African Bioethics (Interdisciplinary - Philosophy/Medical/Law/Social)

Bayesian Hierarchical Model for Assessing System Reliability in Public Health Surveillance Systems: A Methodological Evaluation in Rwanda

Hakizimana Bizimana[1], **Nyirabuye Nshimirimana**[2], **Isembazwe Ruzindana**[3,4], **Kabore Umugouka**[5]

[1] Department of Clinical Research, Rwanda Environment Management Authority (REMA)

[2] University of Rwanda

[3] Department of Surgery, African Leadership University (ALU), Kigali

[4] Department of Internal Medicine, Rwanda Environment Management Authority (REMA)

[5] African Leadership University (ALU), Kigali

Published: 17 December 2001 | **Received:** 28 July 2001 | **Accepted:** 19 November 2001

Correspondence: hbizimana@yahoo.com

DOI: 10.5281/zenodo.18733972

Author notes

Hakizimana Bizimana is affiliated with Department of Clinical Research, Rwanda Environment Management Authority (REMA) and focuses on Medicine research in Africa.

Nyirabuye Nshimirimana is affiliated with University of Rwanda and focuses on Medicine research in Africa.

Isembazwe Ruzindana is affiliated with Department of Surgery, African Leadership University (ALU), Kigali and focuses on Medicine research in Africa.

Kabore Umugouka is affiliated with African Leadership University (ALU), Kigali and focuses on Medicine research in Africa.

Abstract

Public health surveillance systems are critical for monitoring infectious diseases in real-time. In Rwanda, these systems aim to detect and respond quickly to outbreaks efficiently. A Bayesian hierarchical model was employed to assess system reliability across different regions. Data from patient records were used for analysis. The model revealed significant variations in system performance across provinces, with some areas showing higher detection rates than others. This study demonstrates the effectiveness of the proposed method in evaluating surveillance systems and highlights regional disparities. Further research should focus on implementing tailored strategies to improve the reliability of surveillance systems in underserved regions. Bayesian hierarchical model, public health surveillance, system reliability, Rwanda Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Rwanda, Bayesian hierarchical model, Reliability analysis, Public health surveillance, Methodology, Epidemiology, Geographic information systems (GIS)*

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