

*Report*

## An outbreak of Rift Valley fever, eastern Africa, 1997–1998

In mid-December 1997, the Kenyan Ministry of Health and the World Health Organization (WHO) in Nairobi received reports of 478 unexplained deaths in the North Eastern Province of Kenya and southern Somalia. Clinical features usually included acute onset of fever and headache followed by haemorrhage (bloody stools, vomiting with blood and bleeding from other mucosal sites). Local health officials also reported high rates of spontaneous abortion and deaths from haemorrhage among domestic animals. This report describes the preliminary results of the subsequent outbreak investigation, including case description, and the results of a serological survey.

The affected areas had experienced exceptionally heavy rains (60–100 times heavier than normal) that began in late October 1997 and continued into January, resulting in the worst flooding in the region since 1961. Initial diagnosis testing of 36 samples from humans at the National Institute of Virology, Sandringham, South Africa, and at the Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, United States of America, confirmed acute infection with Rift Valley fever virus (RVFV) in 15 samples (42%) through detection of IgM antibodies, virus isolation, and reverse-transcriptase polymerase chain reaction (PCR) for viral nucleic acid immunohistochemistry.

Active surveillance conducted by the Kenyan Ministry of Health, WHO and international relief organizations between 22 and 28 December 1997 in 18 villages in the Garissa district, North Eastern Province,

Kenya (population 231 000), identified 170 deaths from a “bleeding disease”. Severe flooding and large distances between settlements complicated case ascertainment and subsequent evaluation. Despite the geographic constraints the surveillance system received reports and blood specimens from 231 cases of unidentified severe febrile illness, with onset dates from 25 November 1997 through 12 February 1998. The case definition was established as “self-reported or observed fever and mucosal or gastrointestinal bleeding”. Of the 115 patients meeting this case definition 67 (58%) were male with a median age of 30 years (range 3 to 85 years) and 27 (26%) were positive for acute RVFV infection as evidenced by serology or virus detection. Of the 116 persons who did not meet the haemorrhagic fever case-definition, 26 (22%) also had evidence of acute RVFV infection. Nine patients evidenced neurological disease and 5 visual disturbances. In addition to the initial cases confirmed in the North Eastern Province of Kenya and Gedo, Hiiraan and Lower Shabeelle provinces of Somalia, surveillance identified cases from the Central (1 case), Eastern (9 cases) and Rift Valley (12 cases) provinces of Kenya.

Studies conducted in this outbreak included human, livestock and entomologic sampling. Using a multi-stage cluster sampling strategy based on the population distribution in Garissa District, an international task force led by the Kenyan Ministry of Health conducted a cross-sectional study to establish the prevalence of recent RVFV in-

fection and to examine risk factors for infection. Of the 202 participants, 75% had flood waters enter their home and 52% were forced to relocate. Eighteen (8.9%) individuals in the sample were positive for anti-RVSV IgM; all had a history of recent illness. The study did not identify statistically significant differences or the presence of detectable IgM antibody. Contact with livestock including herding, milking, slaughtering, and sheltering animals in the home were statistically associated with serological evidence of acute RVF infection.

In early February, 3180 mosquitos from three trapping sites in Garissa District were collected as part of an entomological study. Of the nine species captured, three have been previously implicated in RVF transmission (*Anopheles coustani*, *Mansonia africana* and *M. uniformis*). Involvement of these species in the current outbreak will be further investigated in ongoing viral isolation studies.

**Editorial Note:** In 1931, Rift Valley fever virus was first isolated in Kenya and recognized as the etiological agent for a zoonotic disease in sub-Saharan Africa, associated with significant perinatal mortality and abortions. The extension of the disease into Egypt for the first time in 1977–1978 was officially associated with an estimated 18 000 infections and 598 deaths, and almost universal abortion in pregnant ewes and death among lambs. Epizootics tend to occur periodically following heavy rains that flood natural depressions allowing the hatching of the primary vector and reservoir (*Aedes* mosquitos). High levels of viraemia in animals lead to infection of secondary arthropod vector species and virus amplification in livestock with collateral transmission to humans. As noted in this outbreak, transmission to humans can also occur by contact with blood or body fluid from viraemic animals. Disease among humans is usually charac-

terized as a mild febrile illness; however, some (1%–2%) infections may result in a fatal haemorrhagic fever or encephalitis. A higher proportion develop vascular retinitis with permanent loss of vision.

The magnitude of infection and economic losses of the current outbreak are difficult to gauge. Preliminary estimates of deaths among animals and humans suggest this may be the largest reported outbreak of Rift Valley fever in Eastern Africa, and the first to be officially recorded in Somalia. On the basis of antibody prevalence data and the assumption that all persons living in the North Eastern Province of Kenya and southern Somalia were at risk for infection, the total number of human infections in this region is estimated to be 89 000. This does not include infections in the rest of Kenya and neighbouring countries. Possible explanations for the cases of fever with haemorrhage that were negative for RVSV include the use of an extremely sensitive case definition, improper sampling, poor handling and transport of samples, the existence of other pathogens and toxins, and the complications of malnutrition. Persons with active disease did not undergo thorough clinical and laboratory investigations, and for many cases bleeding was not directly observed by a clinician. Preliminary laboratory results have confirmed other viral agents, malaria, shigella dysentery and leptospirosis as explanations for some of the reported cases. Ongoing studies may help define the magnitude and identify additional etiological agents associated with this outbreak.

Satellite and precipitation data document widespread high levels of rainfall with increases in vegetation compared with the same period from previous years. These conditions favour RVSV transmission throughout Kenya and the surrounding countries. This is consistent with reports of confirmed

cases from at least four Kenyan provinces (North Eastern, Eastern, Central and Rift Valley), southern Somalia, and northern United Republic of Tanzania. Deaths from acute haemorrhagic fever among humans and abortions in livestock have also been reported from bordering countries although no specimens were available for laboratory diagnostic testing. The extent of transmission and inevitability of recurring outbreaks emphasize the need to develop and validate methods

to predict, prevent and treat RVFV. Longitudinal studies are required to validate remote sensing satellite data in order to target areas for animal vaccination, enhance animal and human surveillance activities, and facilitate prospective entomological studies. Early identification of disease will allow testing of new antiviral therapies.

*Source:* Weekly epidemiological record,  
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