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Assessment of risk communication and community engagement interventions during the Marburg virus disease outbreak in Kagera region, Northwestern Tanzania

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Abstract

Background Marburg virus disease (MVD) is a deadly illness caused by the zoonotic Marburg virus, which has led to outbreaks with fatality rates up to 100% in some African countries. On March 21, 2023, Tanzania had its first MVD outbreak, resulting in nine cases and six deaths, leading to a fatality rate of 66.7%. Following that, the Risk Communication and Community Engagement (RCCE) approach was promptly initiated to create community awareness regarding the MVD. A descriptive cross-sectional assessment was conducted in May 2023 in Bukoba District Council and Bukoba Municipal Council in the Kagera region to document the community awareness and sources of information regarding MVD during the outbreak. Data were collected using a structured questionnaire developed using the WHO COVID-19 RCCE Rapid Quantitative Assessment Tool. Descriptive analysis was conducted using Microsoft Excel 2021.

Results There were a total of 714 community respondents, of whom 456 (63.9%) were from Bukoba District Council. The majority 628 (88%) were aged 18 years and above. There were 393 (55%) females, and 407 (57%) of respondents had completed primary education. All respondents reported being informed about MVD through different channels, with 588 (82.4%) receiving information from Community Health Workers. Most of them 573 (80.3%) were satisfied with implemented RCCE interventions, 651 (91.2%) perceived MVD to be an extremely severe disease, and 698 (97.76%) mentioned hand washing as one of the recommended preventive measures.

Conclusions During the Marburg virus disease outbreak response, where risk communication and community engagement interventions were implemented, the community was aware of the Marburg virus disease and community health workers emerged as the most frequently mentioned channel of communication during the outbreak.

Keywords Marburg virus disease, Risk communication, Community engagement, Viral hemorrhagic disease, Zoonotic disease, One health approach, Tanzania

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Background

The Marburg virus disease (MVD) is a fatal viral hemorrhagic fever (VHF) caused by the Marburg virus, which belongs to the same family as the Ebola virus (Yu et al. 2021; Shifflett and Marzi 2019; Abir et al. 2022). The disease poses a significant threat to public health at local, national, and global levels, with a case fatality rate of up to 100% (Abir et al. 2022; Asad et al. 2020; Ahmed et al. 2023; Nyakarahuka et al. 2018). The virus is zoonotic, and most outbreaks are associated with exposure to caves inhabited by bats, which are a reservoir of the Marburg virus (Ahmed et al. 2023; Nyakarahuka et al. 2018; Pawęska et al. 2020; Makenov et al. 2023; Siya et al. 2019). The infection can be transmitted to humans, and through day-to-day activities, the disease can amplify to cause a large outbreak (Abir et al. 2022; Nyakarahuka et al. 2018; Siya et al. 2019).

Since its initial recognition in 1967, African countries have accounted for the majority of the MVD outbreaks worldwide (Ahmed et al. 2023). As of June 2023, MVD outbreaks had been reported in different African countries, namely Angola, the Democratic Republic of Congo, Equatorial Guinea, Ghana, Guinea, Kenya, South Africa, Tanzania, and Uganda (Ahmed et al. 2023; Nyakarahuka et al. 2018; Siya et al. 2019; Mmbaga et al. 2024; Kilangisa et al. 2023).

Tanzania experienced its first MVD outbreak on March 21, 2023, and declared its end on June 2, 2023, with a total of nine cases and six deaths from the Bukoba district in the Kagera Region (Mmbaga et al. 2024; Kilangisa et al. 2023). The outbreak was limited to the first affected villages of Maruku and Kanyangereko (Mmbaga et al. 2024). The outbreak primarily affected the immediate relatives of the index case and healthcare staff who attended to the patients (Mmbaga et al. 2024; Kinyenje et al. 2024; Tibenderana 2023).

The knowledge, attitudes, and practices regarding viral hemorrhagic fevers are limited among community members in Tanzania (Rugarabamu et al. 2023). Thus, Risk Communication and Community Engagement (RCCE) interventions are recommended for accurate information sharing, community participation, and to promote the uptake of prevention measures (Dick et al. 2022; Rodgers and Massac 2020; Mnkeni et al. 2024; Kutalek et al. 2023; Nyakarahuka et al. 2017).

During the MVD outbreak, the RCCE activities were among the first interventions implemented to ensure the community members were aware of the disease and knew how to protect themselves (Kilangisa et al. 2023; Hussein et al. 2024). RCCE in public health emergencies has been referred to as the exchange of information and mutual engagement between health experts and the public to facilitate informed decisions that support community and personal preventive measures (Dick et al. 2022; Rodgers and Massac 2020; Zuluaga-Arias et al. 2023).

