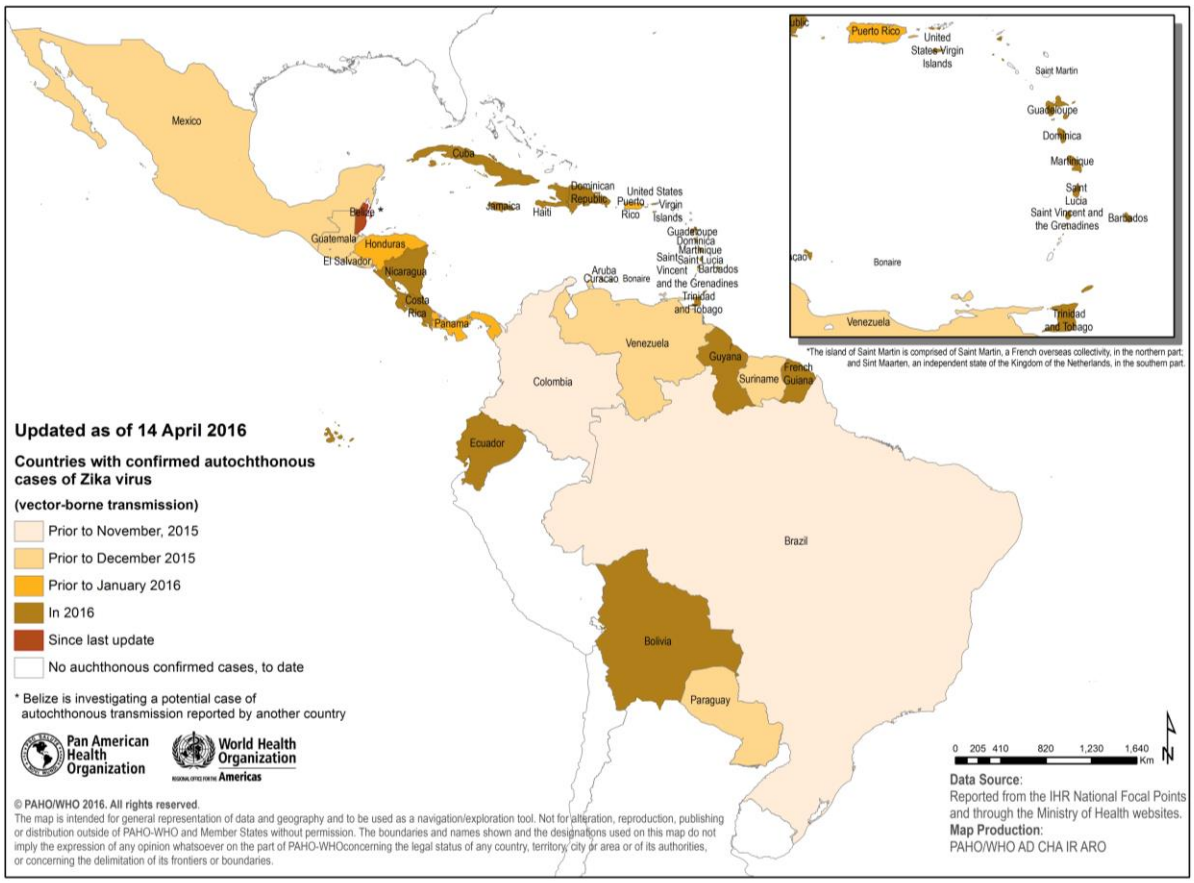
Zika - Epidemiological Update

14 April 2016

Zika virus – Incidence and trends

To date, 35 countries and territories have confirmed local, vector-borne transmission of Zika virus in the Region of the Americas since 2015 (**Figure 1**). Belize is investigating a potential case of autochthonous transmission reported by another country.

