



# **Methodological Evaluation of Public Health Surveillance Systems in Ethiopia: Assessing Efficiency Gains Using Difference-in- Differences Analysis**

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## **Abstract**

Public health surveillance systems play a critical role in monitoring disease prevalence and implementing targeted interventions to improve public health outcomes. Public health surveillance data from two consecutive years were analysed. A difference-in-differences approach was employed to assess changes in surveillance metrics post-implementation of new surveillance protocols. Comparing pre- and post-intervention periods showed a statistically significant increase ( $p < 0.05$ ) in the detection rate of infectious diseases by 20% compared to baseline, indicating improved system efficiency. The DiD model demonstrated that targeted surveillance improvements significantly enhanced disease detection rates, suggesting potential for broader implementation and resource allocation strategies. Public health authorities should prioritise ongoing evaluation and adaptation of surveillance systems based on the findings to ensure continued effectiveness and optimal resource utilization. Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *Ethiopia, Geographic Information Systems (GIS), Public Health Surveillance, Evaluation Metrics, Difference-in-Differences, Outcome Measures, Spatial Analysis*

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