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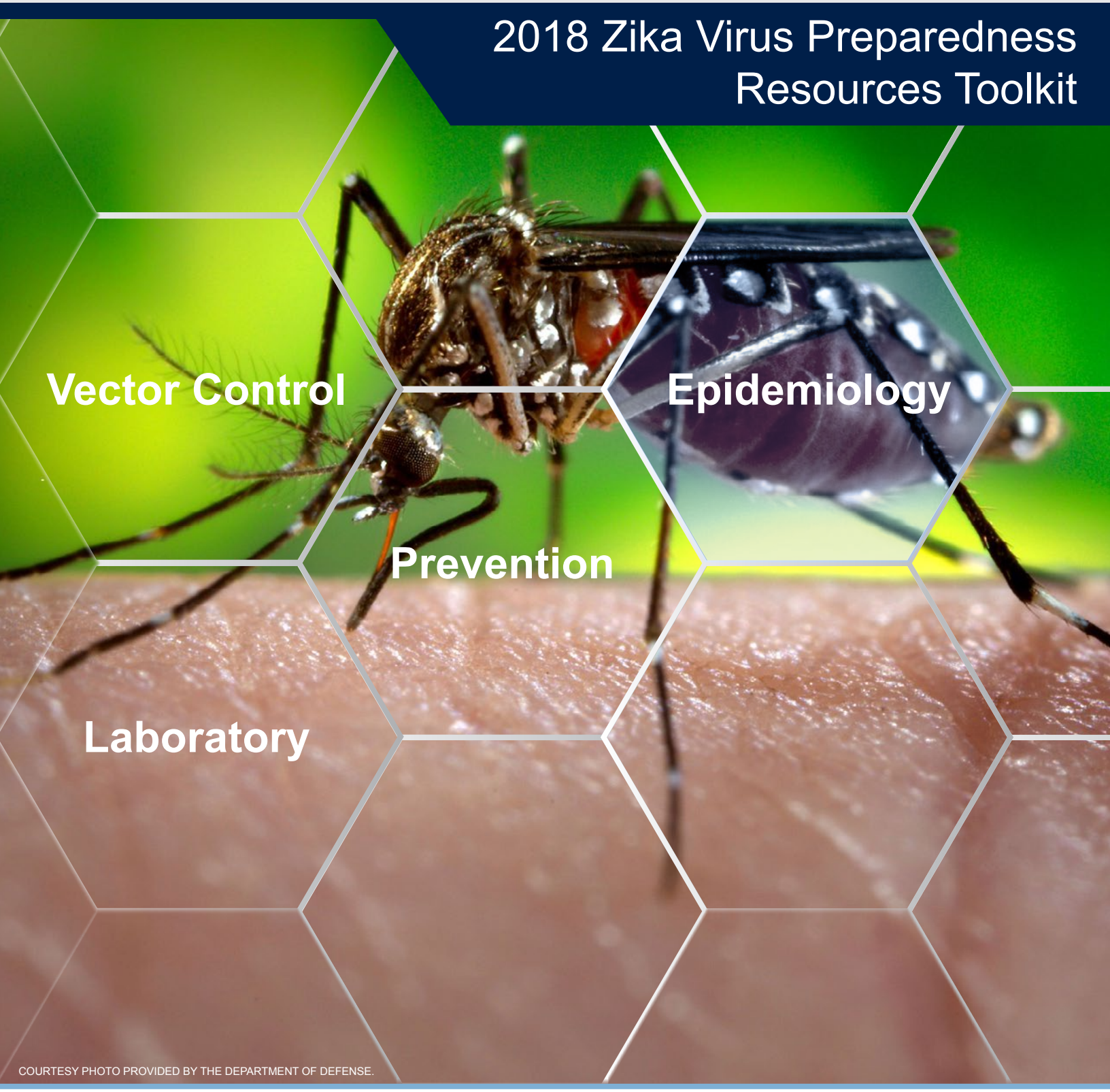
COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS

2018 Zika Virus Preparedness Resources Toolkit



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Introduction

Purpose/Goal: The threat of Zika virus disease—and consequent need for preparedness—has become a top national public health priority. Population movement, climate change, expanding vector ranges, and viral movement across borders and hemispheres have all abetted the virus's emergence. To further the response to this new threat in the United States, CSTE has compiled a reference document to help epidemiologists, laboratorians, entomologists, mosquito control officials, clinicians, and other public health professionals better understand the nature of the challenge and to boost their capacity to develop and implement evidence-based prevention and control strategies.

This *Zika Virus Preparedness Resources Toolkit* covers a broad range of relevant topics:

- General background information and tools
- Epidemiology
- Data management
- Laboratory guidance
- Maternal and Child Health guidance
- Vector research and management
- Policy statements
- An Appendix explaining acronyms and abbreviations

Target Audience: State, territorial, local and tribal epidemiologists; state and private laboratory directors; clinicians; mosquito control officials; public health educators and media directors; public health administrators; and other public health professionals.

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GENERAL AND OVERVIEW RESOURCES

General and Overview Resources

The most comprehensive and technical document addressing Zika virus in the United States is the Centers for Disease Control and Prevention (CDC) Zika Interim Response Plan, released in May 2017. In addition, there are numerous, less technical sources of information:

- Overviews created by various governmental and non-governmental organizations
- Media interviews with different experts and media articles incorporating prevention and control advice
- Journal articles discussing possible social and economic implications of Zika virus disease spread in the United States.

Technical Guidance and Information

Technical guidance for preventing and controlling Zika virus infections is of immense importance for public health practitioners, clinicians and the public. Together, the CDC's Zika Response Plan and the World Health Organization's (WHO's) response plan show the commonalities between national and international responses. Similar information is available from elsewhere at the CDC and from other sources. Importantly, our understanding of what can be done is enhanced by understanding what we do not know, as reflected in discussions of research priorities and in the Lancet update article.

An Update on Zika Infection. The Lancet, 2017;390:2099-2109. www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31450-2.pdf This comprehensive review covers the history of Zika virus emergence; pathophysiology of infection; Zika virus transmission, diagnosis and possible complications; and knowledge gaps as of early 2017.

California Zika Response Activities and Resources, May 2016. https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CAZikaResponseActivitiesResources.pdf. This is California's overview of the state health agency's Zika virus surveillance, communication, response and control activities and resources.

CDC. Guidance for areas with local transmission of Zika virus in Hawaii and the continental US https://www.cdc.gov/zika/geo/domestic-guidance.html. This webpage outlines CDC recommendations for areas with active and possible Zika transmission.

CDC. Top 10 Zika Response Planning Tips: Brief Information for State, Tribal, Local, and Territorial Health Officials https://www.cdc.gov/zika/public-health-partners/tips.html. This webpage lists general tips and resources for state, local and territorial health officials responsible for preparing for and responding to Zika virus expansion into their jurisdictions.

CDC. Zika Interim Response Plan, May 2017 https://www.cdc.gov/zika/pdfs/zika-draft-interim-conus-plan.pdf. This early plan presents CDC guidance and resources for responding to cases of Zika virus infection in the continental United States. It is intended for state, local and tribal jurisdictions, but can be used elsewhere as applicable. (It may be superseded by later plans.)

Center for Infectious Disease Research and Policy (Dec. 5, 2017). Phase 1 trials promising for 2 Zika vaccines, including shelved one http://www.cidrap.umn.edu/news-perspective/2017/12/phase-1-trials-promising-2-zika-vaccines-including-shelved-one. This newsletter article describes efforts to create a killed viral vaccine against Zika, and the importance of that goal. It provides links to related articles.

