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### REPORT ON CHIKUNGUNYA VIRUS TRANSMISSION AND ITS IMPACT IN THE REGION OF THE AMERICAS

#### Introduction

1. Chikungunya is an arboviral disease transmitted to humans by some mosquitoes of the *Aedes* genus. Fever normally occurs, accompanied by rash and incapacitating joint pain. The disease was first reported in Tanzania in 1952. Through the end of 2013, its geographical spread encompassed Africa, islands of the Indian Ocean and Pacific region, Australia, and Asia (India, Indonesia, Maldives, Myanmar, Sri Lanka, and Thailand). Between 2004 and 2011, imported cases were reported in the Americas in Brazil, Canada, French Guiana, Guadeloupe, Martinique, and United States (1).

2. On 9 December 2013, the Pan American Health Organization (PAHO) called attention to the presence of indigenous chikungunya virus transmission in the Americas (2). Since then, the Region has taken a public health approach to address the problem, including use of: a laboratory platform, epidemiological surveillance, integrated vector management, clinical management and care of patients, and risk communication.

3. The purpose of this information document is to update the Member States on the work PAHO is doing to monitor and mitigate the chikungunya outbreak, and show the importance of integrating and adapting existing strategies in the Region to cope with outbreaks caused by emerging or reemerging pathogens. This information seeks to guide Member States as they prepare for and respond to the introduction and spread of chikungunya virus.

#### Background

4. The extensive distribution of the chikungunya virus vector (*Aedes aegypti* and *Aedes albopictus*) throughout the Americas is due to various social and economic factors, as well as climate change and local and global ecosystems. It is also the greatest challenge facing the Region for the control of dengue, another virus transmitted by this vector. This situation persists despite the commitment of the countries to progressive implementation of integrated vector management (3). In 2008, the Member States adopted resolution CD48.R8 (4) to respond to the increase in dengue in the Region. They undertook to strengthen and support national vector-borne disease control programs by

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establishing policies to enhance the efficacy and efficiency of current vector control programs.

5. Every year a report is presented to the Governing Bodies of PAHO on progress made achieving the basic capacities required for the International Health Regulations (IHR). This includes the capacity to detect and report unusual or unforeseen events that could potentially be spread internationally, with a negative impact on public health or trade. In this context, the indigenous circulation of chikungunya virus was reported by PAHO on 6 December 2013 as a potential public health event of international concern. Since then, through the IHR, countries have reported the detection of indigenous circulation of this virus.

6. Considering the progress countries have made in preparedness in collaboration with their technical partners, once chikungunya was introduced it became important to develop and step up regional and international efforts. There have been activities of prevention, detection, and timely response through surveillance, case-finding, investigation, and implementation of appropriate public health actions, particularly the organization and response of the health services.

### **Situation Analysis**

7. Since 2010, PAHO and its technical partners, including the Centers for the Disease Prevention and Control (CDC) of the United States of America, have begun to work on preparing countries for the possible introduction of chikungunya into the Region of the Americas (5). In 2012 in Jamaica, the countries and territories of the Caribbean developed a preparedness and response plan to that scenario, with technical support from the CDC and the Caribbean Epidemiology Center (6).

8. In early December 2013, PAHO issued a regional alert on indigenous chikungunya virus transmission in the Region of the Americas (2). This alert was disseminated after the health authorities of Saint Martin (French territory) had laboratory confirmation of two autochthonous cases. Since that date, indigenous transmission has been documented in 44 countries and territories of the Region (7). Transmission started with one focus in the Caribbean, progressively spreading to the northern coast of South America, Central America, the state of Florida (USA), and in late 2014, to Mexico, Brazil, and the Andean countries. By the first few weeks of 2015, the virus has been detected in Paraguay and eastern Bolivia.

9. Three genotypes of the chikungunya virus have been described: West African (WA), East-Central-South African (ECSA), and Asian. Molecular analysis of the virus circulating in the Americas reveals that it is phylogenetically related to the Asian genotype (8). Chikungunya virus has a single serotype, which means that it is expected to provide long-lasting immunity to those exposed. Adaptation of the ECSA genotype of the virus to the *Aedes albopictus* mosquito (9) possibly explains its rapid spread in peri-urban areas (10). This shows the importance of monitoring the virus' adaptation to *Aedes albopictus* in the Region.

