Methodological Evaluation of Public Health Surveillance Systems in Tanzania Using Multilevel Regression Analysis

Sewa Esther[1,2]**, Kamwesiga Thumbi**[3]**, Mishaba Joseph**[4,5]**, Simba Muhamed**[4]

[1] National Institute for Medical Research (NIMR)

[2] Department of Pediatrics, State University of Zanzibar (SUZA)

[3] State University of Zanzibar (SUZA)

[4] Tanzania Commission for Science and Technology (COSTECH)

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

Author notes

Sewa Esther is affiliated with National Institute for Medical Research (NIMR) and focuses on Medicine research in Africa.

Kamwesiga Thumbi is affiliated with State University of Zanzibar (SUZA) and focuses on Medicine research in Africa.

Mishaba Joseph is affiliated with Tanzania Commission for Science and Technology (COSTECH) and focuses on Medicine research in Africa.

Simba Muhamed is affiliated with Tanzania Commission for Science and Technology (COSTECH) and focuses on Medicine research in Africa.

Abstract

This study addresses a current research gap in Medicine concerning Methodological evaluation of public health surveillance systems systems in Tanzania: multilevel regression analysis for measuring efficiency gains in Tanzania. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A mixed-methods design was used, combining survey and interview data collected over the study period. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of public health surveillance systems systems in Tanzania: multilevel regression analysis for measuring efficiency gains, Tanzania, Africa, Medicine, original research This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. 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, Public Health Surveillance, Multilevel Analysis, Regression Models, Geographic Information Systems, Spatial Statistics, Epidemiology*

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