World Health Organization

ZIKA VIRUS MICROCEPHALY AND GUILLAIN-BARRÉ SYNDROME

SITUATION REPORT
17 MARCH 2016

SUMMARY

- From 1 January 2007 to 16 March 2016, Zika virus transmission was documented in a total of 59 countries and territories. Cuba and Dominica are the latest to report autochthonous (local) transmission of Zika virus on 14 and 15 March, respectively. Five of these countries and territories reported a Zika virus outbreak that is now over. Three countries (France, Italy and United States of America) have reported locally acquired infection in the absence of any known mosquito vectors, probably through sexual transmission.
- The geographical distribution of Zika virus has steadily widened since the virus was first detected in the Americas in 2014. Autochthonous Zika virus transmission has been reported in 33 countries and territories of this region.
- So far an increase in microcephaly and other fetal malformations has been reported in Brazil and French Polynesia, although two additional cases linked to a stay in Brazil were detected in the United States of America and Slovenia.
- In the context of Zika virus circulation 12 countries or territories have reported an increased incidence of Guillain-Barré syndrome (GBS) and/or laboratory confirmation of a Zika virus infection among GBS cases.
- The mounting evidence from observational, cohort and case-control studies indicates that Zika virus is highly likely to be a cause of microcephaly, GBS and other neurologic disorders. Among the tasks ahead are to further quantify the risk of neurologic disorders following Zika virus infection, and to investigate the biological mechanisms that lead to neurologic disorders.
- The global prevention and control strategy launched by WHO as a Strategic Response Framework[1] encompasses surveillance, response activities and research, and this situation report is organized under those headings.

[1] http://apps.who.int/iris/bitstream/10665/204420/1/ZikaResponseFramework_JanJun16_eng.pdf?ua=1

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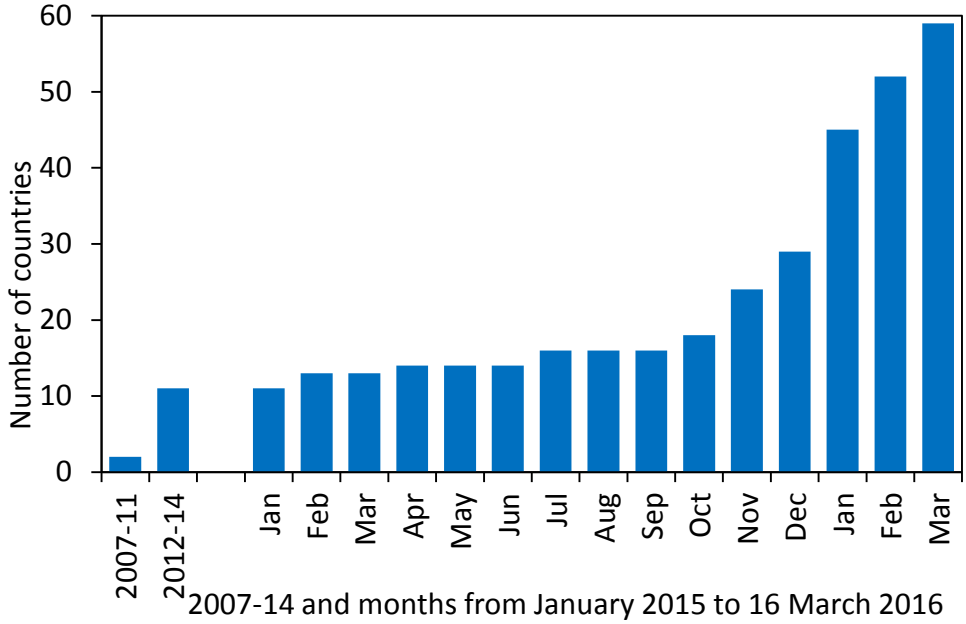
I. SURVEILLANCE

Incidence of Zika virus

- From 1 January 2007 to 16 March 2016, Zika virus transmission was documented in a total of 59 countries and territories (Fig. 1, Fig. 2; Table 1). Cuba and Dominica are the latest to report autochthonous (local) transmission of Zika virus on 14 and 15 March, respectively. Five of these countries and territories reported a Zika virus outbreak that is now over. Three countries (France, Italy and United States of America) have reported locally acquired infection in the absence of any known mosquito vectors, probably through sexual transmission.
- A newly reported Zika virus case from 2014 in Bangladesh is a result of a retrospective study; similar investigations confirmed Zika virus cases from 2015 in Papua New Guinea.