Community Preventive Services Task Force Recommendation for Text Messaging Interventions to Improve Medication Adherence for Chronic Disease Management. MMWR, 2017;66(47):1309. http://dx.doi.org/10.15585/mmwr.mm6647a6 or https://www.thecommunityguide.org/findings/health-information-technology-text-messaging-medication-adherence-chronic-disease. While this article is not specific to Zika virus, it discusses the robust body of literature regarding the use of text messaging to achieve positive maternal and child health outcomes. Similar text messaging interventions could be used to transmit mosquito control and pregnancy protection advice during times of possible Zika transmission.

David Heymann discusses Zika and new CCDM chapter on the virus
www.publichealthnewswire.org/?p=15351 This American Public Health Association (APHA), Public Health Newswire article discusses, and provides a link to, APHA's *Control of Communicable Diseases Manual, 20th Edition.*

Potential Research Priorities to Inform Public Health and Medical Practice for Domestic Zika Virus: Workshop in Brief (2016). National Academies Press.
https://www.nap.edu/catalog/23404/potential-research-priorities-to-inform-public-health-and-medical-practice-for-domestic-zika-virus This National Academies of Science workshop was organized to develop Zika virus research priorities. The workshop addresses (1) key factors to reduce the likelihood of local Zika virus transmission in the United States; (2) areas of insufficient knowledge related to the prevention strategies; (3) potential research priorities of specific concern (e.g., establishing causality or the absence of causality between Zika virus and microcephaly); and (4) critical communication needs regarding the level of risk and associated risk factors; viral transmissibility; associated health consequences; and the measures and strategies that should be taken to minimize Zika virus infections and prevent Zika virus spread in the United States.

Occupational Safety and Health Administration and National Institute for Occupational Safety and Health. Interim Guidance for Protecting Workers from Occupational Exposure to Zika Virus. Fact Sheet April 2016
https://www.cdc.gov/niosh/topics/outdoor/mosquito-borne/pdfs/osha-niosh_fs-3855_zika_virus_04-2016.pdf. This discusses protective measures for people who work outdoors, healthcare and laboratory workers, agricultural workers, and mosquito control workers. It also offers general guidance for employers of people suspected or confirmed of being infected with Zika virus.

New Jersey Department of Health (NJDOH). Emerging Infections Educational Kit: Spot Symptoms, Stop the Spread, and Save Lives.
To download: 1) On your device, launch your mobile browser (Safari, Chrome, or other) and enter "bar:qsp.mobi/tv28sh3a" into your address; 2) Select "Install" and wait until your download ends; 3a) (for Androids) Relaunch your browser, select the "refresh" button; 3b) (for Apple) Relaunch your browser, select the "refresh" button. This eGuide provides basic epidemiological information about 12 EIDs, including Zika virus; disease outbreak preparedness information; and, online resources from CDC, NJDOH, WHO and others. You can use this guide to develop infectious disease training; to serve as a teaching aid for interactive workshops; and to access EID information from NJDOH's Communicable Disease Service.

Pennsylvania Department of Health, Department of Environmental Protection, and Other Stakeholders. Pennsylvania Zika Virus Response Plan (Revised May 2016).
http://www.health.pa.gov/my%20health/diseases%20and%20conditions/u-z/zikavirus/documents/pennsylvania%20zika%20virus%20response%20plan.pdf. This is Pennsylvania's overview of the elements of Zika virus surveillance, communication, response and control.

State of Connecticut. Zika Virus Surveillance and Response Plan, 2016 (Revised April 2016)
http://www.ct.gov/mosquito/lib/mosquito/publications/Zika_plan.pdf This provides a comprehensive overview of the elements of Zika virus surveillance, communication, response and control. It is based on the Connecticut's West Nile Virus response plan.

WHO. Zika Strategic Response Plan
http://apps.who.int/iris/bitstream/10665/246091/1/WHO-ZIKV-SRF-16.3-eng.pdf?ua=1&ua=1&ua=1&ua=1. This plan is for July 2016-December 2017.

WHO (2016). WHO's response to Zika virus and its associated complications.
http://who.int/emergencies/zika-virus-tmp/response-zika-2017.pdf This report to donors provides general information about WHO Zika virus response activities.

IFRC, PAHO, WHO, UNICEF. Risk Communication and Community Engagement for Zika Virus Prevention and Control
https://www.unicef.org/cbsc/files/Zika_Virus_Prevention_and_Control_UNICEF_English.pdf
A guide for engaging communities and organizations.

General Overviews

The following resources are aimed at a variety of audiences: health professionals, the public, the military, childcare workers, emergency response professionals, and non-native English speakers. All are in the public domain, so images and text can be used to create your own material, with source attribution.

APHC. Zika Virus Fact Sheet 18-085-0216
http://www.acq.osd.mil/eie/afpmb/docs/zika/ZikaVirus_FS_18-085-0216.pdf. A fact sheet about Zika virus infection and prevention, from the military perspective.

ASPR-TRACIE. Zika: Resources at your fingertips
https://asprtracie.s3.amazonaws.com/documents/aspr-tracie-zika-virus-disease-resources-at-your-fingertips.pdf Compiled by the US Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response, this document provides Zika virus resources (mostly federal) and an overview of public health and healthcare system Zika virus considerations and implications relevant to healthcare workers, emergency management stakeholders and other audiences.

California Department of Public Health. Zika Outreach and Education Materials.
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/ZikaOutreachandEducationMaterials.aspx
This websites contains posters, talking points, graphics and sample tweets relating to Zika virus and pregnancy, sex, travel, and family planning. It also provides links to additional resources that can be used to educate the public about Zika virus.

California Department of Public Health (CDPH). Zika: What Californians Need to Know
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Zika.aspx This is the CDPH Zika website, containing information for travelers, health professionals, laboratories, blood centers and others. It also offers monthly updates on California Zika cases, a list of countries and territories with active Zika virus transmission, and a map and city list of *Aedes* mosquitoes in California.

CDC. Overview.
https://www.cdc.gov/zika/about/overview.html The CDC Zika virus homepage provides basic information on the virus (modes of transmission, risk factors, symptoms, prevention strategies, etc.) for a general audience.

CDC. Questions about Zika
https://www.cdc.gov/zika/about/questions.html A CDC fact sheet that answers FAQs. Also available in Spanish. See https://www.cdc.gov/zika/about/index.html.

CDC. The basics of the virus and how to protect against it
https://www.cdc.gov/zika/pdfs/fs-zika-basics.pdf
Another CDC fact sheet, with nice graphics for a general audience.

CDC. Top 5 things everyone needs to know about Zika
https://www.cdc.gov/zika/pdfs/top5.pdf The title is self-explanatory. Also available in Spanish. See: https://www.cdc.gov/zika/comm-resources/infographics.html.

CDC. What we know and what we don't know (about Zika)
https://www.cdc.gov/zika/pdfs/zika-what-we-know-infographic.pdf An infographic from the CDC. Also available in Spanish at https://www.cdc.gov/zika/pdfs/zika-what-we-know-infographic-sp.pdf See: https://www.cdc.gov/zika/comm-resources/infographics.html. Please note, this website is archived for historical purposes and is no longer being maintained or updated

CDC. Zika 101.
https://www.cdc.gov/zika/comm-resources/zika101slides.pptx. A power point presentation that will be automatically downloaded to your desktop.

