



# Methodological Evaluation of Public Health Surveillance Systems in Ethiopia Using Difference-in-Differences Approach to Measure Risk Reduction Effectiveness

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## Abstract

Public health surveillance systems are crucial for monitoring disease trends in Ethiopia, particularly after recent improvements in data collection and reporting. The study employed a difference-in-differences model with an estimated equation:  $\delta Y \{ treatment \} - \delta Y \{ control \} = \beta_0 + \beta_1 Treatment_t + \varepsilon$  where  $\delta Y$  represents change in surveillance data, and  $Treatment_t$  is a binary indicator for treatment group. The study also incorporated robust standard errors to account for potential biases. The analysis revealed a significant reduction of 20% in reported infectious diseases cases post-intervention in the treated regions compared to controls, with an uncertainty interval of  $\pm 5\%$ . This suggests enhanced surveillance effectiveness but calls for further data validation and system optimization. The difference-in-differences model is a robust method for assessing public health surveillance systems' impact on disease reduction in Ethiopia. The findings highlight the need for continuous monitoring and adaptation to ensure consistent efficacy. Given the positive outcomes, ongoing support and regular updates of data collection methodologies are recommended. Additionally, targeted interventions should be implemented based on identified system weaknesses.

**Keywords:** Ethiopia, Public Health Surveillance, Methodological Evaluation, Difference-in-Differences, Randomized Controlled Trial, Geographic Information Systems, Spatial Analysis

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