Zika virus and potential complications: Questions and answers

Online Q&A
Updated 5 April 2016

Summary of the situation

Zika virus is a mild disease and most people with the virus do not have symptoms. However, the recent rise in the spread of Zika virus in Brazil has been accompanied by an unprecedented rise in the number of children being born with unusually small heads—identified as microcephaly. In addition, several countries, including Brazil, reported a steep increase in Guillain-Barré syndrome—a neurological disorder that could lead to paralysis and death. Evidence is growing that Zika virus causes both microcephaly and Guillain-Barré syndrome.

***Click on the questions below to view the answer.**

Zika virus

How do people catch Zika virus?

Zika virus is primarily transmitted to people through the bite of an infected Aedes mosquito, which also transmits chikungunya, dengue and yellow fever. Zika virus can also be transmitted through sex.

Zika virus has been detected in blood, urine, amniotic fluids, semen, saliva as well as body fluids found in the brain and spinal cord.

Where does Zika virus occur?

Local transmission of Zika virus by *Aedes* mosquito has been reported on the continents of Africa, the Americas, Asia and the Pacific.

There are 2 types of *Aedes* mosquito capable of transmitting the Zika virus. In most cases, Zika is spread through the *Aedes aegypti* mosquito in tropical and subtropical regions. The *Aedes albopictus* mosquito also transmits the virus and can hibernate to survive regions with cooler temperatures.

Can El Niño have an effect on Zika transmission?

The *Aedes aegypti* mosquito breeds in still water. Severe drought, flooding, heavy rains and temperature rises are all known effects of El Niño—which is the result of a warming of the central to eastern tropical

Pacific Ocean. An increase in mosquitoes can be expected due to expanding and favourable breeding sites. Steps can be taken to prevent and reduce the health effects of El Niño.

More on El Niño and Zika

Can the *Aedes* mosquito travel from country to country and region to region?

The *Aedes* mosquito is a weak flyer; it cannot fly more than 400 meters. However it may be possible for the mosquito to be transported from one place to another accidentally and introduce Zika virus to new areas.

What are the symptoms of Zika virus disease?

Zika virus usually causes mild illness. Symptoms most commonly include a slight fever or rash, appearing a few days after a person is bitten by an infected mosquito. Although many will not develop any symptoms at all, others may also suffer from conjunctivitis, muscle and joint pain, and feel tired. The symptoms usually last from 2 to 7 days.

There is no known difference in the symptoms of infected pregnant and non-pregnant women.

How is Zika virus disease diagnosed?

Diagnosis is based on symptoms and the person's recent history (e.g. mosquito bites, or travel to an area where Zika virus occurs). Laboratory testing can confirm the presence of Zika virus in the blood. However, this diagnosis may not be reliable as the virus could cross-react with other viruses such as dengue, West Nile and yellow fever.

How is Zika virus disease treated?

The symptoms of Zika virus disease can be treated with common pain and fever medicines, rest and plenty of water. If symptoms worsen, people should seek medical advice.

Mosquito protection

What can people do to protect themselves from mosquito bites?

The best protection from Zika virus is preventing mosquito bites. Women who are pregnant or planning to become pregnant and their sexual partners should take extra care to protect themselves from the bites of the mosquito that transmits Zika. This can be done by:

Wearing clothes (preferably light-coloured) that cover as much of the body as possible.

Using insect repellent: repellents may be applied to exposed skin or to clothing, and should contain DEET (diethyltoluamide) or IR 3535 or Icaridin which are the most common biologically active ingredients in insect repellents. Repellents must be used in strict accordance with the label instructions. They are safe for use by pregnant women.

Using physical barriers such mesh screens or treated netting materials on doors and windows.

Sleeping under mosquito nets, especially when resting during the day, when *Aedes* mosquitoes are most active.

Identifying and eliminating potential mosquito breeding sites, by emptying, cleaning or covering containers that can hold even small amounts of water, such as buckets, flower pots and tyres.

How can pregnant women protect themselves from mosquito bites?

Pregnant women living in areas of Zika virus transmission should follow the same prevention guidelines as the general population.

Pregnant women living in areas with ongoing Zika virus transmission should attend their regular antenatal care visits in accordance with national standards and comply with the recommendations of their health-care providers. They should also start antenatal care visits early for diagnosis and appropriate care and follow-up if they develop any of the Zika symptoms or signs.