CDC. Zika: The basics of the virus and how to protect against it
https://www.cdc.gov/zika/pdfs/fs-zika-basics.pdf. An infographic from the CDC. Also available in Spanish at http://espanol.cdc.gov/img/cdc/ES_49305.pdf. See: https://www.cdc.gov/zika/fs-posters/index.html#basics

CDC. How Zika spreads.
https://www.cdc.gov/zika/comm-resources/infographics.html. An infographic available in English and Spanish.

CDC. Is it flu or is it Zika?
https://www.cdc.gov/zika/pdfs/flu_or_zika_infographic.pdf. An infographic. Also available in Spanish: https://stacks.cdc.gov/view/cdc/49881.

CDC. What can be done?
www.cdc.gov/zika/pdfs/zika-whatcanbedone.pdf.
A fact sheet about general prevention strategies. Please note, this document is archived for historical purposes and is no longer being maintained or updated.

CDC. What you need to know about Zika
https://www.cdc.gov/zika/about/needtoknow.html. This provides simple language about five basic things people need to know about Zika virus. A Spanish version is available from https://espanol.cdc.gov/enes/zika/about/needtoknow.html. A low-literacy fact sheet version is also available in English from the CDC. https://www.cdc.gov/zika/pdfs/LowLit_FS_WhatToKnow.pdf.

CDC. Sick with chikungunya, dengue or Zika?
https://www.cdc.gov/zika/pdfs/sick-with-chikv-denv-zika.pdf. A CDC fact sheet with guidance on diagnosing and managing one's illness.

CDC. Zika Action Day Event Toolkit – Event Guidance
https://www.cdc.gov/zika/public-health-partners/zad-toolkit.html. This toolkit offers guidance for health departments, community-based organizations and other groups interested in holding a Zika community engagement event. Available in English and Spanish.

CDC. Zika Basics Flipbook for Community Health Workers
https://www.zikacommunicationnetwork.org/resources/zika-basics-community-health-workers. This is a resource for community health workers. It can be used for low literacy groups and is available in Spanish (https://espanol.cdc.gov/img/cdc/ES_56371.pdf), Spanish for Puerto Rico (https://www.cdc.gov/zika/pdfs/zika_basics_low-literacy_flipbook-spa-pr.pdf), and Portuguese (https://portugues.cdc.gov/img/cdc/PT_56374.pdf).

CDC Zika Homepage
http://www.cdc.gov/zika/index.html. This is a gateway to additional information relating to Mosquito Control, Prevention and Transmission, and Symptoms, Testing and Treatment

- Mosquito Control http://www.cdc.gov/zika/vector/index.html
- Prevention and Transmission http://www.cdc.gov/zika/prevention/index.html
- About Symptoms, Testing, and Treatment http://www.cdc.gov/zika/symptoms/index.html

ChildCare Aware of America. Children and Zika: What child care providers need to know
https://www.youtube.com/watch?v=k6mFuVoRw_g. This one-hour video discusses Zika virus prevention and awareness for childcare workers.

Chicago Department of Public Health Stop Zika website
https://www.stopzikachicago.org/. This website contains general information—available in English or Spanish—for travelers, pregnant women and healthcare providers.

Maine Zika Fact Sheet (2017-08-29)
http://www.cste.org/resource/resmgr/Zika/Zika_Fact_Sheet_Revised_8-29.pdf. A general overview with answers to FAQs.

Zika Virus. A Toolkit for Healthcare providers in Maine
https://cdn.ymaws.com/www.cste.org/resource/resmgr/Zika/Zika_Toolkit_082017_1.pdf. This provides an overview of information about Zika virus, and guidance for case investigation and follow-up, screening and testing, patient counseling and specimen submission. It also includes patient handouts.

NJ Department of Health. Zika Basics Slide Show
https://www.youtube.com/watch?v=kQApHb8akkA. A YouTube overview of Zika virus basics.

NJ Department of Health. Zika virus brochure for the public (English)
http://www.nj.gov/health/cd/documents/topics/zika/zika_virus_brochure.pdf. General information about Zika virus for NJ residents.

Ottawa County, Michigan Health Department. Zika Information.
https://www.miottawa.org/Health/OCHD/zika.htm. This is Ottawa County's adaptation of general information from the CDC.

Vectorbase. A list of public health resources from the NIH.
https://www.vectorbase.org/zika/other-public-health-resources

Zika Virus: Transmission, Detection, Control and Prevention. Frontiers in Microbiology, 2017;8:doi:10.3389/fmicb.2017.00110.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5290000/pdf/fmicb-08-00110.pdf. A February 2017 article discussing Zika virus epidemiology, microbiology, transmission, detection and control measures.

History of Zika Virus in the United States. Together, the following articles provide a history of Zika virus in the United States.

Zika Virus Disease in Travelers Returning to the United States, 2010–2014. American Journal of Tropical Medicine and Hygiene, 2016;95(1):212-215.
https://www.ncbi.nlm.nih.gov/pubmed/27139440 or https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4944692/pdf/tropmed-95-212.pdf. Discusses Zika virus disease in travelers returning to the US whose specimens were tested at CDC from 2010 to 2014. The article describes patients' demographics, travel history, and clinical features.

Zika Virus Outbreak on Yap Island, Federated States of Micronesia. New England Journal of Medicine, 2009;360:2536-2543
http://www.nejm.org/doi/full/10.1056/NEJMoa0805715. Details a 2007 Zika virus outbreak on Yap Island, involving 49 confirmed and 59 probable cases.

Local Mosquito-Borne Transmission of Zika Virus — Miami-Dade and Broward Counties, Florida, June–August 2016. MMWR, 2016;65(38):1032-1038.
https://www.cdc.gov/mmwr/volumes/65/wr/mm6538e1.htm. As of July 22, 2016, the Florida Department of Health had identified 321 Zika virus disease cases in the state, most (but not all) occurring in travelers from areas with active Zika virus transmission or sexual contacts of recent travelers.

Travel-Associated Zika Virus Disease Cases Among U.S. Residents — United States, January 2015–February 2016. MMWR, 2016;65(11):286-289.
https://www.cdc.gov/mmwr/volumes/65/wr/mm6511e1.htm. During January 1, 2015–February 26, 2016, a total of 116 residents of 33 US states and the District of Columbia had laboratory evidence of recent Zika virus infection, based on testing performed at CDC.

Update: Ongoing Zika Virus Transmission – Puerto Rico, November 1, 2015–April 15, 2016. MMWR, 2016;65(17):451-455.
https://www.cdc.gov/mmwr/volumes/65/wr/mm6517e2.htm. In December 2015, Puerto Rico became the first US jurisdiction to report local Zika virus transmission. This article discusses the island's Zika virus surveillance and public health response through April 15, 2016.

Update: Non-congenital Zika Virus Disease Cases — 50 U.S. States and the District of Columbia, 2016. MMWR, 2016;67(9):265-269.
https://www.cdc.gov/mmwr/volumes/67/wr/mm6709a1.htm?s_cid=mm6709a1_w. A total of 5,168 non-congenital Zika virus disease cases with symptom onset during January 1 – December 31, 2016, were reported to ArboNET. This article provides a high-level description of those cases.

Social and Economic Implications of Zika

One of the extraordinary aspects of Zika is that it is a mosquito-borne virus that can subsequently be transmitted sexually and vertically, from mother to fetus. The virus's versatility holds possible implications for reducing the stigma of sexually transmitted infections, for mosquito control in the United States, and for maternal and child health. It also raises concerns about the virus's possible economic impacts in the US.

