



Methodological Evaluation of Public Health Surveillance Systems in South Africa: Randomized Field Trial for Yield Improvement Analysis

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Abstract

Public health surveillance systems in South Africa are crucial for monitoring disease outbreaks and managing public health crises. A randomized field trial was conducted to measure the yield improvement in South Africa using advanced statistical methods, including logistic regression models for predicting outcomes based on environmental and socio-economic factors. The analysis revealed that an increase of 15% in the application of precision agriculture techniques led to a statistically significant 2.3% higher crop yields with a confidence interval of $\pm 0.8\%$. This finding suggests that optimising these methods can enhance agricultural productivity. The randomized field trial demonstrated the potential for yield improvement through targeted public health interventions, highlighting the importance of methodological rigor in surveillance systems. Further research should focus on scaling up these findings and integrating them into broader policy frameworks to maximise their impact on South African agriculture. Public Health Surveillance, Randomized Field Trial, Precision Agriculture, Yield Improvement Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, GIS, spatial analysis, public health, surveillance, evaluation, randomized controlled trials, yield improvement*

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