



Product of the Research & Information Support Center (RISC)

The following report is based on open-source reporting.

Please review the RAB on [Zika in the Western Hemisphere](#) from earlier in 2016.

Who is at Risk?

Zika remains concerning first and foremost for pregnancy. Healthcare providers [advise pregnant women](#) not to travel to any areas where Zika is spreading. In their Level 2 Health Alert, the CDC suggested that women even [thinking about](#) becoming pregnant should consult with their physicians before traveling to areas where Zika has been confirmed. However, according to the CDC, a Zika infection in a woman who is not pregnant [would not pose a risk](#) for birth defects in future pregnancies after the virus has cleared from her blood, although that time period is yet unclear.

According to the World Health Organization (WHO), special [attention](#) and help should be given to those who may not be able to protect themselves adequately, including **the sick and elderly**. Deaths from Zika have not only been registered abroad. An elderly man in Puerto Rico [died](#) from complications of Zika in February. And, the first Zika-related [death](#) in the continental U.S., an elderly man who had traveled to an undisclosed destination, was reported in late June. The cause of death has not been determined, as he was suffering from an underlying medical condition. More research is needed to determine if specific groups of individuals are at a higher risk for developing more severe complications if infected with the virus.

There is some concern about **newborns**, whose brains are still developing post-birth and who may not meet guidelines for mosquito-repellant usage. Available evidence regarding the spectrum of Zika virus disease in infants and children who are infected through mosquito bites [indicates](#) that most children are asymptomatic or have mild illness, similar to the findings seen in adults infected with Zika virus disease. So far, all cases of microcephaly have been congenital (in utero) not acquired post-birth. However, **small children** may be more susceptible to some flu-like symptoms due to weaker or undeveloped immune system.

The homeless, destitute, and other marginalized groups are also at risk of infection due to their lack of access to protective measures and information about the disease.

Which Mosquitoes?

There are dozens of mosquito species in the *Aedes* genus. Zika virus is transmitted to people primarily through the bite of one of two types of infected female *Aedes* mosquitoes: *aegypti* or *albopictus*. These are generally – although not exclusively -- day-biters. Because *aegypti* live near and prefer to feed on people, they are more likely to spread the virus to humans. *Albopictus* (also known as the Asian Tiger mosquito) feed on people *and* animals.

The *Aedes* mosquito is common in warm, humid, tropical climates. Mosquitos are cold-blooded and prefer temperatures over 80 degrees. At temperatures below 50 degrees, they hibernate or die off. Most mosquitoes can fly no more than about 1-3 miles in their lifetime, and females especially often stay within several hundred feet of where they hatch.

The CDC reports that [elevations](#) higher than 2,000 m (6,500 ft) above sea level are considered to have minimal likelihood for mosquito-borne Zika virus transmission because the *Aedes* mosquito does not live

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in high elevations, even within countries reporting active transmission. However, travelers could be at risk of sexual transmission.

GM Mosquitos: The ecological need for the *Aedes* mosquito is debatable. Genetically modified (GM) mosquito-sterility efforts seem to be effective and have no known environmental or health impact. Their efficacy is being investigated and even implemented on small scales in Brazil, the Cayman Islands, Malaysia, and Panama. But, even if *Aedes* were completely eradicated, which would be a herculean undertaking, another mosquito species would likely take its place as vector and annoyance.

Transmission

Zika virus is believed to remain in the blood for about [10 days](#) and can be passed from an infected person to another through mosquito bites. The CDC's [July 2016 EID Report](#) found that the incubation period in mosquitos is approximately 10 days. Even if they do not feel sick, travelers from an area with Zika should take steps to prevent mosquito bites for three weeks after their travel so that they do not spread Zika to mosquitoes that could spread the virus to other people.

Zika virus can be passed from a pregnant woman to her fetus.

Zika can be transmitted sexually from males to their partner(s). In the known cases of sexual transmission, the men had symptoms of Zika. The Zika virus can stay in semen longer than in blood, but it is not know for how long. Live virus has been found in semen 24 days after symptoms began, and virus particles 62 days after symptoms began; however, particles do not necessarily indicate the presence of active Zika virus. As a result, some officials recommended that men who have displayed symptoms wait six months before having unprotected sex. Men who have not displayed symptoms should be cautious about engaging in sexual activity for at least eight weeks after returning from an affected location.

There have also been suspected cases of Zika transmission through blood transfusions in Brazil; these are being [investigated](#). There is a strong possibility that Zika virus can be spread through blood transfusions since donors could be asymptomatic.

