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Bayesian Hierarchical Model for Evaluating Cost-Effectiveness of Public Health Surveillance Systems in Kenya,

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Abstract

Public health surveillance systems are critical for monitoring diseases that can impact public health in Kenya. A Bayesian hierarchical model was applied to assess and compare surveillance costs across different geographic regions within Kenya. The model accounts for varying levels of disease prevalence and resource allocation. The analysis revealed significant variations in the cost-effectiveness ratios (CER) among regions, with some showing substantial savings over others when adjusted for regional differences in healthcare infrastructure. This study highlights the importance of tailored surveillance strategies to optimise resource utilization within Kenya's diverse geographical and health service landscapes. Public health authorities should prioritise investments in areas where cost-effectiveness is highest, based on this model’s findings, to maximise disease control outcomes. Bayesian Hierarchical Model, Cost-Effectiveness Analysis, Public Health Surveillance, Kenya 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, Cost-Effectiveness Analysis, Markov Chain Monte Carlo, Spatial Statistics, Epidemiology Models*

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