Health system disruption by epidemics: the example of Zika in Brazil

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Estimating the full public health value of vaccines
Les Pensières Fondation Mérieux Conference Center
Veyrier-du-Lac - France 5-7 December 2016

Zika Virus

First identified in primates in 1947

TRANSACTIONS OF THE ROYAL SOCIETY OF
TROPICAL MEDICINE AND HYGIENE.
Vol. 46. No. 5. September, 1952.

COMMUNICATIONS

ZIKA VIRUS

(I). ISOLATIONS AND SEROLOGICAL SPECIFICITY

BY

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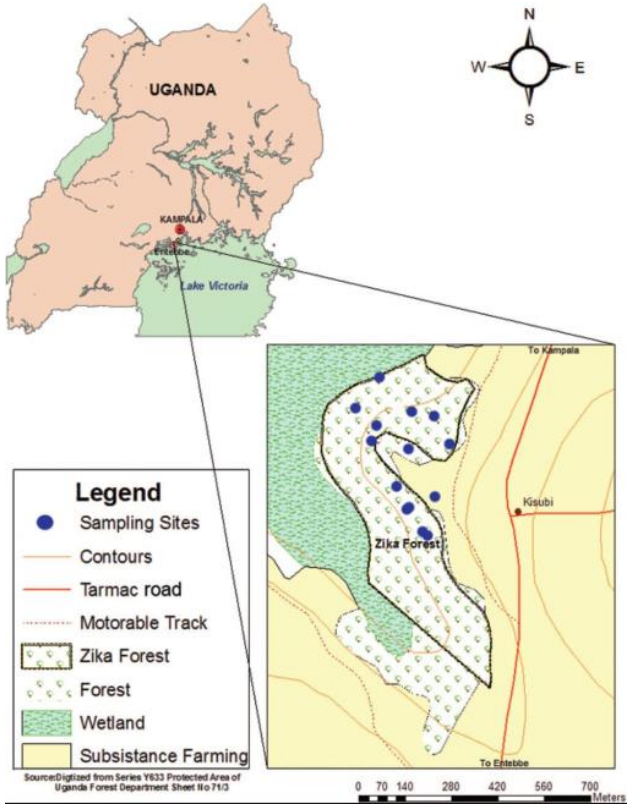
The isolation of filterable viruses from mosquitoes taken in Uganda has already been recorded on several occasions. Two of the agents so recovered, although well known, had not previously been identified by isolation from mosquitoes in Uganda, viz. yellow fever virus (MAHAFFY et al., 1942 ; SMITHBURN and HADDOW, 1946 ; SMITHBURN et al., 1949) and Rift Valley fever virus (SMITHBURN et al., 1948). A third which was called Mengo encephalomyelitis (DICK et al., 1948) (now known to be identical with Columbia SK,MM and encephalomyocarditis viruses (DICK, 1949 ; WARREN et al., 1949), has been isolated on several occasions from *Taeniorhynchus* spp. (DICK et al., loc. cit., DICK and HADDOW, (unpublished)). GILLETT and DICK (unpublished) have, however, failed to transmit this agent in the laboratory by three species of *Taeniorhynchus*. The isolation of three hitherto unknown, filterable viruses secured from wild mosquitoes in Uganda has been described, viz. Bunyamwera virus (SMITHBURN et al., 1946), Semliki Forest virus (SMITHBURN and HADDOW, 1944), Ntaya virus (SMITHBURN and HADDOW, 1951) ; the description of a fourth, Uganda S virus, is to be published (DICK and HADDOW). The purpose



Symptoms

- About 1 in 5 people infected develop the disease
- Incubation period: 2 – 7 days
- Mild flu-like symptoms: rash with or without fever, general malaise, joint and muscle pain, conjunctivitis, headache, digestive problems (pain, cramps, diarrhoea, constipation)
- Hospitalization and death cases are very rare
- Similar to and milder than dengue and chikungunya

Transmission of Zika Virus

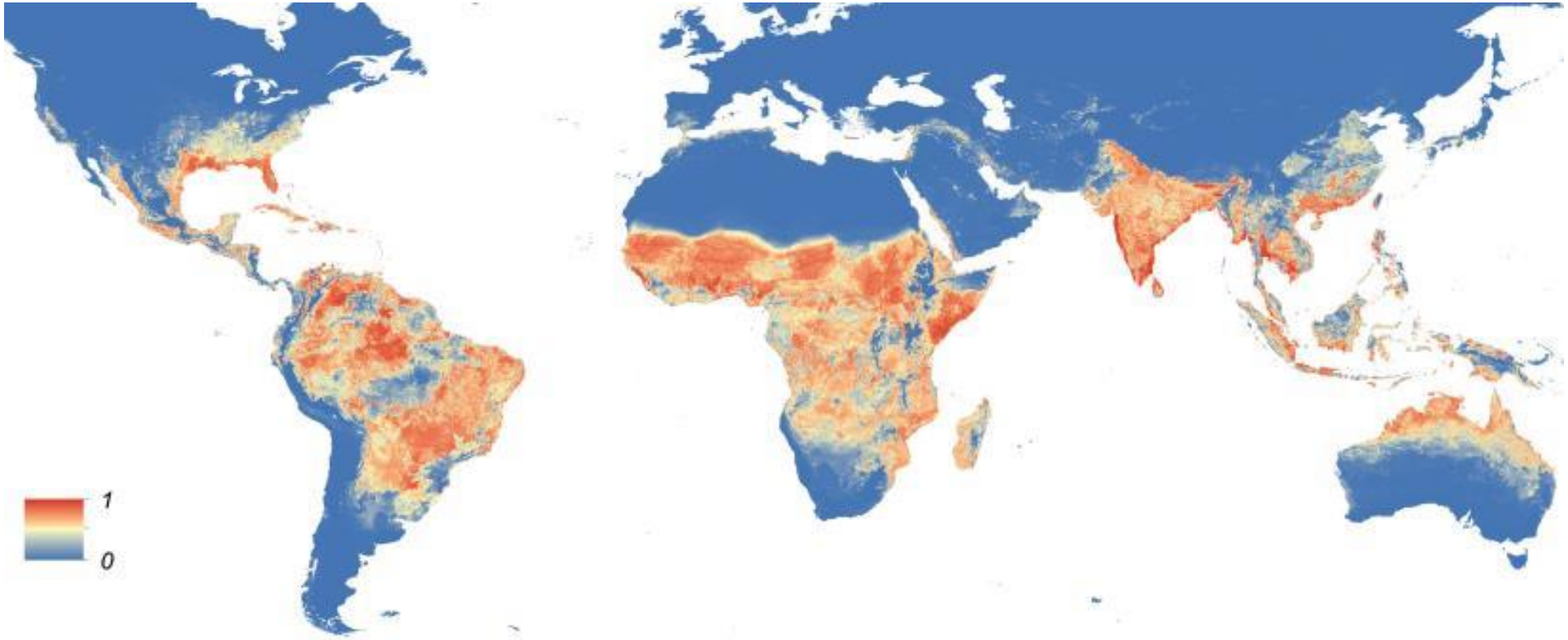
- **Arbovirus: mosquito-human-mosquito transmission**
- **Primarily through infected mosquitos of the *Aedes* genus, mainly *Aedes aegypti***
- **The same mosquito also transmits dengue, chikungunya and yellow fever**
- **Human-human (sexual, blood, transplacental) transmission**
- **Breastmilk?**

Lancet. 2016 Mar 1. pii: S0140-6736(16)00624-3. doi: 10.1016/S0140-6736(16)00624-3. [Epub ahead of print]

Infectious Zika viral particles in breastmilk.