Figure 1: Cumulative number of countries, territories and areas reporting Zika virus transmission, 2007-2014, and monthly from 1 January 2015 to 16 March 2016.



- Towards the end of 2014, Brazil detected a cluster of cases of febrile rash in the Northeast Region of the country. The diagnosis of Zika virus infection was confirmed (RT-PCR test for viral RNA[2]) in May 2015. The Brazilian Ministry of Health estimates that there were 0.4-1.3 million cases of Zika virus infection in 2015.[3]
- Zika virus has spread rapidly across the Americas. By 16 March 2016, 33 countries and territories in the Americas reported autochthonous transmission of the virus. The reported rate of its spread across South and Central America accelerated from October 2015 onwards (Table 1, Fig. 1).
- From 1 October 2015 to 3 March 2016, Colombia reported 51 473 suspected cases of Zika virus. The number of laboratory confirmed cases is 2090.[4]

[2] Reverse transcriptase polymerase chain reaction (RT-PCR).
[3] http://portalsaude.saude.gov.br/images/pdf/2016/janeiro/22/microcefalia-protocolo-de-vigilancia-e-resposta-v1-3-22jan2016.pdf
[4] http://www.ins.gov.co/boletinepidemiologico/Boletn%20Epidemiolgico/2016%20Boletin%20epidemiologico%20semana%207.pdf

Table 1. Countries, territories and areas with autochthonous Zika virus circulation, 2007–2016.*

Classification	WHO Regional Office	Country/Territory/Area
Reported or indication of autochthonous Zika virus transmission AND Guillain-Barré syndrome AND microcephaly (2)	**AMRO/PAHO (1)**	Brazil
	WPRO (1)	French Polynesia[+]
Reported or indication of autochthonous Zika virus transmission, Guillain-Barré syndrome and no reports of microcephaly cases (10)	**AMRO/PAHO (10)**	Colombia, El Salvador, French Guiana, Haiti, Honduras, Martinique, Panama, Puerto Rico, Suriname, Venezuela (Bolivarian Republic of)
Reported or indication of autochthonous Zika virus transmission and no reports of Guillain-Barré syndrome or microcephaly cases (40)	**AFRO (2)**	Cabo Verde, Gabon
	AMRO/PAHO (22)	Aruba, Barbados, Bolivia (Plurinational State of), BONAIRE - Netherlands, Costa Rica, Cuba, Curaçao, Dominica, Dominican Republic, Ecuador, Guadeloupe, Guatemala, Guyana, Jamaica, Mexico, Nicaragua, Paraguay, Saint Martin, Saint Vincent and the Grenadines, Sint Maarten, Trinidad & Tobago, United States Virgin Islands
	SEARO (4)	Bangladesh, Indonesia, Maldives, Thailand
	WPRO (12)	American Samoa, Cambodia, Fiji, Lao People's Democratic Republic, Malaysia, Marshall Islands, Papua New Guinea, Philippines, Samoa, Solomon Islands, Tonga, Vanuatu
Countries/territories/areas with outbreaks terminated (4)	**AMRO/PAHO (1)**	ISLA DE PASCUA - Chile
	WPRO (3)	Cook Islands, New Caledonia, YAP - Micronesia (Federated States of)
Locally acquired without vector-borne transmission (3)	**AMRO/PAHO (1)**	United States of America
	EURO (2)	France, Italy

