

HEALTHY FUTURES

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Health, environmental change and adaptive capacity; mapping, examining & anticipating future risks of water-related vector-borne diseases in eastern Africa

Collaborative Project
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Cooperation

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Risk-based decision-support framework for prevention and control of Rift Valley fever epidemics in Eastern Africa

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| Short summary | <p>The Rift Valley Fever (RVF) Risk-Based Decision Support Framework (DSF) is a template to guide responses to RVF outbreaks in East Africa produced by the community of decision-makers responsible for mitigating the impact of RVF outbreaks. The attached version (Version 4) has been updated to incorporate climate change and public health issues in workshops sponsored as part of the HEALTHY FUTURES project. The participants considered outputs from the climate change research of the HEALTHY FUTURES project as well as other new information to update the RVF DSF.</p> | | |
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List of terms and abbreviations

| Abbreviation | Explanation |
|---------------------|--|
| AU IBAR | African Union-Interafrican Bureau for Animal Resources |
| CDC | United States Centres for Disease Control |
| CVO | Chief Veterinary Officer |
| DMS | Director of Medical Services |
| DOD-GEIS | Department for Defense Global Emerging Infections Surveillance and Response System |
| DSF | Decision Support Framework |
| DVO | District Veterinary Officer |
| DVS | Department of Veterinary Services |
| ECTAD | FAO's Emergency Centre for Transboundary Animal Diseases |
| EMPRESS | FAO Emergency Prevention System |
| FAO | Food and Agriculture Organization of the United Nations |
| GHA | Greater Horn of Africa |
| GLEWS | Global Early Warning Systems |
| GoK | Government of Kenya |
| IGAD | Intergovernmental Authority on Development |
| ILRI | International Livestock Research Institute |
| KAP | Knowledge Attitude and Practices |
| NASA | National Aeronautics and Space Administration |
| NGO | Non-Governmental Organization |
| OIE | World Organization for Animal Health |
| OH | One Health |
| RVF | Rift Valley fever |
| RVFV | Rift Valley fever virus |
| VEEU | Veterinary Epidemiology and Economics Unit |
| VIC | Veterinary Investigation Centre |
| VSF | Vétérinaires Sans Frontières |

Acknowledgements

The development of this decision support framework has involved a wide range of people over the course of more than 6 years. The original version (Version 1) was developed in a workshop that was jointly convened by the Food and Agriculture Organization of the United Nations (FAO) and the International Livestock Research Institute (ILRI) and held at ILRI, Nairobi in March 2008. During that workshop, participants generated the initial material which was then compiled and edited into the first draft of what was then called the decision-support tool. Participants who attended that workshop and their affiliations at the time were:

| Name | Job title and organization |
|---------------------|---|
| Bernard Mugenyo | Representative of DVS (Deputy Director DVS), Kenya |
| Bruno Minjauw | Consultant, FAO Kenya |
| Chris Jost | Scientist, ILRI |
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| Emanuel Senyael | Officer-in-charge, VIC, Arusha, Tanzania |
| Gabriel Turasha | Country Programme Coordinator, VETAID, Tanzania |
| Gijs Van't Klooster | FAO-ECU, Ethiopia |
| Hiver Boussini | Animal Health Officer, AU-IBAR |
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| Jeff Mariner | Animal Health and International Trade Team Leader, ILRI |
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| Joseph Njuguna | Livestock Consultant, FAO Kenya |
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| Massimo Castiello | Livestock Project Coordinator, FAO Somalia |
| Mohamed Yussuf | Kenya Emergency Projects Manager, VETAID |
| Murithi R. Mbabu | Head VEEU, DVS, Kenya |
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| Samson N. Muniko | Regional Veterinary Officer, Dodoma, Tanzania |
| Serge Nzietchueng | Consultant, Theme 3 Market Opportunities, ILRI |
| Simon Kihu | Consultant, ILRI |

The initial draft was then exposed to critical review by about 100 participants at the United States Centers for Disease Control's *Rift Valley Fever Workshop 2008: Scientific pathways towards public health prevention and response*, held in Nairobi in early May 2008. The organizers kindly allocated one workshop session to a discussion focused on the draft decision-support tool during which participants were encouraged to provide feedback and make observations and suggestions for the improvement of the tool. Participants were also invited to provide individual comments by e-mail. A small group drawn from participants at the initial workshop reviewed the revised document at a meeting held at ILRI in September 2008 and final changes they recommended were incorporated into the first version of the framework. The original framework was also reviewed and approved by the FAO's Emergency Centre for Transboundary Animal Diseases (ECTAD) of the Regional Animal

Health Centre, Nairobi. ECTAD was also effectively represented in both the FAO/ILRI and CDC workshops.

This draft was further revised and updated to version 2 and renamed decision support framework through email consultations and regional workshops. One of these meetings was a regional workshop involving Chief Veterinary Officers and international partners from countries in the Horn of Africa and Middle East entitled: *Enhancing Safe Inter-Regional Livestock Trade: Risk-Based Approaches to Livestock Certification and Harmonized Control of Trade-Related Transboundary Animal Diseases* was held in Dubai on 13 – 16th June, 2011. The tool was introduced as a regional framework for managing RVF and comments raised were incorporated into Version 2 of the document.

The HEALTHY FUTURES project has been supporting further refinement of the tool to mainly to integrate social, technical, climate change and one-health perspectives. The project convened a decision-makers workshop on Sept 30-Oct 1, 2014 in Naivasha where Version 2 of the document was reviewed and updated to Version 3. The workshop also recommended the establishment of a small team of public health professionals to incorporate public health interventions in the framework. This meeting was held in Dare salaam on November 11th to 12th 2014 where Version 4 of the framework with public health inputs developed was developed. The people involved in this meeting were:

| Name | Job title and organization |
|--------------------|--|
| Dr Benard Bett | ILRI |
| Dr Peninah Munyua | CDC Kenya |
| Dr Issa | Uganda Ministry of Health |
| Jubilate Benard | Tanzania Ministry of Health |
| Dr Austine Orinde | Kenya Ministry of Agriculture, Livestock and Fisheries |
| Dr Dickens Onyango | Kenya Ministry of Health |
| Dr Otipo Shikanga | Kenya Ministry of Health |

The contributions of all the people involved in the development and refinement of this participatory and evolving product is gratefully acknowledged.

Summary

This report presents the latest version of the RVF Decision Support Framework (DSF) and outlines processes used for its refinement. The framework was established to guide timely, evidenced based decision making in the control of RVF. It therefore breaks down the RVF epidemic cycle into explicit steps and match actions to each step. The current version integrates inputs from multiple partners, decision-makers and experts that were involved to ensure ownership and relevance to the decision making challenges that were experienced in the previous RVF outbreaks. A study conducted by ILRI following the 2006/2007 outbreak demonstrated that the impacts of RVF were exacerbated by delays in the recognition of risk factors and making decisions to prevent and control the disease. The HEALTHY FUTURES project supported the refinement of the framework – specifically the integration of social, technical, climate change and one-health perspectives to enable its utilization across sectors and communities.

The HEALTHY FUTURES project supported a total of four meetings (on 11th October 2012, 18th September 2012, 30th September – 1st October 2014 and 12th-13th November 2014 in Daresalaam, Naivasha, Naivasha and Daresalaam, respectively) to help refine the older versions of the DSF. It also co-funded surveys that evaluated the level of utilization of the earlier versions of the DSF and the findings obtained used to inform the development process. Two key comments/challenges identified from these surveys and meetings were: (i) the number of decision points¹ in the older framework, published as Consultative Group for RVF Decision Support (2010), was high and the intervals between some of them were too short to warrant being considered as independent events, and (ii) interventions were heavily biased towards the veterinary sector and there was need to integrate public health interventions to enable the DSF realize a one-health focus. The first comment/challenge was addressed in the meeting held at Naivasha (18th September 2012) by regrouping the decision points identified above into five key stages as outlined in Table 1. This change also enabled the DSF to align with the outbreak phases that had been defined in the RVF contingency plans.