Can Zika Account for the Missing Babies? Frontiers in Public Health, 29 November 2017.
https://doi.org/10.3389/fpubh.2017.00317 Brazil experienced a 15% drop in live births between September and December 2016, compared with the previous year, and this sharp drop is strongly correlated with the number of recorded Zika virus cases about 40 weeks earlier.

The Potential Economic Burden Of Zika In the Continental United States. PLOS Neglected Tropical Diseases, 2017;11(4):e0005531.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5407573/ According this study, a Zika attack rate of 0.3% across the six states at greatest risk of Zika emergence (AL, FL, GA, LA, MS, TX) would result in costs exceeding $0.5 billion. An attack rate of 1% would exceed $1 billion, and an attack rate of 2% would exceed $2 billion.

The Zika Outbreak in Brazil: An Unequal Burden. Tidsskr Nor Legeforen, 2017;22:doi:10.4045/tidsskr.17.0655.
http://tidsskriftet.no/en/2017/11/global-helse/zika-outbreak-brazil-unequal-burden The large 2015-2016 Zika virus outbreak in the tropical Americas highlights local challenges related to gender inequality, poverty, social stigma, and women's rights and healthcare access.

Zika: The Tragedy and The Opportunities. American Journal of Public Health, 2016;106(4):582.
https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2016.303114 This letter to the editor discusses possible social and public health outcomes of Zika virus emergence.

Media Coverage and Information

Print, broadcast and social media can all be used to convey information about Zika virus. The challenge for public health professionals is to get information out first and be the most authoritative voice. In addition, public health professionals may tap key partners to deliver their messages to specific audiences.

Zika virus: Public Health on High Alert as Mosquito Season Looms: Preparations Ramping up In States. APHA, The Nation's Health.
https://www.apha.org/topics-and-issues/communicable-disease/zika This newsletter article describes efforts to prepare for the 2017 Zika season in the US.

CDC's Beard: How We Can Protect Ourselves, and Each Other, From Zika. APHA, Public Health Newswire, 19 August 2016.
www.publichealthnewswire.org/?p=15853 Ben Beard, chief of CDC's Bacterial Diseases Branch, advises people to control mosquitos around the home, use protection when engaging in sex, and travel safely.

MedicineNet. Zika Vaccine Works in Early Human Trial. October 5, 2017.
https://www.medicinenet.com/script/main/art.asp?articlekey=207414 The important take-away from this article is that Zika virus vaccines are under development.

National Public Health Information Coalition (NPHIC). Zika Virus
https://www.nphic.org/cdc-zikasite This site provides links to information for the public (including pregnant women and other high-risk groups), healthcare providers, and other specific groups.

NJ Department of Health. Telemundo interview with Dr. Arturo Brito, Deputy Commissioner of Health (Spanish)
http://www.nj.gov/health/er/njphtv.shtml Dr. Brito discusses the Zika virus.

NJ Department of Health. Zika FAQs for the public (English, Spanish, Portuguese and Creole)
http://www.nj.gov/health/cd/documents/faq/zika_faq.pdf Links for other languages are available here (under "Education Materials"): http://www.nj.gov/health/cd/topics/zika.shtml.

NJ Department of Health. Zika Virus Public Service Announcement (English, Spanish
https://www.youtube.com/watch?v=HSr4CeL3QUs Commissioner of Health Cathleen Bennett delivers a public service announcement regarding Zika virus. The Spanish version is available at: https://www.youtube.com/watch?v=Q_HrCbjc5xA.

EPIDEMIOLOGY

Epidemiology

The epidemiology of Zika virus is evolving along with the virus itself. The following resources and tools deal primarily with human surveillance. See the "Vector Research/Management" section for information about mosquito surveillance.

Surveillance and Surveillance Strategies

These resources include some of the premier databases available to track and analyze Zika virus outbreak data. There are also articles that could provide suggestions for instituting surveillance in new enzootic and endemic areas, and two describing the benefits of collaboration with local military institutions.

A Location-specific Spreadsheet for Estimating Zika Risk and Timing for Zika Surveillance, Using US Military Facilities as an Example. The US Army Medical Department Journal, 2017;(Jan-Jun):34-46.
https://www.ncbi.nlm.nih.gov/pubmed/28511272 or http://www.cs.amedd.army.mil/FileDownloadpublic.aspx?docid=93b3cfad-57c7-476c-8b37-c81b1fa190db The Army developed an electronic spreadsheet that uses vector information, virus temperature thresholds, remotely-sensed maximum temperature thresholds, and habitat suitability to ascertain if Zika is likely in a specific location and, if so, when surveillance should be conducted.

ArboNET: National surveillance system for arboviral diseases in the United States
http://www.nationalacademies.org/hmd/~/media/Files/Activity%20Files/Global/ZoonoticDisease/Presentation4Fischer.pdf This 2008 power point presentation announces the creation of the ArboNET system. It predates the expansion of Zika virus into the United States but describes ArboNET data sources and the strengths and weaknesses of this surveillance system. Not all jurisdictions have access rights to the system.

Assessing real-time Zika risk in the United States
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5415743/ Given Zika's low incidence in the US and the geographic variability in suitable vector conditions, a cluster of reported cases may reflect diverse scenarios, ranging from independent introductions to a self-sustaining local epidemic. This paper presents a quantitative framework for real-time Zika virus risk assessment that captures uncertainty in case reporting, importations, and vector-human transmission dynamics.

Canadian Medical Association Journal (2017). Surveillance report among Canadian travelers returning from the Americas.
http://www.cmaj.ca/content/suppl/2017/02/28/189.9.E334.DC1/161241-Zika-visual-abstract-CMAJ.pdf
Surveillance of travelers can be an important adjunct to surveillance of local populations in enzootic areas.

CDC. Case Counts (provisional) Reported to CDC
https://www.cdc.gov/zika/reporting/case-counts.html
The site provides access to CDC's weekly updates of US Zika cases, plus historical case counts.

CDC and the Instituto Nacional de Salud of Colombia Collaborate to Understand Long-Term Effects of Zika Virus Infection During Pregnancy
https://www.cdc.gov/media/releases/2016/p0902-cdc-colombia-collaboration.html Since February 2016, CDC and the Instituto Nacional de Salud (INS) have collaborated on Proyecto VEZ (Vigilancia de Embarazadas con Zika) to implement enhanced surveillance of women infected with Zika during pregnancy in three sites across Colombia. CDC and INS hope to better understand the full range of potential health problems after Zika virus infection in pregnancy.

CDC. Guidance for Areas of Local Zika Transmission in the Continental United States and Hawaii
https://www.cdc.gov/zika/geo/domestic-guidance.html Covers recommendations regarding travel, prevention, testing, and preconception counseling in areas where local mosquito-borne transmission has been identified.

CDC. Real-time Evolution of Zika Virus Disease Outbreak, Roatan, Honduras
https://wwwnc.cdc.gov/eid/article/23/8/pdfs/16-1944.pdf A description of the surveillance methods that identified an outbreak of Zika virus infection in the Honduras, in an area where chikungunya virus and dengue virus were also present.

CDC. West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control
https://www.cdc.gov/westnile/resources/pdfs/wnvGuidelines.pdf Although this is a guide for West Nile Virus, it provides a description of ArboNET, the national arboviral surveillance system managed by CDC and state health departments.

