



# Methodological Evaluation of Public Health Surveillance Systems in South Africa: A Randomized Field Trial for Measuring Risk Reduction in Public Health Contexts

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## Abstract

Public health surveillance systems are crucial for monitoring disease outbreaks in South Africa. However, their effectiveness can vary significantly based on implementation and operational strategies. A randomized field trial was conducted in two South African provinces, with 100 participants randomly assigned to either a control group or an intervention group receiving enhanced surveillance services. Data collection included pre- and post-intervention assessments using standardised health surveys. The results indicate that the intervention group showed a statistically significant reduction in risk factors by 25% (95% CI: -10%, 60%), suggesting improved public health outcomes with enhanced surveillance systems. This finding supports the efficacy of randomized field trials in evaluating public health interventions. This study provides evidence that randomized field trials can effectively measure and assess risk reduction in public health contexts, particularly in resource-limited settings like South Africa. The findings from this study should inform policy makers on the importance of investing in robust surveillance systems to mitigate public health risks. Future research could explore longitudinal studies to further validate these results. Public Health Surveillance, Risk Reduction, Randomized Field Trial, Public Health Contexts Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *African epidemiology, Geographic Information Systems (GIS), Sampling theory, Randomized controlled trials, Outcome measurement, Public health metrics, Surveillance effectiveness*

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