Mosquito surveillance (monitoring)

What role does mosquito surveillance play in addressing Zika virus?

Monitoring the numbers and location (surveillance) of mosquitos is used for operational and research purposes. It helps to determine changes in geographical distribution of mosquitos, for monitoring and evaluating control programmes, for measuring mosquito populations over time, and for facilitating appropriate and timely decisions regarding interventions.

Surveillance can serve to identify areas where a high-density infestation of mosquitos has occurred or periods when mosquito populations increase. In areas where the mosquitos are no longer present, mosquito surveillance is critical in order to detect new introductions rapidly before they become widespread and difficult to eliminate. Monitoring of the mosquito population’s susceptibility to insecticide should also be an integral part of any programme that uses insecticides. Surveillance is a critical component of prevention and control programme as it provides the information necessary for risk assessment, epidemic response and programme evaluation.

Surveillance programs in use for *Aedes aegypti* mosquitos do not involve collecting thousands of mosquitoes to test them all for the Zika virus. This would be extremely difficult to do considering the huge number of mosquitoes in the environment and the actual very low rate of Zika infection, even in an epidemic. For example, published reports suggest that less than 1 mosquito is infected with Zika for every 1000 mosquitoes.

What proportion of *Aedes Aegypti* mosquitoes have to be infected with Zika virus to create major breakouts such as the ones we are seeing in the Americas?

In Brazil, surveillance tests involving 1000 mosquitoes found that only 3 were infected with the Zika virus. This is a typical rate of infection found in what is commonly described as an epidemic situation.

Similarly, during a dengue epidemic in a South-American region that had affected more than 10% of the population, the infection rate for dengue in the Aedes aegypti was about 1 for every 1500.

These rates are quite typical, even in an epidemic.

Why is WHO focusing on the Aedes mosquito as the primary vector for Zika? Is enough known to warrant the current design of the vector control program?

All studies conducted to-date in Africa, Asia, the Pacific, and the Americas support the conclusion that *Aedes aegypti* is the main vector and a mosquito in the same family, *Aedes albopictus*, has the potential for transmission of Zika virus. These 2 species of Aedes account for more than 90% of the bites received by a person during the daytime in the infected area. Both species breed and live near or inside human dwellings, preferring to bite humans over other animal hosts, and extensive documentation has shown their competency in transmitting the Zika virus. They are also known vectors of the other Flaviviruses such as dengue.

The current vector control recommendations targeting the *Aedes* species are also very efficient against other mosquito vectors and diseases. The range of methods for reducing mosquitos include spraying the inside walls of houses, indoor space spraying, larval control, and eliminating breeding sites. Mosquito control is recommended along side personal protection steps such as the use of insect repellents, bed nets, window and door netting, and wire mesh screens.

Is it possible that another species of mosquito, the *Culex* for example, could be involved in the Zika virus epidemic?

There is no current evidence that the *Culex* species of mosquito is able to transmit the Zika virus. *Culex* quinquefasciastus mainly bite at night, and thus people sleeping under mosquito nets would be protected against Zika virus if *Culex* were the main transmitter. In Brazil, pregnant women are used to sleeping under mosquito nets, in particular in those states affected by malaria. From the epidemiology of the Zika virus, it appears that Zika virus is circulating in malarious areas where mosquito nets are currently being used.

To further strengthen our knowledge on the vectors of Zika virus, some research institutions such as Fiocruz in Brazil and Pasteur Institute in Paris are currently testing other mosquito species such as *Culex* for their potential competency for Zika virus.

Is there national or international research underway into the Zika virus to look at all the possible causes?

There is a severe lack of international research and a shortage of funding to address the questions that have arisen during this outbreak. Available evidence indicates that *Aedes* mosquitoes are the main vectors

in urban and semi urban areas, and comprehensive efforts are underway to control it. WHO is working closely with partners to better understand any additional factors that contribute to Zika virus transmission and complications.

Where can I find more information about mosquito surveillance?

More information on mosquito surveillance can be found in the publication below:

Entomological surveillance for *Aedes* spp. in the context of Zika virus: Interim guidance for entomologists

A review of Zika vectors - *Aedes*

Sexual transmission

What can people do to be protected from sexual transmission of Zika virus?

All people who have been infected with Zika virus and their sexual partners—particularly pregnant women—should receive information about the risks of sexual transmission of Zika virus, contraceptive options and safer sexual practices. When feasible, they should have access to condoms and use them correctly and consistently.

