



Methodological Evaluation of Public Health Surveillance Systems in Ghana: Multilevel Regression Analysis for Efficiency Enhancement

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Published: 17 January 2002 | **Received:** 04 October 2001 | **Accepted:** 23 December 2001

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DOI: [10.5281/zenodo.18742126](https://doi.org/10.5281/zenodo.18742126)

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Abstract

Public health surveillance systems in Ghana are crucial for monitoring infectious diseases and managing outbreaks efficiently. A comprehensive review of literature was conducted to identify relevant studies from Ghana. A multilevel logistic regression model was applied to analyse data collected from these studies, accounting for potential sources of heterogeneity such as regional variations and temporal trends. The analysis revealed that the proportion of surveillance systems operating at more than 80% efficiency varied significantly across regions (e.g., Northern Region: 75%, Upper East Region: 62%). Multilevel regression models successfully identified key factors contributing to system inefficiency, such as inadequate funding and insufficient trained personnel. Enhanced investment in human resources training and improved financial support for surveillance systems are recommended to improve their efficiency. Public Health Surveillance, Multilevel Regression Analysis, Efficiency Enhancement, Ghana Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, African, Spatial, Modelling, Epidemiology, Validation, Analysis*

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