** Available information does not permit qualification of the intensity of viral circulation and therefore the risk of infection; the situation is extremely variable according to countries, and this information should be used with caution. For overseas territories/countries/provinces or islands, the affected area rather than the country is reported.*

[#] *Definitions:*

- *Reported autochthonous transmission: Formal notification through IHR, of at least one (1) case of autochthonous transmission by the affected Member State or the Member State where the diagnosis has been performed (for travellers). Autochthonous infection is considered to be any infection acquired in the country i.e. among patients with no history of travel during the incubation period or travels exclusively to non-affected areas.*
- *Indication of viral circulation: Information of at least one Zika biologically confirmed case (by RT-PCR or sero-neutralisation) either diagnosed domestically or exported and diagnosed abroad.*
- *Countries, territories or areas with outbreaks terminated: Countries or territories where the interruption of the viral circulation has be documented through the surveillance data (including syndromic surveillance, laboratory confirmation of suspected cases, etc.) and/or where no suspect case has been reported since 31 December 2014.*
- *Locally acquired without vector-borne transmission: Autochthonous infection but through another mode of transmission than vector borne (including sexual, blood-borne, or organ transplant) and where vector population is unlikely to allow sustained vector-borne transmission.*

[°] *Guillain–Barré syndrome: Countries reporting an increase in the incidence of Guillain-Barré syndrome or at least one case of Guillain-Barré syndrome with documentation of previous Zika infection in the country or territory.*

[§] *Countries reporting an increase in the incidence of microcephaly and/or at least one case of microcephaly with documentation of previous Zika infection.*

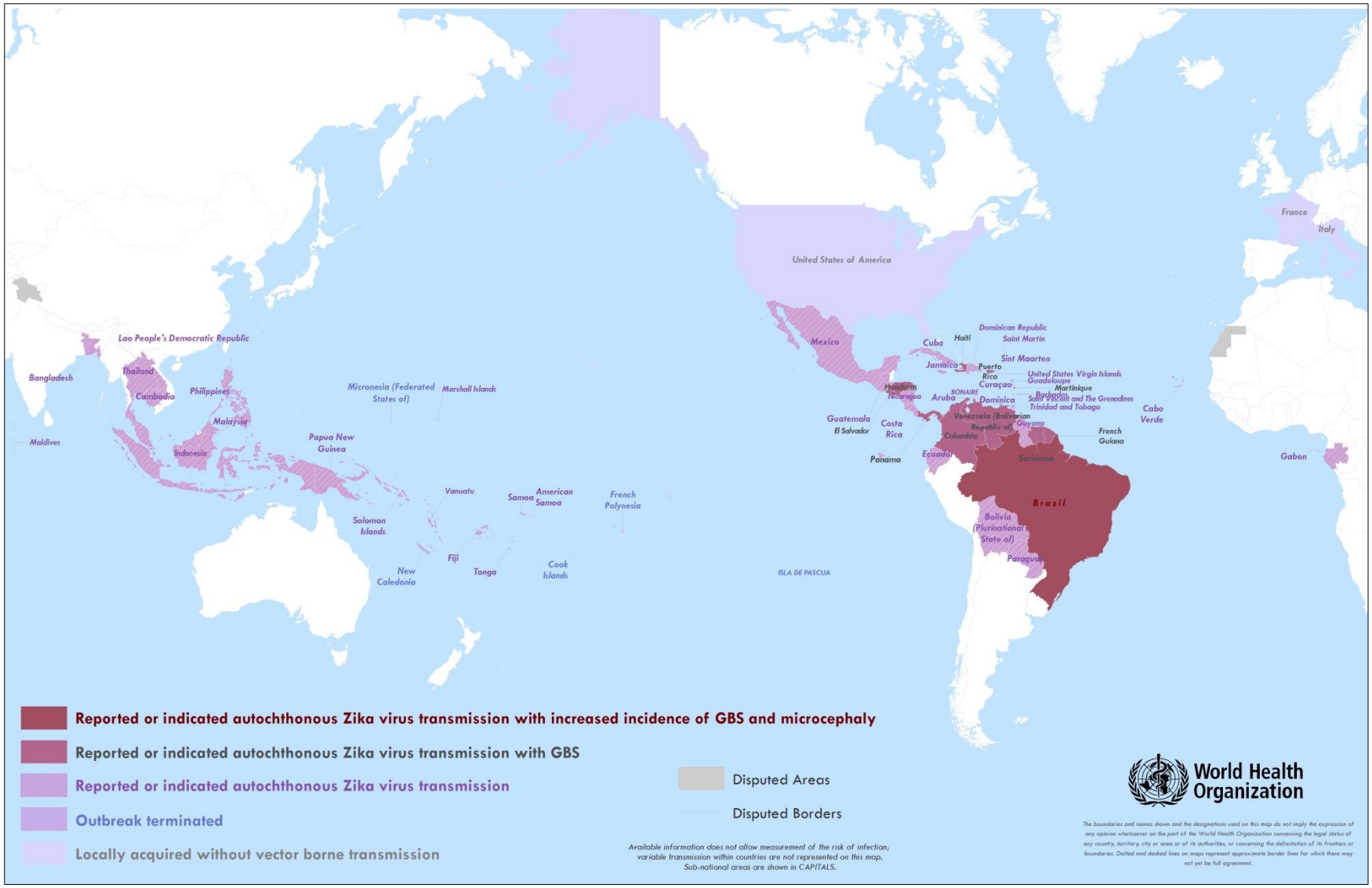
[+] *French Polynesia reported an increase in the incidence of Guillain-Barré syndrome and microcephaly. The Zika virus outbreak is terminated.*

