

## Backgrounders

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### **Ebola Virus**

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#### **Introduction**

The Ebola virus disease, formerly called the Ebola hemorrhagic fever, was first identified in rural Zaire (now the Democratic Republic of Congo) in 1976. The disease had mostly been confined to relatively small outbreaks in rural settings, until the 2014 outbreak, which hit urban areas in Liberia, Sierra Leone, and Guinea. The [World Health Organization](#) (WHO), which has been criticized for its slow response to the epidemic, has called this "the most severe, acute health emergency seen in modern times."

#### **What is Ebola?**

Ebola is a severe and often fatal illness that attacks the immune system and causes extreme fluid loss in its victims. The disease disrupts the blood clotting system, which can lead to internal and external bleeding. Early symptoms include fever, muscle pain, headache, and sore throat, and are followed by vomiting, diarrhea, rash, and bleeding. Most fatalities are caused by severe dehydration or low blood pressure related to fluid loss.

Ebola was first discovered in 1976 in the Democratic Republic of Congo (then Zaire), where it killed 280 people. The virus is named after the Ebola River, in the Congolese region where it was first identified. The largest outbreak prior to 2014 was in Uganda in 2000: 425 were infected and 224 died. Though Ebola fatality rates [vary from 25 percent to 90 percent](#), the WHO has placed the [mortality rate in the 2014 West Africa outbreak](#) at 70 percent.

#### **Watch: Three Things to Know About Ebola in West Africa**

## How is it transmitted?

Ebola is transmitted through bodily fluids from an infected person who is displaying symptoms or by handling a victim's corpse. Unlike the common flu and the measles, Ebola is relatively difficult to contract. The *New England Journal of Medicine* estimates the infection rate (denoted as  $R_0$ ) in this outbreak is between  $R_1.7$  and  $R_2$  in Liberia, Sierra Leone, and Guinea; on average, **[each sick person infects between 1.7 and two](#)** other people. An outbreak is considered "out of control" once it passes  $R_2$ , and for the virus to stop spreading, that number would need to fall below one.

Experts have **[dismissed](#)** suggestions that the disease could mutate into an airborne virus, becoming more contagious. The magazine *Scientific American* wrote that such a radical change in a virus's transmission has "almost no historical precedent." According to CFR Senior Fellow for Global Health **[Laurie Garrett](#)**, the number of genetic mutations that would need to occur for the disease to go air-borne makes that mode of transmission far-fetched.

There is no proven cure for Ebola. In mid-October two vaccines were undergoing human-safety trials, and the WHO expressed hope that **[clinical trials could begin](#)** in West Africa in January 2015. Treatments range from rehydration, plasma infusions from Ebola survivors (who are believed to contain antibodies to the disease), and experimental drugs: **[ZMapp](#)**, **[Favipiravir](#)**, **[Brincidofovir](#)**, and **[TKM-Ebola](#)**.

In a September 2014 interview, **[Garrett was skeptical](#)** that the outbreak would be resolved by technological innovation. Quicker, more accurate, and more thorough screenings of potential carriers, she says, would be critical **[to stemming the disease's spread](#)**.

## What's the best way to contain Ebola?

Ebola can be contained by enforcing quarantines—separating the sick from the healthy, and keeping the exposed away from the general population for the virus's twenty-one-day incubation period. Potential Ebola carriers can be screened for symptoms and travel history, as is **[currently](#)** the case for travelers from West Africa to the United States. Health-care workers must use protective equipment designed to resist the virus. The U.S. Centers for Disease Control released a set of revised guidelines in October to prevent misuse of the gear; the regulations call for training and supervision on the donning and disrobing of the suits.

Other measures have proven more controversial, and their efficacy more questionable. Many U.S. politicians, including House Speaker John Boehner (R–OH), have called for travel bans on the countries hit the hardest. However, little evidence suggests that a travel ban would effectively lower transmission, and in fact some experts say it could do **more harm than good** by isolating West African countries in need of Western aid and support and by driving documentation of the disease underground. "Even when governments restrict travel and trade," wrote the CDC's director Tom Frieden in the *Financial Times*, "**people in affected countries still find a way** to move and it is even harder to track them systematically."

### **Why did the outbreak occur in West Africa?**

The outbreak is believed to have started in December 2013 in a Guinean village near the Liberian and Sierra Leonean borders. The *New England Journal of Medicine* **traced the disease** to a two-year-old boy who died on December 6; he and his family were never tested for the disease, although their symptoms were consistent with Ebola (his mother, sister, and grandmother subsequently became sick and died). Researchers do not know how the family contracted the virus, which can be contracted from primates, bats, or contaminated food.

*"Ebola is more a symptom of a weak health-care system than anything else."—Paul Farmer*

Unlike past outbreaks, which were generally confined to remote villages in central Africa (most past outbreaks took place in the DRC, Sudan, Uganda, and Gabon), the current epidemic hit several communities before being identified as Ebola. By the time the diagnosis was made in early March, the virus had already struck multiple communities in Guinea, with suspected cases emerging in Liberia and Sierra Leone. Cases have also been reported in Nigeria, Senegal, and Mali, although the former two were declared Ebola-free in October. Mali **declared its first case** on October 23.