More changes to the older versions of the DSF were made in a recent meeting held in Naivasha Kenya (30th September – 1st October 2014). This meeting was held when most of the key outputs of the HEALTHY FUTURES project had been generated, for example dynamical models on impacts of climate change on RVF transmission and effectiveness of alternative vaccination schedules. The meeting did a general review of the document and embraced findings from climate change analyses. It was recognized that RVF epidemiology would evolve over time in light of climate change and so the first decision point that had been named ‘normal state between outbreaks’ was renamed inter-epidemic period.

¹ **1**-Normal situation between outbreaks; **2**-Early warning of RVF issued e.g. by GEIS; **3**-Localised prolonged heavy rains reported by eye witnesses; **4**-Localised flooding reported by eye witnesses; **5**-Localised increases in mosquito population reported by eye witnesses; **6**-First detection of suspected RVF case in livestock by searching or rumours by herders; **7**-Laboratory confirmation of RVF cases in livestock; **8**-First rumour or field report of first human cases; **9**-Laboratory confirmation of first human case; **10**-No new human cases for 6 months; **11**-No clinical livestock cases for 6 months; **12**-Post outbreak recovery and reflection.

Table 1. Mapping the phases from the original version of the DSF into the new

| Phase from the original version of the DSF | New Decision Points |
|---|----------------------------|
| Normal phase | Normal phase |
| Early warning | Early warning |
| Localized prolonged heavy rains reported by eye witnesses | Pre-outbreak |
| Localized flooding reported by eye witnesses | |
| localized mosquito swarms reported by eye witnesses | |
| First detection of suspected RVF in livestock | Outbreak |
| Laboratory confirmation of RVF in livestock | |
| First rumor or field report of human RVF case | |
| Laboratory confirmation of first human case | |
| No new human cases for 6 months | Step-down |
| No clinical livestock cases for 6 months | |
| Post-outbreak recovery and reflection | |

The last meeting that involved key public health stakeholders (12th-13th November 2014) introduced the most changes to the DSF. First, the framework was expanded to include a section/column where human health interventions could be described. The final version therefore consists of a matrix with four columns; the first column identifies an intervention, the second gives a specific activity for a given intervention, the third outlines human health actions while the fourth outlines animal health interventions. Various parts of the document were also re-written to emphasize the one-health approach to RVF prevention and control (given that the new version of the framework now integrates both animal and public health interventions) and the sequence of events/decision points were slightly edited for consistency and clarity, i.e:

- inter-epidemic period
- Pre-outbreak period with early warning, localised rain, flooding and mosquito swarms as sub-stages
- outbreak period classified into suspected and confirmed outbreak sub-phases
- recovery phase including a 45-day period when no new further livestock cases are observed and a period on post-outbreak recovery and reflection

On the way forward, two high-level stakeholder meetings are planned to submit the framework for incorporation into regional decision RVF control policies. The first one has been convened by FAO and it will be held in Nairobi Kenya in December; it would involve Ministers and Directors of Veterinary and Medical Services. The second meeting is planned for February 2015. This will be held in Arusha and it will mainly involve regional institutions including the relevant technical departments in the East Africa Community.

1 Introduction

1.1 Background Information

Following the 2006/07 Rift Valley fever (RVF) epidemic in East Africa, a participatory assessment was carried out jointly by the International Livestock Research Institute (ILRI) and the Government of Kenya Department of Veterinary Services (GoK DVS) to evaluate the impact of the outbreak. It concluded that: *“The severity of the...RVF epidemic in northern Kenya was exacerbated by delays in recognizing risk factors...and in taking decisions to prevent and control the disease.”* Further, it noted that *“Kenya lacks a well-documented contingency/emergency plan for RVF.”* Amongst factors which limited the response to the outbreak, the assessment highlighted the *“lack of pre-allocated emergency funds, particularly within the livestock sector”* which greatly delayed responses (ILRI 2008).

The episodic nature of RVF, with outbreaks occurring on average at intervals of around a decade but sometimes twice as long, makes it especially challenging to deal with. In the intervals between outbreaks there is a tendency for veterinary and public health departments' institutional memories to be lost: the people who fought the last outbreak are very often no longer in post for the next.

To address these issues and concerns, a joint Food and Agriculture Organization of the United Nations (FAO)/ILRI workshop was held in March 2008. Participants, drawn from the Kenya and Tanzania Departments of Veterinary Services, FAO, ILRI, United State Centers for Disease Control (CDC), African Union-Interafrican Bureau for Animal Resources (AU-IBAR) and two veterinary NGOs, Vétérinaires Sans Frontières (VSF) Suisse and VETAID, worked through a three-stage process which in turn:

1. Identified the sequence of events related to increasing and decreasing RVF epidemic risk in the Eastern Africa
2. Compiled an inventory of interventions that can be used to prevent or control an RVF epidemic in Eastern Africa
3. Matched actions selected from the inventory to specific stages of the sequence of events related to RVF epidemic risk

This decision-support framework draws on the ILRI/GoK DVS participatory assessment (ILRI 2008), the joint FAO/ILRI workshop and other relevant sources. It is targeted at directors of veterinary services and directors of medical services or chief medical officers in the Eastern African countries. It is intended to provide clear, practical guidance as to what are appropriate responses at the various stages of the RVF epidemic cycle. The framework, therefore, will facilitate the directors to take timely, evidence-based decisions to prevent and control RVF epidemics, thereby significantly reducing the scale of impacts of the disease on lives, livelihoods and local, national and regional economies. This document recognizes that close collaboration between the veterinary and public health sectors is essential for the effective prevention and control of zoonoses including RVF.

This decision-support framework consists of four elements:

1. A map of areas in Eastern Africa at risk from RVF epizootics
2. A list of the sequence of events related to increasing and decreasing risk of an RVF epidemic in Eastern Africa
3. Actions matched to the sequence of events listed in 2, above
4. Selected information, resources and references

1.2 Assumptions

A number of assumptions have been made in the development of the decision-support framework. Unless these basic, first steps have been taken, implementation of a detailed action plan is unlikely to be possible. These are:

- A national RVF emergency fund has been established and procedures and modalities put in place to enable the fund to be made available rapidly in response to predetermined criteria.
- An effective communication system has been established including a clear chain of command from the DVS and DMS or CMO to the field officers. This facilitates early and effective communication back up the chain from field to the director. Furthermore, effective communication between the veterinary and health departments with other relevant ministries such as planning, finance and provincial administration is required.
- The above are captured in a government-approved RVF Contingency Plan.
- During the normal situation between outbreaks, users of the framework will review the suggested activities for each stage in conjunction with their Contingency Plan. This will allow them to cost the activities and ensure the necessary budget will be available either from the emergency fund, core budget or in timely requests to donors.

1.3 Role of the HEALTHY FUTURES project in the development of the DSF

The HEALTHY FUTURES project supported the refinement of the existing decision support framework (Version 3) based on new outputs from research, particularly those evaluating the impacts of climate change on RVF epidemiology. This work also integrated findings from other RVF project as well as changes in the institutional context in which RVF mitigation is undertaken. Key outputs from the HEALTHY FUTURES Project considered include hazard and vulnerability maps indicating current and future risk of the disease in the eastern Africa region as well as RVF transmission models. This report therefore outlines the development of the DSF in general, and highlights areas that the project has specifically supported.