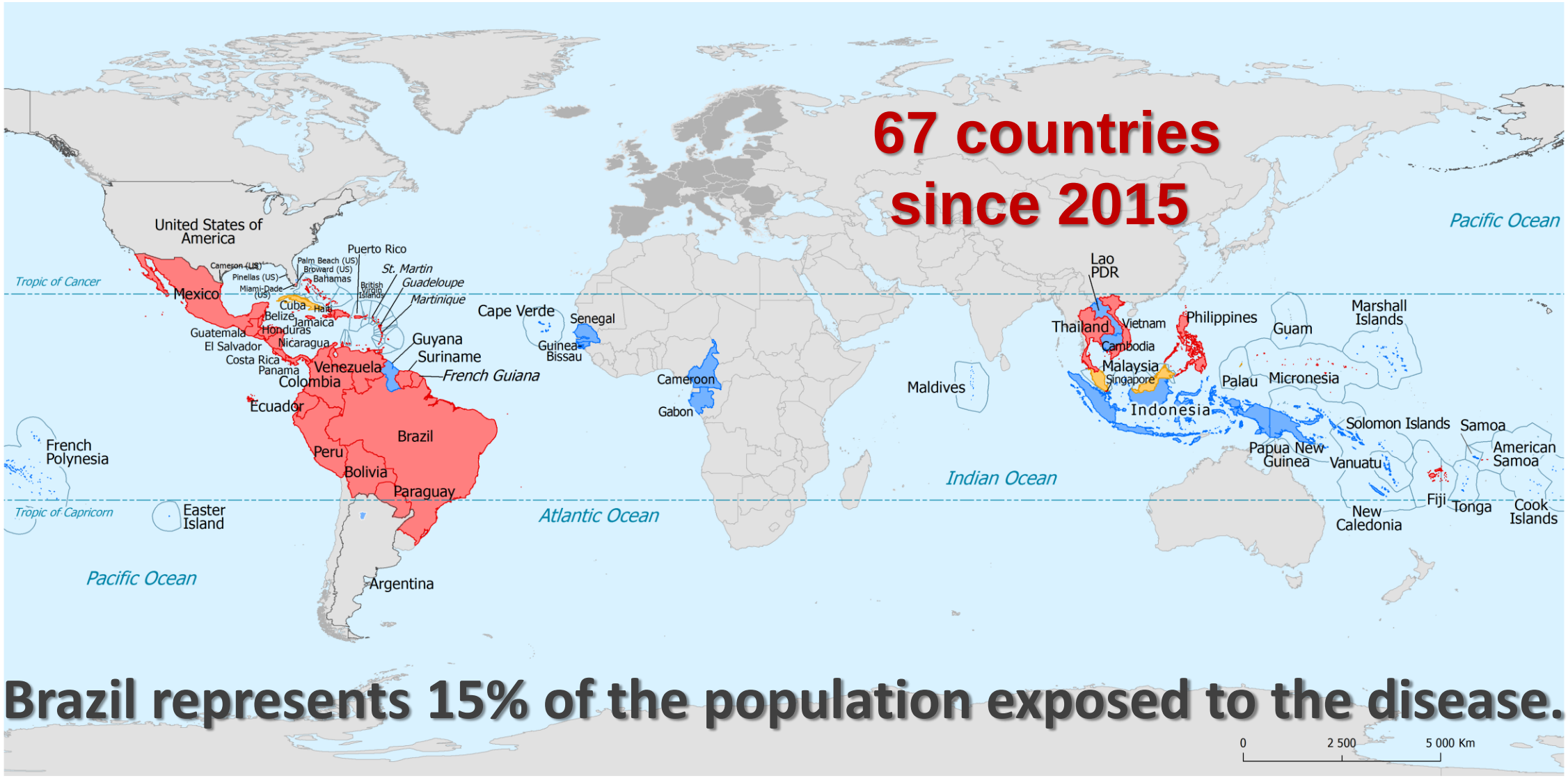
Dupont-Rouzeyrol M[1], Biron A[2], O'Connor O[2], Huguon E[3], Descloux E[3].

Global distribution of *Aedes aegypti* mosquitoes



Source: Moritz UG Kraemer et al. eLife Sciences 2015;
Available at: <http://dx.doi.org/10.7554/eLife.08347.004.>

Zika virus - more than 70 countries and territories since 2007



Brazil represents 15% of the population exposed to the disease.

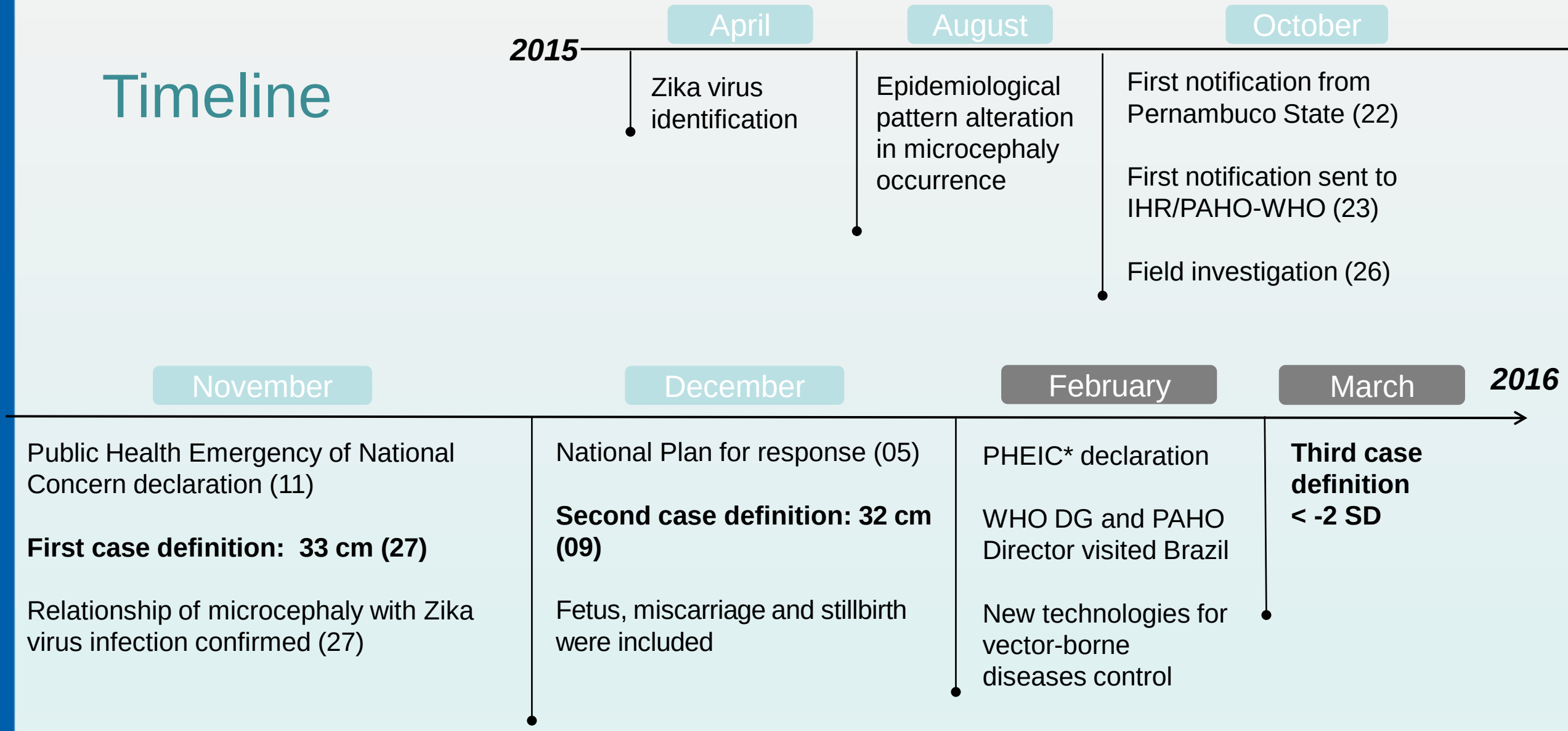
- Widespread transmission in the past three months
- Sporadic transmission in the past three months
- Past transmission (2007 – three months ago)
- *EU/EEA Member States, including outermost regions*
- Other countries and territories
- Maritime Exclusive Economic Zones for non-visible areas

ECDC. Map produced on 2 Dec 2016
Map your data at: https://emma.ecdc.europa.eu

Zika Virus in Brazil

- November 2014: outbreak of exanthematic disease in Northeast region
- April - August 2015 in **Northeast** region :
  - Zika virus isolated (State of Bahia)
  - Clusters of Guillain Barré Syndrome associated to exanthematic disease (Bahia and Pernambuco States)
  - First cases of microcephaly (Pernambuco)

Timeline



*PHEIC - Public Health Emergency of International Concern

Autochthonous Detection of Zika virus in Brazil, 2015-2016.