CDC. World Map of Areas with Risk of Zika
https://wwwnc.cdc.gov/travel/page/world-map-areas-with-zika

CDC. Zika IMS Jurisdiction and Partner Sustainment Strategy, March 23, 2017
https://www.cdc.gov/zika/pdfs/epidemiology-tf-sustainment-webinar-slides-3-23-17.pdf A slide set describing surveillance and modelling to identify expansion of Zika.

Chicago Tribune. 'Herd Immunity' May Be Curbing US Zika Numbers
http://www.chicagotribune.com/lifestyles/health/sc-hlth-herd-immunity-zika-0830-story.html However, outbreaks may still occur.

Expected Duration of Adverse Pregnancy Outcomes after Zika Epidemic. Emerging Infectious Diseases, 2018;24(1):127-130.
https://wwwnc.cdc.gov/eid/article/24/1/17-0482_article Mathematical modeling analysis using reported outcome data suggests that surveillance for adverse pregnancy outcomes should begin as soon as a Zika virus outbreak is detected and should continue for 40 weeks after the outbreak ends.

FDA. Prevention of Blood-Transfusion Transmission of Zika virus
https://www.fda.gov/downloads/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/guidances/blood/ucm518213.pdf FDA guidance on preventing Zika virus transmission through blood.

Georgia's Collaborative Approach to Expanding Mosquito Surveillance in Response to Zika Virus: A Case Study. The US Army Medical Department Journal, 2017;(Jan-Jun):23-33.
http://www.cs.amedd.army.mil/FileDownloadpublic.aspx?docid=93b3cfad-57c7-476c-8b37-c81b1fa190db
Describes a collaboration between the Georgia health agency and military facilities within the state to expand the surveillance capacities of both.

History, Epidemiology, and Clinical Manifestations of Zika: A Systematic Review.
http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2016.303112 A summary of current knowledge and public health challenges.

US Immigration and Customs Enforcement (ICE). Report of the Department of Homeland Security Advisory Committee on Family Residential Centers (September 30, 2016)
https://www.ice.gov/sites/default/files/documents/Report/2016/ACFRC-sc-16093.pdf On Page 117, ICE states its policy to screen detainees in the family residential centers for Zika virus. People found to be infected are to be provided counseling and medical care.

Infection-related Microcephaly After the 2015 and 2016 Zika Virus Outbreaks in Brazil: A Surveillance-based Analysis. The Lancet, 2017;390:861-870.
http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31368-5.pdf Zika outbreaks in different locations and populations have revealed wide variance in the incidence of microcephaly. More data are needed on the characteristics of different infected populations and how these might affect such incidence. See also the associated editorial **Risk of Zika-related Microcephaly: Stable or Variable?** http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31478-2.pdf

Update: Non-congenital Zika Virus Disease Cases – 50 U.S. States and the District of Columbia, 2016. MMWR, 2018;67(9):265-269.
https://www.cdc.gov/mmwr/volumes/67/wr/mm6709a1.htm?s_cid=mm6709a1_e In 2016, 5,168 non-congenital Zika virus disease cases were reported by US states and the District of Columbia. Most cases (4,897, 95%) were in travelers returning from Zika virus-affected areas. A total of 224 cases (4%) were acquired through presumed local mosquito-borne transmission, and 47 (1%) were acquired by other routes.

Potential High-Risk Areas for Zika Virus Transmission in the Contiguous United States. American Journal of Public Health, published online 11 April 2017.
http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.303670 Researchers looked at potential for Zika transmission via *Aedes* mosquito bite and via sexual transmission. 507 counties along the southern US border are at highest risk. Available free-of-charge to APHA members.

Detecting Local Zika Virus Transmission in the Continental United States: A Comparison of Surveillance Strategies. PLOS Currents Outbreaks, 2017 Nov 22.
http://currents.plos.org/outbreaks/article/detecting-local-zika-virus-transmission-in-the-continental-united-states-a-comparison-of-surveillance-strategies/ This article describes and compares various strategies for detecting mosquito-borne transmission.

Zika Virus Case Definition

Case definitions provide standardization among jurisdictions to facilitate data analysis. Below are the approved definitions for a Zika virus case in the United States.

CSTE. Zika Virus Disease and Zika Virus Infection Without Disease, Including Congenital Infections Case Definitions and Addition to the Nationally Notifiable Diseases List, Revised 29 July 2016.
http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16_ID_01_edited7.29.pdf

CSTE. Zika Virus Disease and Congenital Zika Virus Infection Interim Case Definition and Addition to the Nationally Notifiable Diseases List. 26 February 2016
https://www.cste2.org/docs/Zika_Virus_Disease_and_Congenital_Zika_Virus_Infection_Interim.pdf

Case Investigation

Resources in this section define "imported case" and "local transmission." There are also links to information to help differentiate Zika from other mosquito-borne viruses like dengue and chikungunya. Perhaps the most important resource in this section is CDC's toolkit for investigating possible mosquito-borne transmission of Zika virus.

CDC. Toolkit for Investigating Possible Local Mosquito-Borne Transmission of Zika Virus
https://www.cdc.gov/zika/public-health-partners/epidemiologic-investigation-toolkit.html This is the web page for CDC's epidemiologic tool kit. The toolkit itself is posted at https://www.cdc.gov/zika/pdfs/toolkit-user-guide.pdf It contains tools useful for investigations and a Zika case investigation algorithm. The homepage can lead you to forms to help case investigations, creating case line-lists, investigate possible transmission via blood transfusion, collect exposure information, create community surveys, and household and workplace survey and visit logs.

CDC. What is an imported case?
https://www.cdc.gov/zika/pdfs/Imported_Case_CHIKV_DENV_ZIKA.pdf An infographic that defines "imported case" for the general public.

CDC. What is local transmission?
https://www.cdc.gov/zika/pdfs/Local_Transmission_CHIKV_DENV_ZIKA.pdf An infographic describing the term local transmission for the general public.

Chikungunya in North-eastern Italy: A Summing Up of the Outbreak. Euro-surveillance, 2007;12(47): pii=3313.
https://www.eurosurveillance.org/content/10.2807/esw.12.47.03313-en Although not focused on Zika, this article describes an outbreak in northern Italian towns with a recently established population of *Aedes albopictus* mosquitoes and a population of immigrants and refugees with chikungunya virus. Insufficient vector control contributed to the outbreak.

Kansas Department of Health and Environment. Zika virus Investigation Guideline, August 2016
http://www.kdheks.gov/epi/Investigation_Guidelines/ZikaVirus_Disease_Investigation_Guideline.pdf This presents Kansas's Zika virus case investigation protocols and forms.

NJ Department of Health. Zika Patient Information Worksheet
http://www.nj.gov/health/cd/documents/zika_patient_information_worksheet.pdf Intake sheet for clinicians to document clinical and exposure information when requesting Zika testing.

NJ Department of Health. Zika Communicable Disease Manual Chapter
http://www.nj.gov/health/cd/documents/topics/zika/zika_chapter_8.29.17.pdf Disease investigation chapter for local health departments.

Contact Tracing

Contact tracing (now also referred to as p*artner notification or partner services*) was first employed to control the spread of sexually transmitted infections (STIs), but is also relevant to prevent sexually transmitted cases of Zika virus. CDC toolkits contain resources for documenting visits to homes, workplaces and other sites where health officials are looking for primary and secondary cases. The *Science Translational Medicine* article describes a novel disease prevention practice that combines contact tracing with targeted insecticide spraying.

CDC. Toolkit for Investigating Possible Local Mosquito-Borne Transmission of Zika Virus: Household Survey Form
https://www.cdc.gov/zika/public-health-partners/household-survey-form.docx Household member survey forms for tracking visits of index case household and neighboring households targeted for the community survey. The tool can be used to collect household member interview and specimen collection information.