Figure 2: Timeline of introduction of Zika virus in the Americas, 2015-2016.[5]

Available information does not permit measurement of the risk of infection in any country; the variation in transmission intensity among countries is therefore NOT represented on this map. Zika virus is not necessarily present throughout the countries/territories shaded in this map. Countries where sexual transmission occurred are not represented in this map.

[5] http://www.who.int/emergencies/zika-virus/situation-report/en/

Figure 3. Countries, territories and areas reporting Zika virus, microcephaly and Guillain-Barré syndrome*, 2007-2016.



These reports do not exclude the possibility that Zika virus is present in other countries, notably in Africa and Asia.

- From 2007, locally acquired Zika virus cases have been reported in 16 countries and territories in the Western Pacific Region. Five Pacific Island countries and areas (American Samoa, Fiji, Marshall Islands, Samoa and Tonga) have reported Zika infections in 2016.
- From 1 October 2015 to 15 March 2016, Cabo Verde (African region), reported 7490 suspected cases of Zika virus disease although only two cases have been confirmed by RT-PCR. The outbreak peaked during the week of 22 November 2015 and has been in decline since then. The outbreak appears to have begun in Praia and then spread to other municipalities. Preliminary information, subject to confirmation, indicates that this outbreak has been caused by an African strain of Zika virus. 165 pregnant women with suspected Zika virus infection are being followed up. 44 (27%) of these women have delivered.

Incidence of microcephaly

- Between 22 October 2015 and 12 March 2016 a total of 6480 cases of microcephaly and/or central nervous system (CNS) malformation were reported by Brazil including 182 deaths. This contrasts with the period from 2001 to 2014, when an average of 163 microcephaly cases was recorded nationwide per year. A detailed description of this sharp increase is provided in a recently published paper.[6] The prevalence of microcephaly among newborn children in 15 states with laboratory-confirmed Zika virus transmission (2.8 cases per 10 000 live births) significantly exceeded that in four states without confirmed Zika virus transmission (0.6 cases per 10 000 live births).
- Of the 6480 cases of microcephaly reported in Brazil suspected to be associated with a Zika virus infection, investigations have been concluded for 2212 cases and 863 were confirmed for Zika virus (Table 2).[7]
- Microcephaly cases have been detected throughout Brazil but the reported increase is concentrated in the Northeast Region (Fig. 4).

