

Zika:

Resources at Your Fingertips

Current as of February 26, 2016.

This document provides Zika virus disease resources and an overview of public health and healthcare system considerations and implications that are applicable to professionals in those systems, emergency management stakeholders, and other audiences. **Appendix A** contains resources from the U.S. Department of Health and Human Services (HHS) Office of the Assistant Secretary for Preparedness and Response (ASPR) and relevant contact links. **Appendix B** includes citations with annotations for additional relevant resources and Zika Guidance. Finally, individuals can review ASPR TRACIE (Technical Resources, Assistance Center, and Information Exchange) [Topic Collections](#), which provide a wide array of materials and resources for further research.

This document and its hyperlinks are current as of February 26, 2016. Information on Zika is constantly evolving, therefore if you are a clinician treating a patient, please check the Centers for Disease Control and Prevention (CDC) [Zika site](#) for the most current information and clinical guidance.

What is Zika Virus?

Zika virus is transmitted through the bite of an infected *Aedes* species mosquito. It is a single-stranded RNA virus of the genus Flavivirus (the same family as dengue). Illness is usually mild – current data show that only about 1 in 5 people infected will become symptomatic. Symptoms (fever, rash, joint pain and conjunctivitis) typically resolve in a few days to a week without any medical intervention. The illness is rarely severe. There may be a rare association with Guillain-Barré syndrome.

More concerning is an apparent linkage between Zika virus infection in pregnant women and microcephaly of the fetus. This linkage is actively being investigated along with other potential fetal risks but may affect some women who contract Zika virus during pregnancy, though the timing and magnitude of the risk are not yet defined. [Microcephaly](#) is a birth defect where a baby's head is smaller than expected when compared to babies of the same sex and age. Babies with microcephaly typically have smaller brains that might not have developed properly. Due to the clusters of microcephaly and other neurological syndromes which are potentially linked

to the spread of Zika virus, the World Health Organization (WHO) declared the situation a [Public Health Emergency of International Concern](#) as of February 1, 2016.

See the [Patient Care](#) section of this document for information on Prevention, Transmission, Presentation, and Treatment.

Where is Zika Virus Found?

Zika virus was first discovered in the Zika forest in Uganda in 1947. Prior to 2015, Zika virus was found in Africa, Southeast Asia, and the Pacific Islands. The largest outbreak to date occurred in French Polynesia during 2013-2014. A recent retrospective analysis of this outbreak conducted by French Polynesian health authorities after cases of microcephaly were identified in Brazil, found increases of cases of microcephaly.

In May 2015, the Pan American Health Organization (PAHO) issued an alert for the first confirmed patient in Brazil. A significant increase in reported cases of microcephaly has occurred simultaneous to spread of the virus in Brazil. Many countries in Central and South America, the Caribbean, and U.S. Territories report local transmission of the virus. Zika virus is not currently being transmitted by mosquitoes in the continental U.S., but there have been cases reported in travelers who visited affected countries and there is active transmission in American Samoa, Puerto Rico and the U.S. Virgin Islands ([CDC, 2016](#)). Though we cannot predict how widespread cases of Zika virus may be in the continental United States, recent chikungunya and dengue outbreaks indicate that we are not likely to see the same type of rapid spread Zika virus infection currently occurring elsewhere. Local transmission of the virus is anticipated to be small and focal.



Figure 1. [Zika virus spread](#). Centers for Disease Control and Prevention February 25, 2016.



Zika Virus Mosquito Vectors and Where They are Found

Figure 1 shows countries that have reported local transmission of Zika virus. Figure 2 shows locations within the continental U.S., where *Aedes aegypti* and *Ae. albopictus* mosquitoes, the

primary vectors of Zika, dengue, and chikungunya viruses, are found. These *Aedes* mosquitoes have been found in 30 states and the District of Columbia, including the southeastern U.S., up the east coast to New York, and west to Indiana and Kentucky. These are areas at potential risk of local transmission of Zika virus (and also areas of potential transmission of dengue, chikungunya, and other diseases spread by *Aedes* mosquitoes). Outside of the continental U.S., *Aedes* mosquitoes have been found in the following states and territories: Hawaii, Puerto Rico, American Samoa, Guam, Northern Mariana Islands, and the U.S. Virgin Islands. Zika is spread from an infected mosquito-person-mosquito. The virus can spread to new areas where *Aedes* mosquitoes are known to exist when an infected, viremic traveler from an endemic area is bitten by a mosquito and that person transmits the virus to the mosquito, causing a new transmission chain to begin. Sustainment of that transmission depends on many variables, however, and does not assure that local transmission will continue.

