African Digital Health and Telemedicine

# Multilevel Regression Analysis of Clinical Outcomes in Public Health Surveillance Systems in Uganda: A Methodological Evaluation

**Namugoyi Mukasa**[1,2], **Oketch Okiek**[3,4], **Kizza Bwire**[5], **Otombo Otim**[2]

[1] Gulu University

[2] Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit

[3] Mbarara University of Science and Technology

[4] Kampala International University (KIU)

[5] Department of Internal Medicine, Kampala International University (KIU)

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**Correspondence:** nmukasa@hotmail.com

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**Author notes**

*Namugoyi Mukasa is affiliated with Gulu University and focuses on Medicine research in Africa.*

*Oketch Okiek is affiliated with Mbarara University of Science and Technology and focuses on Medicine research in Africa.*

*Kizza Bwire is affiliated with Department of Internal Medicine, Kampala International University (KIU) and focuses on Medicine research in Africa.*

*Otombo Otim is affiliated with Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems are critical for monitoring disease prevalence and guiding intervention strategies in Uganda. However, their effectiveness can be influenced by various factors at different levels. We employed a multilevel logistic regression model to analyse data from multiple sources, including national surveys and hospital records. The model accounts for both individual patient-level characteristics (e.g., age, sex) and regional-level effects (e.g., climate, healthcare infrastructure). The analysis revealed significant geographical variations in disease prevalence rates with a 15% higher incidence in rural areas compared to urban regions. Our multilevel regression approach provides insights into the complex interplay of factors affecting clinical outcomes within public health surveillance systems, offering a robust method for system evaluation and intervention planning. Public health officials should prioritise resource allocation based on geographical data to optimise disease control efforts across Uganda. public health surveillance, multilevel regression analysis, clinical outcomes, Uganda 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, Public Health, Surveillance, Multilevel, Regression, Evaluation, Geographic*

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