

**BUSITEMA UNIVERSITY**

**FACULTY OF HEALTH SCIENCES**

**DEPARTMENT OF COMMUNITY &PUBLIC  
HEALTH**

**RESEARCH REPORT**

**EVALUATING RESPONSE TO MEASLES OUTBREAK USING  
THE 7-1-7 METRIC: A CASE OF KYENJOJO DISTRICT,  
WESTERN UGANDA, 2024**

**By**

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**SUPERVISORS**

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- 2. DR. ALEX RIOLEXUS ARIO**

**A Report submitted to the Department of Community and Public Health in  
partial fulfilment of the requirement for the award of the degree of Masters of  
Infectious Disease Epidemiology and Biostatistics of Busitema University.**

**November 2025**

## DECLARATION

### Candidate's Declaration

I, **Madenje Micheal**, declare that this epidemiological study, titled " **EVALUATING RESPONSE TO MEASLES OUTBREAK USING THE "7-1-7 METRIC": A CASE OF KYENJOJO DISTRICT, WESTERN UGANDA, 2024** " is my original work. All aspects of the study, including its design, methodology, data analysis, and conclusions, were authentic and followed ethical standards and research integrity. I affirm that no part of this study was plagiarized, and all sources, including literature and data, have been duly acknowledged.

### Supervisor's Declaration

We, DR. ALEX RIOLEXUS ARIO (MD.PhD) AND ASSOC. PROF: JOSEPH KB MATOVU, hereby declare that we thoroughly reviewed and assessed the research report titled " **EVALUATING RESPONSE TO MEASLES OUTBREAK USING THE "7-1-7 METRIC" A CASE OF KYENJOJO DISTRICT, WESTERN UGANDA, 2024**" submitted by **Madenje Micheal** in partial fulfillment of the requirements for Masters of Infectious Disease Epidemiology and Biostatistics. Having carefully examined the contents of the report, we can attest to the following:

1. Originality and Significance: The research report demonstrates originality in its approach and addressed a significant research gap within the field. The topic was relevant and holds the potential to contribute valuable insights to the existing body of knowledge.
2. Feasibility and Methodology: The methodology was appropriate for the research objectives outlined. The methods chosen were feasible within the available resources and time frame constraints. The research design reflected a sound understanding of the subject matter and employed appropriate data collection and analysis techniques.
3. Academic Rigor: The report adhered to academic standards and demonstrated a clear and logical structure. The research questions were well-defined, and the objectives were clearly articulated. The literature review provided a comprehensive overview of relevant theories and previous studies, establishing a solid foundation for this research report.

4. Ethical Considerations: The report acknowledges and addresses ethical considerations associated with the research, including participant consent, confidentiality, and potential risks. The researcher demonstrated awareness of ethical guidelines and outlined appropriate measures to ensure the welfare of participants and the integrity of the research process.

5. Supervision and Support: As the supervisor, I confirmed my willingness and availability to provide guidance and support throughout the research process. I am confident in the researcher's ability to conduct the study effectively and to engage in critical analysis and interpretation of findings under my supervision. Based on the above assessment, I endorse the approval of the research report and recommend it for further consideration and implementation.

**1. Assoc. Professor Joseph KB Matovu (MHS, PhD)**

**Signature:** 

**Date:** August 7<sup>th</sup> , 2024

**2. Dr. Alex Riolexus Ario (MD, PhD)**

**Signature:** 

**Date:** 7 August 2024

**PROFESSOR: PETER OLUPOT-OLUPOT (MB.CHB, MPH, PhD, SRF, FUNAS, FRCP)**

**ADVISOR**

## **APPROVAL**

**I, Madenje Micheal**, as the principal investigator of this epidemiological study, confirm that the research protocol was reviewed and approved by the Institutional Review Board (IRB) at Mbale Regional Referral Hospital. The study adhered to all ethical guidelines and regulations governing human research, and informed consent was obtained from all participants. Any modifications to the study protocol have been duly reviewed and approved by the IRB. This research was conducted with the utmost commitment to participant confidentiality, privacy, and the ethical principles outlined in the Declaration of Helsinki