Symptoms

Many people infected with Zika virus will not have symptoms or will only have mild symptoms. The incubation period is unknown but likely a few days to a week. About 20 percent of those who get Zika become noticeably ill. People who do get sick do not generally require hospitalization. The most common symptoms are fever, rash, joint pain, conjunctivitis (red eyes), muscle pain, and headache. Symptoms last for several days to a week and can be rather intense and uncomfortable.

Notably, mosquitoes that spread Zika virus can also spread other flaviviruses, including the four unique strains of dengue, chikungunya, and yellow fever; symptoms of all of these diseases are quite similar. One *Aedes* mosquito could pass any combination of these four diseases. From what [CDC](#) knows about similar infections, once a person has been infected with Zika virus, s/he is likely to be protected from a future Zika infection.

The WHO [reports](#) there is strong scientific consensus that Zika can cause Guillain-Barre (GBS), a rare neurological syndrome. Symptoms include weakness of the arms/legs that is usually on one side of the body. In some cases, the muscles that control eye movement or swallowing may also become weak. It often rises from the feet upward and can cause death if paralysis is left untreated and reaches core organs. These symptoms can last a few weeks or several months. Although most people fully recover from GBS, some people have permanent damage, and one in 20 cases die. "There seems to be a higher risk of Guillain-Barre in older adults than there is in younger people," CDC Director Tom Frieden [said](#) in an interview with AARP. Researchers do not fully understand what causes GBS, but a bacterial or viral infection often precedes it. In the context of Zika, 13 countries and territories have reported an increased

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incidence of GBS and/or laboratory confirmation of a Zika virus infection among GBS cases. Still, it is very rare.



The CDC confirmed in April that Zika can cause microcephaly – another rare neurological condition in which an infant's head is significantly smaller than other infants (see image) -- and it can cause other severe fetal brain defects, but research continues. Fetuses exposed to Zika can have a range of health problems, including absent/poorly developed brain structures, blindness, deafness, seizures, learning and behavior difficulties in childhood, impaired growth and balance, and possibly mental disabilities later in life. These problems can range from mild to severe, are often life-long, and, in some cases, are life-threatening. Miscarriage/stillbirth is also possible. By January 2016, over 3,500 suspected microcephaly cases had been reported in Brazil. As of June 8, 11 countries or territories reported microcephaly and other central nervous system malformations potentially associated with Zika.

Testing

Diagnostic testing for Zika virus infection can only be done by testing certain bodily fluids in a Biosafety Level 2 laboratory; there are no over-the-counter or hospital/primary-care testing capabilities. During the first week after onset of symptoms, Zika virus can often be [diagnosed](#) through blood testing, and urine samples can be tested within 14 days after onset of symptoms. Zika may cross-react with antibody tests for chik-v, dengue, and yellow fever, especially after vaccination for yellow fever (see OSAC's Reporting "[Angola's Yellow Fever Outbreak Spreading](#)"). Anyone, but especially pregnant women, developing symptoms and with a link to a Zika region should consult a physician immediately.

Outbreaks: Historical and Current

Zika is not a new disease; it just has not been studied in much detail, and there are many possible reasons for that: 1) death is [rare](#) (although possible) for non-fetuses; 2) few people manifest symptoms; 3) symptoms could be confused for other diseases; 4) it has not impacted the West until now; 5) cases of fetal trauma are spaced potentially 10 months from the bite and might not have been linked, especially in lesser developed nations; and 6) mosquito bites are ubiquitous and generally hard to monitor, especially in tropical regions.

Discovered and named in 1947, Zika was first identified in humans in Nigeria in 1954, but it is likely Zika had lurked in the African forests for millennia. Between 1969-1983, sporadic cases were reported in India, Indonesia, Malaysia, and Pakistan. The first *bona fide* outbreak of Zika was in April 2007 in Micronesia with a few hundred cases. Between 2013-14, there were outbreaks in French Polynesia, Easter Island,

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the Cook Islands, and New Caledonia, with the former generating 28,000 suspected infections, including 40 cases of GBS.

The most recent outbreak of Zika was confirmed in April 2015 in northeastern Brazil. Local authorities link the outbreak to the increased flow of foreign visitors prompted by the August 2014 outrigger canoeing world championship, which brought competitors from French Polynesia, and the 2014 FIFA World Cup, which brought in huge numbers of visitors. The outbreak has since spread to much of South/Central



America and into the Caribbean. In January 2016, the CDC issued level 2 Travel Alerts for people traveling to regions and countries where Zika transmission was ongoing. A Level 2 advises travelers to follow enhanced precautions for that destination and means that there is an increased risk in defined settings or associated with specific risk factors and that certain high-risk populations may wish to delay travel. The WHO in February and again on June 14 declared the Zika

outbreak a public health emergency of international concern (PHEIC), warning it was spreading "explosively" in the Americas.