Figure 1. Countries and territories in the Americas with confirmed autochthonous (vector-borne) Zika virus cases, 2015-2016 (as of 14 April 2016)



Zika virus cases and other mosquito-borne diseases, like dengue and chikungunya have been showing a downward trend in many countries in the Americas consistent with what was observed in the same period in the previous year. However, trends of suspected Zika

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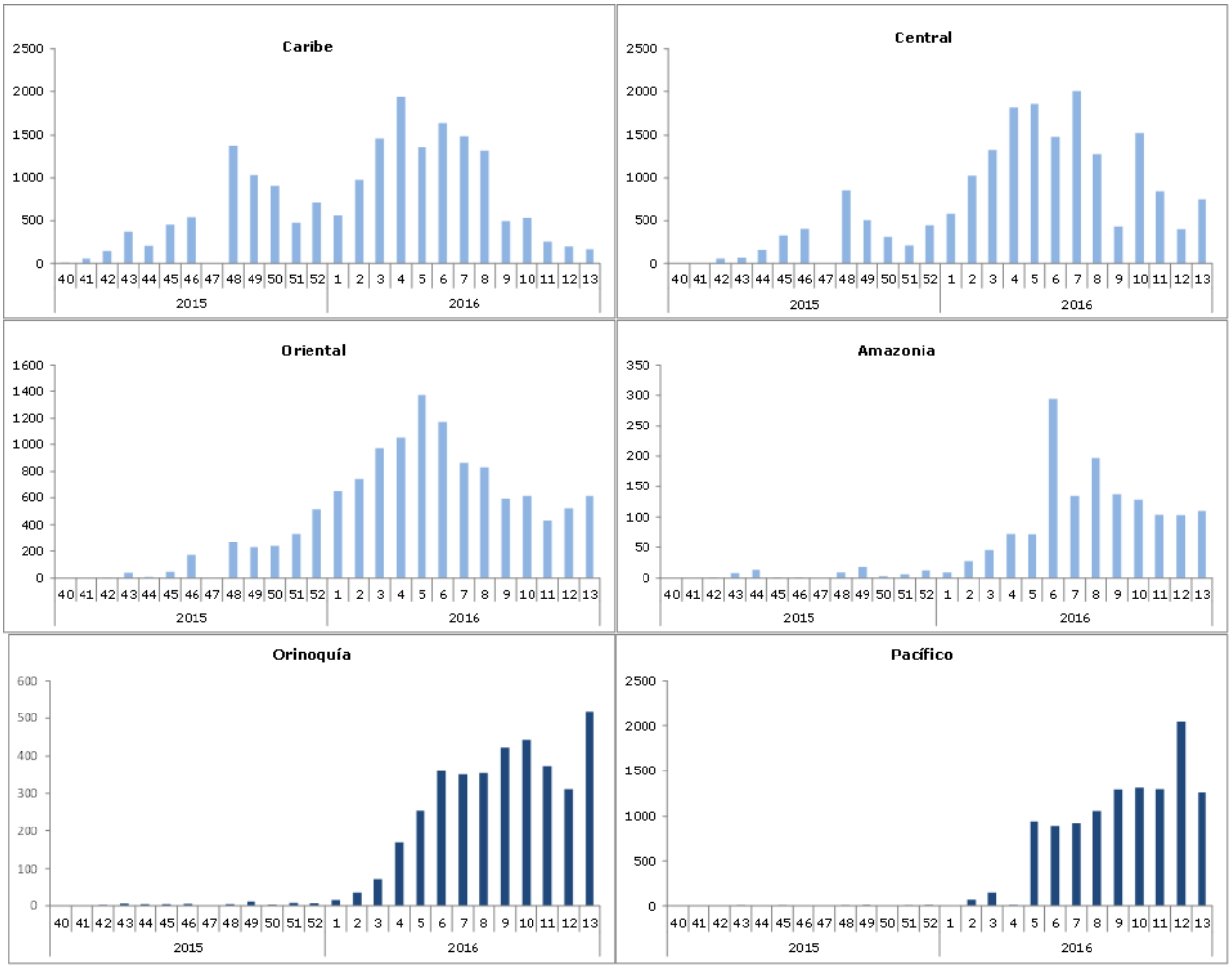
virus cases by sub-national levels show variations in different geographic areas. This is illustrated by data from Colombia showing an increasing trend in reported Zika cases in the regions of Orinoquía and Pacifico, while in the rest of the regions, the number of cases is decreasing (**Figure 2**).

