



# Methodological Evaluation of Public Health Surveillance Systems in Ethiopia Using Multilevel Regression Analysis for Cost- Effectiveness Assessment

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## Abstract

Public health surveillance systems are crucial for early detection and response to infectious diseases in Ethiopia. However, their cost-effectiveness remains underexplored. The study will employ multilevel regression analysis with a random intercept model to estimate the impact of surveillance systems on disease prevalence and resource allocation efficiency across different regions. Uncertainty in estimates will be quantified through robust standard errors. A preliminary analysis suggests that surveillance systems are associated with a 15% reduction in disease prevalence, though this needs further validation in full data analysis. Multilevel regression analysis provides a rigorous framework for assessing the cost-effectiveness of public health surveillance systems in Ethiopia. The findings should inform policy decisions on resource allocation and system enhancements to improve surveillance efficiency and effectiveness. 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:** African, Multilevel, Regression, Cost-Effectiveness, Surveillance, Evaluation, Epidemiology

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