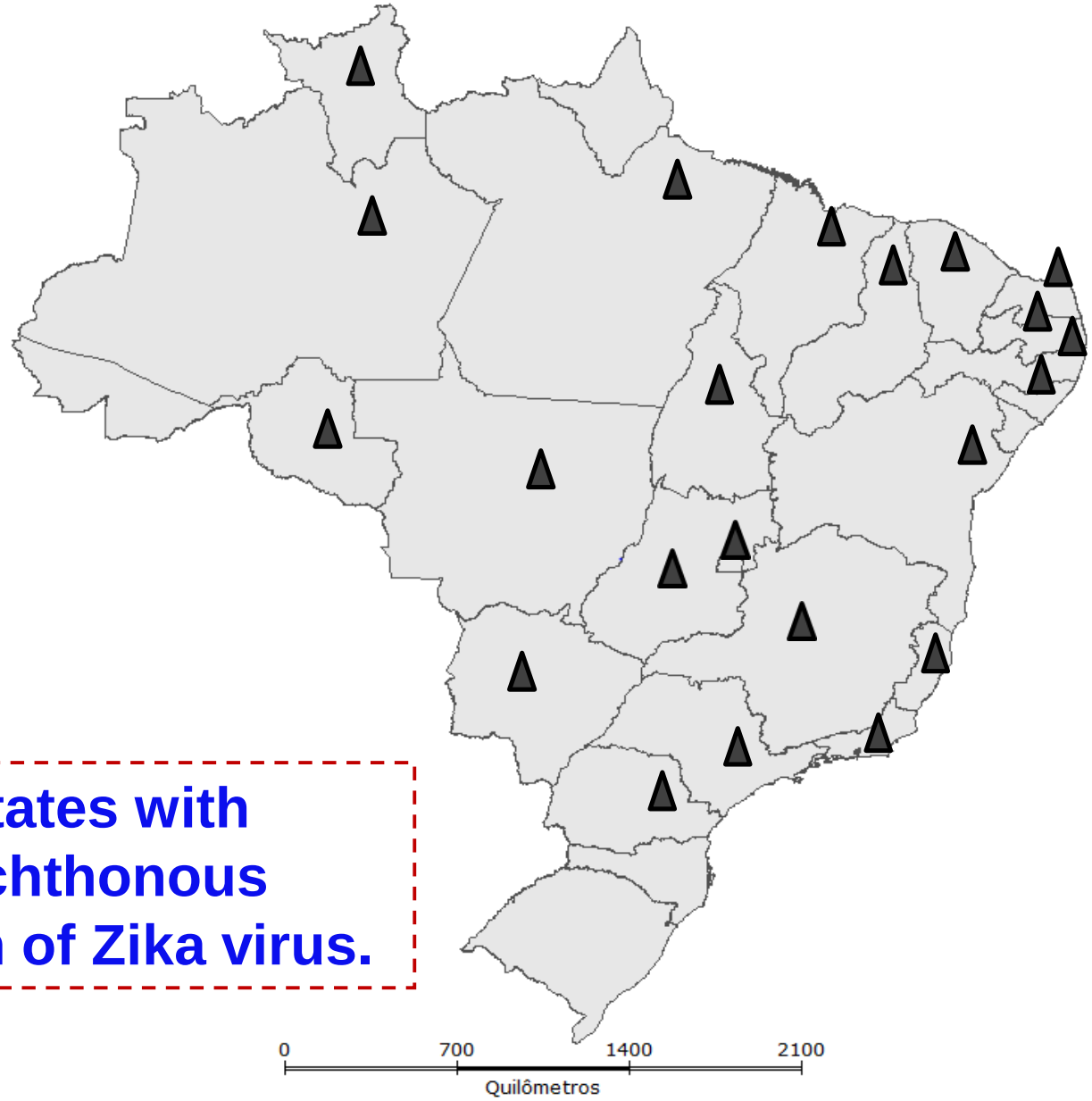
North
Roraima
Rondônia
Pará
Amazonas
Tocantins

Northeast
Maranhão
Piauí
Ceará
Rio Grande do Norte
Paraíba
Pernambuco
Alagoas
Bahia

