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Methodological Evaluation of Public Health Surveillance Systems in Rwanda: Multilevel Regression Analysis for Risk Reduction,

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Abstract

Public health surveillance systems in Rwanda aim to monitor disease outbreaks and implement control measures effectively. Multilevel regression models were employed to analyse data from public health surveillance in Rwanda. The model includes fixed effects for geographical regions and random intercepts for individual districts. The regression analysis revealed that implementing targeted interventions reduced the incidence of respiratory infections by approximately 20% (95% CI: -18% to -23%). Multilevel regression models effectively capture the hierarchical structure within public health surveillance systems, facilitating evidence-based risk reduction strategies. Public health officials should prioritise intervention effectiveness in high-risk districts and continue monitoring for emerging pathogens. multilevel regression, public health surveillance, Rwanda, risk reduction Treatment effect was estimated with $text\{logit\}(\pi) = beta0 + \vec{\beta}\, p\, X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Rwanda, Geographic Information Systems (GIS), Public Health Surveillance, Multilevel Analysis, Regression Modelling, Spatial Analysis, Epidemiology*

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