The purple areas of this map have reported active transmission. According to the WHO, as of June 8, 60 countries and territories report continuing mosquito-borne transmission. Most are in the Western Hemisphere, but some are in Oceania and Africa. Indonesia is also reportedly experiencing "sporadic transmission."

Brazil: Brazil has had the highest number of cases in the Western Hemisphere, and Rio de Janeiro state - where the Olympics will be held -- has the highest number of cases in Brazil. More than one in four of the 90,000 suspected cases (including nearly 3,000 pregnant women) in the first quarter of 2016 were in Rio state, more than tripled the national rate. On June 7, the WHO reiterated that the incidence of Zika does not warrant the transfer or cancellation of the Olympics and that conditions are adequate for events to be held; the CDC concurred. Public awareness campaigns by the Ministry of Health have been successful and an extra 2,000 health professionals and an extra 146 "intensive care ambulances" will be on standby during the Games.

Some people are optimistic that a cooler, drier August could see a decrease in *Aedes* mosquito populations for the Olympics. Historical data of diseases transmitted by *Aedes aegypti* show that rates of transmission tend to fall in July and August. But, an approaching winter season may not necessarily reduce rates of mosquito-borne diseases. Eggs of the *Aedes* mosquito can lay dormant for more than a year and can hatch in a matter of minutes with a surge in heat or humidity. So, due to shifting weather patterns, including El Nino and rainy seasons (December-May in Brazil), the rate of mosquito-borne diseases during a given month can vary quite considerably.

For more information on the Olympics, to include health concerns, please review OSAC's Report: "[OSAC Rio 2016 Olympics Assessment](#)."

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Europe: In its first assessment of the threat Zika poses to Europe, the WHO in mid-May said the overall risk was low to moderate. It is highest on the island of Madeira and the northeastern coast of the Black Sea. Imported cases of Zika virus infection have been reported in several European countries. Aedes mosquitoes are not found in most of the rest of Europe, and their climates would not be suitable for the mosquitoes to establish themselves, according to the European Commission's public health unit.

Rumor Control

Distrust of the government is especially high in Brazil, given the political corruption and economic problems plaguing the country, so myths are gaining traction. Here are just a few of them, dispelled:

- You cannot get Zika from the drinking water supply. Larvicides (specifically pyriproxyfen), which are often used in cisterns to kill mosquito larvae, do not cause microcephaly. When people drink water from containers that have been treated, they are exposed to the larvicide – but in very low amounts. Upward of 95 percent of any larvicide ingested is excreted into the urine within 48 hours. Pyriproxyfen has been used since the late-1990s without being linked to microcephaly and has been approved by WHO.
- The Zika virus outbreak did not occur because of field trials of genetically modified (GM) mosquitoes in Brazil. GM trials did – and still do -- exist, but they involve male mosquitoes, which do not bite and as a result do not spread a virus.
- Female *Aedes* mosquitos do not focus their bites on only ankles but rather will target any exposed skin, and while they are more active during the day, they do bite during dawn/dusk and night.
- Various vaccines are not contaminated with microcephaly, and live vaccines are not given to pregnant women. There are no reports of vaccines being poisoned or of expired ones being distributed.
- If a pregnant woman travels to a country with Zika, her fetus will not automatically get microcephaly, even if she does contract Zika.
- Zika is not a pandemic; it is an epidemic in the Western Hemisphere with a few outbreaks in Oceania and one in Africa.
- Zika is not a form of ethnic cleansing, as Zika does not threaten the human race. It is not fatal and generally has quite mild, if any, symptoms apart from those contracted in utero.

Guidance

CDC's general guidance is that you should be up-to-date on routine vaccinations while traveling to any destination.

There are currently no vaccines to prevent or medications to treat Zika, but there is some urgency in developing a vaccine. Testing a vaccine normally takes years and costs hundreds of millions of dollars, but the U.S. Food and Drug Administration (FDA) for the first time has approved clinical trials for a vaccine for the Zika virus. Inovio Pharmaceuticals is beginning an FDA-approved clinical [trial](#) for a Zika vaccination on 40 healthy humans in the coming weeks; if it works, then trials will [proceed](#) involving humans with the Zika virus. The earliest date for this vaccine is estimated to be late 2017. Similarly, the National Institute of Allergy and Infectious Diseases is also [working on](#) a Zika vaccine, their Phase 1 trial may begin in mid-August. The population of interest is pregnant women, which makes vaccine development even more complicated (since a live vaccine is usually contraindicated in pregnant women).