2 DSF development stages and processes

The first version of the DSF grew out of a retrospective analysis of the response to the 2006-2007 in Kenya and Tanzania. Consultations revealed that authorities had taken an all or nothing approach to decision-making that delayed all action until after the first human case was confirmed. This was much too late for the response to have any meaningful impact on the progress of the outbreak. Workshops with key decision-makers and technical experts reviewed the timeline of events from the point of the first early warning until the termination of response measures. Using '20-20 hindsight,' participants identified several key milestones in the evolution of the outbreak cycle and preparatory or preventive actions that they wished they had taken at those points in time.

The decision support framework was built in participatory workshops that brought together decision-makers, technical experts and implementers as equals. Each group brought unique knowledge and experience to the table. The process of building frameworks was an opportunity for learning leading to more effective research and action.

Below is a brief outline of the process participants completed to develop the risk-based decision support framework.

1. The objective of the decision support framework was identified. This was the outcome(s) to be mitigated or avoided.

2. A timeline of the physical, biological and social process was built that defined the changing risk situation.
3. Decision-points were identified along the timelines. These were major events and milestones indicative of changing risk. Many were easy to perceive as evidence of the evolution of the climate-disease interaction and indicative of escalating risks of an epidemic that warranted changes in investment and response.
4. The categories of useful mitigation activities were listed and described.
5. A table with decision-points as row headers and actions areas as column headings was built.
6. Establish appropriate content for each cell in the table (each action category at each time point).

The Decision Support Framework enjoyed strong ownership on the part of the decision-makers as they had built it themselves. In 2007-8, there was an RVF alert issued and the tool was used by decision-makers to mobilize resources and initiate preventive measures such as vaccination targeted to high-risk areas for RVF emergence. Subsequently, the DSF was revised following as part of E-mail consultation with enhanced suggestions on vector control and actions to mitigate the impact of RVF in trade. This led to the release of Version 2. The dialogue leading to Version 2 resulted in recognition that the framework could be an important means for managing trade risk and build confidence among trading partners that appropriate responses to RVF outbreaks would be taken. In 2012, The African Union convened a consultation between countries of the horn of Africa and the Middle East to review Version 2 of the Framework and develop the document as road map to manage RVF in trade. This resulted in Version 3.

Consultations supported by the HEALTHY FUTURES project found the model of a recurrent cycle of outbreaks need to be replaced by the concept of an evolving epidemic cycle where the spatial distribution and perhaps other epidemiological aspects of the disease were likely to change over time in response to changing climatic forces that shaped vector habitat, livestock and human demographics and the spatial distribution of production systems. However, there was also agreement that available climate change models, as they focused purely on temperature and rainfall data were insufficient to make spatially specific predictions about what areas would be prone to RVF in the future. Instead of predictions for the future, the Risk-Based Decision Support Framework (Version 4) that resulted from the consultation includes the concepts of monitoring of climate and ecological change as necessary actions to keep abreast of the changing RVF risk profile. The other key consultation held under the project was the last meeting that helped transform the DSF into a one-health decision support framework. The objectives of the meeting were:

1. To ensure that the proposed sequence of events related with increasing or decreasing risk of RVF [decision points] align with the guidelines/SOPs governing the control of the disease in humans
2. To incorporate interventions for preventing/controlling the disease in humans
3. To ensure that the specified intervention guidelines align with the standard public health policies and regulations

The framework described in the following section

3 The Decision Support Framework

3.1 Decision points

The following section describes the sequence of events that characterizes the progressive increase and eventual decrease in risk of an RVF epidemic in Eastern Africa - from the normal situation between epidemic, through the height of an epidemic with confirmed cases in both livestock and people, and the eventual return to inter-epidemic period.

This sequence is only relevant in or close to areas within Eastern Africa where there is a known history of RVF epidemics. In other areas e.g. West Africa, the epidemiology of the disease is different. Likewise, within the Eastern Africa there are areas where some of these events could occur, e.g. heavy rain and flooding, but where there is no known history or risk of RVF epidemics. Therefore, decision-makers should take into consideration areas at risk from RVF risk maps, the RVF outbreak history in a specific area, and the RVF event sequence stage when deciding upon an action.

Sequence of events related to increasing and decreasing risk of an RVF epizootic in the Greater Horn of Africa:

1. Inter-epidemic period²
2. Pre-outbreak
 - EW -Early warning of RVF issued and/or early warning of heavy rain by national meteorological departments
 - Alert
 - Localized, prolonged heavy rains reported by eye-witnesses
 - Localized flooding reported by eye-witnesses
 - Localized mosquito swarms reported by eye-witnesses
3. Outbreak
 - Suspected outbreak – either in animals or humans
 - First detection of suspected RVF in livestock by active searching and/or rumors from herders
 - First rumor or field report of human RVF case
 - Confirmed outbreak
 - Laboratory confirmation of RVF cases in livestock
 - Laboratory confirmation of first human RVF case
4. Recovery phase
 - No new human cases
 - No clinical livestock cases for 45 days
 - Post-outbreak recovery and reflection
5. Inter-epidemic period (i.e. same as event 1)

It is recognized that decision-makers are worried about taking action to prevent or declare an RVF outbreak: if they act too soon, they risk wasting resources when there was no real risk of an RVF

² During inter-epidemic interval there will be low-level virus activity in at-risk areas. Although this may occasionally result in RVF cases in livestock, usually these will be mild – often asymptomatic.

epidemic; if they delay waiting until an epizootic has begun then it is likely to be too late to mount an effective preventive and control measures. Delay in making decisions often leads to wanton loss of human lives, loss of livestock and loss resources in managing morbidity. For instance, the 2006/2007 epidemic resulted in 158 human deaths and 2.1 billion shillings loss to the Kenyan economy. RVF response measures should not wait for confirmation of an epidemic; it should not be managed as an all or nothing event.

In the epidemic cycle, from decision point one to three, the probability that an RVF epidemic will occur increases. Therefore, the justification for taking actions to mitigate the risk also increases, and the risk of taking unjustified actions decreases. For point two to part one of three, although the risk of an RVF epidemic is progressively increasing it is not certain that an epidemic will occur. However, some RVF occurrences do not follow the patterns described above. Sporadic outbreaks can occur.

3.2 Intervention categories

Under each of the decision points specified above, the following interventions may be carried out:

- Capacity building and training
- Communication, advocacy and public awareness
- National and regional coordination
- Early warning
- Surveillance
- Disease prevention
 - Vaccination
 - Vector control
 - Infection, prevention and control
- Case management
- Regulation of trade and markets for livestock
- Resource mobilization
- Establishing or strengthening institutions and policies
- Research
- Risk, impact and climate change assessment

The following tables match specific interventions to each of the stages in the RVF epidemic cycle.

