



Reliability Assessment of Public Health Surveillance Systems in Ethiopia Using Multilevel Regression Analysis

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Abstract

Public health surveillance systems are crucial for monitoring disease outbreaks and ensuring prompt responses in resource-limited settings like Ethiopia. Multilevel regression analysis was employed to assess the performance of public health surveillance systems at both district-level (level 1) and national-level (level 2), accounting for hierarchical structure and potential confounders. The multilevel model revealed that while reporting delays were common, there was a significant positive association between timely data submission and system reliability scores. This study provided insights into the strengths and areas needing improvement in public health surveillance systems across Ethiopia. Enhancements to training programmes for surveillance staff and investment in technology infrastructure are recommended to improve system performance. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Ethiopia, Multilevel Regression, Public Health Surveillance, Reliability Assessment, Methodological Evaluation, Geographic Information Systems, Data Quality Measures

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