CDC. Toolkit for Investigating Possible Local Mosquito-Borne Transmission of Zika Virus: Household/Workplace Visit Log
https://www.cdc.gov/zika/public-health-partners/visit-log.pdf Can be used for tracking investigative visits to households and workplaces and other locations, where one would look for primary and secondary cases within such settings.

Combining contact tracing with targeted indoor residual spraying significantly reduces dengue transmission. Science Translational Medicine, 2017;3(2):e1602024.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5315446/ The authors investigated the epidemiological value of location-based contact tracing (identifying potential out-of-home exposure locations by phone interviews) to determine where to target insecticide spraying.

Recent Travel

While investigating possible risks and cases of Zika virus exposure, public health officials and clinicians will need to ask people about travel to areas with active Zika transmission.

CDC. Guidance for Areas of Local Zika Transmission in the Continental United States and Hawaii
https://www.cdc.gov/zika/geo/domestic-guidance.html Identifies active transmission areas and "cautionary areas," with recommendations for travel to each.

CDC. Zika travel information
https://wwwnc.cdc.gov/travel/page/zika-travel-information

NJ Department of Health. Track When You're Back infographic
http://www.nj.gov/health/cd/documents/topics/zika/mosquito_track_when_youre_back.pdf An infographic outlining steps to prevent the spread of mosquito-borne disease after travel to areas with active mosquito-borne disease transmission.

NJ Department of Health. Track When You're Back Video
https://www.youtube.com/watch?v=0TOVYOabIV4&feature=youtu.be New Jersey State Epidemiologist Tina Tan shares "Track when you're back" campaign messages.

High Risk Populations
(e.g. pregnant women)

Some groups face higher risks for subsequent disease transmission or for adverse health outcomes following Zika virus exposure. This sections details advice for these special populations. [Many of the CDC fact sheets are available in multiple languages at: https://www.cdc.gov/pregnancy/zika/protect-yourself.html .]

CDC. Doctor's Visit Checklist
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/ZIKA-ClinicVisit-Checklist.pdf A fact sheet for pregnant women living in an area with Zika.

CDC. US Zika Pregnancy Registry. What Pregnant Women Need to Know
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/Zika-Pregnancy-Registry-What-Pregnant-Women-Need.pdf Describes the purpose and benefits of enrolling in the US Zika Pregnancy Registry.

CDC. Men and Zika
https://www.cdc.gov/zika/men/index.html Infection and disease prevention advice for men.

CDC. Pregnant and Worried About Zika? Zika Prevention Kit for Pregnant Women
https://www.cdc.gov/zika/pdfs/Zika-Kit-flyer.pdf An infographic describing the use of bed nets, insect repellent, condoms, standing water treatment tabs and permethrin spray to protect against mosquitoes.

CDC. Pregnant and Living in an Area With Risk of Zika?
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/preg_areaswithzika.pdf A fact sheet from the CDC.

CDC. Pregnant and in an Area with Zika? Protect your pregnancy
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/protect-your-pregnancy.pdf A fact sheet from the CDC.

CDC. Pregnant? Read this before you travel
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/ZIKA-PregnancyTravel.pdf A fact sheet from the CDC.

CDC. Thinking about having a baby? Plan your pregnancy
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/zika-plan-your-pregnancy.pdf A fact sheet from the CDC. Also available in Spanish https://www.cdc.gov/pregnancy/zika/pregnancy/documents/zika-plan-your-pregnancy-sp.pdf and Creole https://www.cdc.gov/pregnancy/zika/pregnancy/documents/zika-plan-your-pregnancy-creole.pdf

CDC. What to Know if Your Baby Was Born with Congenital Zika Syndrome
https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Congenital-Zika-Syndrome.pdf A fact sheet from the CDC. Also available in Spanish https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Congenital-Zika-Syndrome-sp.pdf

CDC. What to know if your doctor suspects microcephaly during pregnancy
https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Doctor-Suspects-Microcephaly.pdf A fact sheet from the CDC. Also available in Spanish https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Doctor-Suspects-Microcephaly-sp.pdf

CDC. Zika Pregnancy Registry: What Parents Need to Know
https://www.cdc.gov/pregnancy/zika/materials/documents/ZikaPRegTesting508.PDF

Center for Infectious Disease Research and Policy. Brazilian Study Sheds New Light on Zika Neuro Complications In Adults
http://www.cidrap.umn.edu/news-perspective/2017/08/brazilian-study-sheds-new-light-zika-neuro-complications-adults A summary of the article, "Neurologic Complications Associated with the Zika Virus in Brazilian Adults," from JAMA Neurology, 2017;74(10:1190-1198. See also: https://jamanetwork.com/journals/jamaneurology/article-abstract/2647256?redirect=truehttps://jamanetwork.com/journals/jamaneurology/article-abstract/2647256?redirect=true

Measures Taken to Prevent Zika Virus Infection During Pregnancy – Puerto Rico, 2016. MMWR, 2017;66(22);574-578.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6622a2.htm?s_cid=mm6622a2_w

WA Department of Health. Zika Screening Questions.
http://www.cste.org/resource/resmgr/Zika/Zika_Screening_Questions_2di.pdf

WA Department of Health. Zika Intake Form.
http://www.cste.org/resource/resmgr/Zika/Zika_Intake_Form_2dii.pdf

Sexual Transmission

While investigating possible risks and cases of Zika virus exposure, public health officials and clinicians will need to ask potentially exposed individuals about their sexual contacts during the infectious stage and counsel them about risk-reducing strategies.

CDC. Clinical Guidance for Healthcare Providers for Prevention of Sexual Transmission of Zika Virus
https://www.cdc.gov/zika/hc-providers/clinical-guidance/sexualtransmission.html

CDC. Condom Use Palm Card
https://www.cdc.gov/zika/pdfs/CondomUsePalmCard2.pdf

CDC. Guidance for Areas of Local Zika Transmission in the Continental United States and Hawaii
https://www.cdc.gov/zika/geo/domestic-guidance.html
Outlines recommendations for travel, prevention, testing and preconception counseling for pregnant women and couples considering conception in areas of active Zika virus transmission.

CDC. LGBT Community: How to Protect Yourselves from Zika
https://www.cdc.gov/zika/pdfs/LGBT-Zika-Fact-Sheet.pdf An infographic for general public education.

CDC. Zika and Sex: Information for Pregnant Women in Areas with Risk of Zika
https://www.cdc.gov/zika/pdfs/PregSexTransmission.pdf An infographic for the general public's education.

CDC. How to Protect Yourself From Getting Zika From Sex. Information for People Whose Partner Traveled to an Area with Risk of Zika
https://www.cdc.gov/zika/pdfs/fs-Zika-Sex-PartnerTravel.pdf

CDC. How to Protect Yourself From Getting Zika From Sex. Information for People Living in Areas with Risk of Zika
https://www.cdc.gov/zika/pdfs/fs-Zika-Sex-Local.pdf

CDC. Zika Can Pass Through Sex
https://www.cdc.gov/zika/pdfs/Low-Lit_Condom.pdf

Investigating the Sexual Transmission of Zika Virus. The Lancet, 2018;6:e24-e25. http://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X(17)30419-9.pdf This commentary summarizes a WHO Zika Sexual Transmission Research Group meeting held in March 2017. In the absence of methodologically rigorous population-based studies, the epidemiology of sexually transmitted Zika virus remains poorly understood. To help remedy this information gap, the Group developed a sexual transmission framework describing seven variables and their inter-relationships: incubation period, serial interval, duration of infectiousness, probability of transmission per sex act, reproductive number, transmission rate through sexual contact, and susceptibility to Zika virus infection through sexual contact.

