# OCCURRENCE OF RIFT VALLEY FEVER (RVF) IN DODOMA REGION, TANZANIA AND ITS MANAGEMENT IMPLICATIONS

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## ABSTRACT

Rift Valley Fever (RVF) is a peracute or acute febrile zoonotic mosquito-borne viral disease affecting wildlife, domestic animals and occasionally humans. It occurs after heavy rains and floods and is transmitted to humans through infected mosquito bite or handling of infected animals and/or their products. The Dodoma Regional Authority received reports from 90 villages on possibility of occurrence of RVF in livestock in December 2006. About 315 animals were suspected of being infected by the disease. This was followed by the Dodoma Regional and District hospitals, receiving several patients from different parts of the region in critical conditions in January 2007. Blood samples were collected for disease examination. While waiting for the results the patients were treated for malaria and/or meningitis based on visual/ clinical signs. However, most of the patients did not recover and the situation worsened followed by several deaths. Most of the blood samples were negative for Malaria and/or meningitis. This led to suspicion of RVF. The number of RVF suspects however, declined from an average of 18% in March to 11 % in April 2007 suggesting reduced incidence of the disease. The objective of our study was to determine possibility RVF occurrence to humans by using case study definitions for RVF suspect's, and confirmation by laboratory analysis in order to develop appropriate management program for the unfamiliar disease. Blood samples and/ or postmortem biopsies from all RVF suspected patients were submitted in Nairobi-Kenya for laboratory confirmation. Among 130 suspects, 71 were RVF positive. Although there was no specific treatment used to treat the disease other than provision of supportive treatment, more than fifty percent of the infected patients were discharged within two weeks. The supportive treatment included analgesic, antimicrobial and antiepileptic drugs, fluid and electrolyte therapy, food and oxygenation and intensive care. The major management used in Dodoma included preventive measures such as livestock movement quarantine, health education campaigns, livestock vaccination, disinfecting livestock carcasses and vector management and intensified surveillance. We recommend development of capacity for confirming RVF in the country and strengthening the disease surveillance and communication among communities. A retrospective household survey should be implementing to determine number of deaths and or patients with similar symptoms that occurred since January 2007 to date. This may give an indication of the extent of RVF incidence in Dodoma.

**Key words**: Rift Valley fever – zoonotic - re-emerging – human – Dodoma - Aedes mosquito

## INTRODUCTION

Rift Valley fever is a peracute or acute zoonotic viral disease affecting both wildlife and domestic animals and sometimes humans. The disease is transmitted from animals to humans through flood-water *Aedes* mosquitoes which are the principal vectors and inter-epizootic reservoir for RVF virus in eastern Africa (WHO 2007). The RVF virus belongs to Phlebovirus genus, a member among five genera in the family Bunyaviridae. It has three segmented single stranded, negative sense RNA genome. The disease occurs in Africa mostly in countries where the rift valley passes such as Tanzania, Kenya, Somalia, Ethiopia and Sudan. Usually it occurs as an outbreak during or after heavy rains and floods. The disease is considered to be cyclic with inter epidemic periods of 5 - 20 years (Mokiti, 2007, WHO, 2007).

During the period of outbreaks, slaughtering, skinning, and eating meat or drinking raw milk from infected animals can enhance transmission of the disease. Also, it is transmitted through handling or contact with blood or body fluids from infected animals or humans. Animals, which are affected by RVF mostly, include water buffalo sheep, cattle, goat and camels. In most cases the disease is not detected because most adult animals that are infected by this disease recover on their own within seven days without showing clinical signs. Whereas adult animals normally do not die, the majority of them abort or experience stillbirth. Most of the affected young animals die at 100 percent without showing clinical signs. Due to the outbreak nature and in-conspicuousness of the disease presentation, most people are taken by surprise and it may take several days to months before the disease been recognized.

The incubation period of the disease in wildlife and domestic animals varies from 2 - 6 days, followed by high fever, vomiting, diarrhoea and increased abortion (Mokiti Personal observation). In humans the incubation period also varies from 2 – 7 days, followed by influenza–like illness, with sudden onset of fever, headache and backache. Most of the infected people recover within a week but in severe cases, patients develop complications such as vomiting blood, bleeding from nose, gums and ears, loss of vision, mental disturbances and finally death. The major management options in animals include vector control, quarantine and vaccination of susceptible animals and disinfection and disposal of carcasses. In humans it involves prevention, health education campaigns, supervised slaughtering and intensified surveillance. Most human cases of RVF are uncomplicated, of short duration and self-limiting. There is no specific treatment for RVF other than supportive treatment, which includes analgesic, antimicrobial and antiepileptic drugs, fluid and electrolyte management, oxygenation and intensive care.