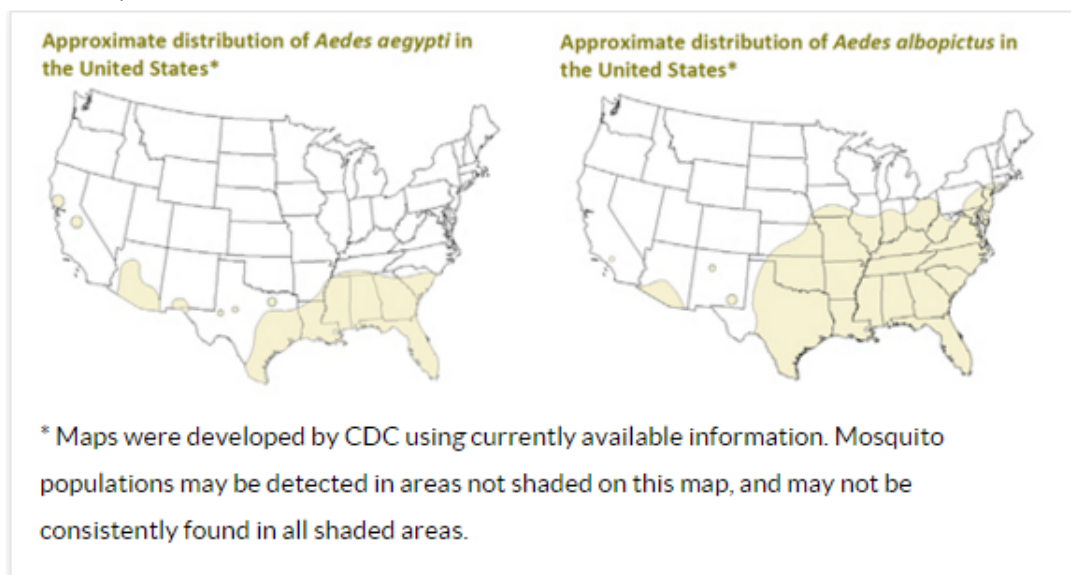


Figure 2. CONUS *Aedes* mosquito distribution. Graphic Courtesy of the CDC. February 2016.

How do Clinicians Test for Zika Virus Disease?

There is no commercially available diagnostic test for Zika virus disease. Molecular diagnosis, via polymerase chain reaction (PCR) testing, is available for Zika virus disease through CDC and select public health laboratories; however, the test is only positive during acute infection, approximately the first 7 days after onset of symptoms. Serologic diagnosis, through IgM testing, is often difficult to interpret in people who have been previously infected with another flavivirus (like dengue) due to antibody cross-reaction. In addition, because there is currently a limited number of laboratories capable of Zika testing, laboratory capacity cannot support widespread testing of the general population. Serologic testing for IgM antibodies should be offered to asymptomatic pregnant women who have traveled to locations with active Zika virus disease transmission within 2-12 weeks of return. Pregnant women with sexual partners who

have traveled to areas with active Zika virus disease transmission should consult with their healthcare providers. A positive serologic test will require additional assays to determine the exact virus, but a negative test effectively rules out Zika virus exposure. Contact your local/state health department for local testing policies and procedures.

Can Zika Virus be Transmitted by Someone Who is Infected?

Although there is evidence that Zika virus can be [sexually transmitted](#), and transmitted from mother to her fetus during pregnancy, there is no evidence it can be transmitted through casual contact or through air. There are indications that it is possible to transmit Zika through a [blood transfusion](#), so providers should, as always, use standard precautions for personal protection when dealing with blood and blood products.

How is Zika Virus Disease Treated?

There is no specific treatment for Zika Virus disease. Supportive care and symptom management are the best options. No vaccination currently exists. It is important to note that Zika virus disease is transmitted by the same mosquitoes that spread chikungunya and dengue viruses, therefore all three diseases should be considered in any patient with consistent signs and symptoms. The mainstay of disease management is prevention. Pregnant women should be referred to their provider for further evaluation and treatment.

For more information about Zika virus disease and the current outbreak, including guidance to clinicians, visit the [CDC Zika virus website](#).

Why is Zika Virus Disease a Public Health and Healthcare Systems Concern?