Update: Interim Guidance for Preconception Counseling and Prevention of Sexual Transmission of Zika Virus for Persons with Possible Zika Virus Exposure – United States, September 2016. MMWR, 2016;65(39);1077-1081.
https://www.cdc.gov/mmwr/volumes/65/wr/mm6539e1.htm

Investigating a Suspect Locally-acquired Zika Case

It is important that areas near Zika enzootic and endemic locations have a high index of suspicion that the virus has spread into their jurisdiction.

Screening Criteria for Ophthalmic Manifestations of Congenital Zika Virus Infection
https://jamanetwork.com/journals/jamapediatrics/fullarticle/2636587 All infants with prenatal Zika exposure need an eye exam.

NJ Department of Health. Zika Testing Criteria
http://www.nj.gov/health/cd/documents/topics/zika/zika_testing_criteria.pdf This describes the criteria for testing at the New Jersey Public Health Laboratory.

Prevention Measures for Recent Case

There are two major strategies for preventing transmission from a recently-occurring Zika case: avoiding mosquitoes and engaging in safe sexual practices.

Mosquito Avoidance

CDC. Prevent Mosquito Bites
https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html This CDC webpage provides advice for the general public.

How to Avoid Mosquito Bites
https://www.wikihow.com/Avoid-Mosquito-Bites This wikiHow webpage explains strategies to prevent mosquito bits, avoid mosquito habitats and eliminate individual mosquitoes. Intended for the general public.

6 Ways To Stop Mosquito Bites—And 6 Common Tactics That Just Don't Work. Prevention Magazine, August 2015.
https://www.prevention.com/health/stop-mosquito-bites
Some common sense, and some not so obvious ways, to make it difficult for a mosquito to bite you.

Abstaining From Sexual Relations or Using Condoms Correctly

CDC. Pregnant and Worried About Zika? Zika Prevention Kit for Pregnant Women
https://www.cdc.gov/zika/pdfs/zika-kit-flyer.pdf An infographic describing the use of bed nets, insect repellent, condoms, standing water treatment tabs and permethrin spray to protect against mosquitoes.

CDC. Condoms
https://www.cdc.gov/zika/pdfs/condomusepalmcard2.pdf An infographic explaining condom "dos and don'ts" to the general public.

CDC. Sexual Transmission and Prevention of Zika
https://www.cdc.gov/zika/prevention/sexual-transmission-prevention.html A webpage with prevention advice for the general public.

CDC. Travelers Can Protect Themselves from Zika. Zika Prevention Kit for Travelers
https://www.cdc.gov/zika/pdfs/zpk_poster.pdf An infographic describing the use of bed nets, insect repellent, condoms, standing water treatment tabs and permethrin spray to protect against mosquitoes.

Virginia Department of Health. Sexual Transmission of Zika Virus
http://www.vdh.virginia.gov/epidemiology/zika-virus-update/sexual-transmission-of-zika-virus/ This webpage provides prevention advice for various audiences, including pregnant women and LGBT individuals.

Forms

Each public health jurisdiction has its own surveillance data forms. Many are suggested by the federal government to assure standardization of data reported by jurisdictions to the federal government.

Armed Forces Pest Management Board
http://www.acq.osd.mil/eie/afpmb/. Look under "Zika Virus Preparation" and click on "Vector Surveillance Log" to see a sample vector surveillance data collection form.

Educational Materials

These two resources describe Zika virus surveillance efforts and the rationale behind them.

CDC. (Zika Virus) Reporting and Surveillance.
https://www.cdc.gov/zika/reporting/index.html This webpage describes the sources and uses of Zika virus surveillance data.

Zika Virus Surveillance and Preparedness – New York City, 2015-2016, MMWR, 2016;65(24).
https://www.cdc.gov/mmwr/volumes/65/wr/mm6524e3.htm
This article describes the surveillance and public education efforts of the New York City Department of Health and Mental Hygiene.

DATA MANAGEMENT

Data Management

There are many data management systems in place in public health departments and public health laboratories. Some were created in-house, using public domain or other software, while others are proprietary creations of private consulting firms. CDC's ArboNET is the nation's comprehensive, public health surveillance data management system for Zika and other arthropod-borne viruses.

CDC. ArboNET Login Information. https://wwwn.cdc.gov/arbonet/ All health departments that report arthropod-borne virus data directly to the CDC have access to this system. Others may request access here: https://wwwn.cdc.gov/arbonet/Register.aspx

CDC. West Nile Virus Surveillance Resources. https://www.cdc.gov/westnile/resourcepages/survresources.html This web page, created for West Nile virus, provides background on ArboNET, CDC's national arboviral surveillance system. In addition to cases of human disease, ArboNET maintains data on arboviral infections among presumptive viremic blood donors, veterinary disease cases, mosquitoes, dead birds, and sentinel animals.

Healthcare IT News. Zika Virus Outbreak Makes Disease Surveillance a Critical Healthcare IT Tool, Expert Says http://www.healthcareitnews.com/news/zika-virus-outbreak-makes-disease-surveillance-critical-healthcare-it-tool-expert-says This article explains the importance of electronic communication between hospitals and health departments to help control Zika virus.

LABORATORY GUIDANCE

Laboratory Guidance

Laboratory confirmation of infection is a critical component of surveillance and especially important to distinguish among Zika, dengue and chikungunya infections. By July 2016, all state public health laboratories were able to test for the virus using IgM enzyme-linked immunosorbent assays (ELISA), real-time polymerase chain reaction tests (RT-PCR), and/or plaque-reduction neutralization test (PRNT) assays.

Testing Algorithms

The CDC provides public health laboratories with recommend testing guidelines. All Laboratory Response Network member laboratories follow these guidelines and use CDC's standardized test reagents.

APHL Responds to Zika
https://www.aphl.org/programs/preparedness/Crisis-Management/Pages/Zika.aspx A compendium of laboratory guidance documents can be found at this site.

CDC. Guidance for US Laboratories Testing for Zika Virus Infection, July 24, 2017
https://www.cdc.gov/zika/laboratories/lab-guidance.html Provides an overview of Zika virus testing, overview of updates to testing guidance, and information about biosafety, and testing methods for various populations.

CDC. Collecting and Submitting Specimens at Time of Birth for Zika virus Testing
https://www.cdc.gov/zika/hc-providers/test-specimens-at-time-of-birth.html

CDC. Interim Guidance for Zika Virus Testing of Placental, Fetal or Infant Autopsy Tissues
https://www.cdc.gov/pregnancy/zika/materials/documents/specimen-zika-virus-testing-fact-sheet.pdf

CDC. Interim Guidance. Evaluation and Testing for Infants with Possible Zika Infection
https://www.cdc.gov/zika/pdfs/ZIKA_PEDS.pdf

CDC. Blood and Tissue Safety
https://www.cdc.gov/zika/areasatrisk.html Basic safety guidance for blood and tissue collection centers.

CDC. Interim Guidance for Zika Virus Testing of Urine – United States, 2016
https://www.cdc.gov/mmwr/volumes/65/wr/mm6518e1.htm

CDC. Revised Diagnostic Testing for Zika, Chikungunya, and Dengue Viruses in US Public Health Laboratories, February 7, 2016
https://www.cdc.gov/zika/pdfs/denvchikvzikv-testing-algorithm.pdf This memo from CDC's Division of Vector-borne Diseases outlines Zika virus testing options, as of February 7, 2016.

