



Bayesian Hierarchical Model Assessment of Public Health Surveillance System Reliability in Tanzania

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Published: 11 August 2004 | **Received:** 29 May 2004 | **Accepted:** 03 July 2004

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DOI: [10.5281/zenodo.18787830](https://doi.org/10.5281/zenodo.18787830)

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Abstract

Public health surveillance systems (PHSSs) are crucial for monitoring disease prevalence and guiding interventions in Tanzania. A systematic literature review was conducted to assess PHSS reliability, employing Bayesian hierarchical models. Data from published studies were analysed for model fitting and inference. The analysis revealed that the majority of PHSSs in Tanzania had a median reliability score of 0.85 with robust standard errors indicating moderate accuracy. Bayesian hierarchical models provided insights into system performance, highlighting areas needing improvement to enhance data quality and reliability. Enhanced training for surveillance staff and investment in technology are recommended to improve PHSSs' functionality and effectiveness. 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: *African geography, Bayesian hierarchical models, Methodological evaluation, Public health surveillance systems, Reliability assessment, Statistical methods, Systematic reviews*

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