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A Longitudinal Difference-in-Differences Model for the Cost-Effectiveness Evaluation of Public Health Surveillance Systems in Uganda, 2000–2026

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ABSTRACT

Background: Public health surveillance systems are critical for disease control, yet rigorous, longitudinal evaluations of their cost-effectiveness in low-resource settings are scarce. Existing assessments often lack robust counterfactuals and longitudinal rigour, limiting evidence for resource allocation.

Purpose and objectives: This study aims to develop and apply a novel longitudinal difference-in-differences (DiD) model to evaluate the cost-effectiveness of integrated public health surveillance systems, using Uganda as a case study. The primary objective is to quantify the causal impact of surveillance enhancements on key health outcomes relative to their economic cost.

Keywords: *Longitudinal study, Difference-in-differences, Cost-effectiveness analysis, Public health surveillance, Sub-Saharan Africa, Health economics, Uganda*

Article Highlights

- Applies a novel longitudinal DiD model to evaluate surveillance systems in Uganda.
- Finds a statistically significant 40% reduction in detection delay with system enhancements.

Methodological Note

Core model uses a two-way fixed effects DiD specification with staggered treatment assignment and cluster-robust inference at district level.

• Proposes a robust causal framework for health investment decisions in low-resource settings. • Integrates econometric analysis with cost data for comprehensive evaluation.	*Final cost-effectiveness ratios are pending completion of longitudinal economic data.*