

Post Outbreak Evaluation Of One Health Integrated Interventions Of Rift Valley Fever And Crimean Congo Haemorrhagic Fever In Kiboga And Kiruhura Districts, Uganda

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Research note

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Abstract

Objective: Following containment of Rift Valley Fever (RVF) and Crimean Congo Hemorrhagic Fever (CCHF) outbreaks, a post evaluation of the use of a one health approach in management of the reported viral haemorrhagic fevers was conducted in the affected districts of Kiboga and Kiruhura districts in Uganda. This was done through a cross sectional study using participatory epidemiology tools, mainly observation and key informant interviews. Results: The findings indicated that the interventions employed had been successful in the management of the outbreaks and multidisciplinary approach enabled containment of these hemorrhagic fever outbreaks in the districts. Although the outbreaks had been contained, delays could have been minimized by undertaking laboratory diagnosis at district level instead of transporting samples to national referral laboratories in Entebbe. Response to the RVF and CCHF challenge could have been delayed by dependence on funding of central government and non governmental organizations due to failure to plan and allocate funds for surveillance and mitigation of diseases outbreaks at district local government levels.

Introduction

Evidence has demonstrated that using a One health approach that consists of multi-disciplinary teams of health, community workers, environmental and veterinary specialists can improve preventive public health interventions for these zoonotic conditions [1]. This includes establishing environmental monitoring and case surveillance systems to aid in the prediction and control of future outbreaks, surveillance through close monitoring for infections in animal and human populations, education that raises awareness about transmission dynamics as well as practices to mitigate the risk [1]–[3]. It was in the interest of this study to undertake an evaluation of the extent to which the multidisciplinary one health approach was envisaged in the management of the RVF and CCHF outbreaks so as to identify the successes to be built on and areas for improvement. The specific objectives included; Identification and assessment of the roles of different stakeholders in the management of Rift valley fever outbreak in Kiruhura and Kiboga Districts, Assessment of the transmission dynamics of RVF and CCHF in Kiruhura and Kiboga Districts, Identification of the challenges faced during the outbreak and recommendations to combat any future outbreaks.

Methodology

Study design

A Cross sectional study was conducted using participatory epidemiology tools from 20th February to 1st March, 2018 in Kiboga and Kiruhura districts in Uganda. The two districts were the most recently affected with the RVF and CCHF outbreaks. The study employed qualitative methods because of the exploratory nature of the investigation. Key Informant Interviews were held with District administrators, health and veterinary officers and community leaders to explore their professional experience on the RVF and Crimean Congo Fever outbreaks. In depth Interviews were held with case contacts to explore their

experiences regarding the outbreaks. Observation of the cases, farms and the environment was used to understand the disease transmission dynamics.

Kiboga district is located in the Central Region of Uganda and is bordered by the districts of Nakaseke, Mityana, Mubende and Kyankwanzi. Kiboga occupies an area of 4,045.5 Km² and in the 2014 census had a population of 148,218. Agriculture is a major source of employment constituting 80% of the district's labor force of which livestock farming is involved [4].

Kiruhura district is located in Ankole sub-region in Western Uganda. It is bordered by Kamwenge, Kyegegwa, Sembabule, Lyantonde, Rakai, Isingiro, Mbarara and Ibanda districts. Kiruhura occupies 4,605 Km² and in the 2014 census, had a human population of 328,777 (UBOS 2014). Kiruhura is a farming district with livestock forming the backbone of economic activity. Livestock animals include cattle and goats of local, exotic and hybrid breeds. The District's veterinary office estimates that Kiruhura boasts of 490,000 heads of cattle; 340,000 heads of shoats and it is estimated that each farming household has about 70 heads of cattle. Kiruhura District is home to Lake Mbuho national park consisting of wildlife which interact with the nearby farms' livestock. The park is home to that the wild animals that are most susceptible to RVF are the Water Buffaloes, Antelopes, Impala, Etopi and Zebras [4], [5].

Study Population

For key informants, the study included persons whose profession or position of power enabled them to get involved in the RVF or CCHF outbreak management for the period of November, 2017 to February, 2018. These included District administrators, health and veterinary officers and community leaders in Kiboga and Kiruhura Districts.

For cases, the study included persons or their proxies/contacts in Kiboga (Busajja village, Kiboga Sub-county and Kihinikibi village, Busaka-kibige Sub-county) and Kiruhura (Sanga village in Rushororo Sub-county) with a lived experience of being affected by RVF or CCHF for the period of November, 2017 to February, 2018.

Up to 9 Key Informants and 8 in-depth interviews were conducted in Kiboga and Kiruhura Districts (Table 1).