Southeast
Rio de Janeiro
São Paulo
Espírito Santo
Minas Gerais

Center West
Mato Grosso
Mato Grosso do Sul
Distrito Federal
Goiás

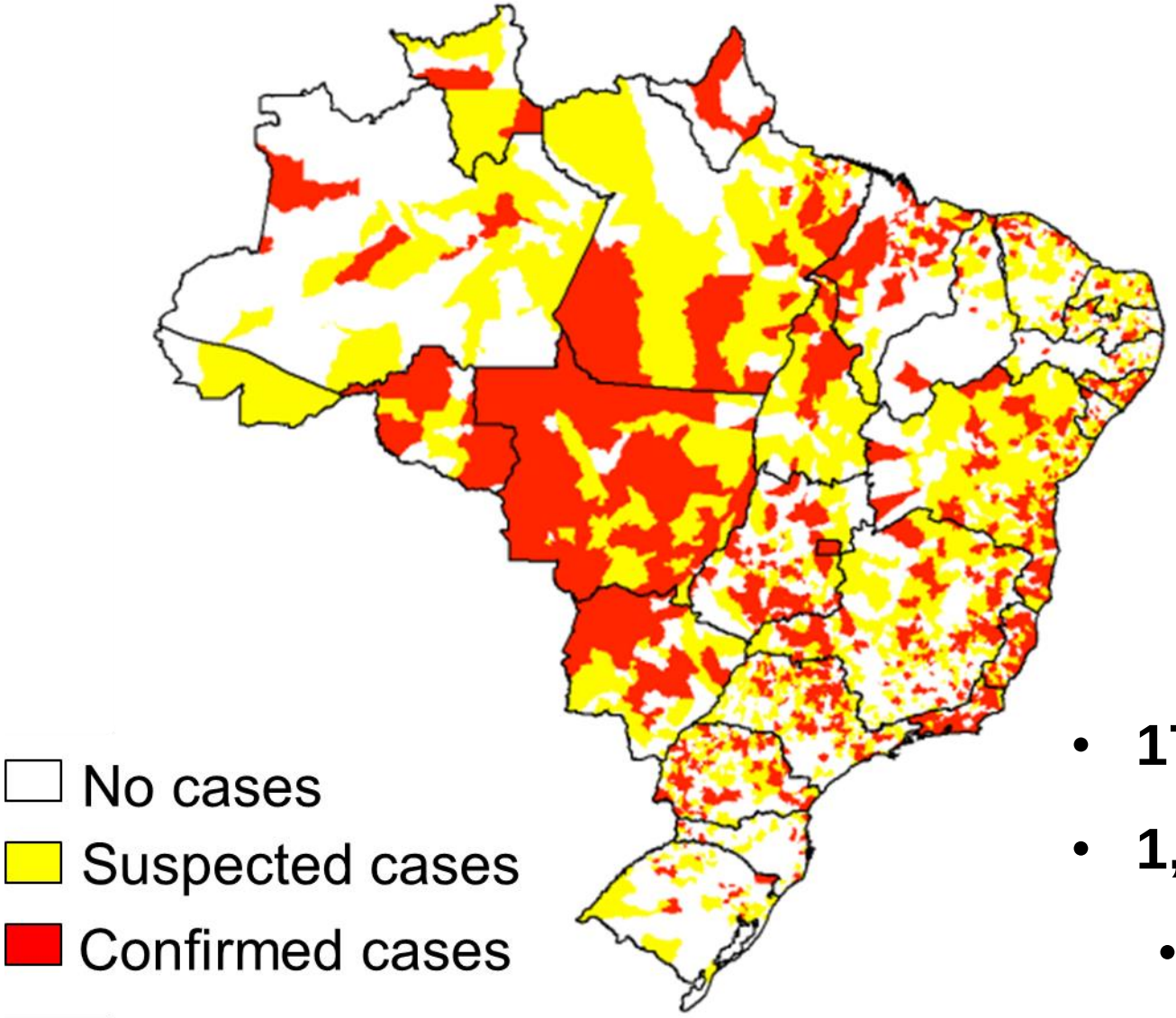
South
Paraná



22 states with autochthonous detection of Zika virus.

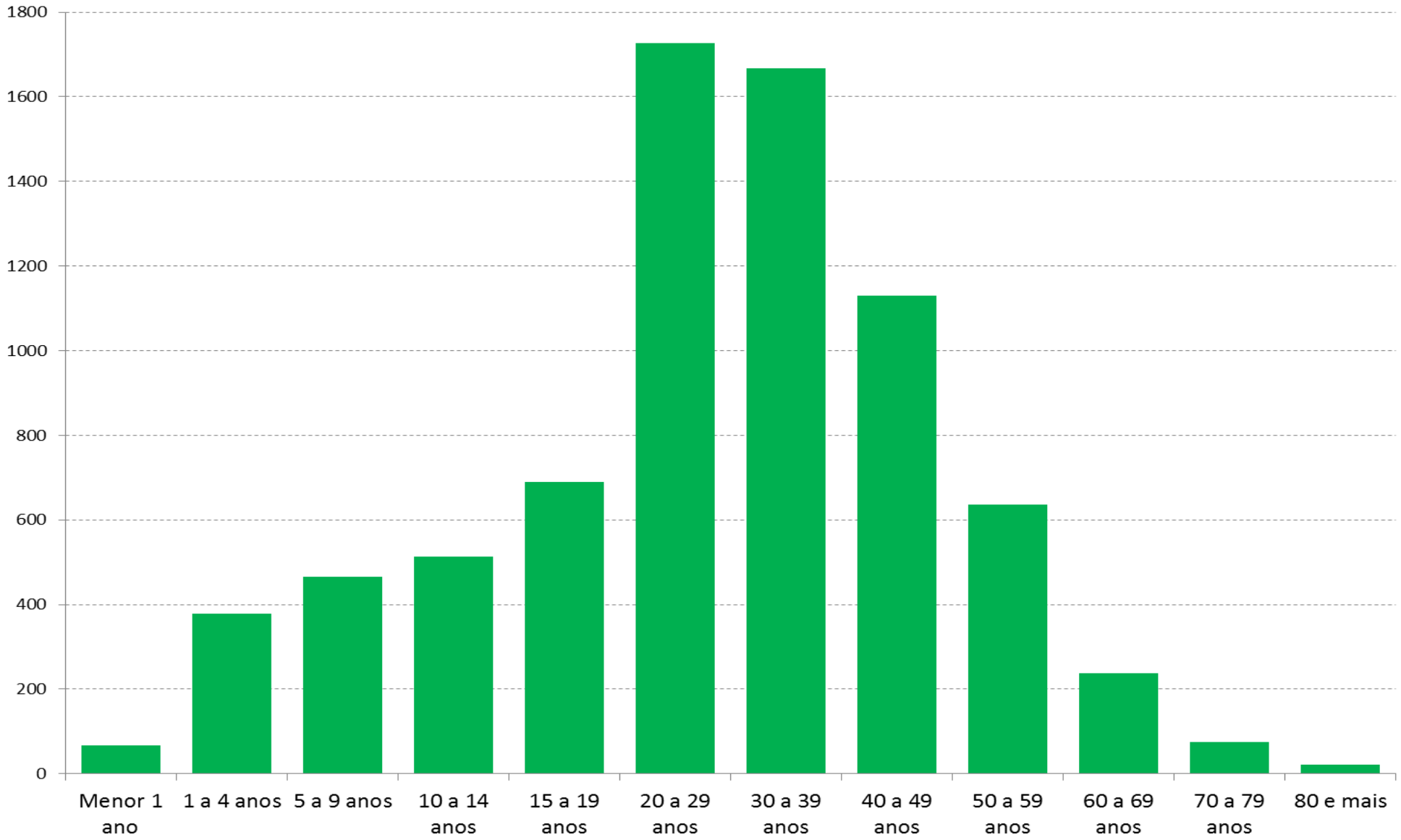
Source: GAL-Sinan NET-SES.

Reported and Confirmed Cases of Zika Virus by municipalities, up week 27, Brazil, 2016

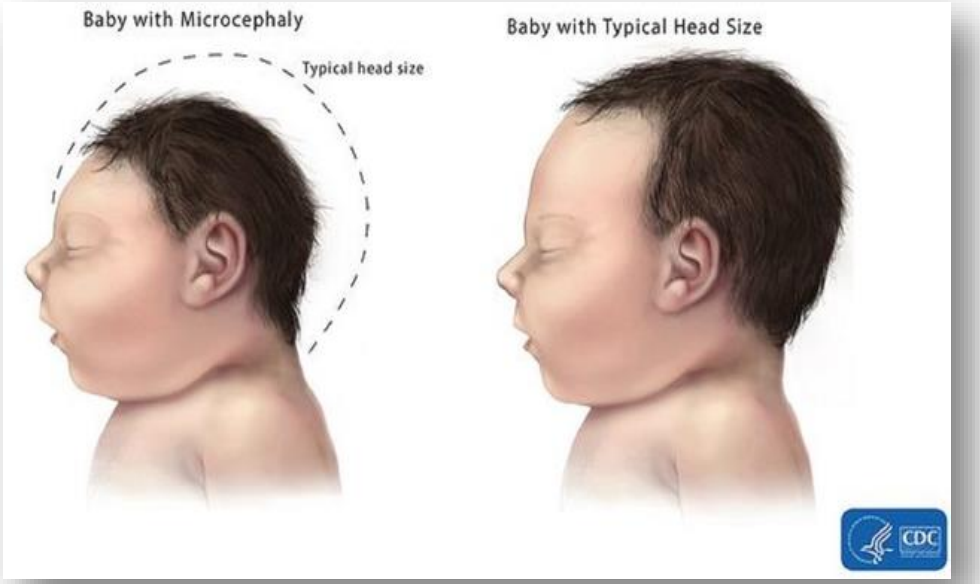


- **174,003 reported cases of Zika**
- **1,399,480 probable dengue cases**
  - **How many Zika cases included?**

Age distribution of suspected cases by Zika virus in Brazil, 2015-2016



Microcephaly



- **A neonatal malformation**
- **Head size 2-3 *s.d.* bellow normal**
  - **Developmental disabilities**
- **From mild to severe**
- No treatment
  - Stimulation programmes
  - No treatment

Sign and symptoms

Develop entirely normally
Develop epilepsy
Cerebral palsy
Learning disabilities
Hearing loss and vision problems