Zika virus is an emerging pathogen and our understanding of it is still evolving. The major reason that Zika virus disease is a public health concern is due to the implications for women in endemic areas or traveling to endemic areas who are pregnant or considering pregnancy. Zika virus disease has been identified in [fetal and placental tissues](#), although little is known about rates of transmission nor the risks and timing of congenital malformations. As there is no specific treatment or “cure” for Zika virus disease and symptoms of acute infection are usually mild and self-resolving, the most important steps for public health emergency managers relate to prevention, mitigation, and risk communication. Healthcare providers should familiarize themselves with the signs and symptoms of Zika virus, take travel histories of their patients and the sexual partners of pregnant women, and follow CDC guidance on diagnostic testing for Zika virus in pregnant women and monitoring of pregnant women with evidence of Zika virus infection.

Key Points for Consideration and Resources by Profession/Facility

Clinicians/Healthcare Providers

Preparedness

- Monitor outbreak information and changes or updates to CDC medical management guidance and from public health departments or healthcare coalitions.
- In the U.S., Zika testing is limited. Contact the state health department to facilitate testing. Ensure a plan is in place for transporting laboratory samples to designated labs for confirmatory testing.
- Familiarize yourself with [CDC testing criteria](#) for Zika virus in pregnant women and children, patients with Guillain-Barré, and those with a history of travel to an area with local Zika virus transmission.
- Continue to collect travel histories during healthcare assessments for: (1) symptoms suggestive of mosquito-borne illness, and (2) all pregnant patients.

Patient Care

- Prevention
 - There is currently no vaccine.
 - Counsel pregnant women in [mosquito avoidance](#). Serologic testing should be offered for asymptomatic pregnant women who have traveled to areas with ongoing Zika virus transmission within 2-12 weeks of return from travel.
 - Pregnant women who have traveled to or reside in areas with ongoing Zika virus transmission should be evaluated for symptoms and offered testing.
 - Healthcare providers should discuss Zika infection with [women of reproductive age](#), residing in or planning travel to areas with active Zika virus transmission.
- Transmission
 - Primary mode of transmission of Zika virus is a bite from an infected mosquito.
 - Perinatal and sexual transmission, as well as transmission via blood transfusion have been reported.
 - Incubation period is 2-7 days, but other arboviral diseases, like dengue and chikungunya can take up to two weeks.
- Presentation
 - About 1 in 5 people infected become symptomatic (80% of infections are asymptomatic and self-limiting).

- Acute onset of fever with maculopapular rash (flat, red area on skin covered by small bumps), arthralgia (joint pain), and/or conjunctivitis (inflammation of the inner surface of the eyelid and outermost layer of the eye).
- Myalgia (muscle pain) and headache are also reported.
- Illness is usually mild, lasting several days to a week.
- Hospitalization for acute Zika infection is uncommon. Deaths are rare.
- An increase in the number of babies born with microcephaly has been reported in areas experiencing Zika virus disease outbreaks. Further research is needed to confirm causation but current evidence strongly suggests an association between Zika virus during pregnancy and fetal harm, including microcephaly. Pregnant women presenting with Zika virus disease symptoms should be evaluated according to the [Interim Guidelines for Pregnant Women and Women of Reproductive Age During a Zika Virus Outbreak](#).
- Reports of [Guillain-Barré](#) have been reported, which could result in the need for intensive care and mechanical ventilation – unlikely to reach levels of significant impact on the healthcare system.
- Treatment
 - There is no “cure” or treatment specific to Zika virus disease.
 - Symptoms of acute Zika virus infection can be treated with supportive care.
 - Do **not** give NSAIDs—for example acetyl- salicylic acid (aspirin) and ibuprofen—until dengue infection can be ruled out. These drugs thin the blood and can increase the risk of bleeding.
 - Be prepared for a possible increase in demand for specialized care for patients with Guillain-Barré syndrome– unlikely to reach surge levels in most domestic hospitals.
 - Be prepared to strengthen antenatal care and ensure availability of fetal ultrasound capability as well as antenatal counseling and support.
 - Confirmatory laboratory testing is not recommended for all patients, but is recommended for pregnant women with recent travel history to areas with local Zika virus transmission, microcephalic infants born to mothers with relevant travel history and positive or inconclusive Zika virus diagnostic test results, and patients presenting with Guillain-Barré or other neurologic syndromes and a travel history to areas with ongoing transmission of Zika virus.
 - Currently, Zika serologic tests are cross-reactive if the patient has been previously infected with other flaviviruses (e.g., yellow fever and dengue). In these cases, positive Zika IgM tests need further testing to attempt to rule out the possibility of a false positive.