Table 1: Summary of data collection methods of the study

Specific Objectives	Methods	Tools	Respondents
1.To assess the roles of different stakeholders during the management of RVF and CCHF outbreaks	Key informant interviews	1. Key Informant guide	1. Chief Administrative Officers 2. District Veterinary officers 3. District Health Officers 4. Local Council Leader
2. To assess the transmission dynamics of RVF and CCHF.	In Depth Interviews	2. In Depth Interview guide	1. A case 2. Contacts/proxies to cases of RVF and CCHF
	Observation method	1. Eye sight 2. Camera	1. Livestock farms 2. Homes of cases 3. The environment including the Lake Mbuho national park and the forest reserve
3. Identification of the challenges faced during the outbreaks and recommendations to combat any future outbreaks	In- Depth Interviews	1. In-Depth Interview guide	1. A case 2. Contacts/proxies to cases of RVF and CCHF
	Key informant interviews	2. Key Informant guide	1. Chief Administrative Officers 2. District Veterinary officers 3. District Health Officers 4. Local Council Leader

Results

Data collected was analyzed and summarized into three key themes with corresponding subthemes according to the objectives of this study as described by Braun and Clarke [6]. Details of the findings are shown in table 2.

Table 2: A summary of the post-outbreak evaluation of management of RVF and CCHF in Kiboga and Kiruhura districts.

Roles Of Different Stakeholders roles in management of RVF and CCHF Kiboga and Kiruhura	Transmission dynamics of RVF and CCHF	Post-outbreak opportunities and challenges
<p><u>District administration</u> Formed and led rapid response teams that contained the fevers in the shortest time possible -Teams included; CAO, RDC, DHO,DVO, District environment Officer -Facilitated submission of samples to UVRI - Provided charts that were teaching people how to avoid transmission -Awareness programs were intensified through community mobilization and radio talk shows -Communication channels established to ease information flow - Writing surveillance reports each month instituted -Attempts to mobilize funds for the outbreak undertaken -Isolation unit made available for any other suspects at specified health facilities -Families have been asked to use bed nets and keep away empty tins to control vectors <u>Health workers</u> -Health workers in Kiboga treated the young man with a crimean congo hemorrhagic fever successfully -Kiruhura health workers successfully treated the</p>	<p><u>Human hosts</u> -Herds men are more at risk -Eating dead animals e.g in Kiruhura the young man who had RVF had previously eaten a dead calf -Working in an abattoir may expose workers to infected animals -Migrations and Refugees may facilitate transmission of hemorrhagic fevers from one area to another <u>Environment(vectors)</u> -Swamps and stagnant water act as homes to mosquitoes which transmit RVF -Heavy rains created more breeding grounds for mosquitoes -Bushes harbor ticks <u>Livestock-wildlife interactions</u> -Grazing of wild and domestic animals was found to be dangerous as 10% of zebras were found to have positive antibodies for RVF in Kiruhura District. -Kiruhura has a challenge of farmers rotating around neighboring Districts for pasture which increases the risk of transmission</p>	<p><u>Strengths</u> -The outbreaks increased vigilance among stakeholders - Technical workers (health and veterinarians) can now detect cases with signs and symptoms of hemorrhagic fevers as a result of the training and experience -The efforts of one health approach can be felt on ground - Tensions due to outbreaks have since reduced among communities <u>Areas for improvement</u> - Death of the RVF case in Kiboga and burial was mismanaged. It was left to the family who reportedly opened it to confirm if the deceased was their own -The CCHF patient in Kiboga discharged himself -Decision makers at districts have realized the need for an emergency fund to control out breaks -In Kiboga stakeholders plan to have a profile of refugees because there is an influx whose origin and number is unknown. -Provide incentives to keep district rapid response teams active -Strengthen disease reporting networks at community level - Enforcement of quarantines of livestock in affected communities still a challenge due to many exit routes in communities -Ticks and ticks resistance has remained a big problem in Kiruhura District -Communities need to be encouraged to seek for health care as opposed to self medication -Laboratory capacity to diagnose human and animal samples could be improved by training the technicians and acquiring rapid field tests</p>

<p>RVF victim and he has since recovered</p> <ul style="list-style-type: none"> - Health workers meet monthly to be sensitized and share information <p><u>Veterinary workers</u></p> <ul style="list-style-type: none"> -Restriction of livestock movements -Testing all animals before slaughtering - Provided personal protective equipments to health workers <p><u>L. Mbuoro National park workers</u></p> <ul style="list-style-type: none"> -Game rangers were sensitized on handling and disposal of dead wild animals -Samples were collected from wildlife and submitted to UVRI. -Capacity of laboratory technicians being equipped on diagnosis of RVF and CCHF 	<ul style="list-style-type: none"> -Farms in affected areas need to be fenced to avoid direct grazing with wild animals -Farmers need to follow spraying regimes using effective acaricides -Vaccination of livestock against RVF should be supported by MAAIF
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Discussion

This post-outbreak evaluation study provides evidence that considerable efforts were made in Kiboga and Kiruhura districts to use a one health approach in combating the outbreaks of RVF and CCHF. This was demonstrated by the active involvement of top administrators and heads of departments in the planning, surveillance and actual implementation of control strategies. The various stakeholders interviewed strongly agreed that it was this collective effort that enabled containment of these hemorrhagic fever outbreaks in their districts. Such achievements are practical indicators that strategic objectives set by the Uganda One Health Platform, of building resilient, sustainable systems to prevent and respond to zoonotic diseases are attainable [7]. The use of a one health approach through multi-sectoral collaboration has been recognized as an effective way of controlling and managing the globally increasing public health risks. The effectiveness of such a multidisciplinary approach can only be possible with well-structured and resilient health systems that prioritize prevention of disease outbreaks before they occur [1], [3].

