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# Methodological Evaluation of Public Health Surveillance Systems in Kenya: Multilevel Regression Analysis for Efficiency Gains

**Oginga Kiburi Wambura**[1]

[1] International Centre of Insect Physiology and Ecology (ICIPE), Nairobi

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**Correspondence:** owambura@hotmail.com

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**Author notes**

*Oginga Kiburi Wambura is affiliated with International Centre of Insect Physiology and Ecology (ICIPE), Nairobi and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems in Kenya are crucial for monitoring infectious diseases and managing outbreaks efficiently. A multilevel logistic regression model will be employed to analyse data from surveillance reports at both national and sub-national levels. The model is specified as: $\log(\frac{P}{1-P}) = beta0 + beta1\,DistrictLevelX + \beta_2\,NationalLevelY$, where $P$ is the probability of disease detection, and $DistrictLevelX$ and $NationalLevelY$ are indicator variables for district-specific and national-level factors respectively. Uncertainty in parameter estimates will be assessed using robust standard errors. The multilevel regression analysis revealed a significant interaction effect between district-level health resources and national surveillance policies on disease detection rates, indicating that the efficiency gains can vary based on these contextual factors. This study provides insights into how multilevel regression models enhance understanding of public health surveillance system efficiencies in Kenya, offering potential for policy adjustments to improve outcomes. Policy makers should consider district-specific resource allocation and national-level coordination strategies to maximise efficiency gains from public health surveillance systems. Public Health Surveillance, Multilevel Regression Analysis, Efficiency Gains, District-Level Factors, National-Level Policies

**Keywords:** *African, Geographic, Multilevel, Regression, Surveillance, Evaluation, Efficiency*

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