



# Bayesian Hierarchical Model for Assessing Reliability in Public Health Surveillance Systems in Kenya,

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## Abstract

Public health surveillance systems in Kenya have been established to monitor infectious diseases such as malaria and tuberculosis. These systems are critical for timely detection of outbreaks and effective response strategies. A systematic literature review was conducted using databases such as PubMed and Scopus. Studies published between and were considered to assess the reliability of public health surveillance systems in Kenya. The analysis revealed a significant variation ( $p < 0.05$ ) in system performance across different regions, with urban areas showing higher reliability compared to rural settings. The Bayesian hierarchical model provided insights into the variability and reliability of public health surveillance systems in Kenya, highlighting the need for targeted interventions to improve system effectiveness in underperforming regions. Public health authorities should prioritise support and training for surveillance staff in rural areas where system performance is notably lower than urban centers. Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** *African, Bayesian, Hierarchical, Methodology, Reliability, Surveillance, Systematic*

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