Number of microcephaly cases by year, Brazil, 2000 -2016

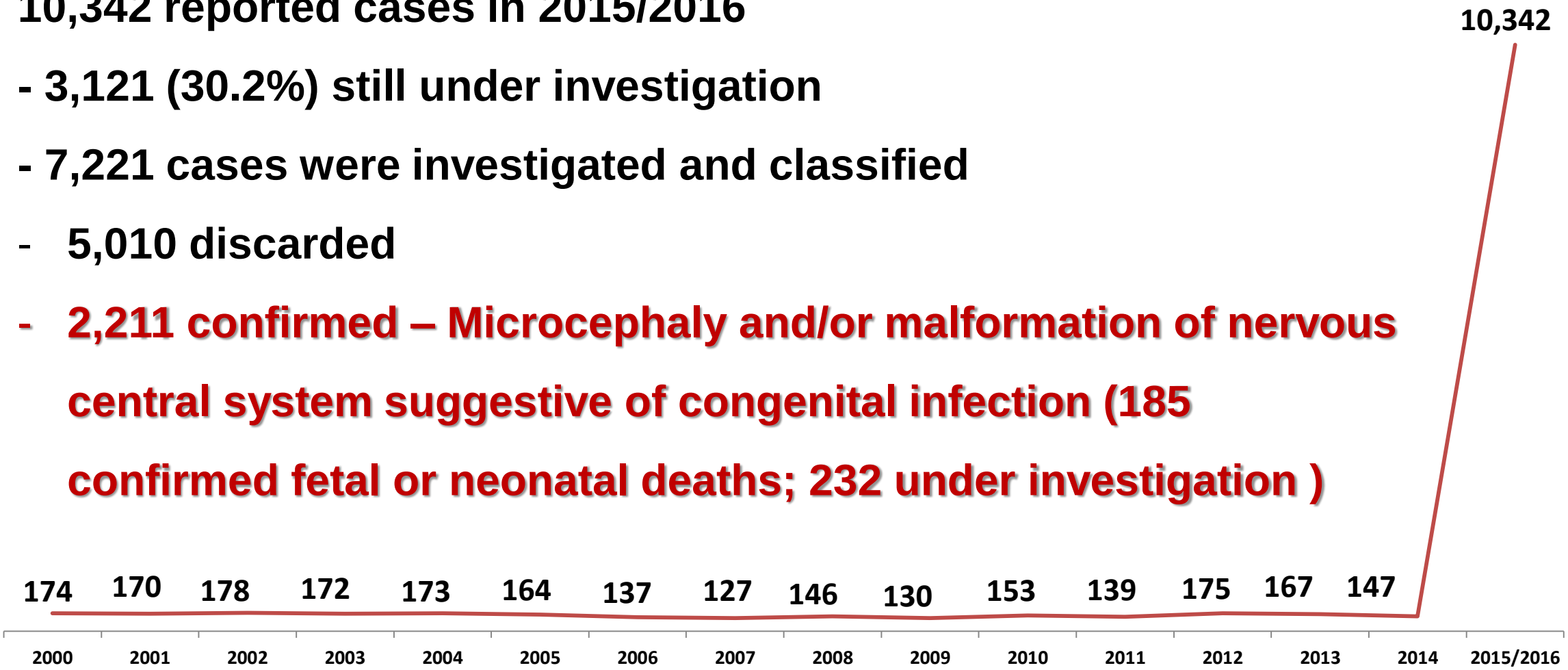
10,342 reported cases in 2015/2016

- 3,121 (30.2%) still under investigation

- 7,221 cases were investigated and classified

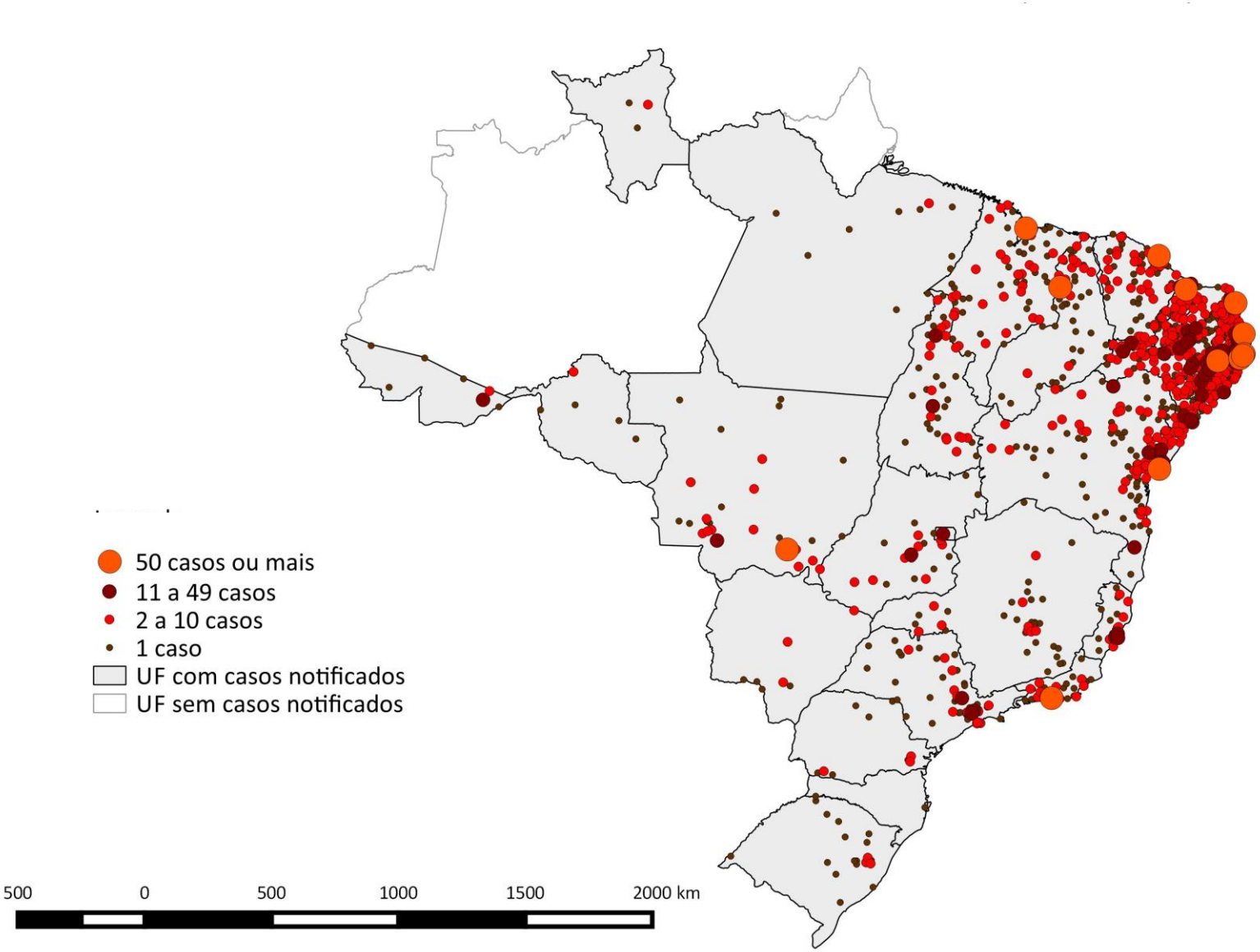
- 5,010 discarded

- 2,211 confirmed – Microcephaly and/or malformation of nervous central system suggestive of congenital infection (185 confirmed fetal or neonatal deaths; 232 under investigation)



Fonte: Ministério da Saúde e Secretarias Estaduais de Saúde (atualizado até 20/02/2016)

Suspected cases of microcephaly by municipality, Brazil, Week 45/2015- Week 7/2016