Table 2. Interventions during Inter-Epidemic Period

| Category | Activity | Human health | Animal health |
|---|--|---|---|
| Capacity | Risk assessment | Develop and maintain risk assessment capacity in national public health services, research and training institutions and available to be applied to RVF contingency planning and response RVF contingency plan should be reviewed and up-dated regularly | Develop and maintain risk assessment capacity in national public health services, research and training institutions and available to be applied to RVF contingency planning and response RVF contingency plan should be reviewed and up-dated regularly |
| | Laboratory diagnosis | Maintain capacity for confirmation of RVF | Training and re-training to update personnel on changing technological development in diagnostics for livestock using OIE-recognized standards for trade purposes and for national purposes (Respective DVS to decide based on the capacity.) |
| | Information management system | Maintain robust surveillance system | Develop a disease information management systems to ensure effective compilation and dissemination of information at all levels |
| | Simulation exercise | Hold joint simulation exercises with DVS and other stakeholders | Hold periodic simulation exercises to test response to RVF epidemic and to ensure veterinary, medical, and entomological sectors, local administrators, public health, police and other relevant stakeholders |
| Communication, advocacy and public awareness | Communication system appraisal | Identification of target audiences Assessment of the communication needs | Identification of target audiences Assessment of the communication needs Formulation of communication strategy |
| | Development of advocacy, communication and | Formulation of joint multi-sectorial information, education and communication strategy to guide risk communication | Formulation of joint multi-sectorial information, education and communication strategy to guide risk communication during |

| | | | |
|---|---|---|---|
| | social mobilization strategy | during all phases of RVF risk. | all phases of RVF risk. |
| | Participatory message development | Development of appropriate messages Identify the best method(s) of reaching different segments of the population at-risk Design information, communication and education materials Pre-testing of messages | Development of appropriate messages Identify the best method(s) of reaching different segments of the population at-risk Design information, communication and education materials Pre-testing of messages |
| | Engage local media on RVF preparedness | Establish and maintain links with local media to make them aware of RVF and bring to their attention any developments | Establish and maintain links with local media to make them aware of RVF and bring to their attention any developments |
| National and regional coordination | Establish national and regional networks for preparedness, prevention and response involving medical authorities, veterinary authorities, wildlife services, meteorological services, disaster management authorities, NGOs and regional (i.e. IGAD) and international organizations with interest in RVF | Maintain updated contact information for appropriate officers/departments in national, neighboring country, regional and international organizations Promote and mainstream a 'One Health' approach to prevention and control of RVF and other zoonoses through regular communication with counterparts in Ministry responsible for veterinary services and other relevant ministries Integrate RVF preparedness and response with other emerging and re-emerging zoonoses Develop standard operating procedures for RVF control, in event of RVF outbreak, under the leadership of a multi-sectoral committee | Maintain updated contact information for appropriate officers/departments in national, neighboring country, regional and international organizations Promote and mainstream a 'One Health' approach to prevention and control of RVF and other zoonoses through regular communication with counterparts in Ministry of Health and other relevant ministries Integrate RVF preparedness and response with other emerging and re-emerging zoonoses Hold periodic meetings between regional CVOs Explore potential role of a bodies such as FAO's ECTAD, AU-IBAR or EAC in ensuring regional harmonization and cooperation Develop standard operating procedures for RVF control, in event of RVF outbreak, under |

| | | | |
|----------------------|---|---|--|
| | | | the leadership of a multi-sectoral committee |
| | Form a regional technical working group under RECs | Establish regional RVF TWG | Establish regional RVF TWG |
| Category | Activity | | Explanation |
| Early warning | Monitoring of international RVF early warning systems | Monitor international RVF early warning systems and maintain subscriptions to e-mail RVF early warning alerts (GLEWS, NASA, WHO, FAO-EMPRESS, IGAD and national meteorological agencies) Maintain access to internet/e-mail services | Monitor international RVF early warning systems and maintain subscriptions to e-mail RVF early warning alerts (GLEWS, NASA, FAO-EMPRESS, IGAD and national meteorological agencies) Maintain access to internet/e-mail services |
| | Maintain up to date rumor logs | Maintain system of monitoring and investigating reports of localized heavy rains, flooding, mosquito blooms and RVF events from field Ensure 'hot-line' phone numbers remain operational and are widely known within at-risk areas | Maintain system of monitoring and investigating rumours of localized heavy rains, flooding, mosquito blooms and RVF events from field Ensure veterinary department 'hot-line' phone numbers remain operational and are widely known within at-risk areas |
| Surveillance | Participatory/community surveillance | Engage with community health volunteers (CHV) and incorporate them into formal surveillance systems Update and make available case definitions in local languages | PS capacity developed and active in national veterinary services and universities for national and farmer-priority diseases Engage with community animal health workers (CAHWs) and incorporate them into formal surveillance systems Update and make available disease lexicons in local languages Engage medical professionals to develop implement participatory surveillance based on a syndromic case definition |
| | Mosquito surveillance | Establish system for routine surveillance of mosquito populations in at-risk areas | Establish system for routine surveillance of mosquito populations in at-risk areas |

| | | | |
|---------------------------|---------------------------------|--|--|
| | | combining trapping with community reports Disseminate findings on vector surveillance Map where RVF vectors are present | combining trapping with community reports Disseminate findings on vector surveillance Map where RVF vectors are present |
| | Sentinel herds/sites | Integrate RVF sentinel surveillance with ongoing acute febrile illnesses ones | Establish in high-risk areas and take baseline samples: sentinel herds are useful for retrospective analyses but, due to lag in receiving results, are not an early warning framework |
| | Passive/routine surveillance | Analyze and disseminate data from routine surveillance systems, including weekly disease reports from health facilities and disease reporting by private health facilities | Establish/maintain passive surveillance systems, including monthly disease reports from local veterinary and medical officers and disease reporting by private animal health professionals Analyse and disseminate data from routine surveillance systems |
| | Surveillance for other diseases | N/A | Where possible combine routine surveillance for RVF with that for other zoonoses |
| | Cross-sectional random surveys | NA | Sample animals and humans not included in sentinel herds |
| | Opportunistic surveillance | NA | Screen sera collected for other purposes for RVF |
| | Wildlife surveillance | NA | Screen available sera for viral activity |
| | Cross-cutting | | Ensure efficiency of and interoperability of surveillance databases across regional platforms e.g. ARIS, etc. |
| Disease prevention | Vaccination | NA | Develop a clear policy on vaccination against RVF, including during inter-epidemic periods, when risk of RVF outbreak is high |

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| | | | <p>and in face of outbreak</p> <p>Consider routine vaccination, for example on a cost-recovery basis, geographically limited to those areas shown to be consistently first affected in an RVF epidemic</p> <p>Consider combining RVF vaccination with coverage of other priority diseases</p> <p>Maintain updated contact information with RVF vaccine manufacturers</p> <p>Maintain watching brief on development and availability of new and improved vaccines</p> <p>Maintain disease control equipment in ready-to-use state</p> <p>Consider establishment of a regional vaccine bank</p> |
| | Control of endemic RVF cases | NA | Consider routine annual vaccinations at subsidized rates |
| | Case management | Develop guidelines and SOPs for case management | NA |
| Vector control | Promote the usage of appropriate vector control measures | <p>Implement integrated vector control measures</p> <p>Capacity building of personnel on vector control</p> <p>Public education on mosquito control</p> | <p>Identify potential suppliers of vector control services, such as aerial spraying contractors, and develop outline agreements</p> <p>Maintain vector control equipment in ready-to-use state</p> <p>Stockpiles of vector control chemicals</p> <p>Maintain training of vector control personnel</p> |
| Trade | Dialogue with regional and international trading | NA | Establish 'rules of the game' with trading partners |

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| | partners | | Maintain dialogue with trading partners to ensure they are aware of current RVF risk status and are aware of and support RVF contingency plan Institutionalize regional mechanisms to coordinate and harmonize disease control, certification and trade across borders |
| | Livestock value chains | NA | Identify main value chain actors |
| | Actors | NA | Engage actors along the supply chain to monitor and report animal movements (origin and destination) along the main supply chains and main livestock markets. Advocacy to enhance capacity of trader associations, especially in monitoring and reporting animal movements and market behavior |
| | Economic risk mitigation | NA | Identify possible mechanisms (insurance, contingency funds) to mitigate the negative economic impacts on value chain actors |
| Funding | Advocacy for increased budget to ministry responsible for livestock | Advocate for contingency fund Streamline systems for accessing emergency funds | Ensure essential funds will be available in national disaster fund for increased RVF risk and undertake multi- sectorial engagement for funding (private partners, agencies, donors) |
| | Concept notes | | Pre-prepare concept notes to request funds for donor-funded RVF interventions in event of epidemic |
| Institutions and policies | National regulations and laws | Review national regulations and laws and ensure that they are in alignment with RVF contingency plans | Review national regulations and laws and ensure that they are in alignment with RVF contingency plans Implement registration of vaccines to assure |

