# WHO RISK ASSESSMENT
# Human infections with Zaïre Ebolavirus in West Africa
# 24 June 2014

## Summary of surveillance and investigation findings

***Human cases of Ebola virus disease to date***

Laboratory-confirmed cases of human infection with *Zaïre ebolavirus* have been reported so far to World Health Organization (WHO) by the Ministry of Health of Guinea (MOH Guinea), the Ministry of Health & Social Welfare of Liberia (MOHSW Liberia), and the Ministry of Health and Sanitation of Sierra Leone (MOHS Sierra Leone).

The cases occurred in an initial wave from January to May 2014, when 36 cases were reported on 21 March in Guinea. Subsequent cases were reported by the MOHSW Liberia on 31 March. Since May 2014, a second wave of human cases has been occurring, including a second outbreak reported by the MOHSW Liberia on 29 May. Also on 26 May, MOHS Sierra Leone reported an outbreak.

**Update on cases and deaths in Guinea**

As of 22 June 2014, MOH Guinea reports a total of 390 cases of Ebola virus disease (270 confirmed, 89 probable, and 31 suspected) including 273 deaths (165 confirmed, 81 probable, and 27 suspected).

**Update on cases and deaths in Liberia**

As of 23 June 2014, MOHSW Liberia reports a total of 62 cases of Ebola virus disease (35 confirmed, 10 probable, and 17 suspected) including 37 deaths (23 confirmed, 10 probable, and 4 suspected).

**Update on cases and deaths in Sierra Leone**

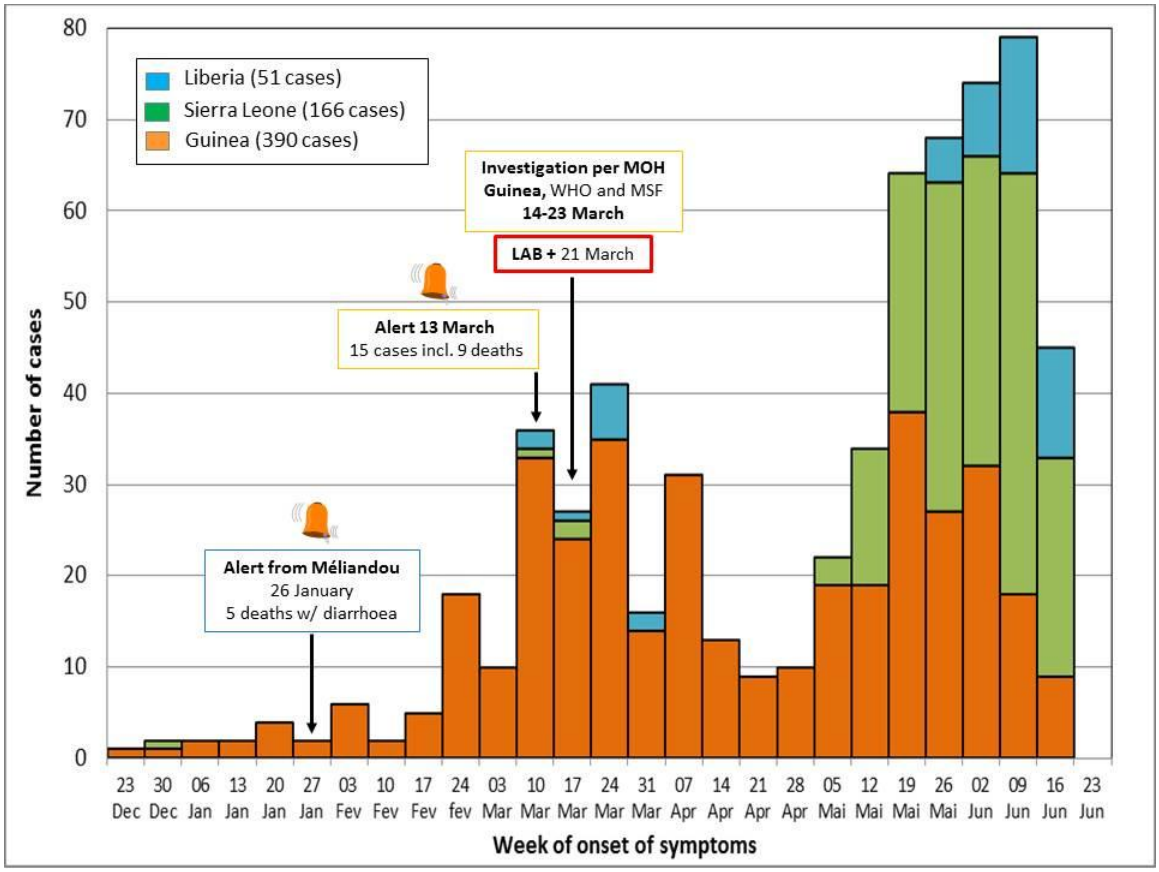
As of 23 June 2014, MOHS Sierra Leone reports 166 cases of Ebola virus disease (156 confirmed, 8 probable, and 2 suspected) including 47 deaths (39 confirmed, 8 probable, and 0 suspected) (due to difficulties in collecting accurate information from the field, the number of deaths is largely underestimated in Sierra Leone).