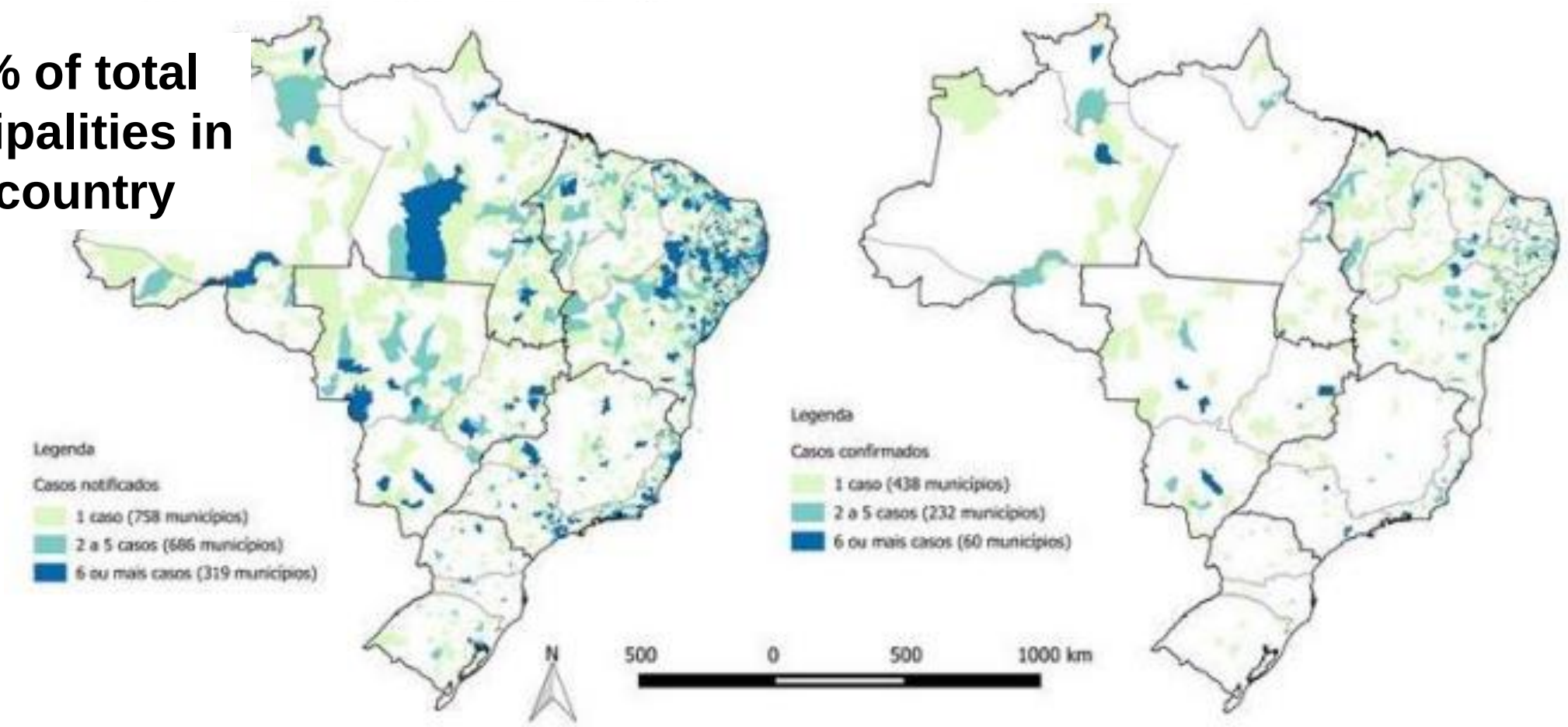


Suspected and Confirmed cases of microcephaly by municipality, Brazil, up to week 47/2016

Reported cases (1.763 municipalities)

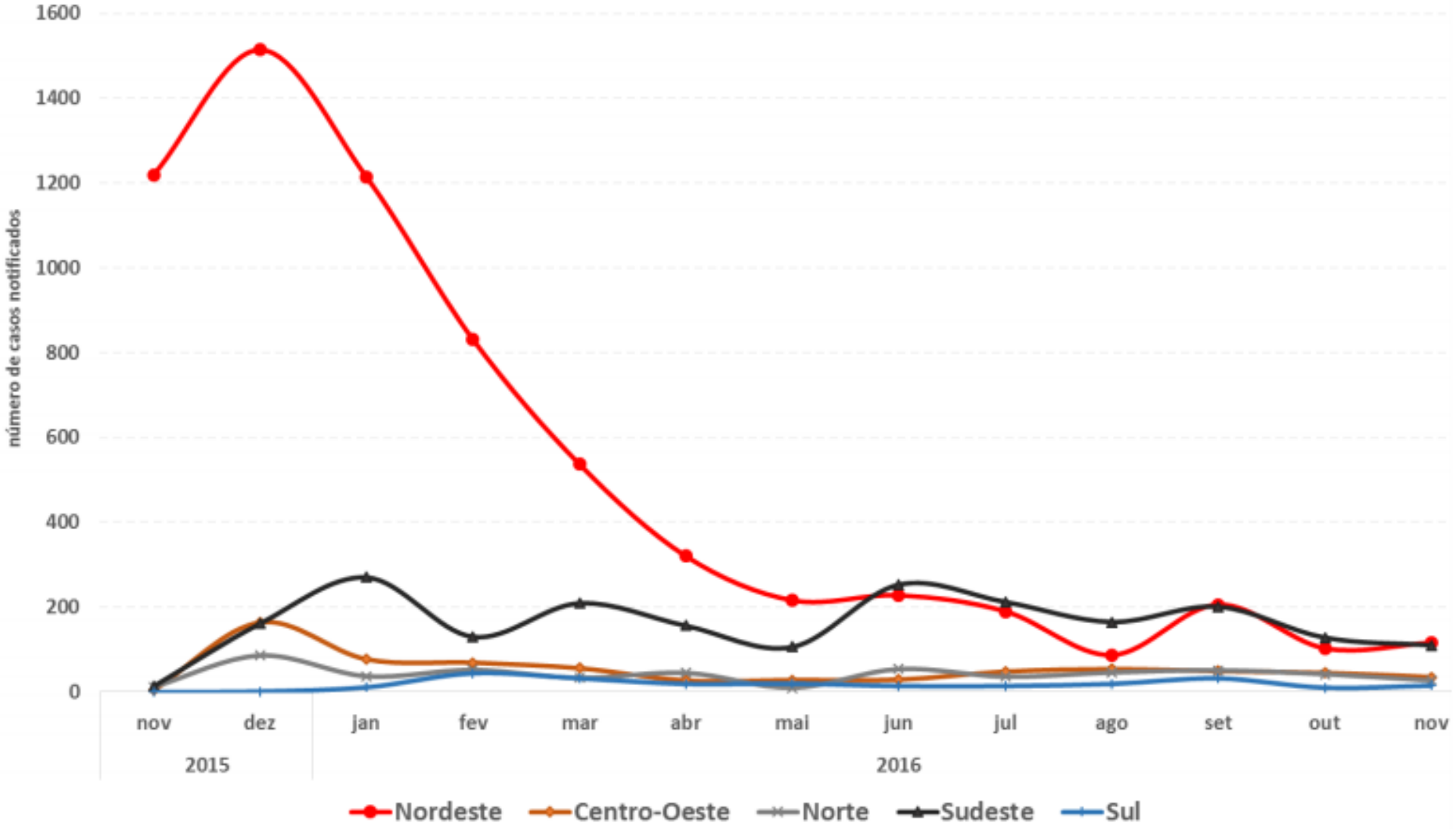
Confirmed cases (730 municipalities)