Table 2. Countries, territories and areas reporting microcephaly cases potentially associated with Zika virus infection.

Reporting country	Number of reported microcephaly cases potentially associated with a Zika virus infection	Probable location of infection
French Polynesia	8	French Polynesia
Brazil	863	Brazil
United States of America [8]	1	Brazil
Slovenia [9]	1	Brazil

[6] http://www.cdc.gov/mmwr/volumes/65/wr/mm6509e2er.htm?s_cid=mm6509e2er_w
[7] http://portalsaude.saude.gov.br/index.php/cidadao/principal/agencia-saude/22649-microcefalia-4-268-casos-suspeitos-continuam-em-investigacao
[8] http://governor.hawaii.gov/newsroom/doh-news-release-hawaii-department-of-health-receives-confirmation-of-zika-infection-in-baby-born-with-microcephaly/
[9] http://www.nejm.org/doi/pdf/10.1056/NEJMoa1600651

Figure 4: Distribution of microcephaly cases associated with Zika virus infection in Brazil (863 cases reported up to 12 March 2016).

- Among the 6480 cases of microcephaly and/or CNS malformation reported in Brazil, 182 child deaths occurred after birth or during pregnancy (including miscarriage or stillbirth); 40 of these were confirmed as having microcephaly and/or CNS malformation potentially linked to congenital Zika virus infection, 124 remain under investigation and 18 were discarded.
- An outbreak of Zika virus in French Polynesia was followed by an increase in the number of CNS malformations in children born between March 2014 and May 2015.[10] A total of 19 cases was reported including eight microcephaly cases compared to the national average of 0-2 cases per year.
- In the context of the Cabo Verde Zika virus outbreak, a baby with microcephaly was reported on 14 March 2016. Samples were collected from both mother and baby and the results of tests for Zika virus are pending.

[10] http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(16)00651-6.pdf

- Given the temporal and geographical associations between Zika virus infections and microcephaly, the association between Zika virus and microcephaly observed in prospective and retrospective studies of women during pregnancy, and the repeated discovery of virus in fetal brain tissue, a causal role for Zika virus is highly likely.

Incidence of Guillain-Barré syndrome (GBS)

- In the context of Zika virus circulation 12 countries or territories have reported increased GBS incidence and/or laboratory confirmation of a Zika virus infection among GBS cases (Table 3, Fig. 3).

Table 3. Countries, territories or areas reporting GBS potentially related to Zika virus infection.

Classification	Country/Territory/Area
Reported increase in incidence of GBS cases, with no GBS case confirmed with Zika virus infection	Colombia, Honduras
Reported increase in incidence of GBS cases, with at least one GBS case with confirmed Zika virus infection	Brazil, El Salvador*, French Polynesia, Suriname, Venezuela (Bolivarian Republic of)
No increase in GBS incidence reported, with at least one GBS case with confirmed Zika virus infection	French Guiana, Haiti*, Martinique, Panama, Puerto Rico

**GBS cases with previous history of Zika virus infection were reported by the International Health Regulations (2005) National Focal Point in United States of America.*

- Between October 2013 and April 2014, French Polynesia experienced the first Zika virus outbreak ever recorded in the country. During the outbreak, 42 patients were admitted to a hospital with GBS. This represents a 20-fold increase in incidence of GBS in French Polynesia compared with the previous four years. A recently published formal analysis of these data (a case-control study) showed a strong association between Zika infection and GBS. [11] Based on a 66% attack rate of Zika virus infection in the general population (judged from a serological survey), the risk of GBS was estimated to be 0.24 per 1000 Zika virus infections.
- In 2015 in the Brazilian state of Bahia, 42 GBS cases were reported, among which 26 (62%) had a history of symptoms consistent with Zika virus infection. A total of 1708 cases of GBS were registered nationwide, representing a 19% increase from the previous year (1439 cases of GBS in 2014), though not all states reported an increase in incidence.
- From December 2015 to 5 March 2016, Colombia reported 327 cases with neurologic syndromes, of which 220 are GBS with a history of suspected Zika virus infection. To date, none of the cases of GBS have been laboratory confirmed for Zika virus infection, or other possible causes.
- El Salvador recorded 136 GBS cases from 5 December 2015 to 5 March 2016, including five deaths, while the annual average number of GBS cases is 169. One GBS case has been laboratory confirmed for Zika virus infection as reported by the International Health Regulations (2005) National Focal Point in United States of America.

