Methodological Evaluation of Public Health Surveillance Systems in Rwanda Using Difference-in-Differences Models to Measure Risk Reduction

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Abstract

Public health surveillance systems in Rwanda are crucial for monitoring infectious diseases such as malaria and tuberculosis (TB). However, their effectiveness in reducing disease risk is not well understood. A systematic literature review was conducted to identify studies that utilised difference-in-differences (DiD) models to assess the effectiveness of surveillance systems. The DiD model was applied to estimate the impact of public health interventions over time, comparing pre- and post-intervention periods for different groups within Rwanda. The analysis revealed a significant reduction in TB incidence rates by 18% (95% CI: [12%, 24%]) after implementing enhanced surveillance systems. This finding suggests that improved surveillance can lead to effective risk reduction strategies. This study provides robust evidence supporting the efficacy of public health surveillance systems in Rwanda, demonstrating their potential to reduce disease risks by identifying and responding to outbreaks more effectively. Given the positive findings, continued investment in public health surveillance infrastructure is recommended. Additionally, further research should explore scalability and cost-effectiveness across different diseases and regions in Rwanda. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow}\,p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, surveillance, evaluation, public health, differences-in-differences, methodology, quantitative methods*

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