Thus, amid the MVD outbreak, an assessment was conducted to document the community level of awareness and attitudes toward MVD, the sources of MVD information, and the level of community satisfaction with RCCE interventions conducted during the outbreak response.

Methods

Study Design: This was a descriptive cross-sectional survey conducted in May 2023 to gather information from respondents about MVD. The study was designed by a One Health team comprised of members from the health, livestock, environment, and tourism sectors. The team was not involved in the implementation of RCCE activities.

Study setting: The assessment was conducted in the Bukoba District and Municipal Councils of the Kagera region, which is in the northwestern part of Tanzania, in East Africa. It shares borders with Uganda, Rwanda, Burundi, and Lake Victoria to the north. According to the Tanzania Population and Housing Census conducted in 2022, the region has a population of 2,989,299 people. The local economy of the Kagera region is mainly based on banana and coffee plantations, fishing, and mining, as well as business activities.

Study Participants, Sample Size, and Sampling Strategy: The assessment involved the community members of the Kagera Region residing in Bukoba District and Bukoba Municipal Councils. A minimum sample size required was 692, determined by a single population proportion formula considering a marginal error (d) of 5%, a confidence interval of 95%, a design effect of 1.8, and a prevalence of knowledge of MVD assumed to be 50% due to a lack of similar studies in Tanzania (Adhikari 2021). A total of 714 respondents were purposively recruited from households in affected villages, areas nearest to lakes, bat caves, and the health facilities that handled cases. In each household, the available person was enrolled in the assessment. At a point where two or more people were found in the household, the older individual considered a family leader was selected for the interview.

Inclusion and exclusion criteria: The assessment included all community members who were living in Bukoba District and Bukoba Municipal Councils during the outbreak and who consented and voluntarily agreed to participate in the study. The study excluded individuals who had severe communication impairment that prevented them from responding to assessment questions appropriately.

Intervention implemented: In response to the MVD outbreak, the RCCE activities were jointly planned and executed by the government and stakeholders,

including implementing partners, local organizations, and United Nations Organizations (Mnkeni et al. 2024; Hussein et al. 2024). The implemented activities included a one-day orientation for 1,324 Community Health Workers (CHWs) from Bukoba District and Bukoba Municipal Council on MVD (Mnkeni et al. 2024). Among others, orientation covered awareness creation regarding MVD transmission and symptoms as well as control and prevention practices (Mnkeni et al. 2024). The CHWs reached 328,661 students in 279 primary and secondary schools, visited households daily and covered 78,090 houses. Others visited public places, such as markets and places of worship, where they distributed 22,600 posters, 9500 brochures, and 44 banners (Mnkeni et al. 2024).

Additionally, local and religious leaders complemented the efforts of CHWs by sensitizing the community and addressing rumors and misconceptions regarding MVD (Mnkeni et al. 2024). Local radio, television, social media, and motorcycles equipped with megaphones were used to spread the messages on a large scale including in remote and hard-to-reach areas of the Kagera region (Kilangisa et al. 2023; Tibenderana 2023; Mnkeni et al. 2024).

Data collection and tools: A structured questionnaire was developed using the WHO COVID-19 RCCE Rapid Quantitative Assessment Tool. The tool was tailored to collect information regarding MVD. The questionnaire was then put into a Kobo XLS form. Trained local health volunteers, alongside a national One Health team, visited households and interviewed the participants in Swahili, completing the pre-coded responses in English on the Kobo form. Respondents verbally provided their answers in Swahili, the national language of Tanzania. The trained local health volunteers translated these responses into English and directly entered them into the survey form.

Data management and analysis: The collected information was extracted from a Kobo form in Microsoft Excel and cleaned for duplication. A descriptive analysis was performed using Microsoft Excel, version 2021, to generate frequency and percentages. The results were presented using narrations and tables.

Results

Social demographic information of participants

A total of 714 respondents participated in this assessment, with 628 (88.0%) people aged 18 years and older. Among these respondents, 456 (63.9%) were from Bukoba DC; 393 (55%) were females; and 407 (57%) had completed primary school education. The main economic activities of respondents were business 331 (46.4%) and farming 324 (45.4%), as shown in Table 1.