Pregnant women's sex partners living in or returning from areas where local transmission of Zika virus occurs should practice safer sex, wearing condoms, or abstaining throughout the pregnancy.

People living in areas where local transmission of Zika virus occurs should practice safer sex or abstain from sexual activity.

In addition, people returning from areas where local transmission of Zika virus occurs should adopt safer sexual practices or consider abstinence for at least 4 weeks after their return to reduce the risk of onward transmission.

Information for the general public:
Fact sheet: Family planning/Contraception

Information for policy-makers:
UNFPA, WHO and UNAIDS Statement on condoms & prevention of HIV, other STIs and unintended pregnancy

Information for health-care providers:
Prevention of potential sexual transmission of Zika virus, interim guidance

What should women do if they have been exposed to unprotected sex but do not wish to become pregnant because of possible infection with Zika?

All women and girls should have ready access to emergency contraception, including accurate information and counselling as well as affordable methods.

Advice for general public:
Fact sheet: Emergency contraception

Travel

What should people travelling to Zika-affected areas do?

Travellers should stay informed about Zika virus and other mosquito-borne diseases, such as chikungunya, dengue and yellow fever, and consult their local health or travel authorities if they are concerned.

Pregnant women should be advised not to travel to areas of ongoing Zika virus transmission; pregnant women whose sexual partners live in or travel to areas with Zika virus transmission should ensure safer sexual practices or abstain from sex for the duration of their pregnancy.

More on travelling in the context of Zika

Guillain-Barré syndrome, microcephaly and other neurological disorders

Is Zika virus a cause of microcephaly and Guillain-Barré syndrome?

Based on a growing body of preliminary research, there is scientific consensus that Zika virus is a cause of microcephaly and Guillain-Barré syndrome.

While intense efforts continue to reinforce and refine the link between Zika virus and a range of neurological disorders within a rigorous research framework, a stream of recent case report studies as well as a small number of case control and cohort studies, support the conclusion that there exists an association between Zika and microcephaly and Guillain-Barré syndrome.[i]

What events led WHO to investigate a causal link?

A Zika outbreak in Brazil, identified in early 2015, was followed by an unusual increase in microcephaly among newborns, as well as an increased number of cases of Guillain-Barré syndrome. In the light of these events in Brazil, it was determined that a previous outbreak of Zika virus in French Polynesia in 2013-14 was also associated with an increased number of cases of Guillain-Barré syndrome, microcephaly, and other neuro disorders on the islands. The scientific community responded with urgency to the rapidly evolving situation and began building a knowledge base about the virus and its implications extremely quickly.

Are there other explanations for microcephaly and Guillain-Barré syndrome?

Guillain-Barré syndrome and microcephaly are conditions with a number of underlying causes, triggers and neurological effects. Microcephaly can result from infections in the womb, exposure to toxic chemicals and genetic abnormalities, while Guillain-Barré syndrome is an autoimmune

condition that can be triggered by specific infections.

Scientists do not exclude the possibility that other factors may combine with Zika virus infection to cause neurological disorders but more research is needed before any conclusions in this area can be reached.

Is there a link between Zika and other neurological disorders?

Recent case reports suggest there may be a link between Zika and other neurological abnormalities such as: myelitis (inflammation of the spinal cord) or brain abnormalities on scan in the absence of microcephaly. WHO and partners have acted on the emerging reports about the other neurological manifestations and assessment of the evidence for these conditions is on-going, as for microcephaly and Guillain-Barré syndrome.

What is Guillain-Barré syndrome?

Guillain-Barré syndrome is a rare condition in which a person's immune system attacks his or her nerves. People of all ages can be affected, but it is more common in adult men. Most people recover fully from even the most severe cases of Guillain-Barré syndrome. In 20%-25% of people with the condition, the chest muscles are affected, making it hard to breathe. Severe cases of Guillain-Barré syndrome are rare, but can result in paralysis.

Fact sheet on Guillain–Barré syndrome

What is microcephaly?

Microcephaly is a condition where a baby's head is smaller than those of other babies of the same age and sex. Microcephaly happens when there is either a problem in utero, causing the baby's brain to stop growing properly, or after birth when the head stops growing properly. Children born with microcephaly often have developmental challenges as they grow older. In some cases, children with microcephaly develop entirely normally. Microcephaly can be caused by a variety of environmental and genetic factors such as Down syndrome; exposure to drugs, alcohol or other toxins in the womb; and rubella infection during pregnancy.