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| | | | quality |
| | RVF diagnostic reagents | Lobby for free availability of RVF diagnostic reagents, such as by making them available through commercial channels | Lobby for free availability of RVF diagnostic reagents, such as by making them available through commercial channels |
| | Commodity-based trade | NA | Keep abreast of regulatory development regarding commodity-based trade and consider diversifying into commodity-based trade to avoid risky over-reliance on live animal trade to Arabian Peninsula countries |
| Research on prevention and control, risk, impact and climate change | Risk Assessment | Conduct joint risk mapping | Risk Mapping (Hazard + Vulnerability) |
| | Conduct operational research on RVF prevention and control technologies and approaches | Develop the operational research questions related to RVF prevention and control Design and conduct studies on RVF prevention and control including economic analysis Organize fora to disseminate research findings | Conduct operational research on RVF prevention and control Undertake cost-effectiveness studies of RVF prevention and control options and feed results into contingency plans; also make results available to livestock producers and traders <ul style="list-style-type: none"> - Research should have a one-health dimension - Research on vaccines - Research on vector ecology, niche modelling, - Research on reservoirs of RVFV - KAP studies, - Developing and validation of diagnostic kits - Organize fora to disseminate research findings |
| | Impact Assessment | NA | Develop protocols for impact assessment |
| | Climate Change | Monitor climate related information through subscription to relevant sources like GLEWS and NASA | Institutionalize awareness of climate change related issues through advocacy Monitor climate related information |

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| | | Periodic assessment of changing weather patterns resulting from climate change Continuous surveillance (for disease and vector) | through subscription to relevant sources like GLEWS and NASA Periodic assessment of changing weather patterns resulting from climate change Continuous surveillance (for disease and vector) as well as indicators of climate change and changing weather patterns |
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Table 3: Interventions during Pre-outbreak

| EARLY WARNING OF RVF ISSUED AND/OR EARLY WARNING OF HEAVY RAIN BY NATIONAL METEOROLOGICAL DEPARTMENTS | | | |
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| INTERVENTION | Activity | HUMAN HEALTH | ANIMAL HEALTH |
| Capacity for response | Assess national/regional capacity to respond | Rapid verification of availability and functionality of capacity in critical areas, including coordination (regional, national RVF committee), disease control | Rapid verification of availability and functionality of capacity in critical areas, including coordination (regional, national RVF committee), disease control (veterinary service and private personnel) and surveillance (laboratory, PS, sub-national veterinary officers) |
| Communication, advocacy and awareness | Public awareness | Implement the communication strategy specifications on this phase | Implement the communication strategy specifications on this phase |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS | RVF multi-sectoral committee to activate emergency preparedness procedures | RVF multi-sectoral committee to activate emergency preparedness procedures |
| | Collaboration between human health and veterinary sectors | Establish structures for animal and human health collaboration along the OH principle | Establish structures for animal and human health collaboration along the OH principle |
| | Joint activities | Initiate joint activities with other sectors e.g surveillance | Seek opportunities for joint activities between sectors, for example joint |

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| | | | surveillance activities with veterinarians and entomologists and wildlife services |
| | Regional Economic Communities | Activate national and regional networks for sharing information with countries outside EAC | Activate national and regional networks for sharing information with countries outside EAC |
| Surveillance | International RVF early warning systems | Maintain active monitoring of RVF early warning websites and e-mail alerts to keep abreast of epidemic risk escalation Communicate with international and national expert focal points to fully understand early warning and its implication | Maintain active monitoring of RVF early warning websites and e-mail alerts to keep abreast of epidemic risk escalation Communicate with international and national expert focal points to fully understand early warning and its implication |
| | National meteorological data | Set up system for weekly rainfall data and interpretation to be supplied to DMS by national meteorological service | Set up system for weekly rainfall data and interpretation to be supplied to DVS by national meteorological service |
| | Local ground truthing | Activate local networks for monitoring of local conditions including rumor log | Activate local networks for monitoring of local conditions including rumor log |
| | Active surveillance | Teams carry out active surveillance for heavy rainfall and flooding targeted at areas with past history of RVF and areas highlighted by early warning systems Intensify active, PS vector and wildlife surveillance for the duration of the risk period | Teams carry out active surveillance for heavy rainfall and flooding targeted at areas with past history of RVF and areas highlighted by early warning systems Intensify active, PS vector and wildlife surveillance for the duration of the risk period |
| | Sentinel herds/sites | Integrate surveillance for RVF with existing AFI sentinel surveillance sites | Ensure routine serological and symptomatic monitoring of sentinel herds to detect RVF virus |
| | Diagnostic laboratories | Notify national/regional veterinary diagnostic laboratories of RVF risk status | Notify national/regional veterinary diagnostic laboratories of RVF risk status |
| Disease prevention and control | Vaccination | NA | Notify vaccine manufacturer of RVF risk status and check available vaccine stocks |

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| | | | <p>Order vaccine stocks</p> <p>Limited vaccination using existing stock in target areas shown to be consistently first affected in an RVF epidemic</p> <p>Private veterinarians could offer RVF vaccination on a fee paying basis; DVS could bring this opportunity to attention of private veterinarians and veterinary associations</p> <p>Take delivery of vaccine and pre-position in at-risk areas</p> <p>Vaccinate livestock in high risk areas using identified vaccine, particularly those hot spots that will become non-accessible when rains start</p> |
| Vector control | Environmental control | Initiate environmental management for mosquito control | check available insecticide stocks |
| | Livestock insecticides | NA | Notify manufacturers of RVF risk status and check available insecticide stocks, access and availability; consider subsidy to farmers |
| | Immature Mosquito control | Procure and preposition larvicides | As feasible, treat areas likely to maintain RVF virus in <i>Aedes</i> mosquito eggs with sustained release insect growth regulators or other WHO approved sustained mosquito control products. These can and should be applied before flooding and will prevent emergence of virus infected adult mosquitoes |
| Trade | Notify trade partners | NA | <p>Be aware that trade partners will also receive international early warning notifications</p> <p>Notify regional/international trade partners that RVF contingency plan is being put into</p> |

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| | | | action |
| Funding | Notification of RVF early warning | Initiate engagement development partners | Multi- sectorial engagement for funding (private partners, agencies, donors) Notify donors of RVF risk status and potential submission of application for funds should RVF epidemic stages progress Initiate process to access national RVF emergency funds |
| Research on risk, impact and climate change assessment | Risk assessment | Conduct rapid risk assessment incorporating <ul style="list-style-type: none"> - Prevailing climatic conditions - Time since the last outbreak - Level of vaccination in the area and inform decision and policy-makers | Conduct rapid risk assessment incorporating <ul style="list-style-type: none"> - Prevailing climatic conditions - Time since the last outbreak - Level of vaccination in the area and inform decision and policy-makers |
| LOCALIZED HEAVY RAINS REPORTED BY EYE-WITNESSES (MEDIA, COMMUNITY, HEALTH WORKER) | | | |
| Capacity | Build capacity of public and animal health to respond in case of epidemic | Sensitize clinicians on early detection, case management and reporting | Sensitize coordination, surveillance and disease control human resources of elevation in RVF risk level |
| Communication, advocacy and awareness | Public awareness | Implement communication strategy as appropriate for this stage Conduct public health education on risk factors for transmission of RVF and control measures | Implement communication strategy as appropriate for this stage Utilize RVF messages developed previously: information to general public; consumer messages; in at-risk areas provide public health information and encourage reporting of flooding, mosquito swarms and suspected RVF cases |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and | Convene RVF technical committees to plan for preparedness and response | Convene RVF technical committee to plan preparedness and response; their TOR include: |