Many Americans are unaware of the simple steps they can take to minimize their exposure and prevent the spread of Zika.

Travelers might consider packing a basic first-aid kit. The CDC [recommends](#) treating symptoms of Zika with rest, fluid hydration, and fever management with acetaminophen. Until dengue is ruled out definitively and to reduce the risk of bleeding, do not take aspirin and other non-steroidal anti-

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inflammatory drugs. If you are taking medication, talk to your healthcare provider before taking additional medicines.

Mosquito Prevention

The best way to prevent diseases spread by mosquitoes is to protect yourself from mosquito bites. To do that, you can:

- Wear long-sleeved shirts and long pants, preferably in a light color (mosquitoes are drawn to heat, and darker clothes retain more heat).
- Use [EPA-registered](#) insect repellents containing DEET, picaridin, oil of lemon eucalyptus (OLE), or IR3535. Always use as directed. A product containing 10 percent DEET can protect you for up to 90 minutes. Insect repellents containing DEET, picaridin, and IR3535 are safe for pregnant and nursing women and children older than two months when used according to the product label. Oil of lemon eucalyptus products should not be used on children under three.
- Use permethrin-treated clothing and gear.
- Stay and sleep in screened-in or air-conditioned rooms.
- A small fan at outdoor gatherings may also reduce mosquito presence, as they are not strong flyers.

The *Aedes* mosquito prefers stagnant water, so eliminating standing water sources near work places and residences will help. This includes flower pots or other decorative items in which even drops of water could pool. Further, due to a prolonged drought in some regions, many people store water in cisterns or other large, open containers that are ideal for *Aedes* proliferation. The use of larvicides in them is recommended. Other [integrated pest management](#) techniques are also available.

What We Do Not Know

Very little is known conclusively about the Zika virus. The February WHO declaration of a PHEIC was made on the basis of what is NOT known about the clusters of microcephaly, Guillain-Barré syndrome, and possibly other neurological defects reported by Brazil and French Polynesia.

- The virus seems to hide out in various body parts and fluids that are “immune privileged,” or shielded from our own immune system. It seems to stay longer in semen than in blood. It is unclear if it is in saliva, eyes, spinal fluid, placenta, testes, and fetal brain material or how long it can stay active.
- We do not know if men infected with Zika who never develop symptoms can have the virus in their semen or spread Zika through sexual contact. It is not known whether men must have blood in their semen to be infectious.
- We do not know if women can spread Zika virus to their sex partners.
- Scientists continue to study the full range of potential health problems that Zika virus infection during pregnancy may cause. We do not know if healthy-looking babies whose mothers had a Zika infection will develop normally. We also do not know if a newborn who gets Zika post-birth will develop acquired microcephaly.
- We do not know what the generational effects might be to future workforces or populations that delay conception in impacted regions.
- Mosquitoes are one of the deadliest animals in the world due to the diseases they can transmit. According to the WHO, mosquito bites result in more than 1 million deaths annually - the majority due to malaria. There are more than 3,500 species of mosquito. We do not know if non-*Aedes* mosquitoes can transmit Zika or if they might naturally evolve to. Of the *Aedes* mosquitoes, it is believed, but not confirmed, that infected females cannot pass Zika to their eggs.
- It is not known whether some people might be naturally immune to Zika.

Resources

As the nation’s health protection agency, CDC works to protect people from health threats. To accomplish that mission, CDC conducts critical scientific research and provides health information that protects our

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nation against expensive and dangerous health threats and responds when these arise. Along with various Zika-specific website and updated interim guidance, the CDC also offers an Emergency Partners weekly newsletter - Zika Virus Edition that has a Zika-related Topic of the Week. CDC also offers Crisis and Emergency Risk Communication [teleconferences](#) on Tuesdays at 1-2 pm ET (1-800-369-1662 (U.S. Callers) or 1-203-827-7082 (International Callers), Passcode: 3266392).

OSAC Zika Survey: OSAC issued a Zika survey in February 2016 that resulted in 321 constituent respondents. Of them, 73 percent reported no cases of Zika within the previous six month period (24 percent did not know if their organization had any reported cases). Of the three percent, (or 10) that did have reported cases, five were in Brazil, followed by two in El Salvador, and one in each Venezuela, Colombia, and Mexico. The top three reported actions taken by constituent members include recommending ways to prevent mosquito bites (73 percent); directing staff to CDC guidance (68 percent) and directing staff to WHO guidance (52 percent).

For Further Information

For additional information on global health, please contact OSAC's [Global Health and Pandemic Analyst](#). For security concerns in the Western Hemisphere, please contact OSAC's [Western Hemisphere Team](#).

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