31.7% of total municipalities in the country



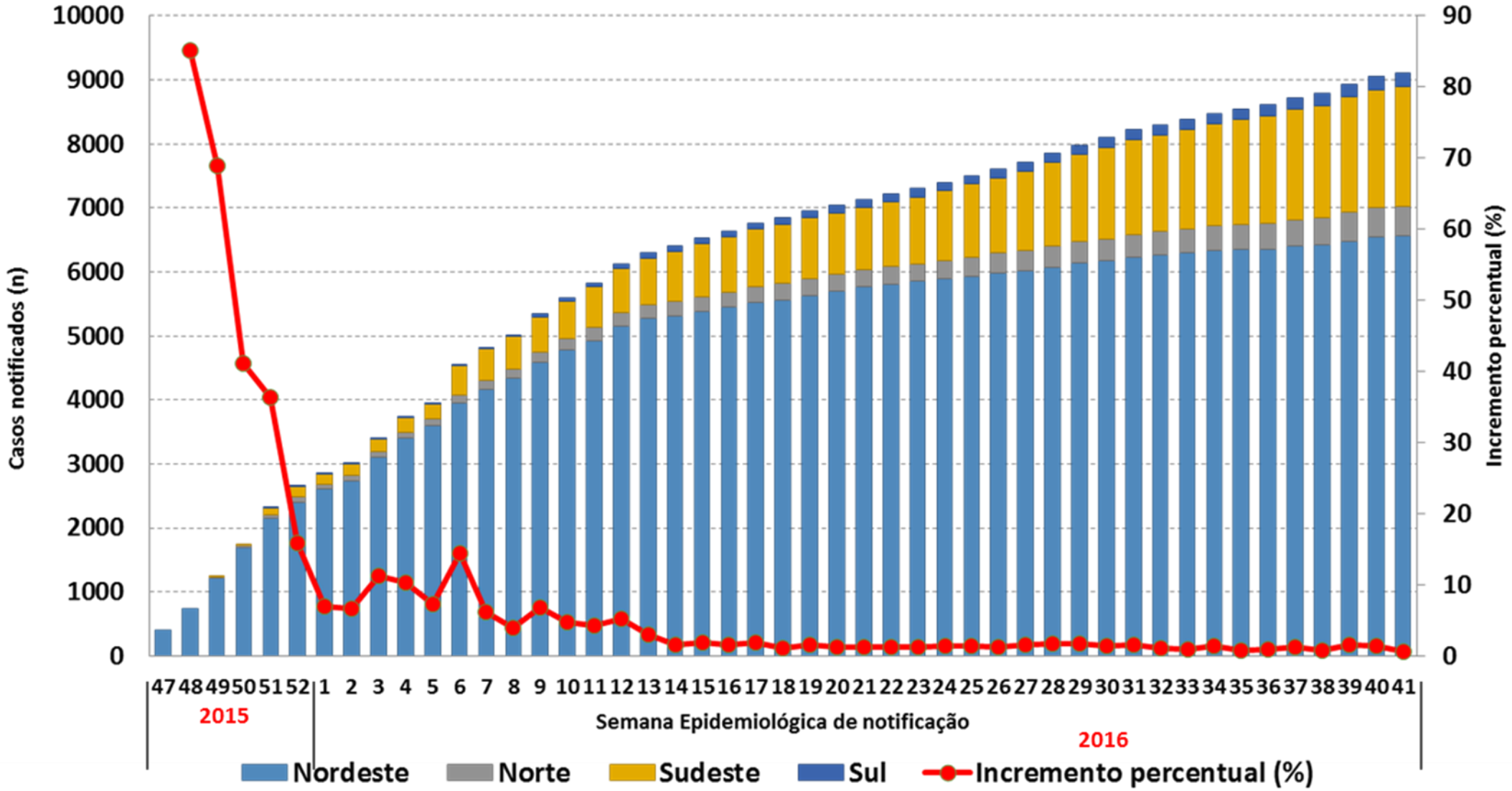
Source: Secretarias de Saúde dos Estados e Distrito Federal (dados atualizados até 26/11/2016).

Microcephaly and/or malformation of nervous central system suggestive of congenital infection by region, Brazil, 2015/2016



Fonte: Secretarias de Saúde dos Estados e Distrito Federal (dados atualizados até 26/11/2016)

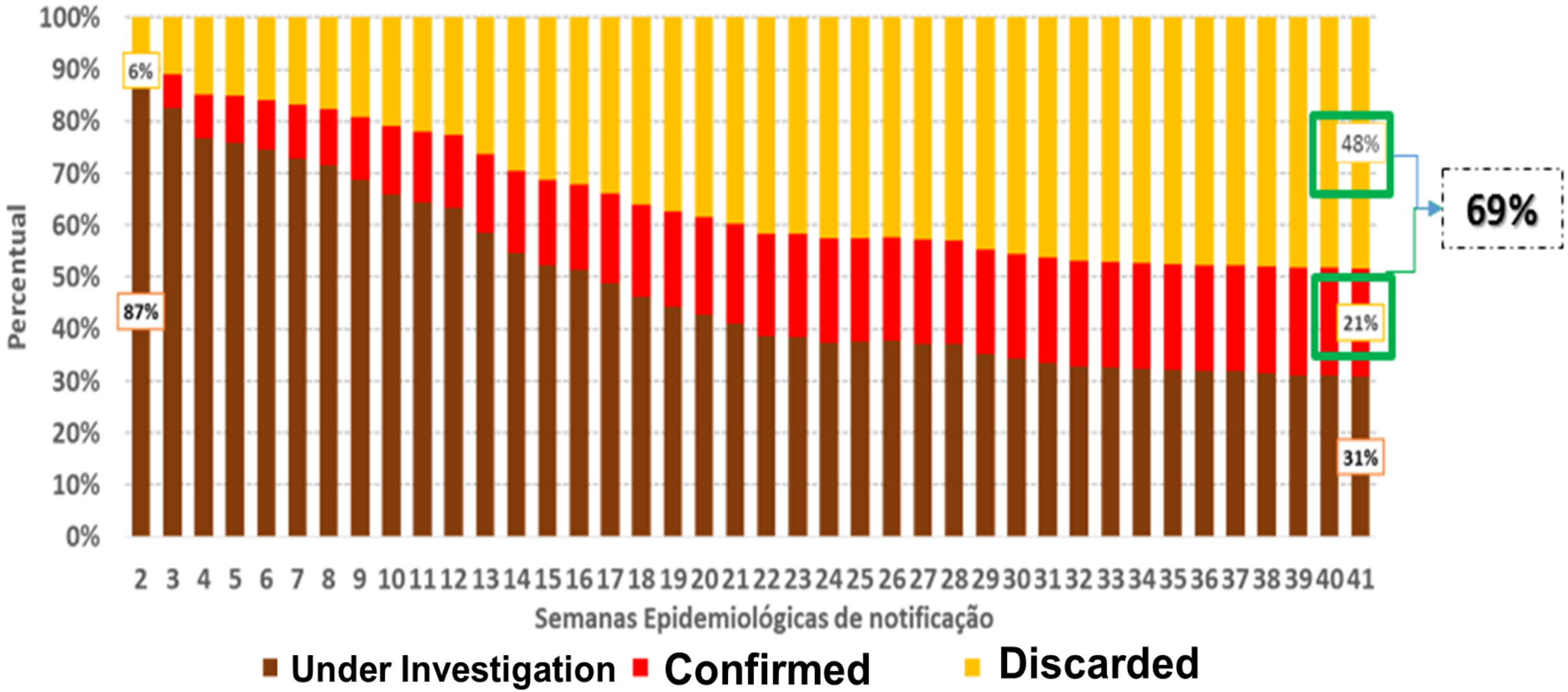
Cumulative distribution of reported cases of Microcephaly and/or malformation of nervous central system and % increase by region, Brazil, up to EW 41/2016



Fonte: Secretarias de Saúde dos Estados e Distrito Federal (dados atualizados até 15/10/2016)