The Ministry of Health and Community Development of Tanzania received reports on occurrence of unfamiliar disease from several regions since 31st January 2007. Up to end of March 2007, The disease was reported to have occurred in Manyara, Tanga, Dodoma, Singida, Morogoro and Dar es Salam regions, infecting 113 humans with 33 deaths (Kiangi 2007 unpublished). Until end of March 2007, the disease was unconfirmed and its causative agent, unidentified. The patients were treated for malaria and/or meningitis without recovering. Most of the blood samples analyzed did not reveal malaria and meningitis. The rapid increase and spread of the disease throughout the region prompted the Dodoma Regional Medical Officer and the main author of this paper to carryout a quick and intensive study to determine what the problem was, confirm presence of RVF and develop an appropriate management of the disease. The symptoms of the unfamiliar disease were similar to those of RVF. Since RVF is a cyclic (5-20 years) disease (Kaswala and Kimera 2007, Mokiti 2007), and because it occurred in Tanzania in the past without being recognized or documented, it was justifiable to conduct the study, determine its occurrence,, confirm and document the important event in the history of emerging and re-emerging diseases in Tanzania. Therefore, the main objective of the study or observation was to determine what was the unfamiliar disease was, confirm presence of RVF and propose appropriate sustainable management practices. The studies therefore, aimed at generating information on the unfamiliar disease by: determining the possibility of occurrence of RVF in Dodoma, Confirming that the unfamiliar

disease(s) of which patients admitted at various health centres in February. 2007 at critical condition was RVF, Establishing surveillance system and manage RVF patients Dodoma region if confirmed to be RVF positive and Assessing factors responsible for high incidences of the disease in Dodoma region compared to other regions.

## MATERIALS AND METHODS

### Study site

The study was mainly conducted at the Dodoma Regional and Mirembe hospitals where patients at critical condition, suffering from unfamiliar disease(s) were admitted in February 2007. Other health centres which admitted similar patients during the time of study included all Dodoma district hospitals (Mpwapwa, Kongwa and Kondoa), Mvumi, Mtitaa and Haneti.

### Interview with health personnel, meat vendors and relatives of diseased

A preliminary interview to get information on possible symptoms of RVF, past occurrence of RVF in Tanzania factors that are responsible for high incidence of the disease in Dodoma region was impromptuly and randomly done to 20 Dodoma regional health personnel's (Doctors, nurses and ward attendants) who were engaged in the management of RVF suspects and later RVF positive cases. A similar interview was conducted to eight butcher owners, five grilled meat vendors locally known as *nyama choma or mshikaki* within Dodoma municipality and some relatives of the diseased. It should be noted that the interview was conducted impromptuly because of nature of the disease and limited time to allow adequate planning for the study. The information obtained was supplemented by literature search using internet. The Ministry of Health and Social Welfare provided a case definition for identification of RVF early April 2007.

### Clinical observation of RVF suspects

All admitted patients were in critical conditions with clinical signs that included fever (37.5$^{o}$ C), headache, vomiting, body weakness, muscle pains and nausea. These are typical signs for malaria and meningitis.

### Preliminary diagnosis

Preliminary diagnosis was made using a standard case definition obtained from the Ministry of Health and Social Welfare Headquarters at Dar es Salaam (Box 1) for the initial diagnostic of RVF suspects

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1. **Suspected Case include:**
   - Any person of any age presenting with history of fever (or measured increased Temperature >37.5) since January 1$^{st}$ 2007 with any of the following additional symptoms; headache, muscle pain, nausea, loss of conscious and loss of vision
   - Any person who has being in direct contact with animal or animal products from a sick or dead animal
   - Any person who has been in direct contact with body fluids of an infected person
   - Any person who has recently travelled (during last week) to, or living in an area where, after heavy rains, livestock die or abort, and where RVF virus activity is suspected/confirmed

2. **Probable Case include**

**A suspected case presenting with unexplained bleeding tendencies (bloody stool, vomiting blood, coughing blood, bleeding from gums, nose, vagina, skin or eyes) or deterioration of vision or decreased consciousness.**

**Box 1 Case Definitions for Suspected RVF**

**Laboratory Examination**

Blood samples collected from all (130) RVF suspect and liver samples from dead bodies were sent to the Centre for Diseases Control and Prevention (CDC) laboratory in Nairobi, Kenya for RVF laboratory confirmation .