Fact sheet on microcephaly

Pregnancy

Can women transmit Zika virus to their fetuses during pregnancy or childbirth?

Transmission of Zika virus from pregnant women to their fetuses has been documented.

Zika virus infection close to term could potentially be transmitted during both pregnancy and at childbirth, although this has not been scientifically proven to date.

Pregnant women in general, including those who develop symptoms of

Zika virus infection, should see their health-care provider for close monitoring of their pregnancy.

Can mothers with Zika infection breastfeed their baby?

Zika virus has been detected in breast milk but there is currently no evidence that the virus is transmitted to babies through breastfeeding.

WHO recommends exclusive breastfeeding for the first 6 months of life.

Fact sheet: Breastfeeding

What should women do if they wish to postpone pregnancy because they are worried about microcephaly?

Whether and when to become pregnant should be a personal decision, on the basis of full information and access to affordable, quality health services.

Women wanting to postpone pregnancy should have access to a comprehensive range of reversible, long- or short-acting contraceptive options. They should also be counselled on the dual protection against sexually transmitted infections provided by condoms.

There are no known safety concerns regarding the use of any hormonal or barrier contraceptive methods for women or adolescent girls at risk of Zika virus, women diagnosed with Zika virus infection, or women and adolescents being treated for Zika virus infection.

Information for policy makers:
Ensuring human rights in the provision of contraceptive information and services - Guidance and recommendations

Advice for health-care providers on medical eligibility for contraception

How can women manage their pregnancy in the context of Zika virus and complications?

Most women in Zika-affected areas will give birth to normal infants.

Early ultrasound does not reliably predict fetal malformations. WHO recommends a repeat ultrasound of the fetus in the late second or early third trimester (preferably between 28 and 30 weeks) to identify fetal microcephaly and/or other brain abnormalities when they are easier to detect.

Where feasible, screening of amniotic fluid for abnormalities and congenital infections, including Zika virus, is recommended, especially in cases where women test negative for Zika, but their ultrasounds indicate fetal brain abnormalities.

Based on the prognosis of associated fetal brain abnormalities, the woman—and her partner if she wishes—should be offered non-directive counselling so that she, in consultation with her health-care provider, can make a fully informed choice about the next steps in the management of her pregnancy.

Women carrying their pregnancy to term should receive appropriate care and support to manage anxiety, stress and the birth environment. Plans for care and management of the baby soon after birth should be discussed with the parents in consultation with a paediatrician or paediatric neurologist where available.

Women who wish to discontinue the pregnancy should receive accurate information about their options to the full extent of the law, including harm reduction where the care desired is not readily available.

Women, whatever their individual choices with respect to their pregnancies, must be treated with respect and dignity.

Safe abortion: Technical & policy guidance for health systems. Legal and policy considerations - Key messages.

Zika virus response

What is the WHO response to Zika?

The Organization, working together with partners, has now developed a framework setting out the key questions that need to be answered to strengthen the body of evidence on a causal relationship between Zika and neurological complications. In addition, WHO convened several meetings among global experts on Zika and related topics during March 2016 to discuss evidence, answer pressing scientific questions and provide practical guidance to support countries responding to the outbreak and to cases of neurological disorders.

WHO will continue to lead the harmonisation, collection, review and analysis of data that will seek to answer these questions. As scientists unravel how Zika is implicated in conditions such as microcephaly and Guillain-Barré syndrome, we will gain a better understanding of the scope of the problem as well as greater clarity on which populations are likely to be affected and to what extent.

More on WHO's Strategic Response Framework

What are WHO recommendations to countries?

Given the severity of the risk to public health, WHO has advised countries in areas where Zika virus is circulating to take decisive and immediate action to protect their populations. Reducing the risk of people being bitten by Zika-infected mosquitoes is the most effective way to prevent people from getting the virus. Affected countries are urged to scale up vector control efforts and ensure that individuals and communities are aware of how to protect themselves from bites and how to eliminate mosquito breeding sites. There is currently no vaccine for Zika.

Social support and care before, during and after pregnancy need to be provided as well as clinical care for individuals who develop Guillain-Barré syndrome.

All of WHO's guidance on Zika virus

How can the Zika response keep up with all the new research being published?

New studies on Zika and its complications are being published daily and the pace of research will continue to increase. WHO and partners will systematically evaluate new studies to track any changes in the direction of the evidence base and to identify knowledge or research gaps.