Figure 2. Sub-national variations in trends of suspected/confirmed Zika virus cases reported in Colombia, as of epidemiological week (EW) 13 of 2016



Source: Data published by the National Institute of Health of Colombia and reproduced by PAHO/WHO

Congenital syndrome associated with Zika virus infection[1]

Summary

Since the detection of Zika virus in Brazil in 2015 to date, six countries have reported cases of congenital syndrome associated with Zika virus (**Table 1**). In addition, two cases were reported, one in the United States of America and the other in Slovenia, both linked to a stay in Brazil. Approximately 98% (1,113 cases) of confirmed cases of congenital syndrome

[1] Case definition available at: http://bit.ly/1TpcVIS

associated with Zika virus have been reported from Brazil, which was also the first country to report increased cases of microcephaly since 22 October 2015.

As reported in a previous Zika Epidemiological Update (31 March), the New England Journal of Medicine published a report on a 33-year-old pregnant woman who tested positive for Zika virus (IgG and IgM) at 4 weeks and 10 weeks after the onset of symptoms. The patient developed Zika virus symptoms after travel to Mexico, Guatemala, and Belize in the 11th gestational week (late November 2015). None of these countries have reported cases of congenital syndrome associated with Zika virus to date. The report indicated, fetal ultrasonography that was performed at 13, 16, and 17 weeks of gestation (1, 4, and 5 weeks after the resolution of symptoms) showed no evidence of microcephaly or intracranial calcifications. However, there was a decrease in the fetal head circumference from the 47th percentile at 16 weeks to the 24th percentile at 20 weeks. Abnormal intracranial anatomy showed at 19 weeks of gestation, and diffuse atrophy of the cerebral mantle showed at 20 weeks of gestation, which was most severe in the frontal and parietal lobes. The patient elected termination of pregnancy at 21 weeks of gestation.

A decreased head circumference were found in the fetal brain, with substantial viral loads in the placenta, fetal membranes, umbilical cord and fetal brain, as detected on quantitative RT-PCR. See full report.

Table 1. Countries and territories in the Americas with reported congenital syndrome associated with Zika virus (as of 14 April 2016)

Countries reporting congenital syndrome associated with Zika virus	Number of confirmed cases to date
Brazil	1,113
Colombia	7
Martinique[2]	3
Panama	3
United States[3]	1

