2014-2016 Ebola Outbreak in West Africa

On March 23, 2014, the World Health Organization (WHO) reported cases of Ebola Virus Disease (EVD) in the forested rural region of southeastern Guinea. The identification of these early cases marked the beginning of the West Africa Ebola epidemic, the largest in history.

The initial case, or index patient, was reported in December 2013. An 18-month-old boy from a small village in Guinea is believed to have been infected by bats. After five additional cases of fatal diarrhea occurred in that area, an official medical alert was issued on January 24, 2014, to the district health officials. The Ebola virus soon spread to Guinea's capital city of Conakry, and on March 13, 2014, the Ministry of Health in Guinea issued an alert for an unidentified illness. Shortly after, the Pasteur Institute in France confirmed the illness as EVD caused by *Zaire ebolavirus*. On March 23, 2014, with 49 confirmed cases and 29 deaths, the WHO officially declared an outbreak of EVD.

Weak surveillance systems and poor public health infrastructure contributed to the difficulty surrounding the containment of this outbreak and it quickly spread to Guinea's bordering countries, Liberia and Sierra Leone. By July 2014, the outbreak spread to the capitals of all three countries. This was the first time EVD extended out from more isolated, rural areas and into densely populated urban centers, providing an unprecedented opportunity for transmission.

On August 8, 2014, WHO declared the deteriorating situation in West Africa a Public Health Emergency of International Concern (PHEIC), which is designated only for events with a risk of potential international spread or that require a coordinated international response. Over the duration of the epidemic, EVD spread to seven more countries: Italy, Mali, Nigeria, Senegal, Spain, the United Kingdom, and the United States. Later secondary infection, mainly in a healthcare setting, occurred in Italy, Mali, Nigeria, and the United States.

The scope of this outbreak, both in terms of cases and geography, can be attributed to the unprecedented circulation of EVD into crowded urban areas, increased mobilization across borders, and conflicts between key infection control practices and prevailing cultural and traditional practices in West Africa. Engaging local leaders in prevention programs and messaging, along with careful policy implementation at the national and global level, helped to eventually contain the spread of the virus and put an end to this outbreak.

Liberia was first declared Ebola-free in May 2015. Additional cases were found and treated, and the country was again declared Ebola-free in September 2015. More cases were discovered in November 2015. On January 14, 2016, Liberia again announced it was Ebola-free; however, cases were detected in March and April of 2016, and Liberia made its final declaration on June 1, 2016.

After an initial declaration in November 2015, Sierra Leone announced a new case of EVD in January 2016 and declared it was Ebola-free on March 17, 2016. In Guinea, the first end of outbreak declaration was in December 2015, but additional cases were discovered in March and April of 2016. Guinea was finally declared Ebola-free in June 2016. [1] Two and a half years after the first case was discovered, the outbreak ended with more than 28,600 cases and 11,325 deaths.

1.

Ebola Virus Disease (EVD) is a rare and deadly disease in people and nonhuman primates. The viruses that cause EVD are located mainly in sub-Saharan Africa. People can get EVD through direct contact with an infected animal (bat or nonhuman primate) or a sick or dead person infected with Ebola virus.

The U.S. Food and Drug Administration (FDA) has approved the Ebola vaccine rVSV-ZEBOV (tradename "Ervebo") for the prevention of EVD. The rVSV-ZEBOV vaccine has been found to be safe and protective against only the *Zaire ebolavirus* species of ebolavirus.

Ebola virus disease (EVD) is a deadly disease with occasional outbreaks that occur mostly on the African continent. EVD most commonly affects people and nonhuman primates (such as monkeys, gorillas, and chimpanzees). It is caused by an infection with a group of viruses within the genus *Ebolavirus*:

- Ebola virus (species *Zaire ebolavirus*)
- Sudan virus (species *Sudan ebolavirus*)
- Taï Forest virus (species *Taï Forest ebolavirus*, formerly *Côte d'Ivoire ebolavirus*)
- Bundibugyo virus (species *Bundibugyo ebolavirus*)
- Reston virus (species *Reston ebolavirus*)
- Bombali virus (species *Bombali ebolavirus)*

Of these, only four (Ebola, Sudan, Taï Forest, and Bundibugyo viruses) have caused disease in people. Reston virus can cause disease in nonhuman primates and pigs, but there have not been cases in people. Bombali virus was first identified in bats in 2018, and experts do not know yet if it causes disease in either animals or people.

