SCIENCE

Fewer Ebola Cases Go Unreported Than Thought, Study Finds

By DONALD G. McNEIL Jr.   DEC. 16, 2014

Transmission of the Ebola virus occurs mostly within families, in hospitals and at funerals, not randomly like the flu, Yale scientists said Tuesday, and far fewer cases go unreported than has previously been estimated.

That implies, they said, that the epidemic is unlikely to reach the gloomy scenarios of hundreds of thousands of cases that studies released in September had forecast were possible; the most pessimistic one, from the Centers for Disease Control and Prevention, had predicted up to 1.4 million cases by late January.

As of Monday, there were 18,464 confirmed cases in Liberia, Sierra Leone and Guinea, with 6,841 deaths, according to the World Health Organization, far more than from all the previous Ebola outbreaks combined.

The new study, led by epidemiologists from the Yale School of Public Health, was published online by the journal Clinical Infectious Diseases. Scientists from Texas, Brazil and the Liberian Health Ministry contributed to the research.

The researchers said they had too little data to predict how many West Africans could eventually be infected, but enough to show that the dire predictions were inaccurate.

In a brief written response, the C.D.C. said that its September projection was "a first attempt to better understand to what extent underreporting was occurring in West Africa." The new study, the agency said, "further refines our understanding, and C.D.C. applauds the method."

The worst-case estimates made in September by the C.D.C., the World Health Organization and others were based on what would happen if the world did not mount an effective response. In the months since, donors have committed hundreds of millions of dollars and thousands of soldiers have been sent into the region, while doctors and nurses have volunteered to help.

By looking at virus samples gathered in Sierra Leone and contract-tracing data from Liberia, the scientists working on the new study estimated that about 17 percent of cases in West Africa go unreported, up to a maximum of 70 percent. That is far fewer than earlier estimates.

In practical terms, said Jeffrey Townsend, a Yale biostatistician and the study's lead author, that means that for every 100 known cases, there are 120 actual ones, rather than 250 as in the earlier estimates.

The study concludes that the epidemic may not be as difficult to control as previously feared if rapid, vigorous contact tracing and quarantines are employed.

In Nigeria and Mali, health workers rapidly traced hundreds of contacts of three initial cases: a Liberian businessman in Nigeria, and an infant and an imam from Guinea in Mali. The outbreaks were halted. The epidemic in Guinea, Liberia and Sierra Leone has proved much more difficult to stop, in part because it had spread to many people in the three months before it was identified as Ebola.

Although the scientists worked with relatively small amounts of data, two kinds produced similar conclusions.

Sierra Leone's outbreak began when 14 women were infected at the funeral of a traditional healer on the Guinea border. Viral sequences from the first 78 cases were so closely related that it was clear that none had passed through many undetected people before reaching a known Ebola victim, Dr. Townsend explained.

The Liberian data, gathered during three weeks of contact tracing in August, showed that the third person in any transmission chain often knew both the first and second person. That is not true in flu, he said, which can be caught from casual contact in offices, on subway cars or in hallways.

The fact that Ebola mostly spreads among people in close contact with one another was "not a huge surprise" to any medical professional working in West Africa, Dr. Townsend said, "but it's nice to have the data quantitatively saying something."

Bryan Lewis, an epidemiologist at the Virginia Bioinformatics Institute at Virginia Tech and lead author of a study released on Sept. 11 that forecast there could be hundreds of thousands of infections, said he respected the new study's authors and their analysis. But he contended that assuming only 120 actual cases for every 100 known ones was "a little too optimistic."

Epidemics surge and wane and the accuracy of case counts falls during surges, Dr. Lewis said, so extrapolating an estimate from one month's data to an entire outbreak was "not legitimate."

Dr. Townsend agreed, saying: "This is a small light on a small part of the outbreak. We need more data."

Asked if he thought horrific sights like dead bodies in the streets might have helped exaggerate epidemic forecasts, Dr. Townsend

recalled a psychology experiment in which an actor playing a policeman arrests another actor in front of witnesses. When the policeman loudly intimidated the arrestee, the experimenters found, witnesses said he was up to a foot taller than he actually was.

"Fear tends to make people's estimates based on intuition worse," Dr. Townsend said.

Correction: December 16, 2014

An earlier version of this article incorrectly reported some results of the study. The new study estimated that the rate of under-reporting of cases was 17 percent, with a 70 percent maximum, not 70 percent. Also, the previous estimate to which it was compared meant that for every 100 known cases, there were 250 real cases, not the 350 reported based on information supplied by the lead author. (It is not the case that previous estimates assumed that up to 250 percent of cases went unreported.)