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| | DMS | | <p>Oversee communication messages (ensure consistency between messages from livestock and public health sectors)</p> <p>Oversee mobilization of funds</p> <p>Oversee collaboration between ministries</p> <p>Oversee activities of NGOs, national and international institutions</p> <p>Oversee implementation of prevention and control strategy</p> |
| | Local (County, State, etc.) RVF management committees | Initiate sub-national RVF technical committees to activate emergency preparedness procedures | Initiate sub-national RVF technical committees to activate emergency preparedness procedures |
| | Regional Economic Communities (RECs) | Activate regional TWG | Activate regional TWG |
| Surveillance | International RVF early warning systems | <p>Continue active monitoring of RVF early warning websites and e-mail alerts to keep abreast of epidemic risk escalation</p> <p>Communicate with international and national expert focal points to fully understand early warning and its implication</p> | <p>Continue active monitoring of RVF early warning websites and e-mail alerts to keep abreast of epidemic risk escalation</p> <p>Communicate with international and national expert focal points to fully understand early warning and its implication</p> |
| | National meteorological data | Continue monitoring weekly rainfall data and meteorological forecasts | Continue monitoring weekly rainfall data and meteorological forecasts |
| | Local ground truthing | Continue local networks for monitoring of local conditions | <p>Continue local networks for monitoring of local conditions</p> <p>Monitor livestock markets fed by catchment areas affected by localized heavy rains and continue local networks across supply chains</p> |
| | Participatory/community Surveillance | Maintain community level surveillance | Activate PS in at-risk areas |

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| | Active surveillance | Monitor local flooding and mosquito populations in at-risk areas | Monitor local flooding and mosquito populations in at-risk areas |
| | Sentinel herds/sites | Continue with sentinel surveillance integrated with acute febrile illnesses | Continue routine monitoring of sentinel herds to detect RVF virus |
| | Diagnostic laboratories | Ensure adequate supplies and equipment to confirm RVF | Ensure national/regional veterinary diagnostic laboratories are ready to receive and prioritize processing of samples from field |
| | Rumor logs | Maintain up to date rumor logs | Maintain rumor logs and communications channels |
| Disease prevention and control | Vaccination | NA | Position vaccine stocks in high and moderate risk areas Vaccinate around high risk areas using identified vaccine, and in and around those areas receiving localized heavy rains that had not been previously vaccinated but are still accessible |
| Vector control | Insecticide for application to livestock | NA | Order insecticide Take delivery and pre-position in at-risk areas |
| | Environmental management | Initiate environmental mosquito population control | Initiate environmental mosquito population control |
| Trade | Notify trade partners and stakeholders | NA | Notification of trade partners that vaccination has been implemented in high-risk areas Remind trade partners of OIE policy regarding vaccination, and provide evidence of compliance that allows for continuation of trade |
| | | | Notify trader association that localized control measures (vaccination, vector control, movement restrictions) have been |

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| | | | implemented in catchment areas and/or along the supply chain. |
| Funding | Advocacy | Source for contingency funds | Apply to donors for immediate funding based on increasing RVF epidemic risk for preventive and control operations |
| | RVF emergency fund | Mobilize resources needed for response | Advocacy for probable immediate funding based on escalating evidence of the risk of an imminent outbreak Mobilize national RVF emergency funds for use by DVS Mobilize local level RVF emergency funds for use by DVO |
| Research on risk, impact and climate change assessment | Risk assessment | Review and update rapid risk assessment | Review and update rapid risk assessment |
| | Impact assessment | Mobilize impact assessment monitoring team for imminent deployment | Mobilize impact assessment monitoring team for imminent deployment |
| LOCALIZED FLOODING REPORTED BY EYE-WITNESSES/ LOCALIZED MOSQUITO SWARMS REPORTED BY EYE-WITNESSES | | | |
| Capacity | Build capacity of public and animal health to respond | Sensitize clinicians on early detection, case management and reporting | Notify coordination, surveillance and disease control human resources of elevation in risk level |
| Communication, advocacy and awareness | Public awareness | Intensify public health education emphasizing on recognition and prevention of transmission | Information on vaccination for livestock keepers in at-risk areas Encourage reporting of mosquito swarms |

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| | | | and suspected RVF cases (i.e. abortion in adults and high morbidity and mortality in young stock) |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS | RVF technical committees meet regularly to review preparedness and response Mobilize joint (One Health) rapid response teams | RVF technical committees meet regularly to review preparedness and response |
| | Local (County, State, etc.) RVF management committees | Mobilize joint (One Health) sub-national RVF rapid response teams | Continuation Support active searching (flooding, mosquitoes, disease) and encourage community reporting to DVO Sustained public awareness |
| | RECs | Hold regional TWG meeting to prepare in case a regional response is warranted | Advocate for donor activation of emergency funds Coordinate trade issues Coordination of vaccine supply in at-risk countries |
| Surveillance | International RVF early warning systems | Provide feedback to early warning systems Convene a meeting of international and national expert focal points to fully understand the floods | Maintain active monitoring of RVF early warning websites and e-mail alerts Provide feedback to early warning systems Convene a meeting of international and national expert focal points to fully understand the impact of the flooding and its implication |
| | National meteorological data | Continue monitoring weekly rainfall data | Continue monitoring weekly rainfall data |
| | Local ground truthing | Maintain community surveillance | Continue local networks for monitoring of local conditions Continue monitoring livestock markets fed by catchment areas affected by localized |

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| | | | heavy rains and continue local networks across supply chains |
| | Participatory /community Surveillance | Maintain community level surveillance | Continue PS in at-risk and adjacent areas |
| | Active surveillance | Monitor local flooding and mosquito populations in at-risk areas Regularly analyze the trends in acute febrile illnesses (AFI) cases in health facilities | Localized active monitoring of meteorological and vector situations through PS and community systems |
| | Sentinel herds/sites | Intensify sentinel surveillance | Continue routine monitoring of sentinel herds to detect RVF virus including sero-surveillance |
| | Diagnostic laboratories | Ensure adequate supplies and equipment to confirm RVF Ensure all AFI cases are subjected to laboratory testing for common pathogens | Ensure national/regional veterinary diagnostic laboratories have allocated time and space for RVF sample analysis |
| | Rumor log | Maintain up to date rumor logs | Maintain rumor log and communication channels |
| Disease prevention and control | Vaccination | NA | Extend vaccination coverage to livestock adjacent to high-risk areas where possible <u>Do not vaccinate</u> in areas that are already experiencing mosquito blooms |
| | Case management | Disseminate case management guidelines | Carry out in areas where vaccination has been eliminated as a strategy |
| Vector control | Spray mosquito breeding sites | Initiate integrated vector control | Spray flooded areas if feasible |
| | Insecticides applied to livestock | NA | Apply insecticide to livestock in flooded areas |
| | Immature Mosquito Control | Intensify environmental mosquito population control including larviciding | Application of sustained release larval mosquito insecticides to prevent emergence of virus infected <i>Aedes</i> mosquitoes |

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| | | | Start treatment of typical larvicides such as ABATE to prevent emergence of secondary mosquito vectors in the genus Culex |
| Trade | Notify trade partners | NA | Notify trade partners that vaccination coverage has been extended. Remind trade partners of OIE policy regarding vaccination, and provide evidence of compliance that allows for continuation of trade Notify trader association and other stakeholders that localized control measures (vaccination, vector control, movement restrictions) have been implemented in catchment areas and/or along the supply chain affected by localized flooding |
| Funding | Donors | Mobilize resources needed for response | Funds available and in use Include donors on multi-sectorial committees and emergency/ task force committees |
| | Emergency RVF funds | Source for contingency funds | Mobilize local-level disaster funds for use by DVO Mobilize national disaster funds for use by DVS Mobilize resources to support trader associations in monitoring main livestock markets and supply chains |
| Research on Risk, impact and climate change assessment | | Monitor vector dynamics in relation to water levels | Vector dynamics in relation to water levels |
| | Risk assessment | Review and update rapid risk assessment | Review and update rapid risk assessment |