- Little is known about Zika virus disease behavior in immunocompromised patients. We do not currently have data on risk factors for severe Zika virus disease. We do know that for West Nile virus, a related flavivirus, immunosuppression does appear to be a risk factor for more severe disease. Similarly, serious adverse events are more likely following administration of live yellow fever vaccine, which is also a related flavivirus. However, we do not know whether Zika virus would pose a similar risk in immunosuppressed patients.

Key Resources for Clinicians/Healthcare Providers

- [CDC Health Care Provider Guidance.](#)
- [Interim Guidelines for Pregnant Women and Women of Reproductive Age During a Zika Virus Outbreak.](#)
- [Interim Guidelines for Prevention of Sexual Transmission of Zika Virus.](#)
- [Interim Guidelines for the Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection.](#)
- [CDC Symptoms, Diagnosis, & Treatment.](#)
- [Fact Sheets and Posters.](#)
- [Memorandum: Revised diagnostic testing for Zika, chikungunya, and dengue viruses in US Public Health Laboratories.](#)
- [Zika Virus: Collection and Submission of Fetal Tissues for Zika Virus Testing.](#)

Emergency Manager/ Public Health Preparedness/ Healthcare System Emergency Management Professionals

Prevention/Mitigation

- Community-based vector control/ bite prevention education in collaboration with environmental health entities
 - Community/Facility
 - Eliminate standing water and maintain brush.
 - Apply insecticide spray to outdoor areas as feasible.
 - Making netting and other prevention items available as appropriate.
 - Individuals
 - Use insect repellent (as appropriate).
 - Place netting over sleeping areas (e.g., beds, cribs) when screens are not available.
 - Avoidance of exposure is best and pregnant women/those considering pregnancy should delay travel to endemic areas when possible.

- Refer to CDC guidance on [Prevention](#) for more specific steps.
- Risk communication
 - Provide clear instructions to the community about mosquito abatement and avoiding mosquitoes, particularly during biting hours.
 - The community should be educated to purchase and use EPA-registered insect repellents containing one of the following active ingredients: DEET, picaridin, IR3535, oil of lemon eucalyptus, or para-menthane-diol.
 - When used as directed, EPA-registered [insect repellents are proven safe and effective](#), even for [pregnant and breastfeeding women](#).
 - Share information with the community about signs and symptoms of Zika virus disease and when to seek medical treatment.
 - [CDC Zika Fact Sheets and Posters](#).
 - Publicize travel advisories, targeting travelers, especially women who are pregnant or thinking about pregnancy.
 - [Current CDC Travel Advisories](#).
- Establish or enhance surveillance (in people and mosquitoes).
 - Conduct regular surveillance of and testing for mosquitoes.
 - Screen patients for travel history to an area with ongoing Zika transmission.
 - Zika virus disease affected patients
 - Birth defect surveillance
 - Neurologic and autoimmune syndrome surveillance
 - Border screening is not an effective method of controlling vector-borne diseases and is not recommended for Zika management.
- [Blood donation](#) – click link for new national guidance that has been issued by the U.S. Food and Drug Administration.
- Prepare for major national and international events in Zika affected areas.
 - Summer Olympics in Brazil in August 2016 and numerous other sporting events in the Americas (approximately 200,000 people from the U.S. are expected to attend).
 - Paralympics in Brazil in September 2016.

Preparedness/Response

- Monitor outbreak information and changes or updates to CDC medical management guidance.
 - Key roles of healthcare coalitions include:
 - Sharing guidance that comes out from federal, state, and local authorities, including updates.

- Identifying local/regional experts (specifically, neurology, maternal fetal medicine, neonatology) who can interpret guidance and serve as regional discussant/subject matter experts.
 - Coordinating with public health departments on testing indications and process.
 - Coordinating public information about Zika virus disease.
- If local cases are detected in endemic areas (such as U.S. territories) with open-air homes /hospitals, consider bed netting, insect spray, or other mosquito prevention equipment for facilities and workers.
- Ensure a plan is in place for transporting laboratory samples to designated labs for testing. Because no commercial test exists, ensure healthcare facilities have plans and policies in place that state under what situations testing is indicated. Wide-spread testing is NOT recommended and testing is often best carried out in the primary care or obstetric clinic setting since the results are not rapidly available.