**Confirmed Case**

**A suspected or probable case with Laboratory confirmation of Rift Valley Fever**

**By ELISA (anti-RVFV IgM) or PCR.**

Few examples of bleeding under the skin/ mucous membrane due to RVF are shown below:

**RVF**

**RVF**

Box II: Some typical RVF Symptom: Bleeding from body parts Source Mokiti 2007

In addition to the samples collected from the admitted patients, a quick random community survey and blood samples were drawn from 30 normal health people from Fufu village in Fufu ward. The ward is about 120 kilometres south of Dodoma municipality along Iringa–Dodoma road very close to Iringa region. It is among the villages (Kongogo, Fufu, Nkhome, Chinangali II and Itiso) from which reports on high incidences of abortion and death in calves and other livestock were reported (Muniko personal comm.). Also, the Fufu ward councillor reported two human deaths feared to have contacted RVF. This war/ zone borders Iringa Rural district, where occurrence of RVF disease was confirmed earlier (Kiangi, 2007).

**Management of RVF suspects**

While waiting for the results, the patients were treated for malaria and/or meningitis. They were provided with supportive treatments including antimicrobial and analgesic drugs. Some suspects were admitted in intensive care unit and Mirembe Mental hospital following the severity of the disease. Appropriate and sustainable Regional management program was developed and implemented throughout the prior and after confirming the disease.

**RESULTS AND DISCUSSION**

**Occurrence of RVF in the world**

Rift valley fever occurs in countries that are found within the rift valley. Until September 2000 the disease had spread to Yemen and Arabia when all outbreaks were confined to the African continent (WHO, 2000, Mokiti, 2007). The first significant incidence of the disease occurred in the rift valley in Kenya in the twenty century where it was clinically diagnosed in 1918 and the virus was first isolated in sheep and found in humans in 1936 (Table 1). In most cases the occurrence is not recognized because of its nature of infection i.e. infected people and / or adult animals show clinical sign for a very short time and recover within two to seven days. Outbreak of the disease in animals can be recognized by incidence of high abortion rate and juvenile and /or mortalities in animals. In most cases livestock keepers relate abortion and juvenile mortality to other animal diseases such as tick borne disease because they are not aware of RVF. Also they believe on traditional medicine problems.

**Occurrence of RVF in Tanzania**

Rift Valley Fever has been occurring in wildlife animals, domestic animals and humans in Tanzania for many years such as during the 1997/1998 *E'lnino* rains. Several patients with clinical presentation similar to this year's were admitted to various health centres (Dodoma region health workers pers comm.), was un-noticed and undocumented until this year where its outbreak was huge and many people were affected. Almost all nurses indicated that they have seen and attended patients with similar symptoms especially during 1997 *El'nino* rains.

By end of March the disease had occurred in seven regions namely Manyara, Tanga, Dodoma, Singida, Morogoro and Dar es Salaam and 113 humans have been infected with 33 deaths (Kiangi, 2007, Table 2). By 3rd of May, the disease had occurred in 10 of 21 regions of Tanzania namely Manyara, Tanga, Dodoma, Singida, Morogoro, Iringa, Mwanza, Coast Region, Arusha and Dar es Salaam and in total 264 cases was reported and 109 died with a fatality ratio of 41% (WHO, 2007).

**Table 1: Significant events of Rift Valley Fever by year and country of occurrence**

| YEAR | EVENT | COUNTRY |
|---|---|---|
| 1918 | Earliest clinically diagnosed in humans | Kenya |
| 1936 | **Virus isolated: sheep and human** | Kenya |
| 1950 | **First occurrence in southern Africa** | South Africa |
| 1974 | **High Fever, bleeding and encephalitis first recognized** | South Africa |
| 1977 | **First occurrence outside sub-Sahara** | Egypt |
| 1987 | **First West African epidemic** | Mauritania |
| 1990 | **Outbreak related to Ecological and social changes** | Madagascar |
| 1997/98 | Huge outbreak due heavy rains (*El'nino*); un-recognized in most places | East Africa |
| 1997/98 | Major outbreak Approximately 89,000 suspects and 250 deaths | Kenya & Somalia |
| Sept 2000 | **First time RVF reported outside Africa** | Arabia & Yemen |
| 2006/2007 | Major occurrence with many fatalities | Kenya/ Tanzania |

Source: WHO 2000, Mokiti, 2007

Most of human cases came from Dodoma. The disease had also occurred and infected several animals in the above-mentioned regions and also in Iringa region. The occurrence of RVF in Tanzania this year, was because of the excessive heavy rains that occurred from the end of 2006 (October and November) and continued up to March 2007 (Figure 1). The disease is transovarially transmitted in flooding water by mosquitoes especially the *Aedes*. Prolonged flooding leads to high populations of mosquitoes, which are capable of transmitting the virus to both large wildlife populations and domestic animals. Although the construction of highway such as the Dar es Salam - Dodoma, Moshi - Karatu and Dar- es Salaam - Zambia highways have positive impact on delivery and communication, it leads to eruption of diseases. Several trenches have been excavated along these highways. These accumulate lots of water, which consequently create favorable environment for both wildlife and domestic animals.

**Incidence of RVF in Livestock and Humans in Dodoma**

The incidence of RVF to animals in Dodoma was noted and reported to the Ministry of Livestock Development in early January 2007. By 31 March reports were received from 90 villages of which 200, 441 cattle, 81,945 goats

and 37,779 sheep were considered infected with the virus (Muniko 2007). The disease was suspected due to high rates of abortion and mortality among livestock. This was followed by influx of human suspects of RVF admitted to several health centers in early February.

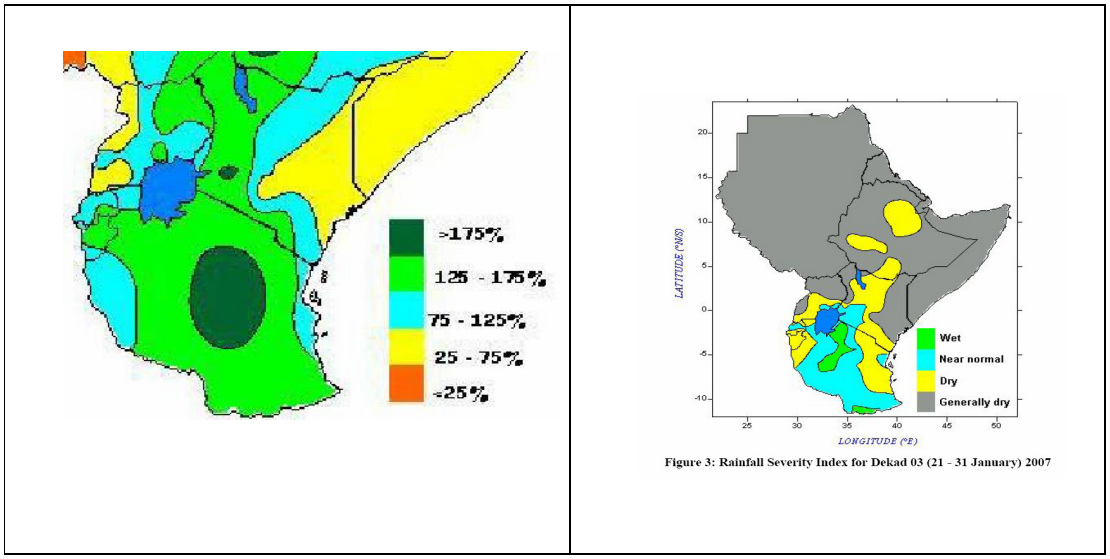


Figure 3: Rainfall Severity Index for Dekad 03 (21 - 31 January) 2007

Figure 1: Rainfall anomalies for December 2006 to February 2007 (Source Kazwala and Kimera, 2007)

By late February reports of occurrence of RVF suspects came from all six districts and by mid March, 85 suspects were admitted. Blood samples from the suspects were sent to Nairobi RVF diagnostic laboratory for further verification. Table 3 shows the number of human RVF suspects and infected patients that were admitted to various hospitals and health centres in the Region from 01 February to 24 April 2007. The number increased very rapidly and peaked at the end of March (Figure 4).The number of RVF suspects declined from an average of 18 percent in March to 11 percent in April that suggested reduced incidence of the disease. Among 130 suspects, 71 (55%) were RVF positive out of which 31 (43.7%) died, 27 (38%) on bed state and 13 (18.3%) were discharged. Two people from the community survey were RVF positive. The total number of suspects that died from other diseases was 28. This shows 45.4% case fatality of all suspects, 43.6% of positive cases and 18.3% positive discharged.

Almost 70% of the discharged RVF positive cases especially those in the young cohort recovered and discharged within two weeks after being admitted.

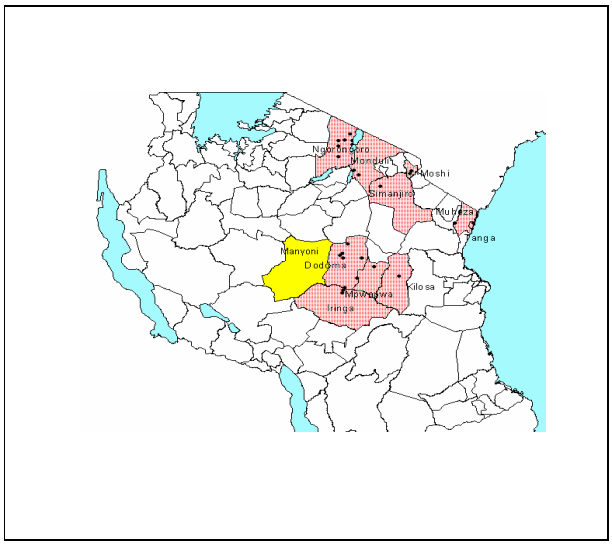


Figure 2: Districts that were affected by RVF in 2007 (Source Mokiti, 2007)

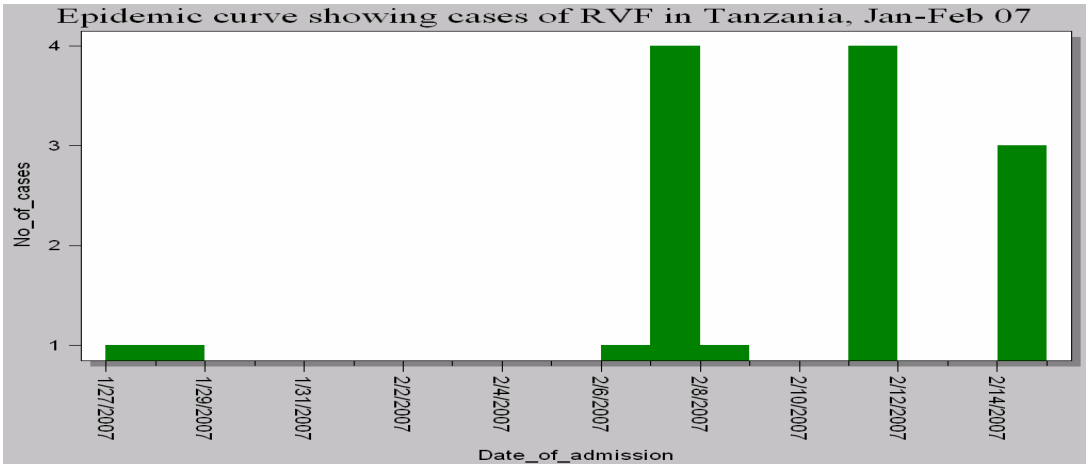


Figure 3: RVF cases in Tanzania, by February 2007

**Table 2: Situation of RVF in Tanzania by March 2007**

| Region | Arusha | Dodoma | Dar es salaam | Manyara | Morogoro | Singida | Tanga | Total |
|---|---|---|---|---|---|---|---|---|
| No of Patients | 12 | 87 | 1 | 5 | 4 | 9 | 1 | 119 |
| No Hospitalised | 0 | 52 | 0 | 0 | 1 | 6 | 0 | 59 |
| No Discharged | 9 | 13 | 0 | 1 | 1 | 3 | 0 | 27 |
| Death | 3 | 22 | 1 | 4 | 2 | 0 | 1 | 33 |
| Number of blood samples | 12 | 87 | 1 | 5 | 4 | 9 | 1 | 119 |
| RVF positive samples | 6 | 43 | 0 | 3 | 2 | 0 | 1 | 57 |

Source: Kiangi, (2007) WHO 2007

The majority of the suspects (more than 93%) came from within the region and the rest from neighbouring districts of Kiteto, Manyoni and Kilosa in Manyara, Singida and Morogoro regions respectively (Table 4). In Dodoma, the highest number of suspects (35%) was from Dodoma Urban, followed by Bahi (21%), Chamwino (19%), Kondoa and Mpwapwa (8%), and Kiteto (3%) and Manyoni and Kilosa (1%) each.

The high number of suspects from Dodoma urban does not necessarily indicate that the prevalence of RVF was highest in this district but it may be because of closeness and easy accessibility to health centres and more people especially meat vendors that handle or are in direct contact with animals (meat) at slaughter houses and meat selling places.

Dodoma municipality being a centre of activity receives people from various parts of the country such as Singida, Shinyanga, and Arusha and Iringa regions. In addition, the people or travellers in Dodoma municipality are believed to be relatively well off with high purchasing power. They buy and consume lots of roast meat almost every day and especially on Saturday at Kizota market place where more than 30 cattle, 50 goats and 20 sheep are slaughtered and consumed (Personal observation). The animals come from different parts of the region and country. Nevertheless, the relative low incidence of suspects or infected people in other district possibly is because of the fact that majority of the

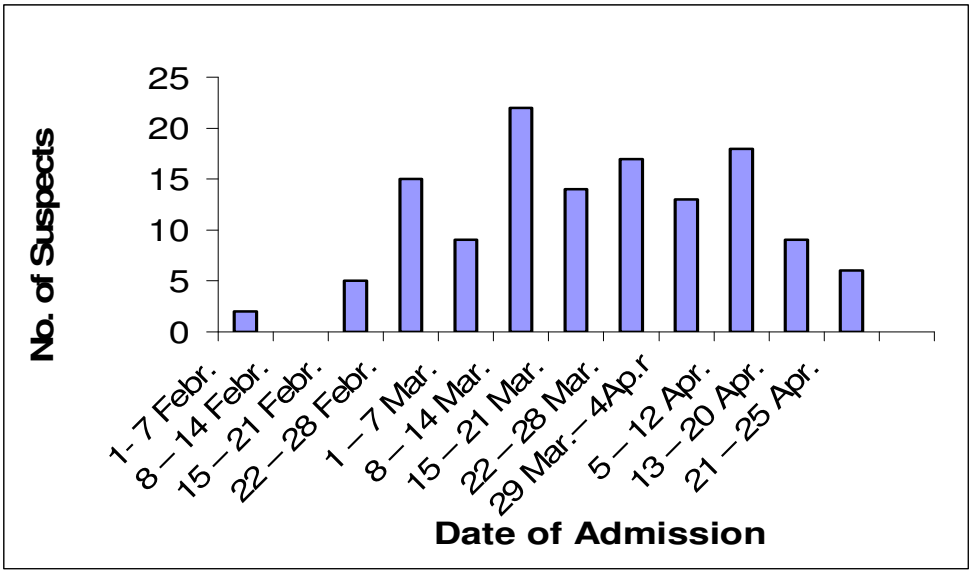


**Figure 4: Weekly admission of RVF suspects admitted at Dodoma Hospitals by April 2007**

**Table 3 Number of patients admitted at various health centres and RVF laboratory results from Dodoma Region by April 2007**

| Health Facility | TSP | +Ve cases | NR | * Ind | +ve Died | S Died | Ind Died | SD | + Ve D | SH |
|---|---|---|---|---|---|---|---|---|---|---|
| Regional HP | 78 | 42 | 34 | 2 | 19 | 19 | 2 | 8 | 6 | 24 |
| Mirembe HP | 28 | 15 | 13 | | 5 | 2 | | 4 | 2 | 15 |
| Mpwapwa HP | 5 | 3 | 2 | | 2 | 1 | | 1 | 1 | 0 |
| Kongwa HP | 3 | 2 | 1 | | 1 | 1 | | 0 | 0 | 1 |
| Mvumi RHC | 5 | 2 | 3 | | 0 | 1 | | 1 | 1 | 2 |
| Kondoa HP | 6 | 5 | 1 | 0 | 2 | - | | 1 | 3 | 0 |
| Haneti RHC | 3 | 2 | 1 | | 2 | 1 | | 0 | 0 | 0 |
| Mtitaa RHC | 2 | 0 | 2 | | 0 | 1 | | 0 | 0 | 0 |
| Total | 130 | 71 | 57 | 2 | 31 | 26 | 2 | 16 | 16 | 42 |

TSP = Total suspects, NR = Sample results not received, Ind = Cause of death not determined, S = Suspect, D = Discharge and SH = Still hospitalised

villages are located in remote areas where health centres are not easily accessible. Also, majority of people and livestock keepers move from one area to another searching for good pastures. A quick survey in Loge area which is about 200 km from the Dodoma municipality revealed two RVF infected people. This shows that there is possibility of more infected persons in remote areas in the region.

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**Symptoms on admission date and their development**

All admitted patients were in critical conditions with the following symptoms: fever, increased temperature 37.5$^{o}$ C, headache, vomiting, body weakness, muscle pains and nausea. These are typical signs for malaria and meningitis. Treatment against malaria and / or meningitis however, showed no response. The situation worsened and some patients started to show typical RVF symptoms including impaired vision, emaciation, bleeding from various parts of the body, loss of memory and convulsions.

**Table 4: Distribution of RVF cases and death by district by April 2007**

| District | Female | Male | Total Cases | Percent | Death | **Percent Death |
|---|---|---|---|---|---|---|
| Dodoma (U) | 17 | 28 | 45 | 34.62 | 25 | 55.56 |
| Bahi | 10 | 19 | 28 | 21.54 | 10 | 35.71 |
| Chamwino | 11 | 14 | 25 | 19.23 | 9 | 36.00 |
| Kondoa | 3 | 8 | 11 | 8.46 | 5 | 45.54 |
| Mpwapwa | 5 | 5 | 10 | 7.69 | 4 | 40.00 |
| Kiteto* | 1 | 4 | 5 | 3.84 | 3 | 60.00 |
| Manyoni* | 0 | 3 | 3 | 2.3 | 1 | 33.33 |
| Kilosa* | 1 | 0 | 1 | 0.77 | 1 | 100.00 |
| **Total** | **48** | **82** | **130** | **100.00** | **59** | ***45.38 |

* Patients from other regions ** Within District *** Case mortality all suspects

**Death for RVF positive patients**

About fifty percent (50%) of the patients died within the first month after being admitted. Although the onset of the disease was reported to occur on 22nd January 2007, as reported by relatives of the diseased, we used the date of admission as bases for discussion in this paper. We assumed the reports from relatives might not be reliable hence misleading. Among the RVF discharged patients, more than 99 percent recovered completely. The incidence of the positive cases and death in Dodoma region was higher than in other regions, which were infected by the disease (Table 2.) There are many factors, which account for this, but the first reason is that most indigenous people (Wagogo) in Dodoma drink raw milk, eat raw meat (is this true or they consume inadequately cooked meat?) and meat from dead animals without considering whether the animal's death is due to diseases or other causes. All recovered patients and or their relatives and respondents from Fufu community indicated that traditionally Dodoma people consume meat from dead animals. They rarely slaughter animals for household consumption. Some respondents reported to have been educated on the ill effects of consuming raw meat and milk, meat from dead animals, they still eat these products and they even dig up buried carcases. Most of the respondents explained that this is a traditional norm for all livestock keepers with the exception of the Masai people who slaughter healthier animals for consumption; and normally do not consume meat from dead animals.

The patients that were still hospitalised at the Regional and Mirembe hospitals were showing good sign of recovery. This supports earlier observations that the disease is self-limiting; and people that are infected with the disease may recover without any treatment. However, some patients showed complications such as mental disorders and/ or confusion and loss of vision. Children became excessively talkative and some adults became aggressive to the extent of fighting. For example, three adult patients became very aggressive, that have been transferred to Mirembe Mental Referral Hospital. It is believed that the aggression may also be associated to HIV infection. (I suggest for deletion of this sentence as there is no connection) Four patients remained unconscious for almost two months.

**RVF among sex and age groups**

In all district, with the exemption of Mpwapwa, males were more infected than females. The higher prevalence in males than in females, possibly, is because males are more exposed to infected animals, as they are more involved in animal herding, handling and slaughtering and meat vendoring than women. Both the Dodoma Regional Medical Officer (RMO) and Regional Health officer and other interviewed hospital personnel were on the opinion that the incidence of the disease in Dodoma region was well above the number of suspects admitted in various hospitals and confirmed cases. This is because the patients admitted were referral cases from various dispensaries and health centres. The majority of the villages are located in the interior where health centres are not easily accessible. Most of the interviewed health officers reported that, although, this is the first time the disease has occurred or recognised and managed intensively in the region, it is possible that the disease had occurred in the region in the past. They reported to have seen patients with similar symptoms in the past but they were treated for Malaria or meningitis and the majority of them died. The Iringa region and Kilolo district livestock advisors reported that the disease was observed in Kilolo District since September 2006 (Pers. Comm.), this substantiated the explanation that the disease had occurring before in the past in Tanzania without being recognized. High rate of abortion of livestock was observed during this time but was not reported since livestock keepers assumed that the abortion was due to other diseases such as brucellosis.

The study also indicates that there was a variation of death within and among age groups (Table 5). The older cohort (61-70 years) was more affected possibly because of decline of immunity and weakness. The high death rate for the age group between 31 and 50 years is contrary to normal population growth models in that we expected this group to recover faster than the other age groups with the exception of young cohort. The high death rate and low recovery possibly is because the patients had been infected with the disease for a long time before coming for supportive treatment. It should be noted there is no treatment for RVF.

