



Methodological Evaluation of Public Health Surveillance Systems in South Africa: A Randomized Field Trial Approach

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Abstract

Public health surveillance systems in South Africa are crucial for monitoring infectious diseases such as tuberculosis (TB). However, their effectiveness and reliability vary widely across different regions. A systematic review will be conducted on published studies evaluating public health surveillance systems for infectious diseases in South Africa. Randomized field trials will be replicated and analysed using a generalized linear mixed model (GLMM) to estimate the impact of these systems on TB incidence with robust standard errors. In our analysis, we found that while some systems showed significant reductions in TB incidence ($p < 0.05$), their effectiveness varied significantly across different regions and surveillance methods. The randomized field trial approach revealed substantial methodological differences among public health surveillance systems, with some demonstrating potential for effective risk reduction but requiring further optimization. Public health officials should prioritise system standardization and continuous improvement to enhance the reliability of TB surveillance data in South Africa. Treatment effect was estimated with $\text{text} \{ \text{logit} \} (\pi) = \beta_0 + \beta^{-1} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, geographical, validity, reliability, triangulation, stratification, intervention effectiveness*

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