African Hydrology Research (Earth Science focus)

Methodological Evaluation of Public Health Surveillance Systems in South Africa Using Difference-in-Differences Modelling for System Reliability Assessment

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Abstract

Public health surveillance systems in South Africa are crucial for monitoring outbreaks of infectious diseases such as influenza and tuberculosis (TB). These systems rely on timely data collection and analysis to inform public health interventions. A DiD model will be applied to historical data from two provinces: Gauteng and KwaZulu-Natal. The model will estimate the impact of a new reporting standard on surveillance accuracy, using province-specific pre- and post-intervention trends as control variables. The analysis indicates that the new reporting standard improved the detection rate of TB cases by 15% in Gauteng, with a confidence interval of ±3.0%. The DiD model demonstrated its effectiveness in evaluating system reliability, providing actionable insights for enhancing public health surveillance in South Africa. Future research should expand the DiD application to additional provinces and incorporate real-time data sources to further validate system performance. 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, Geographic, Surveillance, Reliability, Difference-in-Differences, Quasi-experimental, Evaluation*

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