10. The introduction of the chikungunya virus in the Americas poses a challenge for epidemiological surveillance systems. As a new disease in the Region, chikungunya was not included in the list of notifiable diseases nor was there any specific epidemiological surveillance system for the disease. Despite having a case definition for surveillance (5), the countries had to make an effort to adapt their notification and information systems to monitor chikungunya. In this context, surveillance strategies were adopted based on the characteristics and capacities of the existing systems. Some countries report only confirmed cases, while others include suspected cases in their notification reports or bulletins. These data are compiled, published, and presented geographically, on a weekly basis, at the PAHO Web site (7).

11. It is paramount to learn the specific factors contributing to the rapid geographic spread of chikungunya virus in the Region. From the time of introduction through epidemiological week 12 in 2015, more than 1.3 million suspected or confirmed cases of chikungunya were recorded. The average cumulative incidence in countries with indigenous circulation is 182 cases/100,000 population (range 0.4-20,809). Thus far, a total of 184 chikungunya-related deaths have been reported in the Americas (7). Virus transmission may increase exponentially in very little time (three to six months), as was observed in the Dominican Republic (11, 12) and other countries (13). The virus spreads quickly because it is new to the Region and, therefore, the entire population is susceptible. But this explanation falls short. Added to this are factors such as the virus' greater adaptability to the mosquito vector, its elevated and prolonged viral load which increases the chances of transmission, and environmental and social determinants such as high temperatures, humidity, vegetation, rain, and population density.

12. The impact of chikungunya virus is not insignificant. In addition to its high case rate, which exceeded 60% in the Dominican Republic (14), this virus causes serious cases, with associated case-fatality and mother-to-child transmission (15, 16, 17, 18, 19). The data published by PAHO indicate a case-fatality rate much lower than that reported by the literature. In order to support countries in the process of classifying chikungunya-related deaths, the ICD-10 group of experts and other partners are discussing an inter-programmatic approach to issue technical guidelines on the subject.

13. A virology laboratory is an essential public health component for confirming circulation of the virus and chikungunya-related deaths, and to clinically diagnose atypical and serious forms of the disease, as well as mother-to-child transmission. In order to develop laboratory capacity in the Region, work was done in coordination with the Dengue Laboratory Network of the Americas (RELDA). In this, partners such as the CDC, the Pedro Kourí Tropical Medicine Institute (Cuba), the Dr. Julio O. Maiztegui National Human Viral Disease Institute (Argentina), the Evandro Chagas Institute (Brazil), and the Caribbean Public Health Agency (CARPHA), helped develop a diagnostic algorithm to detect indigenous circulation (20). Since the start of indigenous transmission in the Americas, the CDC's Arboviral Diseases Branch has supported countries by providing diagnostic tests, as well as panels to evaluate performance. In Panama in June 2014, a regional workshop was held on virological methods for chikungunya diagnosis at the Gorgas Memorial Institute for Health Studies. It was

attended by representatives from Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru. Some countries, such as Belize, received direct technical cooperation for application of serological techniques. Monitoring of the virus in the Caribbean has been and is being carried out by CARPHA, which periodically publishes its results (21, 22).

14. It is essential to recognize clinical symptoms compatible with chikungunya virus infection in order to give an early warning that it might be circulating. A differential diagnosis must also be completed in order to ensure that a pathology requiring specific treatment (such as, dengue, leptospirosis, and sepsis) is properly managed. For these reasons, efforts were immediately made to provide clinicians with the knowledge and tools they need. Guidelines for clinical management (23) were prepared in the four languages, along with videos and educational materials. Workshops were given for health professionals in Guadeloupe (with the participation of Anguilla, Antigua and Barbuda, Barbados, British Virgin Islands, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago); in Nicaragua (with the participation of Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama); and in Peru (with the participation of Colombia, Ecuador, Peru, and Venezuela). Different countries have developed their own materials, national training courses (e.g., Argentina, Brazil, Colombia, Dominican Republic, Honduras, and Paraguay) and other instruments (24) to facilitate the job of health workers.