Brazil

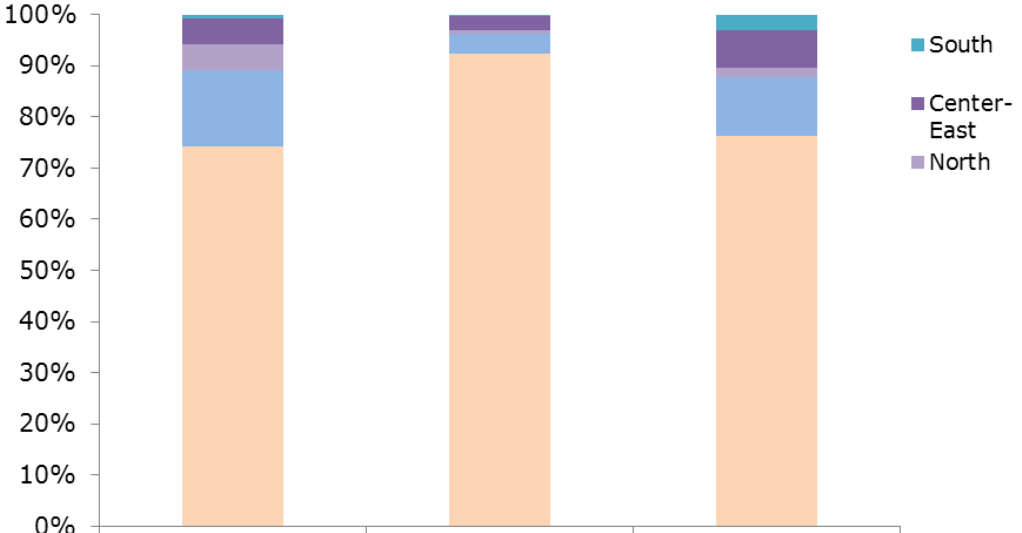
According to the Ministry of Health of Brazil, between 22 October 2015 and 9 April 2016, a total of 7,015 suspected cases of microcephaly or other nervous system malformation among newborns have been reported in 1,386 out of 5,570 municipalities. Of these, 1,113 were confirmed cases of microcephaly and/or other central nervous system (CNS) malformations with evidence suggestive of congenital infection. Out of the total reported cases, 2,066 cases were discarded as being due to non-infectious causes or not fitting the case definition, and 3,836 remain under investigation.

The confirmed cases are distributed in 22 out of 27 Federal Units, with the Northeast region continuing to report the majority of the cases with 74% (2,847) of the total of suspected

[2] Two microcephaly and one other fetal anomaly. See full report.
[3] Imported case from Brazil. See full report.

cases (3,836) and 92% (1,027) of the total of confirmed cases (1,113); followed by the Southeast region that is reporting 15% (571 cases) of suspected and 4% (43 cases) of confirmed cases of microcephaly in Brazil (Figure 4). See full report.

Figure 4. Cases of microcephaly reported in sub-national region of Brazil by classification, EW 45 of 2015 to EW 14 of 2016



	under investigation	confirmed	discarded (non-infectious causes or not fitting the case definition)
South	28	4	64
Center-East	196	30	152
North	194	9	36
Southeast	571	43	239
Northeast	2847	1027	1575

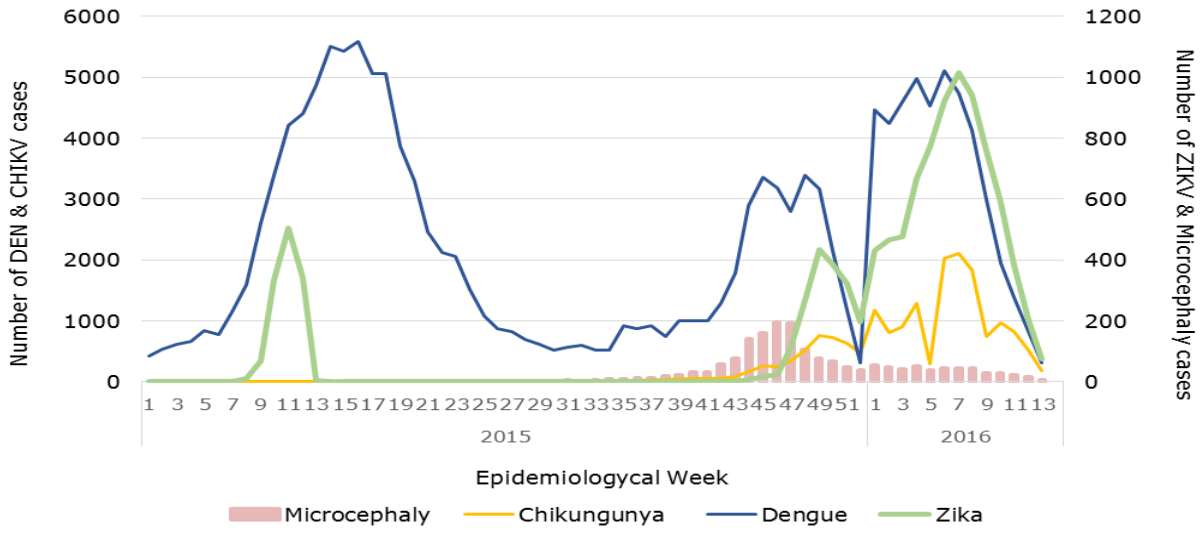
Source: Brazil Ministry of Health

As of EW 14 of 2016, there have been 235 reported deaths (including miscarriages or stillbirths), of which 50 were confirmed as suggestive of congenital infection. See full report.