Recovery

- Continue surveillance and mosquito abatement, as appropriate.
- Evaluate any long-term health impacts to the community.

Key Resources for Emergency Managers/ Public Health Professionals:

- [Surveillance and Control of *Aedes aegypti* and *Aedes albopictus* in the United States.](#)
- [CDC State Public Health Laboratory Diagnostic Testing Guidance.](#)
- Use the [HHS Response and Recovery Resources Compendium](#) to search the repository of HHS products, services, and capabilities available to state, tribal, territorial, and local agencies before, during, and after public health and medical incidents.
- [Insect Repellent Use and Safety.](#)
- [Insect Repellent Use During Pregnancy and DEET Use While Pregnant.](#)

Veterinarians/ Animal Care Professionals

- At this time, animals do not appear to be involved in the spread of Zika virus. Zika virus was first discovered in a monkey with a mild fever in the Zika Forest of Uganda in the 1940s. However the prevalence of Zika virus in monkeys and other nonhuman primates is currently unknown. At this time there have been no reports of other animals becoming sick with Zika or of being able to spread Zika to people or other animals.
- For more information:
 - [Questions and Answers: Zika Virus and Animals.](#)

Research Agenda – Future Studies Needed

- Development of a vaccine and pharmaceutical countermeasure or antiviral treatment.
- Define transmissibility risks and duration, especially non-vector transmission via sexual and other means.
- Define linkage to Guillain-Barré syndrome, microcephaly, and other potential effects.
- Define period of viremia and establish ‘safe period’ of waiting prior to becoming pregnant after visiting endemic areas.

*Contributors and reviewers of this document include **Marion Danis**, MD, Department of Bioethics, National Institutes of Health, **Dan Hanfling**, MD, Contributing Scholar, UPMC Center for Health Security; Member, InterAgency Board, Health and Medical Responder Safety; Attending Physician, BestPractices, Inc. (a division of EmCare); Clinical Professor of Emergency Medicine, George Washington University; Strategic Adviser, HHS/ASPR, Hospital Preparedness Program, **John Hick**, MD, HHS ASPR and Hennepin County Medical Center, **Alicia Livinski**, Biomedical Librarian, HHS National Institutes of Health, **Daniel Lucey**, MD, MPH, Adjunct Professor, Georgetown University Medical Center; Senior Scholar, O’Neill Institute for National and Global Health Law, Georgetown University Law Center, **Gavin Macgregor-Skinner**, BVSc, MSc, MPH, MRCVS, Global Projects Manager, Elizabeth R. Griffin Foundation; Director of Global Response, BIDMC/HHI Fellowship in Disaster Medicine, Harvard Medical School Teaching Hospital; Assistant Professor, Penn State College of Medicine, **Anthony Macintyre**, MD, The George Washington University Department of Emergency Medicine, **Nancy Petit**, MD, Head, Division of Obstetrics; Trinity Health, SFDE, **Mary Russell**, EdD, MSN, Emergency Services, Boca Raton Regional Hospital; Meghan Treber, MS, Principal, Public Health Preparedness Practice, ICF International, ICF ASPR TRACIE Project Director; and Ty J. Vannieuwenhoven, DVM, MPH, MSS, DACVPM, Chief Veterinary Officer, National Disaster Medical System (NDMS), U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response.*

Appendix A: ASPR Resources

PHE.Gov serves as the key one-stop website for all federal public health and medical information sources and assets. The site is searchable for multiple resources. <http://www.phe.gov>

The Technical Resources, Assistance Center, and Information Exchange (TRACIE) is a healthcare emergency information gateway that supports timely access to resources and promising practices, identifies and remedies knowledge gaps, and provides users with responses to a range of requests for technical assistance. <https://asprtracie.hhs.gov/>

The HHS Response and Recovery Resources Compendium is an easy to navigate, comprehensive web-based repository of HHS resources and capabilities available to federal, state, local, territorial and tribal stakeholders before, during, and after public health and medical incidents. <http://www.phe.gov/emergency/hhscapabilities/Pages/default.aspx>

Appendix B: Full References with Annotations

American College of Obstetricians and Gynecologists. (2016). [Practice Advisory: Interim Guidance for Care of Obstetric Patients During a Zika Virus Outbreak.](#)

This joint message from the American College of Obstetricians and Gynecologists and the Society for Maternal Fetal Medicine mirrors the current Interim Guidance issued by the Centers for Disease Control and Prevention (CDC) for the management of pregnant women presenting with symptoms consistent with Zika Virus disease infection. This publication includes a visual algorithm for assessment, diagnosis, and treatment of a pregnant woman.