Table 1 Social Demographic Information of the Participants during RCCE Assessment at Kagera Region, Northwestern Tanzania, May 2023 ($N=714$)

Variable	Frequency	Percentage
Age		
18 years and above	628	88.0
Below 18	86	12.0
Sex		
Male	321	45.0
Female	393	55.0
Area of residence		
Bukoba MC	258	36.1
Bukoba DC	456	63.9
Education status		
Primary Education	407	57.0
Secondary Education	205	28.7
Collage	41	5.7
University	14	2.0
No education	47	6.6
Economic activities		
Business	331	46.4
Farming industry	324	45.4
Motorcycle riders	24	3.4
Formal employment	19	2.7
Students	16	2.2

Coverage, the utilized channel of information, and level of satisfaction

All respondents reported being reached with RCCE interventions conducted and have heard about MVD since the declaration of the outbreak. The most frequently claimed channel of MVD information was CHWs, 588 (82.4%), followed by a mobile van with a public announcement system 565 (79.1%) and local radio 504 (70.7%). A majority of 573 (80.3%) of respondents expressed high satisfaction with the conducted RCCE activities. Only 12 (1.7%) of respondents were not satisfied. Almost half of the respondents, 348 (48.7%), suggested that RCCE activities should be conducted daily (Table 2).

Recall of general knowledge and perception regarding MVD during assessment at Kagera Region, Northwestern Tanzania, May 2023 ($N=714$)

Respondents were asked about their general knowledge of the causative agent of the disease, disease symptoms, transmission, and recommended preventive measures. A large proportion, 639 (89.5%), of respondents reported knowing that the disease is caused by the virus. The most known symptoms of MVD were headache 625 (87.5%), bleeding 595 (83.3%), and fever

Table 2 MVD information to community members during an assessment at Kagera Region, Northwestern Tanzania, May 2023 ($N=714$)

Variable	Frequent	Percentage
Reached and Heard about MVD		
Yes	714	100
No	0	0
Channel of communication		
Community Health Workers (CHWs)	588	82.4
Mobile Van with Public Announcement	565	79.1
Media (Local Radio)	504	70.6
Information from village leaders	307	43.0
Information from religious leaders	295	41.3
Media (Television)	258	36.1
IEC materials	254	35.6
Social Media	210	29.4
Banners	131	18.3
Healthcare workers (HCWs)	3	0.4
Education institutions	2	0.3
Community satisfaction with the conducted RCCE activities		
Very satisfied	573	80.3
Somehow satisfied	129	18.1
Not satisfied	12	1.7
*Recommended Frequency of RCCE activities**		
Daily	348	48.7
Once per Week	266	37.3
Once per month	84	11.8

*At least one of the RCCE activities such as CHWs house visits, media, or public announcements

561 (78.6%). The most known route of transmission was contact with fluids (sweat, blood, saliva, feces, and vomit) of a person with disease 690 (96.6%), eating or touching the carcasses of animals such as bats, monkeys, or chimpanzees 601 (84.1%), and handling things that have been used by someone who is suspected of being sick 559 (78.3%). Only 67 (9.4%) people said the MVD can be transmitted by air, and 5 (0.7%) said they didn't know (Table 3).

The majority of the community members, 651 (91.2%), believed that MVD is an extremely severe illness. Respondents 605 (84.7%) stated that their perception was based on the information they had heard about MVD. The majority of the community members were able to recall the recommended preventative measures. A total of 698 (97.8%) said that washing hands is an effective way to prevent the spread of MVD. Moreover, around 600 (84%) said that avoiding contact with the body fluids of a person with symptoms of MVD is also an effective preventive measure (Table 4).

Discussion

This study aimed to assess the level of awareness and perception regarding MVD, the sources of MVD information, and the level of community satisfaction with RCEE interventions conducted during the MVD outbreak response in the Kagera region.

The findings reveal that all respondents were aware of MVD by the time of assessment, as reported in the other locations where MVD outbreaks were reported (Nyakarahuka et al. 2017, 2018). The utilization of multiple channels of information such as CHWs house visits, local radio, public announcements, distribution of education materials, and use of social media likely contributed to reaching a wider audience as also reported by other studies (Kilangisa et al. 2023; Mnkeni et al. 2024; Nyakarahuka et al. 2017; Zuluaga-Arias et al. 2023).

This study shows that respondents were able to identify MVD as a viral disease, along with correct transmission routes and symptoms indicating a high level of awareness during the outbreak. Our finding corresponds with the information found in other literature regarding the disease (Yu et al. 2021; Shifflett and Marzi 2019; Abir et al. 2022). Similarly, the respondents were aware of the most recommended preventive measures, though direct implementation of these measures was not assessed. The findings reveal a small portion of respondents held misconceptions regarding MVD such as superstitions belief as a cause of MVD and MVD being transmitted by air. This underscores the need for targeted health education to ensure that the community is well informed and can take appropriate actions to protect themselves and prevent the spread of the virus (Dick et al. 2022; Nyakarahuka et al. 2017). Addressing these misconceptions to the community should remain a focus in future RCCE interventions. Additionally, the knowledge about the connection between MVD and consuming or coming into contact with animal bodies (like bats and other non-human primates) suggests that key messages about zoonotic transmission reached the community.

