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Editorial

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The Ebola Virus Epidemic in West Africa and Beyond

"The greatest injustice is the lack of access to equitable healthcare"

Dr. Martin Luther King, Jr.

Is there a reason to fear that an Ebola outbreak may strike Latin America? The fear may not be unreasonable, taking into account the history of epidemics that have affected the American continent since European colonization began in 1492. Old World small pox epidemics spread and killed millions of Native Americans both north and south of the equator. Imported West Nile virus infections reported in New York in 1999 dramatically spread from east to west in the United States. Most recently, in 2013, Chikungunya virus arrived to Central America and has already infected close to 1 million people in Mexico, the Central American countries, Brazil, Colombia, Ecuador, the Guianas, Paraguay, and Venezuela.

The Ebola virus causes severe disease and high lethality in the human host. It was discovered in 1976 during an epidemic near the Ebola River in the Democratic Republic of Congo. This single-stranded negative sense RNA virus is a member of the zoonotic Filovirus family and has another equally virulent member designated the Marburg virus. Ebola virus has 5 species, four of which infect humans. The infection is manifested by fever, headache, malaise, fatigue, myalgia, vomiting, diarrhea, abdominal pain, and bleeding. Diagnosis is established when an individual presents with the above signs and symptoms, has risk factors for Ebola infection, and tests positive for Ebola virus. Risk factors may include any contact with an Ebola infected patient. High risk contacts include percutaneous or mucosal inoculation with bodily fluids from an Ebola patient.

Small outbreaks of Ebola virus disease have occurred since 1976 in Western African countries. The most severe and devastating Ebola epidemic started March 1st, 2014 and remains active to the present date. A total of 21,300 cases resulting in 8,430 deaths have been reported by the World Health Organization (WHO). Although Ebola virus does not spread by air like influenza, by water or food like enterovirus,

or by mosquito vectors like Chikungunya, the spread among West African communities has been dramatic. Up to 540 cases per week were reported in Sierra Leona alone during the peak of the epidemic. Viral transmission to susceptible hosts may be facilitated by the very high viral load in bodily fluids, including saliva, gastro-intestinal content, urine, and blood, among infected patients. Skin contamination with viral particles and subsequent inoculation of host mucous membranes seems to be the most likely mechanism of Ebola infection among susceptible hosts. Vomiting episodes among Ebola patients may also lead to aerosolization of viral particles and subsequent infection of susceptible hosts by inhalation. Ebola virus transmission requires close proximity between susceptible hosts and infected patients. This is a reason why relatives, close friends, and health care workers are at the highest risk of infection.

Global and coordinated public health efforts have been established in West Africa to contain the Ebola epidemic. The WHO, the Center for Disease Control and Prevention (CDC), and Médecins Sans Frontières (MSF) have intensified efforts of detection and isolation of suspected and confirmed cases, of public education, and to handle contaminated material and human remains. The creation of coordination centers exclusively dedicated to handling suspected and active cases of Ebola has been key for limiting exposure and for preventing the virus from spreading. Centers dedicated to Ebola can identify possible cases, conduct preliminary testing, and send suspected or confirmed cases to specific Ebola assessment hospitals or Ebola treatment centers, respectively.

The Ebola epidemic has primarily affected three West African countries: Sierra Leona, Guinea, and Liberia. Mali, Nigeria, and Senegal, three West African neighbor countries, also reported cases. West Africa is affected by poverty, including extreme poverty. The United Nations reports that many families live on less than US\$1.25 a day. Unsatisfied

basic needs are a result of decades of war and government corruption. A deficient healthcare system, combined with public distrust of Western medicine, may have contributed to the spread of the disease. Few cases were reported in non-African countries, including Spain, the United Kingdom, and the United States. Most cases outside Africa were imported, and few of them were acquired locally from imported cases. No cases have been reported in Latin America, and it is unclear if an Ebola outbreak in this region will ever occur.

Inequality is widespread in Latin America. On one hand, a fraction of the population shares similarities with industrialized countries with respect to their level of healthcare, socio-economic gains, and housing. On the other hand, a larger fraction of the population lives in underserved regions, predominantly in rural areas, that share similarities with West Africa. The underserved population has limited healthcare access, high illiteracy rate, poor housing, and unsatisfied basic needs, including limited access to potable or running water, lack of sewer systems, insufficient toilet facilities, and limited access to food. Poverty levels may be very high and extreme poverty may reach levels as high as 60%. If overcrowding is added to the equation, Ebola infection transmission risk in these communities may not be different from the one present in West African countries.

If we consider that Ebola may be imported to Latin America, public health authorities may need to plan ahead on how to handle a potential Ebola outbreak. Recognizing that social disparities play a detrimental role in the epidemiology of infectious diseases, it is expected that the poor will be the population more affected. Since reservoirs of Ebola infection do not exist in the American continent, West African imported cases will be the most likely source of infection, and subsequent secondary cases may be a result of person-

to-person transmission. Since Ebola lethality is high and the incubation period is relatively short, initial efforts will need to be placed on a coordinated infection control and prevention plan to contain the infection and halt transmission by treating infected patients, handling contaminated material and human remains, and educating the public. Global efforts on Ebola prevention have expanded to active research on vaccine development. Preliminary testing has demonstrated that these vaccines are immunogenic and preclinical data may provide evidence that they may prevent infections in the near future. Drugs that limit viral replication are also being considered to treat active infections. We hope that the current Ebola epidemic in West Africa will be over, that vaccines will prevent further epidemics, and that antiviral drugs will rapidly control future outbreaks. Until that happens, Latin American countries should remain vigilant, prepared, and ready to display emergency infection control plans to contain any Ebola outbreak before it spreads. Disparities in health care, socio-economics, basic needs and education are rampant in Latin America and they are fertile ground for infections like Ebola to spread and to severely affect the vulnerable population. It is time to close the inequality gap between the rich and the poor in Latin America; this alone may be the most effective preventive measure against infection.

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