African Hydrology Research (Earth Science focus)

# Methodological Evaluation of Public Health Surveillance Systems in Rwanda: A Randomized Field Trial for Clinical Outcomes Assessment

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## Abstract

Public health surveillance systems in Rwanda are crucial for monitoring disease outbreaks efficiently. However, their effectiveness varies widely across different regions and requires methodological refinement. A randomized controlled trial was conducted in two districts of Rwanda to compare traditional passive surveillance methods with an enhanced active surveillance approach. Clinical data from patients suspected of having infectious diseases were collected using standardised protocols over six months. In the intervention district, a higher proportion (75%) of clinical cases were detected compared to the control area (60%), demonstrating improved system sensitivity and specificity in identifying infections. The enhanced active surveillance approach significantly improved case detection rates without an increase in false positives, suggesting its potential for broader implementation within Rwanda's public health infrastructure. Immediate replication of this study across all districts to ensure consistent performance and further refinement based on findings is recommended. Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *African epidemiology, cluster randomized trials, surveillance systems, public health, outcome measurement, geographic information systems, spatial analysis*

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