American Medical Association. (2016). [Zika Virus Resource Center.](#)

This webpage provides a compilation of resources relate to Zika Virus disease.

Bogoch, I., Brady, O.J., Kraemer, M., et al. (2016). [Anticipating the International Spread of Zika Virus from Brazil.](#) The Lancet. Volume 387.

Through evaluation of travel patterns from current countries with Zika Virus disease spread and mosquito habitation patterns, the authors have predicted possible Zika Virus disease spread throughout the Americas, including the U.S. The authors have included a predictive map.

Center for Infectious Disease Research and Policy. (2016.) [Zika Resource Page.](#)

This webpage offers a compilation of resources on Zika Virus disease including governmental publications, academic publications, research pieces, and popular media mentions. The compilation is updated regularly.

U.S. Centers for Disease Control and Prevention. (2016). [Zika Virus.](#)

This website provides the Centers for Disease Control and Prevention resources related to Zika Virus disease including current transmission and spread information, current clinical recommendations, and prevention and mitigation information. This page is updated regularly.

Lima, A, Lovin, D.D., Hickner, P.V., et al. (2015). [Evidence for an Overwintering Population of *Aedes aegypti* in Capitol Hill Neighborhood, Washington, DC](#). The American Journal of Tropical Medicine and Hygiene. 94(1):231-5.

This article describes a research study demonstrating that *Aedes aegypti* mosquitoes were present in samples taken in Capitol Hill, Washington, DC throughout 2011-2014. These mosquitoes were not previously thought to travel further north than the average 10 degree Celsius isotherm.

Lucey, D.R., and Gostin, L.O. (2016). [The Emerging Zika Pandemic: Enhancing Preparedness](#). Journal of the American Medical Association.

This article discusses the current outbreak of Zika Virus disease and discusses why it is a concern for the U.S. public health and healthcare systems. The authors describe steps that should be taken now to prevent and mitigate spread and steps that should be taken to prepare. The article also outlines a Zika Virus disease research agenda.

National Library of Medicine. (2016). [Zika Virus Health Information Resources](#).

This resource is a comprehensive collection of Zika Virus disease-related resources from the U.S. and abroad. It is compiled and updated regularly from the National Library of Medicine.

Network for Public Health Law, The. (2016). [Primer: Emergency Legal Preparedness Concerning Zika Virus](#).

This primer, presented in a PowerPoint format, outlines public health concerns from Zika Virus disease and discusses potential legal issues in the U.S. and abroad.

Pan American Health Organization. (2016). [Epidemiological Update: Neurological Syndrome, Congenital Anomalies, and Zika Virus Infection](#).

This document is the latest in a series of epidemiological updates provided by the Pan American Health Organization. It highlights the specific issues related to the correlation between Zika Virus disease outbreaks and the increase in neurological syndromes, including Guillain-Barre syndrome and congenital anomalies, specifically microcephaly. The document details recommendations for management, increased surveillance and other public health recommendations.

Pan American Health Organization. (2016). [Zika Virus Infection](#).

This website provides an outline of the disease and its progression specifically in the Americas. It provides information for the general public and health professionals on disease spread, identification, treatment and prevention.

Schuchat, A. (2016). [Zika 101](#). Centers for Disease Control and Prevention.

Written by Dr. Anne Schuchat, Principal Deputy Director of the CDC, this blog provides a clear and easy-to-read question and answer format on Zika Virus disease. The blog describes Zika Virus disease, how it is spread, signs and symptoms, prevention and protective measures, spread in the U.S., and what the Department of Health and Human Services is doing to prepare for Zika Virus disease in the US.

World Health Organization. (2016). [WHO Announces a Public Health Emergency of International Concern](#).

This link provides the official statement from the World Health Organization Director-General declaring Zika Virus disease a Public Health Emergency of International Concern. The declaration was made on February 1, 2016 after convening a meeting of the International Health Regulations (2005) Emergency Committee on Zika Virus disease.

World Health Organization. (2016). [Zika Virus](#).

This website provides an outline of the disease and its progression around the world. It provides information on signs and symptoms, transmission, diagnosis, treatment, and prevention from the World Health Organization.