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**Date: March 29, 2024**

**This research report was submitted for examination with my/our approval as supervisors.**

**1. PROF: MATOVU JOSEPH**

**Signature:** 

**Date: 7 August 2024**

**2. DR. ALEX RIOLEXUS ARIO (MD.PHD)**

**Signature** 

**Date: 7 August 2024**

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## **ACRONYMS**

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>BHDC</b>        | Busitema Higher Degree Committee                              |
| <b>BHSM</b>        | Bachelors' Of Health Services Management                      |
| <b>BU</b>          | Busitema University                                           |
| <b>BUFHS</b>       | Busitema University Faculty of Health Sciences                |
| <b>C.F.D.C</b>     | Child and Family Development Center                           |
| <b>C/S</b>         | Caesarian Section                                             |
| <b>CDC</b>         | Center for Disease Control                                    |
| <b>COM-B</b>       | Capacities opportunities, Motivation, and Behavior framework. |
| <b>DCM &amp;CH</b> | Diploma in Clinical Medicine & Community Health               |
| <b>DHS</b>         | Demographic Health Survey                                     |
| <b>DHT</b>         | District Health Team                                          |
| <b>F/P</b>         | Family Planning                                               |
| <b>H/C</b>         | Health center                                                 |
| <b>HDRC</b>        | High Degree Research Committee                                |
| <b>HF</b>          | Health Facility                                               |
| <b>ICF</b>         | International Care Facility                                   |
| <b>IEC</b>         | Information education and communication                       |
| <b>IMST</b>        | Incident Management Support Team                              |
| <b>IPC</b>         | Infection, Prevention and Control                             |
| <b>IRB</b>         | Institutional Review Board                                    |
| <b>IVB</b>         | Immunization Vaccines and Biologicals                         |
| <b>JEE</b>         | Joint External Evaluation                                     |
| <b>LMIC</b>        | Low and Middle-Income Countries.                              |
| <b>MCV</b>         | Measles-Containing Vaccine                                    |
| <b>MCV2</b>        | Measles Second Dose                                           |
| <b>MeV</b>         | Measles virus                                                 |
| <b>MIMS</b>        | Measles Incident Management System                            |
| <b>MMR</b>         | Measles Mumps Rubella Vaccine                                 |
| <b>MoH</b>         | Ministry of Health                                            |
| <b>MOH</b>         | Ministry of Health                                            |

|               |                                                                           |
|---------------|---------------------------------------------------------------------------|
| <b>MOSRP</b>  | Measles Outbreaks Strategic Response Plan                                 |
| <b>MOSRP</b>  | Measles Outbreaks Strategic Response Plan                                 |
| <b>MPH</b>    | Master of Public Health                                                   |
| <b>MR</b>     | Measles Rubella Vaccine                                                   |
| <b>MV</b>     | Measles Virus                                                             |
| <b>NGO</b>    | Non-Government Organization                                               |
| <b>NMS</b>    | National Medical Stores                                                   |
| <b>PNC</b>    | Postnatal care                                                            |
| <b>PNFP</b>   | Private Note-for-Profit                                                   |
| <b>REC</b>    | Research Ethics Committee                                                 |
| <b>RM</b>     | Ringgit Malaysian (Malaysian currency and 1RM is equal to 0.24 US dollar) |
| <b>RRH</b>    | Regional Referral Hospital                                                |
| <b>RRT</b>    | Rapid Response Team                                                       |
| <b>STATA</b>  | Software for statistics and data science                                  |
| <b>SVD</b>    | Spontaneous Vaginal Delivery                                              |
| <b>UBOS</b>   | Uganda Burial of Statistics                                               |
| <b>UDHS</b>   | Uganda Demographic Health Survey                                          |
| <b>UNFPA</b>  | United Nations Population Fund                                            |
| <b>USA</b>    | United States of America                                                  |
| <b>USAID</b>  | United States Agency for International Development                        |
| <b>UVRI</b>   | Uganda Virus Research Institute.                                          |
| <b>VHT</b>    | Village Health Team                                                       |
| <b>WHO</b>    | World Health Organization                                                 |
| <b>PRISMA</b> | Preferred Reporting items for systemic reviews and meta-analyses          |

## OPERATIONAL DEFINITIONS

Operational definitions are crucial for ensuring consistency and clarity in an evaluational study. Here are operational definitions for key terms in a study title Evaluating measles response using the 7-1-7 metric a case of Kyenjojo district, western Uganda. These operational definitions provided clear criteria that categorized and analyzed data in the context of the epidemiological study, ensuring consistency and reliability in the interpretation of results.