To allow publication of the latest evidence at regular intervals, a living systematic review is being developed. This will be an online summary of health research, which will be updated as new research becomes available. This system can be adapted for future outbreaks of new and emerging communicable diseases to generate real time evidence-based information.

References: [i]

Besnard M, Lastere S, Teissier A, Cao-Lormeau V, Musso D. Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014. Eurosurveillance 2014 Apr 3;19(13):20751. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20751

Brasil P, Pereira JP, Raja Gabaglia C, Damasceno L, Wakimoto M, Ribeiro Nogueira RM, et al. Zika Virus Infection in Pregnant Women in Rio de Janeiro - Preliminary Report. N Engl J Med 2016 Mar 4 [cited 2016 Mar 6];NEJMoa1602412. Available from: http://www.nejm.org/doi/10.1056/NEJMoa1602412

Broutet N, Krauer F, Riesen M, Khalakdina A, Almiron M, Aldighieri S, et al. Zika virus as a cause of neurologic disorders. N Engl J Med: Mar 9 2016. Available from: http://www.nejm.org/doi/full/10.1056/NEJMp1602708#t=article

Cao-Lormeau V-M, Blake A, Mons S, et al. Guillain-Barré Syndrome outbreak associated with Zika virus infection in French Polynesia: a case-control study. Lancet 2016;Published Online February 29, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00562-6.

Cauchemez S, Besnard M, Bompard P, Dub T, Guillemette-Artur P, Eyrolle-Guignot D, et al. Association between Zika virus and microcephaly in French Polynesia, 2013-15: a retrospective study. Lancet 2016 Mar 15; Available from: http://www.ncbi.nlm.nih.gov/pubmed/26993883

Dick GWA. Zika virus. II. Pathogenicity and physical properties. Trans R Soc Trop Med Hyg 1952 Sep;46(5):521–34. Available from: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed1aa&NEWS=N&AN=12995441

European Centre for Disease Prevention and Control ECDC.

Epidemiological update: Complications potentially linked to the Zika virus outbreak, Brazil and French Polynesia - 27 November 2015 [Internet]. 2015. Available from: http://ecdc.europa.eu/en/press/news/_layouts/forms/News_DispForm.aspx?ID=1332&List=8db7286c-fe2d-476c-9133-18ff4cb1b568&Source=http://ecdc.europa.eu/en/press/epidemiological_updates/Pages/epidemiological_updates.aspx

European Centre for Disease Prevention and Control ECDC. Rapid risk assessment: Zika virus disease epidemic: potential association with microcephaly and Guillain-Barré syndrome. 21 January 2016 [Internet].

Heymann DL, Hodgson A, Sall AA, et al. Zika virus and microcephaly: why is this situation a PHEIC? Lancet 2016;387:719-21. Ioos S, Mallet H-P, Leparc Goffart I, Gauthier V, Cardoso T, Herida M. Current Zika virus epidemiology and recent epidemics. Médecine Mal Infect 2014 Jul;44(7):302–7. Available from: http://www.elsevier.com/journals/medecine-et-maladies-infectieuses/0399-077X

Oehler E, Watrin L, Larre P, Leparc-Goffart I, Lastere S, Valour F, et al. Zika virus infection complicated by Guillain-Barre syndrome--case report, French Polynesia, December 2013. Eurosurveillance 2014 Mar 6;19(9):20720. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20720

Petersen LR, Jamieson DJ, Powers AM, Honein MA. Zika virus. N Engl J Med: 30 March 2016. Available at: http://www.nejm.org/doi/full/10.1056/NEJMra1602113

Reefhuis J, Gilboa SM, Johansson MA, Valencia D, Simeone RM, Hills SL, et al. Projecting Month of Birth for At-Risk Infants after Zika Virus Disease Outbreaks. Emerg Infect Dis 2016 May [cited 2016 Mar 6];22(5). Available from: http://wwwnc.cdc.gov/eid/article/22/5/16-0290_article.htm

Rothman KJ, Greenland S. Causation and causal inference in epidemiology. American Journal of Public Health 2005;95 Suppl 1:S144-50.

Vandenbroucke JP. In defense of case reports and case series. Annals of Internal Medicine 2001;134:330-4.

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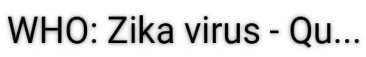

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