**Cumulative cases of and deaths from Ebola virus disease**

Cumulatively, 618 cases of Ebola virus disease (461 confirmed, 107 probable, and 50 suspected) and 357 deaths (227 confirmed, 99 probable, 31 suspected) have been reported across the three countries. The cumulative case fatality rate is 58%. Fifty one (51) health-care workers have been infected during this outbreak (28 in Guinea, 3 in Liberia, and 20 in Sierra Leone).

Figure 1: Epicurve of Ebola virus disease outbreak in West Africa (Guinea, Liberia, and Sierra Leone), by week of onset, December 2013 – June 2014 [1]




Legend: MSF: Médecins Sans Frontières; WHO: World Health Organization; LAB+: laboratory confirmed.

[1] Data used to form this epicurve is continually being reviewed and updated as cases are laboratory-confirmed. Some have been estimated; these estimates were made based on the best available information at the time. This epicurve is as of 23 June 2014; n=607.



***Virus characteristics***

Ebola virus disease (formerly known as Ebola haemorrhagic fever) is a severe, often fatal illness in humans. The case fatality rate for Ebola virus disease can be as high as 90%. Ebola first appeared in 1976 in two simultaneous outbreaks in Nzara, Sudan, and in Yambuku, Democratic Republic of Congo (formerly Zaïre). The latter was in a village situated near the Ebola River, from which the disease takes its name.

Genus *Ebolavirus* is one of three members of the Filoviridae family (filovirus), along with genus *Marburgvirus* and genus *Cuevavirus*. Genus *Ebolavirus* comprises five distinct species:

- Zaïre ebolavirus (EBOV)
- Bundibugyo ebolavirus (BDBV)
- Sudan ebolavirus (SUDV)
- Taï Forest ebolavirus (TAFV)
- Reston ebolavirus (RESTV)

BDBV, EBOV, and SUDV have been associated with large Ebola virus disease outbreaks in Africa, whereas RESTV and TAFV have not. The RESTV species, found in Philippines and the People's Republic of China, can infect humans, but no illness or death in humans from this species has been reported to date.

In this outbreak, viral sequencing conducted by the Institut Pasteur in Lyon, France, shows strong homology (98%) with Zaïre Ebolavirus.

***Source of human infection***

In Africa, fruit bats, particularly species of the genera *Hypsignathus monstrosus*, *Epomops franqueti*, and *Myonycteris torquata*, are considered possible natural hosts for *Ebolavirus*. As a result, the geographic distribution of *Ebolaviruses* may overlap with the range of the fruit bats.

Although non-human primates have been a source of infection for humans, they are not thought to be the reservoir, but are an accidental host like human beings. Since 1994, Ebola outbreaks from the EBOV and TAFV species have been observed in chimpanzees and gorillas.



***Evidence of human-to-human transmission***

Ebola is introduced into the human population through close contact with the blood, secretions, organs, or other bodily fluids of infected animals. In Africa, infection has been documented through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelope, and porcupines found ill or dead or in the rainforest.

Ebola then spreads in the community through human-to-human transmission, with infection resulting from direct contact through broken skin or mucous membranes with the blood, secretions, organs, or other body fluids of infected, symptomatic persons, and indirect contact with environments contaminated with such fluids. Transmission does not occur during the incubation period and only occurs once an infected person presents with symptoms. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola. Men who have recovered from the disease can still transmit the virus through their semen for up to 3 months after recovery.

Health-care workers have frequently been infected while treating symptomatic patients infected with Ebola virus disease. This may occur through close contact with patients when infection control precautions are not strictly practiced, including basic measures – such as hand hygiene – that should be applied even before a patient is suspected of being infected with Ebola virus disease.

## Risk assessment

This 20 June 2014 risk assessment has been prepared in accordance with WHO's published recommendations for rapid risk assessment of acute public health events[2] and will be updated as more information becomes available.

Overall, the public health risk from Ebola virus disease has changed since the last outbreak in August 2012 in Uganda.

**What is the likelihood that additional human cases will occur?**

The understanding of the epidemiology associated with this virus, including the main reservoirs of the virus, and the extent of its geographical spread among humans remains

[2] Rapid risk assessment of acute public health events. Geneva: World Health Organization, 2012. Available at http://www.who.int/csr/resources/publications/HSE_GAR_ARO_2012_1/en/.



high. With the exception of the index case(s) who were infected in December 2013, it seems all other human cases were exposed to Ebola virus disease through contact with other infected or deceased humans. As the virus continues to be detected in humans, further human cases are expected in affected countries and possibly additional neighboring countries.

**What is the likelihood of human-to-human transmission?**

Available information confirms that this virus transmits easily among humans who come in contact with the bodily fluids (blood, sputum, aerosols, semen, etc.) from humans infected with and symptomatic of Ebola virus disease.

