across all sites. Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Kenya, Bayesian Hierarchical Model, Public Health Surveillance, Clinical Outcomes, Methodological Evaluation, Data Analysis, Geographic Epidemiology*

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