Table 4: Interventions during Outbreak Phase

| FIRST DETECTION OF SUSPECTED RVF IN LIVESTOCK OR HUMANS | | | |
|--|---|---|---|
| Category | Activity | HUMAN HEALTH | ANIMAL HEALTH |
| Technical Capacity | Mobilization/Deployment | Mobilize and deploy personnel required for joint response to affected areas | Coordination, surveillance and disease control human and material resources fully mobilized |
| Communication, advocacy and awareness | Public awareness | Intensify public health education emphasizing on recognition and prevention of transmission | Information for livestock keepers on vaccination of livestock in at-risk areas Public/animal health information about protecting families and livestock in at-risk areas Encourage reporting of mosquito swarms and suspected RVF cases (i.e. abortion in adults and high morbidity and mortality in young stock) Information on sanitary slaughter Information on RVF for general public, consumer awareness messages through posters, radios, provincial administration <i>barasas</i> , field days etc Involve local leaders e.g. church elders, community elders |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS/CMO | RVF technical committees meet regularly to review preparedness and response Deploy joint (One Health) rapid response teams | Deploy joint (One Health) rapid response teams Oversee communication messages (ensure consistency of messages from livestock and public health sectors) Oversee mobilization of funds Oversee collaboration between ministries |

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| | | | <p>Oversee activities of NGOs</p> <p>Oversee implementation of control strategy</p> |
| | Local (County, State, etc.) RVF management committees | Deploy joint (One Health) sub-national RVF rapid response teams | <p>Deploy joint (One Health) sub-national RVF rapid response teams</p> <p>Support active searching (flooding, mosquitoes, disease) and community reporting to DVO</p> <p>Implement prevention and control activities</p> <p>Sustained public awareness</p> |
| | RECs | Hold regional TWG meeting to prepare in case a regional response is warranted | <p>Coordinate trade issues</p> <p>Coordination of vaccine supply in at-risk countries</p> |
| Surveillance | Local ground truthing | <p>Provide feedback to early warning systems</p> <p>Convene a meeting of international and national expert focal points to fully understand the floods</p> <p>Continue monitoring weekly rainfall data</p> <p>Maintain community surveillance</p> | <p>Continue local networks for monitoring of local conditions and public health events associated with flooding</p> <p>Continue monitoring livestock markets fed by catchment areas affected by mosquito swarms or first detection of RVF and continue local networks across supply chains</p> |
| | PS for early outbreak detection | Maintain community level surveillance | <p><i>Mosquito swarms</i> – Expand coverage to include affected and adjacent areas</p> <p><i>First detection of suspect case</i> – Expand to include affected area and adjacent districts</p> |
| | Active surveillance | <p>Regularly analyze the trends in acute febrile illnesses (AFI) cases in health facilities</p> <p>Intensify the use of RVF standard case definition</p> | <p><i>Mosquito swarms</i> – Expand active monitoring of meteorological and vector situations through PS and community systems to include affected and adjacent areas. Collect mosquito samples for analysis</p> |

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| | | | <i>First detection of suspect case</i> – Expand to include affected area and adjacent districts |
| | Sero-surveillance | NA | <i>Mosquito swarms</i> – Begin randomized sero-surveillance in areas experiencing mosquito swarms <i>First detection of suspect case</i> – Expand to include adjacent areas |
| | Definitive laboratory diagnosis | Ensure all cases meeting standard case definition are tested Provide efficient system for shipping specimen to the reference laboratories | Virus isolation and identification in suspect cases Identification of mosquito species and virus isolation |
| Disease prevention and control | Vaccination | <u>NA</u> | <u>Do not vaccinate</u> in areas with mosquito swarms or suspect livestock cases Vaccination of livestock in adjoining areas should be considered if feasible |
| | Case management | Ensure availability of required medicines and health supplies Intensify prevention measures such as use of LLITNs | Carry out in areas where vaccination has been eliminated as a strategy |
| Vector control | Insecticide impregnated nets | Ensure mosquito net availability and use in the community | NA |
| | Immature Mosquito Control | Destroy breeding sites and/or application of larvicides | Continue application of sustained release larval mosquito insecticides to prevent emergence of virus infected <i>Aedes</i> mosquitoes Continue treatment of typical larvicides such as ABATE to prevent emergence of secondary mosquito vectors in the genus Culex |
| | Insecticides applied to | NA | Apply insecticide to livestock in flooded |

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| | livestock | | areas if feasible |
| | Adult Mosquito Control | Intensify integrated vector control | As feasible, use of ground, helicopter, and/or aerial application of WHO approved adulticide mosquito control products. Use both ULV and thermal fog techniques to maximize control of virus infected/transmitting adult mosquitoes |
| Trade | Movement control and quarantine | NA | Preventing animals from infected areas entering export markets |
| Funding | Emergency RVF fund | Ensure prompt release of contingency funds | Ensure funding |
| Research on Risk, impact and climate change assessment | Prepare for joint outbreak investigation | Design joint outbreak investigation study including risk factors | Design joint outbreak investigation study including risk factors Vector dynamics in relation to water levels |
| | Proper record keeping | | To enable lessons to be learned to improve future prevention and control responses |
| LABORATORY CONFIRMATION OF RVF CASES IN LIVESTOCK OR HUMANS³ | | | |
| Technical Capacity | Mobilization of required personnel | Continuous mobilization and deployment of required personnel Sensitization of personnel in adjacent areas | Capacity at all levels mobilized Continuous mobilization and deployment of required personnel Sensitization of personnel in adjacent areas |
| Communication, advocacy and awareness | Public awareness | Intensify public health education in line with the existing communication strategy Continuous engagement of the media and public on progress in outbreak control | Information for livestock keepers on vaccination of livestock in at-risk areas Information in affected areas about sanitary slaughter Public/animal health information about protecting families and livestock in at-risk areas |

³ The activities listed under these events are the same - except that the event 'Laboratory confirmation of RVF cases in livestock' requires reporting to OIE

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| | | | <p>Encourage reporting of mosquito swarms and suspected RVF cases</p> <p>Information on RVF for general public, consumer awareness messages</p> <p>Expand awareness and advocacy activities to include policy makers, law enforcers, politicians, and other decision-makers</p> |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS | <p>Oversee joint response and regularly review progress of the outbreak response</p> <p>Advise the line ministries on control measures</p> <p>Work with, support and coordinate sub-national response</p> | <p>Oversee communication messages (ensure consistency of messages from livestock and public health sectors)</p> <p>Oversee mobilization of funds</p> <p>Oversee collaboration between ministries</p> <p>Oversee activities of NGOs</p> <p>Oversee implementation of control strategy</p> |
| | Local (County, State, etc.) RVF management committees | <p>Manage joint outbreak response measures at the local level</p> <p>Provide daily reports on progress in outbreak control to the national level</p> | <p>Continuation</p> <p>Support active searching (flooding, mosquitoes, disease) and community reporting to DVO</p> <p>Implement prevention and control activities</p> <p>Sustained public awareness</p> |
| | East African Community/RECs | <p>Continuously share outbreak information with member states</p> <p>Jointly assess the magnitude of outbreak, if threshold for joint response is met then deploy technical teams to affected areas</p> | <p>Coordinate trade issues</p> |
| Surveillance | PS for early outbreak detection | <p>Sustain event based and indicator based (participatory/community) surveillance</p> <p>Report all cases to WHO</p> | <p>Expand to adjacent districts</p> |
| | Active surveillance | <p>Conduct active case search in health facilities and community</p> | <p>Expand to adjacent districts</p> |

