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Methodological Evaluation of Public Health Surveillance Systems in Ghana Using Multilevel Regression Analysis to Measure Efficiency Gains

Yaw Gyamfi[1], **Kofi Prempeh**[2,3], **Ameyaw Adomaa**[1,2], **Kwame Ofori**[1,4]

[1] University of Ghana, Legon

[2] Kwame Nkrumah University of Science and Technology (KNUST), Kumasi

[3] Department of Clinical Research, Noguchi Memorial Institute for Medical Research

[4] Council for Scientific and Industrial Research (CSIR-Ghana)

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Correspondence: ygyamfi@hotmail.com

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Author notes

Yaw Gyamfi is affiliated with University of Ghana, Legon and focuses on Medicine research in Africa.

Kofi Prempeh is affiliated with Kwame Nkrumah University of Science and Technology (KNUST), Kumasi and focuses on Medicine research in Africa.

Ameyaw Adomaa is affiliated with University of Ghana, Legon and focuses on Medicine research in Africa.

Kwame Ofori is affiliated with University of Ghana, Legon and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems in Ghana are crucial for monitoring infectious diseases such as malaria and tuberculosis. Multilevel regression was employed to analyse data from multiple levels (national, regional, district) within Ghana's public health surveillance system. The multilevel model showed that national-level interventions had a significant positive effect on reducing case notifications by 20% compared to regional and district efforts alone. This study demonstrates the effectiveness of combining national strategies with local adaptations for improved disease control efficiency in Ghana. Public health authorities should prioritise national-level initiatives while supporting localized surveillance programmes to maximise overall impact. multilevel regression, public health surveillance, efficiency gains, malaria, tuberculosis Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta}\ p\ X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Africa, SpatialAnalysis, VarianceComponents, ClusteredData, LongitudinalStudies, HealthImpactModels*

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