African Animal Physiology (Agri/Animal Science)

Multilevel Regression Analysis for Measuring Yield Improvement in Public Health Surveillance Systems in Senegal: A Methodological Evaluation

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Abstract

Public health surveillance systems are crucial for monitoring disease outbreaks and managing public health responses in developing countries like Senegal. However, their effectiveness can vary significantly across different regions. We employed multilevel regression analysis to assess the impact of various factors on the efficiency of public health surveillance systems at both national and regional levels in Senegal. Data was collected from multiple sources including government records, surveys, and feedback mechanisms. The analysis revealed that investment in infrastructure and training for frontline healthcare workers significantly improved system yield by approximately 20% compared to baseline conditions. This study provides a robust methodological framework for evaluating public health surveillance systems. The findings suggest that targeted investments can lead to substantial improvements in system performance. Public health authorities should prioritise investment in infrastructure and training programmes to enhance the yield of public health surveillance systems. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\ p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Geographic Information Systems, Hierarchical Models, Quantitative Methods, Spatial Analysis, Regression Analysis, Public Health Surveillance*