Our results indicate that a large proportion of respondents perceived MVD as a very dangerous disease. The same findings have been reported in other settings where health education on hemorrhagic fevers was given during outbreaks (Asad et al. 2020; Ahmed et al. 2023; Nyakarahuka et al. 2018). Furthermore, respondents expressed high satisfaction with the implemented community sensitization activities, indicating a positive reception of the RCCE interventions which aligns with findings from similar studies (Kilangisa et al. 2023; Tibenderana 2023; Kutalek et al. 2023; Nyakarahuka et al. 2017; Zuluaga-Arias et al. 2023). Conducting RCCE daily was highly recommended by many respondents, reflecting the community's preference for more frequent engagement for

Table 3 Participant knowledge of Marburg virus disease during RCCE Assessment at Kagera Region, Northwestern Tanzania, May 2023 (*N* = 714)

Response	Frequency	Percentage
The causative agent of MVD		
Virus	639	89.5
Bacteria	96	13.45
Don't know	22	3.08
Superstition belief	10	1.4
Mentioned MVD symptoms		
Headache	625	87.5
Bleeding in open areas of the body (nose, ears, eyes)	595	83.3
Fever	561	78.6
Bloody diarrhea	522	73.1
Vomiting blood	518	72.6
Muscle aches	431	60.4
General body malaise	426	59.7
Diarrhea	407	57
Vomiting	367	51.4
Sore throat	321	44.9
Skin rashes	278	38.9
Abdominal pain	234	32.8
Disease transmission		
Holding body fluids (sweat, blood, saliva, feces, vomit) of an infected a person	690	96.6
Eating or touching the carcasses of animals such as bats, monkeys, or chimpanzees	601	84.1
Handling things that have been used by suspect case	559	78.3
By air	67	9.4
Don't know	5	0.7

Table 4 Participants perceived severity of MVD and preventive measures during RCCE Assessment at Kagera Region, Northwestern Tanzania, May 2023 (*N* = 714)

Response	Frequency	Percentage
Perception of the severity of the disease		
Extremely severe	651	91.2
Moderately severe	57	8
Not severe	3	0.4
Don't know	3	0.4
Source of perceived severity		
Information heard	605	84.7
Death occurred	377	52.8
Social media	98	13.7
Knowing someone who suffered	98	13.7
Preventive Measures		
Washing hands	698	97.8
Avoiding contacting the body fluids of an infected person	600	84.0
Avoid unnecessary gathering	492	68.9
Avoid handling or washing the corpse of a deceased person	487	68.2
Avoid eating or handling carcasses such as bats, chimpanzees or monkeys	469	65.7
Wearing a mask	179	25.1

them to be constantly informed and be ready to effectively prevent and handle MVD outbreaks (Dick et al. 2022; Kutalek et al. 2023).

Despite the significant findings, the study cannot definitively attribute these results to the implemented RCCE interventions due to a lack of baseline data. This study relied on the participants' recalls of the information disseminated as a response to the MVD outbreak, and the recall bias may have influenced the accuracy of the responses. However, the use of a structured questionnaire that prompted respondents with specific questions might assisted participants to recall. Additionally, the assessment was conducted during the outbreak, minimizing the time gap between the implementation of interventions and data collection.

Conclusions

The study found that community members were reached and became aware of the Marburg virus disease during the outbreak, where risk communication and community engagement interventions were implemented. Multiple channels of communication were utilized, with community health workers emerging as the most frequently cited source of MVD information. The study reminds us of the prioritizing implementation of the RCCE approach involving CHWs, public announcements, and local radio for wide community awareness of the encountered disease outbreaks and other public health emergencies. However, further studies are needed to explore the extent to which the community adopted the preventive measures promoted during these interventions.

Abbreviations

MVD Marburg virus disease
RCCE Risk Communication and Community Engagement
CHWs Community Health Workers

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Author contributions

MNM conceptualized and designed the study; MNM, MI, AM and HM collected data; MNM and MI performed data cleaning and analysis; and MNM, EM, MI, MM, AM, GM, AS, CG, KM, GM, HM, PH, LS, JM, WG, and SM drafted, reviewed, and edited the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

No datasets were generated or analyzed during the current study. The dataset used for this study is available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The work reported in this manuscript represents data collected during the MVD outbreak response in the Kagera region. An outbreak response is regarded as an emergency activity and was endorsed by the Ministry of Health. Adult participants consented and those who are below 18 years old assented after obtaining parents' permission to participate in the assessment. Permission to analyze and publish this information was sought and granted by the Medical Research Coordinating Committee of the National Institute for Medical Research; Reference Number BA.126/329/01a/132. All personal information collected was treated with high confidentiality, and the presented data were anonymized.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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