[11] Cao-Lormeau *et al* Published Online February 29, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00562-6

- On 29 January 2016, Suriname reported an increased incidence of GBS: 10 GBS cases reported in 2015 and three GBS cases were reported during the first three weeks of 2016, while Suriname registers on average approximately four cases GBS per year. A Zika virus infection was confirmed by RT-PCR in two of the GBS cases reported in 2015.
- Venezuela (Bolivarian Republic of) has also reported an increased incidence of GBS. Between 12 December 2015 and 13 February 2016, 578 GBS cases were reported, from which 235 presented symptoms of Zika virus infection. In 2016, a Zika virus was confirmed by RT-PCR in six GBS cases.
- GBS cases with laboratory confirmed Zika virus infections were reported from El Salvador (one case), French Guiana (one case), Haiti (one case), Martinique (three cases), Panama (two cases) and Puerto Rico (one case).
- A recent report describes the case of a 15-year old girl in Guadeloupe with Zika virus infection who developed an acute myelitis. This is the first such report which highlights the need to better understand the range of neurologic disorder associated with Zika virus infection.[12]
- As with microcephaly, Zika virus is highly likely to be a cause of the elevated incidence of GBS in countries and territories in the Western Pacific and Americas.

II. RESPONSE

- The principal activities being undertaken jointly by WHO and international, regional and national partners in response to this public health emergency are laid out in Table 4.
- WHO and partners are working together to develop and maintain the Joint Operations Plan that combines activities within the six main areas of work; coordination, surveillance, care, vector control, risk communication and community engagement, and research at the global, regional and country level.
- WHO and partners are appealing for the sum of US$ 56 million for an inter-agency, international response to the spread of Zika virus disease and subsequent spikes in cases of microcephaly and neurologic disorders. The request represents the consolidated requirements of 23 partner organizations to address this emergency over the next six months. US$ 25 million is required to fund the WHO and PAHO emergency response and US$ 31 million to fund partners' activities. Approximately 45 donors attended a meeting to discuss the Strategic Response Framework. Donors are reviewing stated needs and requirements.
- On 18 February 2016 the World Bank Group announced that it had made US$ 150 million immediately available to support countries in Latin America and the Caribbean affected by the Zika virus outbreak. This amount follows the WHO declaration of a Public Health Emergency of International Concern (PHEIC) on 1 February 2016 for the recent cluster of microcephaly cases and other neurologic disorders reported in the Americas amid the growing Zika virus outbreak. The World Bank Group has engaged with governments

[12] http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00644-9/fulltext

across the region, including sending technical experts to affected countries. If additional financing is needed, the World Bank Group stands ready to increase its support. These initial estimates assume that the most significant health risks are for pregnant women.

Table 4. Strategic Response Framework and Joint Operational Response Plan: response activities.

