Bayesian Hierarchical Model for Evaluating Public Health Surveillance System Reliability in Tanzania,

Simiyu Galo[1], **Katambirombi Nduta**[2,3], **Kahiga Chituwo**[4], **Mvila Simba**[3,5]

[1] Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha

[2] Department of Public Health, Tanzania Commission for Science and Technology (COSTECH)

[3] Sokoine University of Agriculture (SUA), Morogoro

[4] Department of Epidemiology, Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha

[5] Department of Surgery, State University of Zanzibar (SUZA)

Author notes

Simiyu Galo is affiliated with Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha and focuses on Medicine research in Africa.

Katambirombi Nduta is affiliated with Department of Public Health, Tanzania Commission for Science and Technology (COSTECH) and focuses on Medicine research in Africa.

Kahiga Chituwo is affiliated with Department of Epidemiology, Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha and focuses on Medicine research in Africa.

Mvila Simba is affiliated with Sokoine University of Agriculture (SUA), Morogoro and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems are crucial for monitoring infectious diseases in developing countries like Tanzania. These systems rely on reports from healthcare providers and laboratories to detect outbreaks early. A Bayesian hierarchical model was applied to analyse surveillance data, accounting for variability at different levels (e.g., individual healthcare providers, regional laboratories). The model estimated that the reporting rate from healthcare providers varied by up to 25% across regions, with a mean of 80%, indicating moderate reliability. Bayesian hierarchical modelling provided insights into system variability and reliability, suggesting areas for improvement in data collection and transmission processes. Enhancements should focus on standardising reporting protocols and increasing training to ensure consistent and timely reports from healthcare providers. Public health surveillance, Bayesian hierarchical model, System Reliability, Tanzania Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow} p\, X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Tanzania, Bayesian hierarchical model, infectious diseases, surveillance systems, reliability assessment, methodological evaluation, public health*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ REQUEST FULL PAPER

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge