

Rift Valley Fever

What is Rift Valley Fever?

Rift Valley fever (RVF) is a peracute or acute insect-borne disease of man and animals, historically restricted to Africa. An outbreak of RVF in animals frequently manifests itself as a wave of unexplained abortions among livestock and may signal the start of an epizootic. During epizootics, disease usually occurs first in animals, then in humans. The disease was first reported among livestock in Rift Valley of Kenya around 1915. It results in significant economic losses due to heavy mortality among young animals, unexplained abortion among pregnant animals and ban in export of live animals and livestock products.

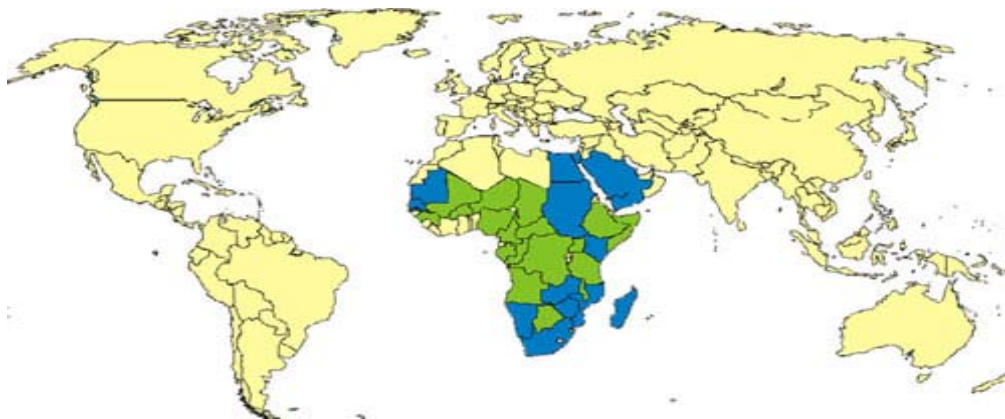
What is the cause of RVF?

The disease is caused by the RVF virus, a member of the genus *Phlebovirus* (family *Bunyaviridae*). It was first isolated during an outbreak among livestock in 1931. It is a highly dangerous pathogen, therefore laboratory confirmation and other diagnostic tests on material derived from suspected animals require biological containment facilities and personal safety.

Where it is found?

RVF has been endemic in most countries of sub-Saharan Africa and in Madagascar (Fig1).

Fig. 1: Geographical distribution of RVF



Countries with endemic disease and substantial outbreaks of RVF:

Gambia, Senegal, Mauritania, Namibia, South Africa, Mozambique, Zimbabwe, Zambia, Kenya, Sudan, Egypt, Madagascar, Saudi Arabia, Yemen

Countries known to have some cases, periodic isolation of virus, or serologic evidence of RVF:

Botswana, Angola, Democratic Republic of the Congo, Congo, Gabon, Cameroon, Nigeria, Central African Republic, Chad, Niger, Burkina Faso, Mali, Guinea, Tanzania, Malawi, Uganda, Ethiopia, Somalia

Source: <http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/rvf/rvfmap.htm>

Epidemics in most of eastern and southern Africa occur in 5 to 20 year cycles, but, in the dry semi-arid zones of eastern Africa the periodicity is 15 to 30 years.

RVF was first observed in southern Africa in 1950. Sporadic cases of RVF infection in animals have been documented in South Africa in recent years. The major outbreak of the disease in humans occurred between 1974 and 76, where an estimated 10,000 to 20,000 cases were affected. The last outbreak occurred in April 2010.

Egypt was the first country to be affected by RVF outside sub-Saharan Africa, namely in 1977. The disease emerged for the first time in the Arabian Peninsula in September 2000 and approximately 800 persons in Saudi Arabia and 1,000 in Yemen had severe illness. The epidemics in Arabian peninsula indicate that the potential exists for spread to other regions of the world outside the African continent.

Why RVF is considered as major zoonosis?

RVF outbreak occurs in unprecedented way during heavy rainfall and flooding with devastating effects on the health of communities and livelihoods based on livestock production and trade. It is not only vector-borne disease but it can be transmitted through direct contact with blood of diseased animals or contaminated materials and even consumption of raw milk from infected animal. The infected animals abort their fetus, and farmers who try to help them may also fall victim to the virus. It is considered as occupational disease affecting veterinarians, animal handlers and abattoir workers. There is no effective treatment and safe, potent vaccine for human use.

An outbreak in Egypt during 1977 to 1978 involved 18 000 human cases (598 fatalities). An outbreak in Kenya, Somalia and Tanzania during 1997 to 1998 involved an estimated 89 000 humans. Sentinel surveillance in animal population is necessary during summer season to take precautionary measures to prevent human infection.

Why outbreak of RVF is linked to development activities and animal movement?

Animal movement during summer time is the most important factor for spread of disease across the countries and territories. Many countries regularly imposes bans on the import of livestock from countries suffering outbreaks of Rift Valley fever in order to prevent the spread of the disease but livestock movement is often unregulated at many international borders.

The disease has been introduced outside Africa through importation of infected animals, The of outbreak of RVF in Saudi Arabia and Yemen were due to importation of possibly infected sheep and goats from East African countries during Ramadan.

The first epidemic of RVF in West Africa was reported in 1987 and was linked to construction of the Senegal River Project. The project caused flooding in the lower Senegal River area. RVF was initially recorded in Mauritania in 1987, following the opening of Diama Dam at the mouth of the Senegal River, in an area where the virus was present but not generally recognized. The dam project created additional breeding grounds for mosquitoes carrying the disease. A major epidemic of RVF was reported in the Nile delta and valley where Aswan Dam is located and development of irrigation channels and agricultural activities created highly suitable breeding ground for mosquito species.

The outbreak of RVF in Mauritania was declared as a potential public health emergency of international concern although it was previously reported from time to time. Why?

It is true that RVF is enzootic in Mauritania and human cases have been reported in 1987, 1998 and 2002-2003.

RVF outbreak is notified as a public health emergency of international concern (PHEIC) only if the assessment done by the country shows that the public health impact can be considered as serious with at least two of the following characteristics: unusual or unexpected event; risk of international spread; significant risk of international travel; or trade restriction. Thus, the occurrence of a RVF outbreak in a well-known focus is not considered as a PHEIC. Conversely, the outbreak of a RVF in a non-endemic region is typically an event to be notified.

This event is unusual because outbreak has been reported for the first time in the northern region of Mauritania and it has potential of rapid transmission in human and animal population and can spread to neighbouring countries.

What are the chances of RVF outbreak in South-East Asia Region (SEAR)?

At present, the chance of introducing RVF infection in SEAR appears to be very low. Since this region is self sufficient in livestock production and livestock movement is limited within the region, there is no scope for importation of live animals from Africa. However, importation of live African goats for breeding or other purpose may be considered as potential risk of introduction of RVF if proper import risk analysis is not carried out.

How does it spread?

RVF is a mosquito-borne disease of animals which spread rapidly during heavy rain and flooding situation in tropical countries. It is spread by the bite of infected mosquitoes, typically the *Aedes* or *Culex* genera. Transovarial transmission has been found in *Aedes* mosquitoes and epidemics may occur when high rainfall favors hatching and development of transovarially-infected offspring. Hot and humid climatic conditions and seasonal heavy rains create an ideal breeding ground for mosquitoes. The disease is spread through the movement of infected livestock.

How can one recognize an RVF outbreak in animals?

The simultaneous occurrence of numerous cases of abortion and disease in ruminants following heavy and prolonged rainfall is characteristic of RVF. RVF is able to infect many species of animals causing severe disease in domesticated animals including cattle, sheep, camels and goats. Sheep are more susceptible than cattle whereas goats are least susceptible. Asian water buffaloes are known to be susceptible from the Egyptian epidemics. Livestock epizootics can occur after heavy rainfall and flooding that result in hatching of *Aedes* mosquitoes and other vectors that feed on nearby mammals.

Most, if not all, infected pregnant animals abort affected fetuses at any stage of gestation. The most severe reactions occur in newborn lambs and kids which die within hours of infection, rarely surviving more than 36 hours. Acute disease is characterized by high fever for 1 to 3 days, anorexia, weakness, listlessness and rapid respiration. Jaundice may be evident. Death occurs after about three days of illness.

The most severe lesions are found in aborted sheep fetuses and newborn lambs. The liver is enlarged, soft, friable and yellowish-brown to dark reddish-brown in colour. In all animals the peripheral and visceral lymph nodes are enlarged, oedematous and may contain petechial haemorrhages in the capsule.

How do human beings get RVF?

The vast majority of human infections result from direct or indirect contact with the blood or organs of infected animals. The virus can be transmitted to humans through the handling of animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures, or from the disposal of carcasses or fetuses. Human infections have also resulted from the bites of infected mosquitoes. Humans may also become infected with RVF by ingesting the unpasteurized or uncooked milk or meat of infected animals.

What are the clinical symptoms in humans?

The incubation period varies from two to six days. Patients who become ill usually experience fever, generalized weakness, back pain, dizziness, and weight loss at the onset of the illness. Most human cases are relatively mild but less than 8% of patients subsequently have severe disease. The severe disease usually appears as one or more of three distinct syndromes: ocular, neurological or haemorrhagic. The most frequent complication is retinitis, usually bilateral, occurring 1 to 3 weeks after primary febrile illness. The overall human mortality rate from RVF has been estimated at 0.5%-1.0% of those infected, but the rate is much higher among those with severe disease.

Is there any treatment or vaccine for prophylaxis?

As most human cases of RVF are relatively mild and of short duration, no specific treatment is required for these patients. For the more severe cases, the predominant treatment is general supportive therapy.

There is no effective human vaccine against RVF. An inactivated vaccine has been developed for human use. However, this vaccine is not licensed and is not commercially available.