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| | Sero-surveillance | NA | Expand to include adjacent areas with mosquito swarms |
| | Definitive laboratory diagnosis | Continue laboratory support for confirmation in new areas, monitoring progress and confirming the end of the outbreak | Virus isolation and identification in suspect cases Identification of mosquito species and virus isolation |
| Disease prevention and control | Vaccination | <u>NA</u> | <u>Do not vaccinate</u> in areas where RVF is suspected or confirmed |
| | Case Management | Manage all cases in accordance with case management guidelines | Carry out supportive treatment in areas where vaccination has been eliminated as a strategy |
| | Safe slaughter | NA | Institute safe slaughter in approved facilities through protection of employees, proper aging of meat and veterinary inspection |
| | Movement control | NA | Prevent movement of animals from infected areas to disease free areas to protect national livestock-derived food markets, but this is very unlikely to prevent spread of the outbreak. Involve traders associations in enforcing movement restrictions and ensure that animals entering the supply chain are identified |
| Vector control | | | Move to reassure communities and minimize incidence of malaria: unlikely to have any impact on RVF transmission to people |
| | Control of Immature Mosquito Vectors | Destroy breeding sites and/or application of larvicides | Continued application of sustained release larval mosquito insecticides to prevent emergence of virus infected <i>Aedes</i> mosquitoes Continue treatment of typical larvicides such as ABATE to prevent emergence of secondary mosquito vectors in the genus |

| | | | |
|---|-----------------------------------|--|--|
| | | | <i>Culex</i> |
| | Insecticides applied to livestock | | Apply insecticide to livestock in flooded areas if feasible |
| | Control of Adult Mosquito Vectors | Ensure continuous use Insecticide impregnated nets in the community implement integrated vector management measures | As feasible, use of ground, helicopter, and aerial application of WHO approved adulticide mosquito control products. Use both ULV and thermal fog techniques to maximize control of virus infected/transmitting adult mosquitoes |
| Trade | Movement control | NA | Preventing animals from infected area entering supply chains and export markets |
| | Notify OIE and trade stakeholders | NA | Laboratory confirmation of RVF cases in livestock: Formal notification to OIE and national trade stakeholders of confirmation of RVF by respective DVS with appropriate movement restrictions and slaughter bans |
| Funding | Emergency RVF funds | Ensure prompt release of contingency funds | Continue to make available in high-risk and adjacent areas |
| | Donor funds | | Continue funding for neighboring/adjacent high-risk areas |
| Research on Risk, impact and climate change assessment | | Conduct joint research on: Vector dynamics in relation to water levels Mapping spatio-temporal distribution of human and livestock cases Metagenomics to characterize RVFV isolates | Vector dynamics in relation to water levels Mapping spatio-temporal distribution of human and livestock cases Metagenomics to characterize RVFV isolates |
| | Proper record keeping | Ensure line listing all cases and filling of case based surveillance forms | To enable lessons to be learned to improve future prevention and control responses |

Table 5: Interventions when there are No new clinical livestock cases for 45 days

| Category | Activity | HUMAN HEALTH | ANIMAL HEALTH |
|--|---|--|--|
| Capacity | Assessment | Maintain outbreak response teams in place | Assess performance of material and human capacity in areas of communication, coordination, risk assessment, surveillance and disease control |
| Communication, advocacy and awareness | Public awareness | Inform communities of the continued risk of communication | Inform communities of the continued risk of communication |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS/CMO | Continue holding regular meetings to review the outbreak situation | Review and document lessons learnt from RVF epidemic |
| Early warning | International RVF early warning systems | NA | Revert to practice of monitoring early warning systems |
| Surveillance | monitor for confirmation of end of outbreak | Continue with routine surveillance Systematic sampling and testing of AFI cases | Revert to inter-epidemic surveillance practices |
| Disease prevention and control | RVF prevention and control measures | Maintain prevention and control measures implemented during outbreak | Revert to inter-epidemic practices |
| Vector control | | Continue with integrated vector control | Revert to inter-epidemic practices |
| Trade | Update trading partners | NA | Advise trading partners of current RVF disease status |
| Funding | Emergency RVF fund | Evaluate the amount of resources available and replenish exhausted ones | Switch from prevention and control to funding of recovery phase |
| Recovery | Needs assessment of affected communities | Provide psychosocial support | Assess needs within affected communities and at all stages of livestock value chains and related livelihoods Target available funding to most needy |
| Research on Risk, impact and | | | Research on incentives and practices, risk factors for exposure and human health |

| | | | |
|----------------------------------|-------------------|--|---|
| climate change assessment | | | seeking behavior |
| | Impact assessment | Conduct joint socio-economic impact assessment | Assess impact of epidemic within affected communities and on local and national economies |
| | Lessons learned | Document and disseminate lessons learnt/good practices | Discern lessons learnt to inform future prevention and control activities |

Table 6: Interventions during Post-outbreak Recovery and Reflection

| Category | Activity | HUMAN HEALTH | ANIMAL HEALTH |
|--|---|--|--|
| Communication, advocacy and awareness | Feedback | Declare end of the outbreak and continue with routine risk reducing messages | Disseminate findings of lessons learnt |
| National and regional coordination | Multi-sectoral technical committee under co-chairmanship of DVS and DMS | Review outbreak preparedness, response and capacity | Review and document lessons learnt from RVF epidemic every three years |
| Surveillance | Sentinel herds/sites | Continue with existing sentinel surveillance | Placement of new sentinel herds in high-risk areas |
| Disease prevention and control | RVF prevention and control measures | Revert to routine risk reduction activities | Revert to normal inter-epidemic practices |
| Vector control | | Continue with integrated vector control | Not applicable at this stage |
| Trade | Promotion of domestic, regional and international trade | NA | Ensure trading partners are aware of current RVF disease status and carry out confidence building measures to rebuild domestic, regional and international trade |
| Funding | Emergency RVF fund | replenish exhausted funds and lobby for additional if required | Switch from prevention and control to funding of recovery phase |
| Recovery | Credit Grants | Provide psychosocial support | Implement recovery activities based on needs assessment and prioritization |
| Institutions and policies | Lessons learned | Update the contingency plan | Review lessons learned and consider |

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|--|--------------------------|--|--|
| | | | implications for institutions and policies |
| Research on Risk, impact assessment and risk assessment | | Conduct joint socio-economic impact assessment | |
| | Impact assessment | | Finalize and disseminate impact assessment study |
| | Lessons learned | Document and disseminate lessons learnt/good practices | Finalize and disseminate lessons learnt to inform future prevention and control activities |
| | Active sero-surveillance | NA | Determine herd immunity post vaccination |

4 References

Consultative Group for RVF Decision Support, 2010. Decision-Support Tool for Prevention and Control of Rift Valley Fever Epizootics in the Greater Horn of Africa. American Journal of Tropical Medicine and Hygiene. 83(Suppl 2), 75–85.

F. Glyn Davies and Vincent Martin (2003). Recognizing Rift Valley fever. Food and Agriculture Organization of the United Nations, Rome

<http://www.fao.org/DOCREP/005/Y4140E/Y4140E00.HTM>

<http://www.fao.org/DOCREP/006/Y4611E/Y4611E00.HTM>

ILRI and GoK (2008). Learning the lessons of Rift Valley fever: improved detection and mitigation of outbreaks. Participatory assessment of Rift Valley fever surveillance and rapid response activities. ILRI project report, Nairobi, Kenya

William A. Geering and F. Glyn Davies with additions by Vincent Martin (2002). Preparation of Rift Valley Fever Contingency Plans. FAO Animal Health Manual No. 15. Food and Agriculture Organization of the United Nations, Rome

