



Methodological Evaluation of Public Health Surveillance Systems in Senegal Using Panel Data for Reliability Assessment

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Abstract

Public health surveillance systems in Senegal are critical for monitoring infectious diseases, yet their reliability and effectiveness have not been comprehensively evaluated. A meta-analysis approach was employed, with panel-data estimation techniques applied to analyse trends and patterns in disease reports from multiple sources across different regions of Senegal. The study utilised mixed-effects models to account for both fixed and random effects, including temporal and spatial variability. Mixed-effects model results indicated that the system's reliability varied significantly by region, with a moderate proportion (35%) of reported cases accurately reflecting actual disease prevalence across the country. The panel-data analysis revealed inconsistencies in reporting between urban and rural areas, suggesting potential biases due to differences in healthcare infrastructure and access to diagnostic facilities. Further research should aim to integrate data from diverse sources (e.g., laboratory reports, community health surveys) into the surveillance system to improve accuracy and reliability. Policy recommendations include strengthening training for surveillance staff and improving communication between regional health centers and central authorities. Public Health Surveillance, Senegal, Panel Data Analysis, Reliability Assessment, Mixed-Effects Models Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, African, Spatial, Networks, Randomized, Pooling, Validity*

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