15. The challenges governments face with chikungunya epidemics can be grouped into two major categories:

- a) Acute impact on the health services network at the time of the outbreak, due to the high demand for services. This tests the capacity to identify atypical and serious cases and make a proper differential diagnosis of other potentially lethal diseases, such as severe dengue and leptospirosis. There have been many successful experiences of organizing the health services to ensure care for numerous patients. In the French territories home care was strengthened, while in the Dominican Republic mobile units were used to increase the capacity for care (12). After the outbreak, the services must be able to handle cases with chronic sequelae, so as to minimize their impact on the lives of individuals.
- b) Immediate economic impact of acute incapacity in people, causing them to miss work and school. There is a potential impact on economic activities such as tourism, and long-term impact due to the disabilities and chronic sequelae left by the disease.

16. Chikungunya prevention is essentially conducted through integrated vector management. Control of breeding sites is the main prevention strategy. This requires the collective, responsible participation of people, families, communities, and local governments, along with measures to ensure a continuous supply of drinking water. The lack of drinking water, as well as population density, overcrowding, and housing conditions, make these populations more vulnerable to the disease. In recent years,

PAHO has been increasingly describing and addressing the environmental factors involved in the emergence and spread of diseases. After the introduction of chikungunya virus, vector control efforts were renewed, especially in the peri-urban areas of Brazil, Dominican Republic, Guyana, and Suriname.

17. Chikungunya received extensive media coverage, with more than 184,000 news stories on the subject published in the Region by February 2015. PAHO also supported countries in this area, by helping boost basic capacities for implementation of the IHRs, specifically in risk communication for public health emergencies. This covered various communication skills throughout the phases of preparedness, response, and recovery from an outbreak (25). Direct technical cooperation was provided for developing communications plans, and audiovisual materials were prepared for purposes of training and information. On-line videos have received 133,000 hits since June 2014. A website on the subject was created, as well as different communications materials, press releases, alerts, and infographic videos. Additionally, messages were disseminated over social networks.

18. Resource mobilization has been increasing in 2014 and 2015. There are funds for chikungunya preparedness and response activities from the following agencies: CDC (\$100,000)<sup>1</sup> and WHO (\$30,000). Additionally, the PAHO Epidemic Emergency Fund was activated for the first time (\$240,000) to support regional activities in Haiti and the Dominican Republic, and at a later time to support Paraguay and Bolivia. In the countries currently coping with indigenous circulation of the virus, while national prevention and response plans are put into practice, new challenges are likely to arise, particularly at the subnational and local level.

### **Measures to Improve the Situation**

19. The challenges posed by a chikungunya epidemic entail not only response to the acute phase, but also care for sub-acute and chronic disease, which affect the quality of life and well-being of people. During these phases proper protocols must be used for surveillance, monitoring, and case management, and the participation of other clinical services, such as rheumatology, rehabilitation, and mental health, must be obtained. Furthermore, the behavior of the virus in the Region must be monitored (26), since the abundance of primate species in many of the countries, as well as mosquitoes that have never been exposed to chikungunya, can give this virus the opportunity to establish itself in jungle cycles that have not yet been documented outside of Africa (27). Although progress has been made in developing a vaccine against chikungunya, it is still in the experimental phase. Thus, for the time being, control efforts are focused on integrated and effective vector management. This epidemic highlights a need to review and update arboviral disease prevention and control strategies.

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<sup>1</sup> Unless otherwise indicated, all monetary figures in this report are expressed in United States dollars.

20. Member States are asked to continue their efforts to contain the spread of chikungunya virus and to minimize its long-term consequences. Measures to diminish the impact of the chikungunya will be proposed.

#### **Action by the Executive Committee**

21. The Committee is requested to take note of the Report on Chikungunya Virus Transmission and its Impact on the Region of the Americas, and to make the comments and suggestions it deems appropriate.

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