2.

Ebola virus was first discovered in 1976 near the Ebola River in what is now the Democratic Republic of Congo. Since then, the virus has been infecting people from time to time, leading to outbreaks in several African countries. Scientists do not know where Ebola virus comes from. Based on similar viruses, they believe EVD is animal-borne, with bats or nonhuman primates being the most likely source. Infected animals carrying the virus can transmit it to other animals, like apes, monkeys, duikers and humans.

The virus first spreads to people through direct contact with the blood, body fluids and tissues of animals. Ebola virus then spreads to other people through direct contact with body fluids of a person who is sick with or has died from EVD. This can occur when a person touches these infected body fluids or objects that are contaminated with them. The virus then gets into the body through broken skin or mucous membranes in the eyes, nose, or mouth. People can get the virus through sexual contact with someone who is sick with or has recovered from EVD. The virus can persist in certain body fluids, like semen, after recovery from the illness.

Ebola survivors may experience side effects after their recovery. These may include tiredness, muscle aches, eye and vision problems and stomach pain.

3.

The U.S. Food and Drug Administration (FDA) approved the Ebola vaccine rVSV-ZEBOV (called Ervebo®) on December 19, 2019. This is the first FDA-approved vaccine for Ebola.

This vaccine is given as a single dose vaccine and has been found to be safe and protective against *Zaire ebolavirus*, which has caused the largest and most deadly Ebola outbreaks to date.

On February 26, 2020, the Advisory Committee on Immunization Practices (ACIP) recommended pre-exposure prophylaxis vaccination with rVSV-ZEBOV for adults ≥ 18 years of age in the U.S. population who are at potential occupational risk of exposure to *Zaire ebolavirus*. This recommendation includes adults who are

- Responding or planning to respond to an outbreak of EVD;
- Laboratorians or other staff working at biosafety-level 4 facilities that work with live Ebola virus in the United States; or
- Healthcare personnel working at federally designated Ebola Treatment Centers in the United States.

A two-dose vaccine regimen of a different vaccine that was also designed to protect against the Zaire ebolavirus species of Ebola was used under a research protocol in 2019 during an Ebola outbreak in the Democratic Republic of the Congo. The two doses of this vaccine use two different vaccine components (Ad26.ZEBOV and MVA-BN-Filo) and the regimen requires an initial dose and a "booster" dose 56 days later. This vaccine has not yet been approved by the FDA for routine use.

4.

On February 14, 2021 the Ministry of Health (MOH) in Guinea announced that cases of Ebola virus disease (EVD) had been confirmed in N'Zérékoré Prefecture, a forested rural region in southeast Guinea. These are the first cases of EVD confirmed in Guinea since the 2014–2016 West Africa outbreak, the largest in history, was declared over.

Sequencing of samples from the outbreak was conducted and when compared to sequences from cases during the 2014-2016 West Africa outbreak, very few mutations were seen. Additionally, a mutation in a glycoprotein that is considered a marker for human adaptation of the virus, was identified in both sets of samples. While researchers cannot definitively determine the cause of the outbreak, findings strongly support the conclusion that the outbreak is likely caused by a persistent source of infection (i.e. a survivor) and not a new introduction of the virus from the animal reservoir.

On June 19, 2021, the Guinea Ministry of Health and WHO announced the outbreak was over. In total, 23 cases (probable and confirmed) and 12 deaths were reported. The outbreak will be followed by 90 days of enhanced Ebola surveillance to ensure that any new cases are quickly detected and responded to.

CDC supported response efforts by providing technical assistance to help contain the spread of the virus and bring the outbreak to an end.