Public health risk communication and community engagement activities	▪ Activate networks of social science experts to advise on community engagement. ▪ Coordinate and collaborate with partners on risk communication messaging and community engagement for Zika. ▪ Develop communication and knowledge packs and associated training on Zika and all related and evolving issues for communication experts. ▪ Engage communities to communicate risks associated with Zika virus disease and promote vector control, personal protection measures, reduce anxiety, address stigma, and dispel rumours and cultural misperceptions. ▪ Disseminate material on Zika and potentially associated complications for key audience such as women of reproductive age, pregnant women, health workers, clinicians, and travel and transport sector stakeholders. ▪ Conduct social science research to understand perceptions, attitudes, expectations and behaviours regarding fertility decisions, contraception, abortion, pregnancy care, and care of infants with microcephaly and persons with GBS. ▪ Support countries to monitor impact of risk communications.
Vector control and personal protection against mosquitoes	▪ Regularly update and disseminate guidelines/recommendations on emergency *Aedes* mosquito control and surveillance. ▪ Support insecticide resistance monitoring activities. ▪ Support countries in vector surveillance and control, including provision of equipment, insecticides, personal protection equipment (PPE) and training.
Care for those affected and advice for their caregivers	▪ Assess and support existing capacity and needs for health system strengthening, particularly around antenatal, birth and postnatal care, neurologic and mental health services, and contraception and safe abortion. ▪ Map access barriers limiting women's capacity to protect themselves against unintended pregnancy. ▪ Develop guidance for: families affected by microcephaly, GBS or other neurologic conditions; women suspected or confirmed to have Zika virus infection, including women wanting to get pregnant, pregnant women, and women who are breastfeeding; health workers on Zika virus health care, blood transfusion services, tools for triage of suspected Zika virus, chikungunya and dengue cases; and for health services management following a Zika virus outbreak. ▪ Provide technical support to countries on health service delivery refinements and national level planning to support anticipated increases in service needs. ▪ Procure and provide equipment and supplies for prioritized countries and territories to prepare their healthcare facilities in provision of specialized care for complications of Zika virus.

- WHO has developed new advice and information on Zika virus case definitions; prevention of sexual transmission of Zika virus; blood safety; identification and case management of Guillain-Barré syndrome; breast feeding in the context of Zika virus; pregnancy management in the context of Zika virus; psychosocial support for pregnant

women and for families with microcephaly and other neurologic complications in the context of Zika virus; risk communications for Zika virus outbreaks; pregnancy management in the context of Ziak virus; case definition, and assessment of infants with microcephaly in the context of Zika; and monitoring and managing insecticide resistance in *Aedes* mosquito populations.[13]

- These materials are being transformed into many formats to support risk communication, community engagement and for the use of key stakeholders including health workers.
- Two applications for mobile devices were released by WHO this week to help Zika responders and health care providers access key information, guidelines and tools. The multi-lingual versions in Portuguese and Spanish will be available for Andriod and IOS platforms this week. This platform will also house future training and briefing videos.
- A joint WHO-PAHO-UNICEF-IFRC document on risk communication and community engagement for Zika virus prevention and control was published and is available for use by field teams in English and Spanish. [14]
- A generic WHO Knowledge Attitude and Practices (KAP) survey resource pack has been finalized for use by all governments and partners in English and Spanish. The Portuguese version will follow next week.
- It has been agreed with the Communicating with Disaster Affected Communities (CDAC) network to develop a media mapping tools for all affected or at risk countries to better engage local reporters on Zika virus risk communication.
- UNESCO, IFRC and WHO together developed and disseminated radio spots on Zika virus risk communication for local use in English and Spanish.

III. RESEARCH

- Public health research is critical for establishing the causal link between Zika virus infection in pregnant women and congenital abnormalities in their babies and for understanding the pathogenesis of Zika virus infection. Technical assistance is being coordinated with various partner agencies globally and in affected countries to identify and answer critical questions (Table 5).
- The Emergency Use Assessment and Listing for Zika diagnostic tests was activated, and a call for submission has been published.[15]
- The first global consultation on Zika virus research – "Towards the development of a research agenda for characterizing the Zika virus outbreak and its public health implications in the America" was convened in Washington, D.C. from 1 to 2 March 2016.
- A global consultation on research related to Zika virus infection was held from 7 to 9 March 2016 to assess the research landscapes and plan for additional research.