| CONCEPT                                      | OPERATIONAL DEFINITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Socio-demographic characteristics</b>     | For this study, socio-demographic characteristics will include age (in years), gender (male, female), occupation (e.g., student, farmer, healthcare worker), and education level (e.g., primary school, secondary school, tertiary education).                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>7- 1 -7 Metric</b>                        | This is a Novel strategy adopted In 2022, a 7-1-7 timeliness metric is proposed to facilitate pandemic preparedness: detection of the outbreak within 7 days of emergence; notification to public health authorities within 1 day of detection; and mounting of effective response actions within 7 days of notification.                                                                                                                                                                                                                                                                                                                                            |
| <b>Timeliness of 7-1-7 reporting system:</b> | <p>The timeliness of the 7-1-7 reporting system will be assessed based on the following criteria:</p> <p><b>Suspected case reporting time:</b> The time interval (days) between the identification of a suspected measles case and its reporting to the appropriate health authorities.</p> <p><b>Case confirmation time:</b> The time interval (days) between the reporting of a suspected case and the laboratory confirmation of measles diagnosis.</p> <p><b>Response initiation time:</b> The time interval (days) between the confirmation of a measles case and the initiation of response activities, such as contact tracing and vaccination campaigns.</p> |

|                              |                                                                                                                                                                                                                                                                                                     |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bottlenecks/Barriers</b>  | Refers to any obstacle, challenge, or limitation that hinders or prevents the successful or effective implementation of the outbreak response.                                                                                                                                                      |
| <b>Facilitators/Enablers</b> | Any factor or element that helps to support, enhance, or promote the successful implementation and outcome of outbreak response.                                                                                                                                                                    |
| <b>Actions</b>               | Actual initiation and implementation of interventions to the outbreak response.                                                                                                                                                                                                                     |
| <b>A suspected case:</b>     | In this study, a suspected case will be defined as a resident of Kyenjojo District with acute onset of fever and at least one of the following symptoms – cough, cold, red eyes, or a generalized maculopapular skin rash – from 19th January 2024 (date of declaration of an outbreak in kyenjojo) |
| <b>A probable case:</b>      | In this study, a probable case will be defined as a suspected case with generalized maculopapular skin rash and at least one of the other suspected case symptoms.                                                                                                                                  |
| <b>A confirmed case:</b>     | In this study will be a suspected or probable case with a positive measles-specific IgM test.                                                                                                                                                                                                       |

## ABSTRACT

**Background:** measles remains a public health concern in Uganda. With frequent outbreaks despite vaccination efforts. In January 2024, Kyenjojo District experienced a measles outbreak with over 70 cases and 3 deaths, the 7-1-7 metric, endorsed by WHO provides a standardized framework to evaluate outbreak response by assessing detection within 7 days, notification within 1 day and response initiation within 7 days. We evaluated the measles outbreak response in Kyenjojo District, Uganda, using the 7-1-7 framework to assess timeliness detection, notification, and response.

**Methods:** We conducted a cross sectional study that collected quantitative data from epidemiological reports, outbreak line lists. We analysed epidemiological and surveillance data to quantify timelines for detection, notification, and response. Additionally, we uncovered facilitators and bottlenecks influencing outbreak management.

**Results:** Only the notification milestone met the 7-1-7 benchmark, occurring within one day of laboratory confirmation. Detection was delayed by 16 days and response initiation was on the day of notification however, final early response actions were completed after 11 days, exceeding the seven-day threshold. Facilitators included information from some proactive health workers, VHT, district leadership, structured coordination, and timely laboratory confirmation. Barriers stemmed from weak VHT-facility linkages, delayed partner mobilisation, logistical gaps, and limited training, insufficient community reporting, and operational fatigue.

**Conclusions:** our study revealed timeliness gaps in detection and full response initiation, however the district achieved timely notification. While Uganda's surveillance system demonstrated strength in notification, frontline response remains hindered by human resource structural challenges at the District and facility level. Systemic weakness in surveillance, logistics and preparedness curtailed outbreak control despite strong leadership and partner support.

**Recommendation:** Strengthen community and facility surveillance through VHT engagement; institutionalize of digital platforms for rapid notification; pre-position vaccines and essential supplies; operationalize and fund district response plans; scale up adoption of the 7-1-7 metric locally to improve outbreak response performance.

**Keywords:** Measles outbreak, 7-1-7 framework, Health systems, timeliness, and response

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