Many experts have noted that the spread of the disease has been in part caused by development in the region—relatively modern roads connect villages in the Gueckedou prefecture to cities, where the disease has spread rapidly. "We have never had this kind of experience with Ebola before," David Nabarro, the UN's senior systems coordinator for Ebola, told the *Washington Post*. "When it gets into the cities, then it takes on another dimension." **Deforestation** may also have played a role. Human incursion into previously untouched land increases contact between humans and animals that may carry the disease.

The disease's ability to spread as it has is largely due to the stricken countries' weak health-care systems: Prior to the Ebola outbreak there were only **fifty doctors in Liberia** (a little more than one per 100,000); in the United States there are around 240 doctors for every 100,000 people. All affected countries have reported a dearth of doctors, treatment and prevention supplies, and beds for sick patients. Doctor and public health expert **Paul Farmer has written** that "Ebola is more a symptom of a weak health-care system than anything else," adding that with proper supplies and trained personnel the disease could have a 90 percent cure rate.

### **What has been the international response?**

International organizations—with the notable exception of nongovernmental organization Doctors Without Borders (known by its French acronym, MSF)—and foreign governments were slow to respond. While MSF sent doctors to region in March 2014 and called the outbreak "unprecedented" on March 31, the WHO, hobbled by recent budget cuts, did not declare a health emergency until August.

In September 2014, donor countries, led by the United States and the UK, ramped up commitments to combatting Ebola. The United States pledged \$350 million and **deployed U.S. military personnel** to the area; the UK has committed \$200 million, and the World Bank said it would finance \$400 million. UN Secretary-General Ban Ki Moon implored other countries to do more in mid-October, noting that only \$100,000 had been contributed to the organization's \$1 billion Ebola fund. Cuba has trained more than four hundred health-care workers in Ebola care and precautions, and has dispatched more than 250 professionals to West Africa. Nigeria, which managed to contain its Ebola outbreak (twenty people had been infected in the country), **pledged to send** six hundred health workers to affected countries.

**Chinese and Russian donations** have been notably low: China has pledged around \$50 million and Russia has contributed \$1 million in food aid. Individual donations—including \$50 million from the Bill and Melinda Gates Foundation and \$25 million from Mark Zuckerberg and his wife Priscilla Chan—have trumped many countries' efforts.

Drawing on figures from the WHO, the *Economist* calculated that building enough hospitals with supplies and staff to treat one-hundred thousand patients would cost between \$1 billion and \$2 billion a month.

### **How have governments responded to the Ebola cases in the United States and Europe?**

By mid-October, eighteen people had been treated for Ebola outside of West Africa, a number that was expected to increase as the epidemic continued. Nine people have been treated for Ebola in the United States, including two health-care workers who contracted the disease when caring for Thomas Eric Duncan, a Liberian national and the first person to be diagnosed with Ebola in the United States. They are the first people known to have contracted the disease on U.S. soil (a Spanish nurse, who was diagnosed on October 6 after having cared for a priest who died of the disease, was the first person to contract the disease outside of West Africa). On October 23, a New York City doctor who had been had been working with Doctors Without Borders in Guinea was diagnosed with Ebola.

The Barack Obama administration has implemented airport screenings for all passengers arriving from West Africa, and President Obama appointed an **Ebola czar, Ron Klain**, in mid-October to oversee the domestic response to Ebola. Officials have assured the U.S. public that Ebola does not pose significant risk in countries with well-developed health systems.

Given regular flights between hubs **like London and Paris** and West Africa, researchers have said that an infected traveler will likely reach each city by the end of October. Both cities' main international airports have begun screening passengers from West Africa for the disease.

### **How many people might be affected?**

The U.S. Centers for Disease Control published a report in early October that projected that as many as **1.4 million people could become infected** with Ebola by January 2015. The report assumes that for every person who has reported his or her infection, 1.5 have not; the report also projects that the number of people infected will double every twenty days, but notes that if at least 70 percent of them are kept in Ebola treatment units that reduce disease transmission, the infection rate will eventually slow.

### **Additional Resources**

The World Health Organization's **Ebola Fact Sheet** outlines basic facts, symptoms, and the history of

the Ebola virus.

The [New England Journal of Medicine](#)'s report on Ebola describes the first nine months of the outbreaks and provides projections for the future. (PDF)

Doctor and Partners in Health founder Paul Farmer reports on the frontlines of the [fight against Ebola](#).

The U.S. Centers for Disease Control released this [Morbidity and Mortality Report](#) projecting the number of Ebola cases it expects to see in 2014 to 2015.

The web site [Ebola Deeply](#) integrates Ebola coverage from a range of sources and platforms.

[FiveThirtyEight](#) discusses some of the challenges of projecting infection rates.

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