**Table 5: Percent and number of RVF Suspects and + ve cases by age by April 2007**

| Age Group (years) | SUSPECTS | | + ve cases | | | | |
|---|---|---|---|---|---|---|---|
| | No | % | No | Discharge | Bed-state | Died | % Died |
| 1-10 | 2 | 1.5 | 1 | 1 | 0 | 0 | 0.0 |
| 11 - 20 | 20 | 15.4 | 7 | 2 | 3 | 2 | 28.6 |
| 21 - 30 | 19 | 14.6 | 10 | 3 | 6 | 1 | 10.0 |
| 31 - 40 | 25 | 19.2 | 16 | 3 | 7 | 6 | 37.5 |
| 41 - 50 | 20 | 15.4 | 15 | 2 | 5 | 8 | 53.3 |
| 51 - 60 | 18 | 13.8 | 10 | 1 | 4 | 5 | 50.0 |
| 61 - 70 | 19 | 14.6 | 9 | 1 | 2 | 6 | 66.7 |
| 71 - 80 | 7 | 5.4 | 3 | 0 | 0 | 3 | 100.0 |
| Total | 130 | 100.0 | 71 | 13 | 27 | 31 | |

**Management, Chalenges and Recommendations**

**Management**

Management and control of the disease was conducted using preventive measures and supportive treatment for both suspects and infected humans.

**Preventative services**

Immediately after the region suspected the occurrence of the disease, a report was sent to the Ministry of Health and Social Welfare. Community health education campaign programmes on prevention of the disease were conducted throughout the region beginning with health workers who in turn disseminated the information to the communities (WHO, 2007). The information was also disseminated to all communities through mass media and leaflets. This was emphasised by the President of the United Republic of Tanzania on. Jakaya Mrisho Kikwete on 30th March 2007 on his end of the month address to the whole nation (Ref)
The following are some of the preventive measures:

- Creation of awareness on the risk of eating dead animals, raw meat and milk and understanding the symptoms of RVF in humans and livestock.
- Insecticide application to potential mosquito breeding sites during periods of epizootic RVF virus activity.
- Use of mosquito nets with repellents or mosquito killers.
- Vaccination of a modified live virus from Smithburn neorotropic strain (SNS) was administered to several livestock within and outside the region
- People who handle livestock products should wear protective devices such as gloves, boots, overcoats, etc; when slaughtering animals and selling or preparing meat.

1. Supervised livestock slaughtering and intensified surveillance/active surveillance.
2. Communities should be advised to do the following:

(i) Avoiding consuming raw or semi-cooked meat and milk
(ii) Proper washing of items (knives, machetes and axes) that have been used in slaughtering of animals or preparing meat.
(iii) Proper hand washing with soap before and after meat preparation.

**Treatment of infected persons**

Being a viral disease without specific treatment and the fact that human RVF cases are uncomplicated, of short duration and self-limiting, the patients were provided with supportive therapy. The supportive treatment included analgesic, antimicrobial and anti-epileptic drugs, fluid and electrolyte management, food and oxygenation and intensive care.

**Challenges**

Among the challenges, which were faced, include:

- Most people including health personnel were not aware of the symptoms of Rift valley Fever.
- Initially the disease was diagnosed as malaria and/or meningitis
- At the beginning there was lack of funds to carry out survey and surveillance of the disease.
- The RVF vaccine was not available in the country and in addition, it was very expensive and not affordable by individual livestock keepers
- There was no laboratory capacity to confirm the disease in the country even for initial diagnosis to suspect presence of RVF.
- Some villages were very far and in remote areas with lack health facilities.
- There was weak collaboration between Ministry of Health and Social Welfare (MOHSW) and Ministry of Livestock Development (MOLD)
- There were a weak and /or lack of preparedness plan.
- Inadequate communication between various stakeholders/sectors.

**Recommendations**

Considering the management and challenges we would like to recommend the following:

- Building of RVF confirming laboratory in the country
- Strengthening the communication between various stakeholders/sectors
- Strengthening the disease surveillance.
- Conduct and intensify health education campaigns to the community and health workers
- Conduct a household, dispensaries and health centre survey so as to determine number of deaths and or patients with similar symptoms that have occurred since January to date. This may give an indication of the extent of RVF in Dodoma
- Continue training of health workers on the identification and management of RVF in all regions and districts in Tanzania
- Continue with community awareness creation on the understandings of RVF disease symptoms in animals and humans.

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