



# Methodological Evaluation of Public Health Surveillance Systems in Rwanda Using Difference-in-Differences Model

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## Abstract

This study addresses a current research gap in Medicine concerning Methodological evaluation of public health surveillance systems in Rwanda: difference-in-differences model for measuring system reliability in Rwanda. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured review of relevant literature was conducted, with thematic synthesis of key findings. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of public health surveillance systems in Rwanda: difference-in-differences model for measuring system reliability, Rwanda, Africa, Medicine, meta analysis This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. 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 Africa, Public Health Surveillance, Methodological Evaluation, Difference-in-Differences, Time Series Analysis, Randomization Models, Geographic Information Systems*

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