Increases in numbers have been observed and health care-associated clusters have been reported. Human-to-human transmission is occurring as a result of 1) persons becoming ill and not seeking or being taken by primary caregivers for treatment and 2) failure to follow safe burial practices. In addition, a lack of point-of-care risk assessment for applying basic infection control measures — such as hand hygiene, appropriate use of personal protective equipment (PPE), proper application of cleaning and disinfection measures, waste management in health-care settings, and supervised burials — are increasing the risk of transmission to health-care workers and the community.

**What is the risk of international spread of Ebola virus disease by travellers?**

There has been international spread of this virus in humans with laboratory-confirmed cases being reported in Liberia and Sierra Leone and suspect cases, which were later confirmed as other diseases, being investigated in Ghana, Mali, and Senegal. Cross-border transmission and spread of the disease is occurring and the risk of spread to travelers to additional countries in the immediate region is high (i.e. countries bordering on/near Guinea, Liberia, and Sierra Leone); in the subregion is moderate; and overseas is low.

- To date, the epicenter of the outbreak is the Guéckédou area in Guinea and the virus has spread by human-to-human transmission to Liberia and Sierra Leone. The capital cities of all three countries have been affected – Conakry, Freetown, and Monrovia, respectively. These cities have international airports with connections to other countries in Africa, Europe, and the Middle East.
- Disease spread between Guinea, Liberia, and Sierra Leone has occurred through a number of mechanisms, including porous ground crossings between the three countries. Limited infrastructure for: adequate health measures at border points; care-seeking behaviors across borders; and cross-border surveillance and contact



tracing across and beyond borders has increased the risk of intercountry spread. The risk of spread to neighboring countries – Burkina Faso, Côte d'Ivoire, Guinea-Bissau, The Gambia, Mali, Mauritania, and Senegal is high.

**Does WHO recommend any travel and trade precautions related to Ebola virus disease outbreak?**

WHO does not advise special screening at points of entry with regard to this event nor does it currently recommend any travel or trade restrictions. However, it has published a specific risk assessment related to travel and transport on its website[3]. A summary is provided of the main points.

Travelers leaving for or arriving in an area where Ebola virus disease is occurring should be provided, at points of entry (e.g. airports or ports upon boarding, in arrival areas, or at ground crossing points), with information on the potential risk of Ebola virus disease and information on how to minimize the risk of becoming infected.

Returning visitors from the affected areas should be alerted that, if they develop infectious disease symptoms (fever, weakness, muscle pain, headache, nausea, sore throat, vomiting, diarrhoea, or bleeding) within three weeks after return or if they suspect that they have been exposed to Ebola virus (e.g. volunteers who worked in health-care settings) in the affected areas, they should seek rapid medical attention and highlight their recent travel and/or possible exposures to the attending physician.

- The risk of a tourist or business person becoming infected with Ebola virus during a visit to the affected areas and developing disease after returning is extremely low as transmission requires direct contact with blood, secretions, organs, or other body fluids of infected (and symptomatic) living or dead persons or animals.
- The risk for travellers visiting friends and relatives in affected countries is similarly low, unless the traveller has direct physical contact with a sick or dead person or animal infected with Ebola virus. In such a case, contact tracing and monitoring should confirm any exposure and prevent further spread of the disease through the exposed traveller.
- The possibility exists that a person who had been exposed to Ebola virus and developed symptoms may board a commercial flight. It is highly likely that such persons would seek immediate medical attention upon arrival, especially if well informed. Such travellers should be isolated to prevent further transmission. Although the risk to fellow

[3] West Africa – Ebola virus disease. Update: Travel and Transport. Geneva: World Health Organization, 2014. Available at http://www.who.int/ith/updates/20140421/en/.



travellers in such a situation is very low, contact tracing is recommended in such circumstances.

**Does WHO have recommendations for public health authorities and transport sectors?**

- There is a risk for health-care workers and volunteers, especially if involved in caring for EVD patients. However, if the recommended level of precaution for such settings is implemented, transmission of the disease should be prevented. The risk level can be considered very low to low unless these precautions are not followed, e.g. inadequate personal protective equipment and practices, needle stick injury, etc.

Health-care providers managing returning travellers need to question them on travel history and consider the possibility of EVD in a person returning from affected areas. A person suspected of having been exposed to Ebola virus should be evaluated regarding the risk of exposure.

If the risk of exposure is considered very low, the person should be reassured, asked to monitor his/her temperature and symptoms for 21 days, and seek immediate care if they develop symptoms. Other pathologies (e.g. malaria) should be investigated and the patient should be monitored regularly. Admission to hospital in these observation phases is not necessary.

**What should countries do?**

WHO advises countries to continue strengthening Ebola virus disease epidemiological and Virological surveillance, reporting of human infections as applicable under IHR (2005), and other national health preparedness and response actions. Current technical information as well as guidance related to Ebola virus disease can be found at the WHO website.