

# Ebola haemorrhagic fever in Sudan, 1976

## Report of a WHO/International Study Team<sup>1</sup>

*A large outbreak of haemorrhagic fever (subsequently named Ebola haemorrhagic fever) occurred in southern Sudan between June and November 1976. There was a total of 284 cases; 67 in the source town of Nzara, 213 in Maridi, 3 in Tembura, and 1 in Juba. The outbreak in Nzara appears to have originated in the workers of a cotton factory. The disease in Maridi was amplified by transmission in a large, active hospital. Transmission of the disease required close contact with an acute case and was usually associated with the act of nursing a patient. The incubation period was between 7 and 14 days. Although the link was not well established, it appears that Nzara could have been the source of infection for a similar outbreak in the Bumba Zone of Zaïre.*

*In this outbreak Ebola haemorrhagic fever was a unique clinical disease with a high mortality rate (53% overall) and a prolonged recovery period in those who survived. Beginning with an influenza-like syndrome, including fever, headache, and joint and muscle pains, the disease soon caused diarrhoea (81%), vomiting (59%), chest pain (83%), pain and dryness of the throat (63%), and rash (52%). Haemorrhagic manifestations were common (71%), being present in half of the recovered cases and in almost all the fatal cases.*

*Two post mortems were carried out on patients in November 1976. The histopathological findings resembled those of an acute viral infection and although the features were characteristic they were not exclusively diagnostic. They closely resembled the features described in Marburg virus infection, with focal eosinophilic necrosis in the liver and destruction of lymphocytes and their replacement by plasma cells. One case had evidence of renal tubular necrosis.*

*Two strains of Ebola virus were isolated from acute phase sera collected from acutely ill patients in Maridi hospital during the investigation in November 1976. Antibodies to Ebola virus were detected by immunofluorescence in 42 of 48 patients in Maridi who had been diagnosed clinically, but in only 6 of 31 patients in Nzara. The possibility of the indirect immunofluorescent test not being sufficiently sensitive is discussed.*

*Of Maridi case contacts, in hospital and in the local community, 19% had antibodies. Very few of them gave any history of illness, indicating that Ebola virus can cause mild or even subclinical infections. Of the cloth room workers in the Nzara cotton factory, 37% appeared to have been infected, suggesting that the factory may have been the prime source of infection.*

In response to a request from the Government of the Democratic Republic of the Sudan, WHO sent a team to investigate an outbreak of haemorrhagic disease in the townships of Nzara and Maridi in the

north of Sudan, close to the Zairian border. This team worked in close collaboration with Sudanese colleagues and with staff provided by other governments. This report describes, in separate sections, the outbreak and the investigations undertaken, the epidemiology of the outbreak, the clinical manifestations, the pathological studies, and the virological and serological investigations undertaken in the human population.

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