In addition, the trends of reported cases of all three arboviruses circulating in the northeastern State of Pernambuco (chikungunya, dengue and Zika) and the reported cases of microcephaly are presented (**Figure 5**).

Compared to the first three months of 2015, Pernambuco has been experiencing an increase of reported dengue and chikungunya cases in the same period. As mentioned in the previous Zika Epidemiological Update (March 24) a large number of dengue-like illness was also registered during the first detection of Zika virus in 2015. An increase of microcephaly cases can be seen 7-8 months after the first detection of Zika virus cases reaching its peak in EW 46, 2015 with 197 cases reported. Reports of microcephaly cases started decreasing on EW 48 of 2015. Between EW 51 of 2015 and EW 13 of 2016, a weekly average of 37 microcephaly cases were registered. Data from the three preceding weeks should be considered preliminary due to delays in reporting. See full report.

Figure 5: Reported cases of dengue, chikungunya, Zika virus and microcephaly in Pernambuco state, Brazil by EW, 2015 to 2016



Source: Pernambuco State Secretary of Health

Guillain-Barré syndrome (GBS) and other neurological disorders

Since the last Zika Epidemiological Update (8 April), one additional country has reported an increase in cases of Guillain-Barré syndrome (GBS).

To date, seven countries in the Region have reported an increase in cases of Guillain-Barré syndrome (GBS) with at least one case laboratory confirmed for Zika virus. One country, Paraguay, has reported an increase in GBS case, and none of the cases have laboratory results confirming Zika virus. Five other countries and territories have not recorded increases but identified Zika virus-associated cases of GBS (**Table 2**).

Table 2. Countries and territories in the Americas with GBS in the context of Zika virus circulation (as of 14 April 2016)

Increase in GBS plus Zika virus lab confirmation in at least one case of GBS	Zika virus lab confirmation in at least one case of GBS
Brazil	French Guiana
Colombia	Haiti
Dominican Republic	Panama
El Salvador	Puerto Rico
Honduras	Martinique
Suriname	
Venezuela	

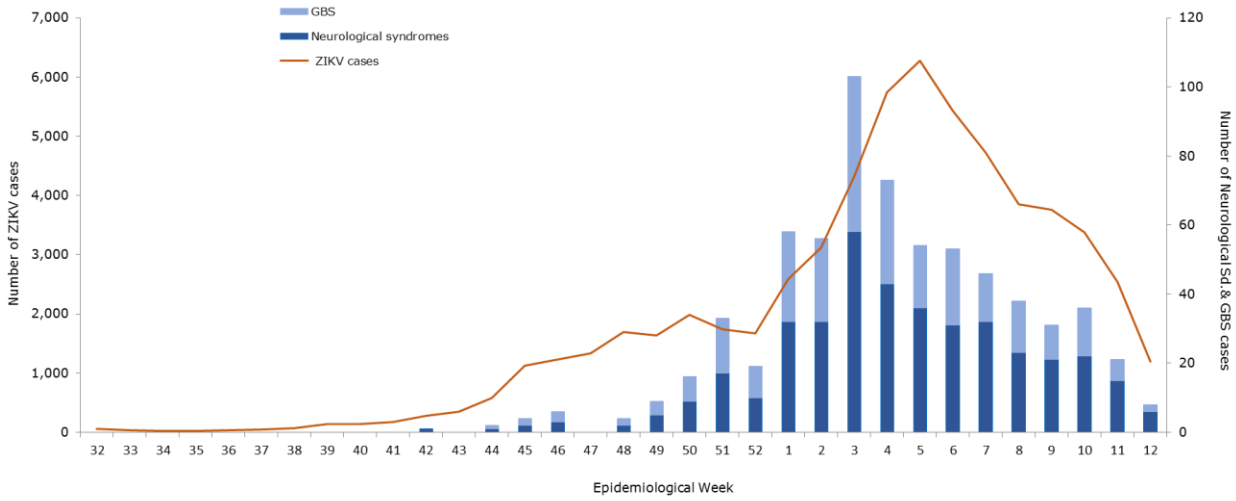
Following is new information on countries with updates.

