

# **Ebola research shows rapid control interventions key factor in preventing spread**

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New Ebola research demonstrates that quick and forceful implementation of control interventions are necessary to control outbreaks and avoid far worse scenarios.

Researchers analyzed up-to-date epidemiological data of Ebola cases in Nigeria as of Oct. 1, 2014, in order to estimate the case fatality rate, proportion of health care workers infected, transmission progression and impact of control interventions on the size of the epidemic.

"Rapid and forceful control measures are necessary as is demonstrated by the Nigerian success story. This is critically important for countries in the West African region that are not yet affected by the Ebola epidemic, as well as for countries in other regions of the world that risk importation of the disease," said Arizona State University's Gerardo Chowell, senior author of the research and associate professor in the School of Human Evolution and Social Change in the College of Liberal Arts and Sciences.

The largest Ebola outbreak to date is ongoing in West Africa with approximately 8,011 reported cases including more than 3,857 deaths as of Oct. 5. Twenty Ebola cases have been reported in Nigeria, with no new cases reported since September 5, 2014. All of the cases stem from a single traveler returning from Liberia in July.

For the paper, "Transmission dynamics and control of Ebola Virus Disease (EVD) outbreak in Nigeria, July-September, 2014," published

today in *Eurosurveillance*, researchers used epidemic modeling to project the size of the outbreak in Nigeria if control interventions had been implemented during various time periods after the initial case and estimated how many cases had thus been prevented by early initiation of interventions.

Control measures enacted in Nigeria included all people showing Ebola symptoms being held in an isolation ward if they had contact with the initial case. Once Ebola was confirmed through testing, people with Ebola were moved to a treatment center.

Asymptomatic individuals were separated from those showing symptoms and those who tested negative without symptoms were discharged. People who tested negative, but showed symptoms - fever, vomiting, sore throat and diarrhea - were observed and discharged after 21 days if they were free of symptoms, while being kept apart from people who tested positive for the disease.

"The swift control of the outbreak in Nigeria was likely facilitated by early detection of the initial case in combination with intense tracing efforts of all subsequent contacts that the person had after developing Ebola," said Folorunso Oludayo Fasina, a senior scientist and lead author of the study at the University of Pretoria, South Africa. "By contrast, the initial outbreak in Guinea remained undetected for several weeks, facilitating the spread of the virus to Sierra Leone and Liberia where the inability to track and contain infectious individuals compounded the situation and resulted in an uncontrolled epidemic."

Ebola transmission is dramatically influenced by how rapidly [control measures](#) are put in place, as researchers found that the projected effect of control interventions in Nigeria ranged from 15-106 cases when interventions are put in place on day 3; 20-178 cases when implemented on day 10; 23-282 cases on day 20; 60-666 cases on day 30; 39-1599

cases on day 40; and 93-2771 on day 50.

"There is brief window of time when a rapid and forceful intervention in terms of relentless contact tracing and isolation pays off handsomely and the transmission is effectively halted and the outbreak dies out," said co-author Professor Lone Simonsen, of the Milken Institute School of Public Health at the George Washington University in Washington D.C.

The person who was initially infected generated 12 secondary cases, in the first generation of the disease; 5 secondary cases were generated from those 12 in the second generation; and 2 secondary cases in the third generation, leading to a rough empirical estimate of the reproduction number according to disease generation declining from 12 during the first generation, to approximately 0.4 during the second and third disease generations. Recent estimates of the reproduction number for the ongoing Ebola epidemic in Sierra Leone and Liberia range between 1.5 and 2 (two new cases for each single case), indicating that the outbreak is yet to be brought under control.

"The effectiveness of the Nigerian response is illustrated by a dramatic decrease in the number of secondary cases over time. Overall, this is a great success story for Nigeria, which sets a hopeful example for other countries, including the U.S., which face risk of importation from high Ebola transmission areas," said Dr. Cécile Viboud, a National Institutes of Health scientist with the Fogarty International Center.

Provided by Arizona State University

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