[13] See resources listed at end of report
[14] http://www.who.int/csr/resources/publications/zika/community-engagement/en/
[15] http://www.who.int/diagnostics_laboratory/eual-zika-virus/160211invitation_to_mx_of_Zika_virus_diagnostics_v2.pdf?ua=1

- Based on the discussion held during the research meeting in PAHO and the R&D meeting in Geneva, five key priority areas have been defined for public health research:
    1. Establish causality between Zika virus infection and neurologic disorders (in fetus, neonates, infant and adults): development of a causality framework and of a systematic review
    2. Risk of adverse outcomes of pregnancy in pregnant women infected with Zika virus and follow-up of babies and infant: establish a cohort of pregnant women
    3. Explore sexual transmission of Zika virus: establish a cohort of men and women and test regularly body fluids for the presence of Zika virus
    4. Vector control research: evaluate interventions based on community and resistance of the vectors, develop surveillance system
    5. Public health system research: evaluate the preparedness of health system to manage babies w microcephaly and assist their families, to manage patient with GBS; to evaluate the availability of contraception in health services to respond to the demand and assess abortion services

Table 5. Strategic Response Framework and Joint Operational Response Plan: Research objectives and activities.

Research and development	Fast-track research and development of new products including diagnostics, vaccines and therapeutics.	▪ Identify research gaps and prioritize needs for products. ▪ Support the conduct of research related to Zika virus diagnostics, therapeutics, vaccines and novel vector control approaches ▪ Convene research actors and stakeholders. ▪ Coordinate introduction of products after assessment and evaluation. ▪ Coordinate supportive research activities including regulatory support and data sharing mechanisms.

Zika virus and potential complications

WHO documents

As of 16 March 2016

World Health Organization

1. Epidemiology and Laboratory

1.1 Zika virus case definition
AR | CH | EN | FR | RU | SP | PT

2. Management of Complications

2.1 Prevention of potential sexual transmission of Zika virus
AR | CH | EN | FR | RU | SP | PT

2.2 Pregnancy management in the context of Zika virus
AR | CH | EN | FR | RU | SP | PT

2.3 Assessment of infants with microcephaly in the context of Zika virus
AR | CH | EN | FR | RU | SP | PT

2.4 Identification and management of Guillain-Barré syndrome in the context of Zika virus
AR | CH | EN | FR | RU | SP | PT

2.5 Breastfeeding in the context of Zika virus
AR | CH | EN | FR | RU | SP | PT

2.6 Psychosocial support for pregnant women and for families with microcephaly and other neurological complications in the context of Zika virus infection
EN | SP | PT

3. Vector Control

3.1 Monitoring and managing insecticide resistance in Aedes populations
EN

3.2 Entomological surveillance for *Aedes spp.* in the context of Zika virus
EN

3.3 Protecting the occupational health and safety of workers in emergency vector control of Aedes mosquitos
EN

4. Risk Communication and Community Engagement

4.1 Risk communications for Zika virus
AR | CH | EN | FR | RU | SP | PT

5. Health Systems

5.1 Maintaining a safe and adequate blood supply during Zika virus outbreaks
AR | CH | EN | ES | FR | RU | PT

6. International Health Regulations

6.1 Aircraft disinsection for mosquito control
EN

7. General Information

Factsheets

7.1 Zika virus
AR | CH | EN | FR | RU | SP | PT

7.2 Microcephaly
AR | CH | EN | FR | RU | SP

7.3 Guillain-Barré syndrome
AR | CH | EN | FR | RU | SP

General information

7.4 Zika virus and potential complications: Questions and answers
AR | CH | EN | FR | RU | SP

7.5 Zika virus and safe blood supply: Questions and answers
AR | CH | EN | FR | RU | SP

7.6 Dispelling rumours around Zika and microcephaly
AR | CH | EN | FR | RU | SP

7.7 Information for travellers visiting Zika affected countries
AR | CH | EN | FR | RU | SP

7.8 Zika virus: video questions and answers
EN

7.9 Zika Strategic Response Framework & Join Operations Plan
EN

7.10 Zika virus disease timeline
EN

Information on research and data sharing

7.11 WHO involvement in Zika R&D
AR | CH | EN | FR | RU | SP

7.12 Data sharing in public health emergencies: a call to researchers
EN

7.13 Zika Open
EN