Increase in GBS and other neurological disorders in Colombia

During the period of enhanced surveillance for neurological syndrome from December 2015 up to EW 13 of 2016, Colombia detected 416 cases of neurological syndrome with history of Zika virus symptoms including 277 cases of GBS (66.6%) and other similar neurological conditions such as ascending polyneuropathy. The epidemiologic curve has shown a steady downward trend since the peak in EW 3 of 2016 (**Figure 6**). Of the total neurological syndrome reported, 56.3% were male (234 cases) and the highest number of cases were in the age group >65 years (49 cases), followed by 45-49 years (41 cases).

A large number of cases of neurological syndrome are reported from Norte Santander with the highest number of GBS cases (81 cases), and the highest number of Zika virus cases in the country. A temporal association is also observed between the number of GBS and neurological syndrome cases with a history of Zika virus symptoms and the epidemic curve of reported Zika virus diseases cases in Colombia since 2015 (**Figure 6**).

Figure 6. Reported cases of Zika virus (suspected and confirmed), neurological syndromes and GBS with a history of Zika virus symptoms between EW 42 of 2015 and EW 12 of 2016 in Colombia



Source: Data published by the National Institute of Health of Colombia and reproduced by PAHO/WHO

Increase of GBS in Paraguay

On 12 April, Paraguay reported an increase of GBS observed in the first three months of 2016. From 2005 to 2011, Paraguay recorded an average of 32 cases of GBS per year, in contrast to the first three months of 2016, when 21 GBS cases were reported. To date none of the cases have laboratory results confirming Zika virus.

Non-human primates infected with Zika virus in Ecuador

On 9 March, Ecuador informed that Zika virus test (RT-PCR) resulted positive in tissue samples taken from the heart and spleen of a dead howler monkey. The sample was collected as part of the investigation of the epizootic (39 monkey deaths) occurred between 1 February and 10 February in a National Park in Manabi province. Serological testing of samples was

negative for influenza, dengue, leptospirosis, and yellow fever virus. This is the first detection of Zika virus infection in non-human primates reported in Ecuador and the first in the Americas. Further investigation is needed to determine the role of these animals in the epidemiology of the disease in the Americas.

Zika virus was first isolated from a sentinel rhesus macaque in the Zika forest of Uganda in the 1940s. The prevalence of Zika virus in monkeys and other nonhuman primates is currently unknown. Evidence of epizootic of Zika virus in non-human primates at the Zika Forest has been described previously between 60s and 70s. So far, there is no evidence that Zika virus is transmitted to humans by contact with animals.

Novel Findings

Zika virus impairs growth in human neurospheres and brain organoids

On 10 April, *Science* journal published the work of researchers based at D'Or Institute for Research and Education. Their study examined the effects of Zika virus infection in human neural stem cells growing as neurospheres and brain organoids. Immunocytochemistry and electron microscopy were used to demonstrate that Zika virus targets human brain cells. The team observed that Zika virus infects human-derived pluripotent stem neural cells, neurospheres, and cerebral organoids, which led to cell death, malformations, and 40% growth reduction. In similar experiments with dengue virus, the cells were infected, but without damage to neural cells, neurospheres, or organoids. The results suggest that Zika virus abrogates neurogenesis during human brain development. See full report.