Kindly shared by WK Oliveira - MoH

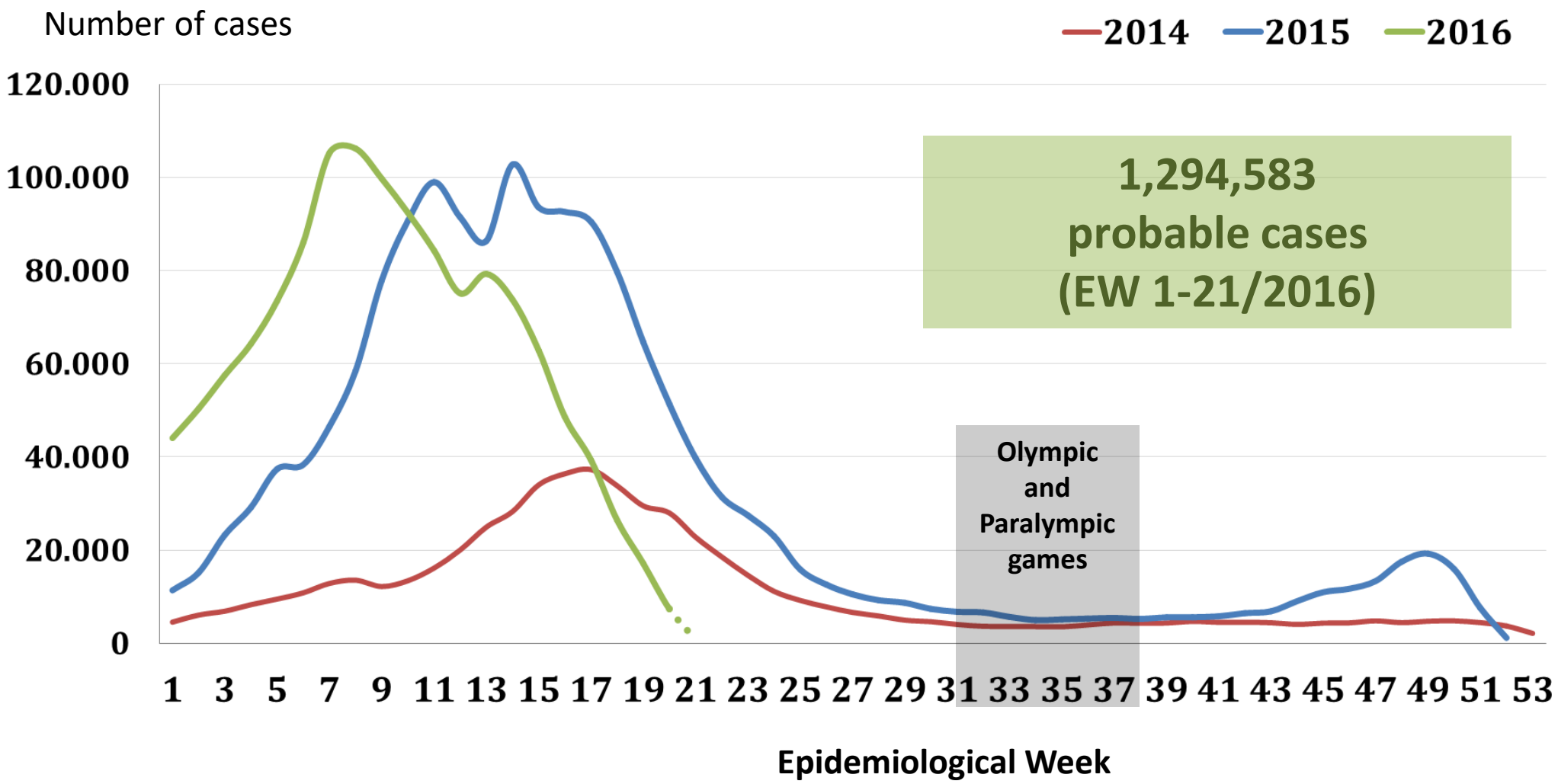
Reported Cases of Microcephaly and/or malformation of nervous central system according to final classification, Brazil, uo to EW 41/2016



Fonte: Secretarias de Saúde dos Estados e Distrito Federal (dados atualizados até 15/10/2016).

Kindly shared by WK Oliveira - MoH

DENGUE: Epidemiological situation, Brazil EW 1-21/2016

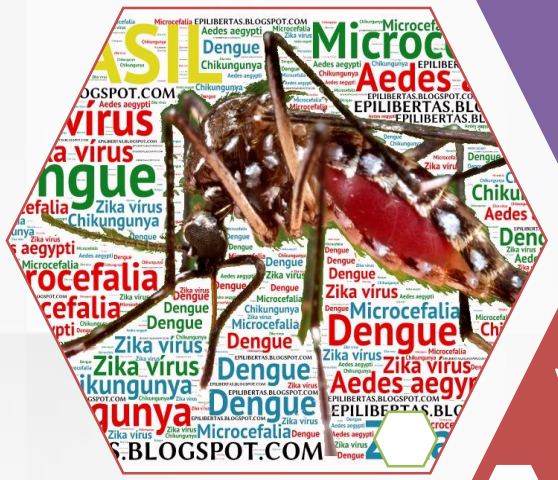


Serotype of dengue virus (DENV-1)

93,2%

Source: Sinan online

SURVEILLANCE AND RESPONSE

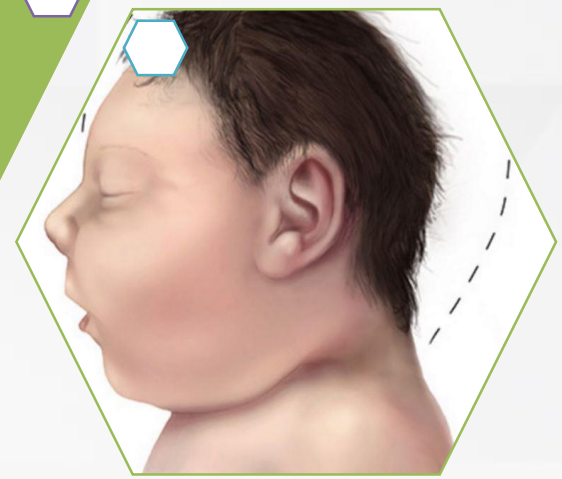


Research, technologies and education

Investment US$ 200 million

Health Assistance

Vector control, epidemiology and risk comunication



Updated data from The National Coordination and Control Room to fight against Dengue, Chikungunya and Zika

- 48 million households were visited (88.8%)
- 266,000 Community Health Agents daily involved
- 46,000 Vector Control Agents daily involved
- Mobilization day (February 13th) – 220,000 military men
- 15-18 February – 55,000 military men
- Education sector Mobilization Day (February 19th): 60 million people including students, teachers, officials and others from primary schools to universities, all over the country

World Health Organization

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Emergencies

Dispelling rumours around Zika and microcephaly

Updated
29 February 2016

No evidence that vaccines cause microcephaly in babies

There is no evidence linking any vaccine to the increases in microcephaly cases that were observed first in French Polynesia during the 2013-2014 outbreak and more recently in northeastern Brazil. No evidence that vaccines cause microcephaly in babies

http://www.who.int/emergencies/zika-virus/articles/rumours/en/

Zika agrava abandono de mulheres no Nordeste

Mães de bebês com microcefalia são obrigadas a criá-los sozinhas

http://oglobo.globo.com/brasil/zika-agrava-abandono-de-mulheres-no-nordeste-18680859

ACKNOWLEDGMENTS

- General Coordination of National Dengue Control Program - MoH
- General Coordination of Surveillance and Response - MoH
- General Coordination of Public Health Laboratories – MoH
- Dr. Wanderson Kleber de Oliveira