The drivers for the outbreaks were reported to be; Human associated practices such as uncontrolled migration, eating animals that died of unknown causes; Environment factors such as increased vector populations due to erratic climatic changes; Livestock-wildlife interactions encouraged by limited pasture and water resources especially during drought. These findings suggest that RVF and CCHF outbreaks occur following synergistic interaction of human, animal and ecosystem associated factors, hence efforts by a single sector to combat these outbreaks may not pay off [3].

Although the outbreaks could have been contained, delays could have been minimized by undertaking laboratory diagnosis at district level instead of transporting samples to UVRI and NADDEC in Entebbe. Response to the RVF and CCHF challenge could have been delayed by dependence on funding of central government and non-governmental organizations due to failure to plan and allocate funds for surveillance and mitigation of diseases outbreaks at district local government levels [5], [8].

Management of RVF and CCHF outbreaks in the two districts provided an opportunity for the involved stakeholders to appreciate benefits of mitigating health challenges using a multidisciplinary approach. However, multi-sectoral one health taskforces in these districts are in the primary stages and need strengthening for better performance as it has been proposed in Uganda One Platform strategic plan [7].

Conclusions

This study indicates that top administrators and heads of departments in the planning, surveillance and actual implementation of strategies for control the outbreaks of RVF and CCHF in Kiboga and Kiruhura districts. Interaction of human-animal and environment associated factors were perceived to be the drivers of the RVF and CCHF outbreaks.

Although the outbreaks were controlled, transporting samples to UVRI and NADDEC in Entebbe could have delayed diagnosis and interventions. The interventions entirely depended on funding of central government through MOH and non-governmental organizations in both districts because no funds had been planned and allocated for surveillance and mitigation of diseases outbreaks at district local government levels.

Recommendations

1. Improvement of district laboratory services by equipping district health and veterinary laboratories with Rapid diagnostic test kits to detect RVF and CCHF as well as building capacity of laboratory technicians.
2. Continued surveillance by MOH, MAAIF and other research agencies should be done
3. One Health interventional approach should be strengthened and encouraged other than independent entities the prevention and control of diseases.
4. Districts should always budget for any emergencies to promote preparedness to avert disease epidemics.

5. Early warning signals should be established for quick and prompt outbreak detection for prompt management
6. More studies to understand the dynamic epidemiology of RVF and CCHF.
7. The government and other funding agencies should support research to develop vaccine against hemorrhagic fever (RVF and CCHF) for humans and animals.

Study limitations

Some of the contact cases were not accessed to interview them which may compromise the scope of the data obtained to extrapolate to the general population.

List Of Abbreviations

CCHF: Crimean Congo Hemorrhagic Fever, MAAIF: Ministry of Agriculture Animal Industry and Fisheries, MOH: Ministry of Health, NADDEC: National Animal Diseases Diagnostics and Epidemiology Centre, OHCEA: One Health Central and Eastern Africa, RVF: Rift Valley Fever, USAID: United States Agency for International Development, UVRI: Uganda Virus Research Institute, VHF: Viral Haemorrhagic Fevers.

Declarations

Ethical approval and consent to participate

The study was submitted for approval to the Research and Ethics Committee of the College of Veterinary Medicine, Animal Resources and Biosecurity of Makerere University. (Reference Number: VAB/REC/17/08).

Prior to the study, written consent was obtained from Ministry of Health and Ministry of Agriculture Animal Industry and Fisheries of the government of the republic of Uganda. Formal consent was also obtained from the district officials, individual index cases and the contacts who were involved in this study.

Consent to publish

Not applicable in this study.

Availability of data and materials

All necessary data has been included in this manuscript submitted. Figures of photographs in the field have been submitted as additional files.

Competing interests

Authors declare that there are no competing interests.

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Authors' contributions

JMK: Conception and design of study, collection, analysis and interpretation of data; drafting and critical review of manuscript, gave final approval for submission of manuscript.

PN: Conception and design of study, collection, analysis and interpretation of data; drafting and critical review of manuscript, gave final approval for submission of manuscript.

AW: Collection, critical review of manuscript, gave final approval for submission of manuscript.

JDK: Conception and design of study, critical review of manuscript, gave final approval for submission of manuscript.

WB: Conception and design of study, and critical review of manuscript, gave final approval for submission of manuscript.

All authors have read and approved the manuscript.

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