

Quashing the Ebola epidemic

By Scientific American, adapted by Newsela staff

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Health workers wearing protective gear wait to carry the body of a person suspected to have died from Ebola, in Monrovia, Liberia, Monday Oct. 13, 2014.

Ebola outbreaks in the past few decades have consistently “burned out” in relatively isolated and rural areas in Central Africa. Sick patients did not come into contact with many people. Without new patients to infect, the virus eventually had nowhere to go.

The current outbreak in West Africa, however, is taking place at the meeting point of several countries’ borders, helping it boom into an epidemic which has a global reach.

What will it take to quash the ongoing Ebola epidemic? New studies suggest at least 50 percent—and perhaps 70 percent—of all contagious Ebola patients in West Africa would need to be isolated and kept from infecting others.

Those figures come from two new mathematical projections. One is by the U.S. Centers for Disease Control and Prevention (CDC). A separate analysis was published in *Eurosurveillance*, a medical journal about diseases. Short of that level of containment, the outbreak could still be reduced but it will fail to be extinguished and may continue to spread, perhaps for years.

Difficult To Contain The Virus

Right now every ill patient with Ebola during this outbreak typically makes about two more people ill. The World Health Organization (WHO) tally suggests there are 7,178 cases of Ebola and 3,338 deaths so far.

Projections from the WHO and the CDC suggest that the death toll could soon climb to the tens of thousands if efforts to contain the epidemic are not substantially increased. In a worst-case scenario the CDC projected that by mid-January, Sierra Leone and Liberia alone could have up to 1.4 million cases. But that figure is avoidable.

The massive scale-up in resources provided by international forces could lessen the effects of the disease. But short of getting to that 50 percent control figure the virus will not be contained. Smaller reductions in the number of Ebola patients will buy communities some time to scale-up their medical facilities and perhaps, develop a vaccine.

Yet the longer the response takes, the greater the possibility that areas that are now Ebola-free or that become Ebola-free could flare up again.

“This is also about how long it takes to stop the disease,” says Alessandro Vespignani, a professor of physics at Northeastern University who has been working on mathematical models to calculate the spread of Ebola.

“If it’s a more minimal response and it takes nine months, that means more deaths, many more hiccups along the way and the cases in the region could spin out of control,” he said.

Symptomatic And Contagious

The incubation period for the disease can last from two to 21 days. Only then do people become symptomatic and contagious. Yet it’s evident that the disease can be contained. Already Senegal and Nigeria appear to have stopped the spread of Ebola.

But other factors could worsen the threat if the disease is not completely contained soon. No one has studied how long Ebola immunity lasts. The assumption has been patients in recovery would be immune for several years, but it’s possible that, for example, recovered patients may get ill again next year.

It’s undeniable Ebola is a formidable virus but it is not as readily passed between people as some other diseases.

The 1918 Spanish flu that killed more than 30 million people worldwide reportedly had a reproductive rate between two and five. Each ill person infected between two and five people depending

on the location and environment, says Gerardo Chowell, a mathematical epidemiologist at Arizona State University who investigates the spread of diseases.

Chowell produced the first Ebola modeling in 2004, which calculated prior Ebola reproductive rates from outbreaks in Central Africa. He concluded those outbreaks led to an average of 1.3 to 1.8 secondary cases.

In September, Chowell published estimates in *Eurosurveillance*. They suggest the reproductive rate has not changed much between those historical cases and this epidemic in West Africa.

Ebola's Global Threat

And the CDC puts the figure even higher than Chowell's 50 percent containment estimate. In its findings published on Sept. 23, it reported that perhaps 70 percent of patients would need to be placed in Ebola treatment centers or otherwise isolated to alter the course of the epidemic.

The second case of Ebola diagnosed in the U.S. recently only underscores the global threat of the virus and how vital it is to contain it.

"We can't make the risk zero until the outbreak is controlled in West Africa," CDC Director Tom Frieden says.

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Quiz

1. Select the sentence that BEST describes the reproductive rate of the Ebola virus.
 - (a) Short of that level of containment, the outbreak could still be reduced but it will fail to be extinguished and may continue to spread, perhaps for years.
 - (b) Right now every ill patient with Ebola during this outbreak typically makes about two more people ill.
 - (c) The World Health Organization (WHO) tally suggests there are 7,178 cases of Ebola and 3,338 deaths so far.
 - (d) The incubation period for the disease can last from two to 21 days.
2. According to the article, which of the following sentences is CORRECT?
 - (a) Studies suggest that 50 percent of the people in Central Africa are infected with Ebola.
 - (b) The WHO has prepared a vaccine with the help of aid provided by international forces.
 - (c) At present, every Ebola infected person infects between two and five other people.
 - (d) An Ebola infected person can infect other people only after the incubation period of the virus.
3. The article draws a connection between all of the following EXCEPT:
 - (a) Spanish flu and a reproductive rate of 1.5
 - (b) Ebola virus and global epidemic
 - (c) Sierra Leone and Ebola virus
 - (d) Ebola virus and Spanish flu
4. Select the paragraph from the section “Difficult To Contain The Virus” that describes the connection between the response time to develop a vaccine for Ebola and the spread of the virus.

Answer Key

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 - (a) Short of that level of containment, the outbreak could still be reduced but it will fail to be extinguished and may continue to spread, perhaps for years.
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