CDC. Zika Virus Testing Guidance
https://www.cdc.gov/zika/hc-providers/testing-guidance.html

CDC. Updated Interim Pregnancy Guidance: Asymptomatic Pregnant Women with Possible Zika Virus Exposure
https://www.cdc.gov/pregnancy/zika/testing-follow-up/documents/testing-algorithm-asymptomatic.pdf

CDC. Interpretation Table for Nucleic Acid and Antibody Tests for Zika Virus Infection
https://www.cdc.gov/pregnancy/zika/testing-follow-up/documents/lab-table.pdf

FDA. Zika Virus Emergency Use Authorization.
https://www.fda.gov/MedicalDevices/Safety/EmergencySituations/ucm161496.htm This webpage describes tests permitted for Zika virus detection under the US Food and Drug Administration's February 26, 2016, emergency use authorization.

Ability To Serologically Confirm Recent Zika Virus Infection in Areas with Varying Past Incidence of Dengue Virus Infection in the United States and U.S. Territories in 2016. Journal of Clinical Microbiology, 2018;56(1):e01115-17.
http://jcm.asm.org/content/56/1/e01115-17.long
Using plaque reduction neutralization tests, researchers found that positive IgM test results could not distinguish among infection with Zika virus, dengue virus or unspecified flaviviruses. A positive IgM result should be considered a presumptive positive and not evidence of a confirmed infection.

MA Department of Public Health. Webinar on Zika Practice and Guidelines. Overview and Laboratory Testing.
http://bit.ly/2knsYhf Registered users can access a discussion of laboratory testing algorithms. (Online registration is available.)

FDA Approves First Test for Screening Zika Virus in Blood Donations
https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm579313.htm
The U.S. Food and Drug Administration has approved the cobas Zika test to screen donated blood for the Zika virus.

WebMD. Rapid, Easy Zika Test Developed.
https://www.webmd.com/a-to-z-guides/news/20170927/rapid-easy-zika-test-developed
This article describes a "dipstick" test for Zika and dengue viruses.

Sample Testing Algorithms Used by States and Local Jurisdictions

Although CDC-funded jurisdictions adhere to CDC guidance, they may differ in their reporting requirements, data forms, and test submission protocols. Below are samples state testing algorithms and protocols..

Indiana State Department of Health. Scenario Review: Who Should be Tested?
http://www.cste.org/resource/resmgr/Zika/Scenario_Review_Who_Should_B.pdf This brief power point presentation provides guidance on testing in different patient scenarios.

Indiana State Department of Health. ISDH Zika Virus Testing Authorization Form.
http://www.cste.org/resource/resmgr/Zika/Zika_Virus_Authorization_For.pdf

Indiana State Department of Health. Zika Specimen Submission Guidance and Algorithms 9-17.
http://www.cste.org/resource/resmgr/Zika/Zika_Specimen_Submission_Gui.pdf

MA. Department of Public Health. Specimen Collection, Storage and Shipment for Molecular, Serological and Tissue Testing for Zika Virus (August 1, 2017)
http://www.mass.gov/eohhs/docs/dph/infectious-disease/zika-specimen-guidance.pdf

MA. Department of Public Health. Recommended Perinatal Testing and Evaluation of Infants Born to Mothers with Possible Zika Virus Exposure and Infants with Congenital Zika Virus Syndrome August 3, 2017
http://www.mass.gov/eohhs/docs/dph/infectious-disease/dph-infant-zika-advisory.pdf

NJ Public Health and Environmental Laboratories. Technical Bulletin. Zika Virus Testing for New Jersey Patients
http://www.nj.gov/health/cd/documents/topics/zika/zika_tech_bulletin_8.22.17.pdf This bulletin for sentinel laboratories describes how to collect and ship specimens for Zika testing at the state public health laboratory.

Washington State Department of Health. Criteria for Zika Virus Testing Through Public Health
https://www.doh.wa.gov/Portals/1/Documents/Pubs/420-165-CriteriaForZikaTestingWAPHL.pdf

Clinical Decision Support for Public Health and Healthcare Providers

Although the preponderance of clinical decision guidance comes from the CDC, below are examples from some professional organizations and health departments. The advice will be generally consistent but may emphasize different professional foci or have other minor differences.

ACOG. Clinical Practice: Updated Practice Guidance on Zika: New Information Available
https://www.acog.org/About-ACOG/ACOG-Departments/ACOG-Rounds/March-2016/Zika-Virus
Find prevention, management and treatment advice for obstetricians and gynecologists.

British Medical Journal Best Practices: Zika Virus Infection. British Medical Journal.
http://bestpractice.bmj.com/topics/en-gb/1302 Find a comprehensive summary of clinical practice advice, based on materials published in the professional literature.

CDC. (Advice) For Healthcare Providers
https://www.cdc.gov/zika/hc-providers/index.html
This page provides links to clinical evaluation and testing protocols for evidence of Zika virus infections.

CDC. Assessment of Infant Hearing for Infants Testing Positive for Zika Virus Infection
https://www.cdc.gov/mmwr/volumes/66/wr/mm6641a1.htm?s_cid=mm6641a1_w
Recommendations for testing children suspected of being infected with Zika virus

CDC. Blood and Tissue Safety: Geographic Areas With Zika Virus Transmission Risk
https://www.cdc.gov/zika/areasatrisk.html Provides information on high-risk areas for the purposes of blood and tissue safety interventions.

Zika Virus Disease: A CDC Update for Pediatric Health Care Providers Update: Interim Guidance for the Diagnosis, Evaluation, and Management of Infants with Possible Congenital Zika Virus Infection — United States, October 2017
https://www.cdc.gov/mmwr/volumes/66/wr/mm6641a1.htm?s_cid=mm6641a1_w Clinical guidance for pediatricians http://pediatrics.aappublications.org/content/early/2016/03/22/peds.2016-0621

American College of Obstetricians and Gynecologists. Practice Advisory Interim Guidance for Care of Obstetric Patients During a Zika Virus Outbreak
https://www.acog.org/Clinical-Guidance-and-Publications/Practice-Advisories/Practice-Advisory-Interim-Guidance-for-Care-of-Obstetric-Patients-During-a-Zika-Virus-Outbreak

CDC. When to Test for Zika Virus
https://www.cdc.gov/zika/pdfs/when-to-test-zika.pdf
Testing advice for healthcare providers.

CDC. Guidance for Follow-up Care for Infants Born to Women with Possible Zika Virus Exposure
https://www.cdc.gov/zika/hc-providers/infants-children/follow-up-care.html#patientmaterials

CDC. Key Zika considerations for health care settings
https://www.cdc.gov/pregnancy/zika/materials/documents/Key-Zika-Considerations.pdf.

CDC. Measuring Head Circumference
https://www.cdc.gov/zika/pdfs/Microcephaly_measuring.pdf More information is available from the CDC about microcephaly and its management at https://www.cdc.gov/pregnancy/zika/testing-follow-up/zika-syndrome-birth-defects.html Videos with measurement instructions are available in the following languages

- English https://www.youtube.com/watch?v=HWV1JdAhsSo
- Spanish https://www.youtube.com/watch?v=tPBxXkIljt0
- Italian https://www.youtube.com/watch?v=Doy1L-ZeMvs
- French https://www.youtube.com/watch?v=SxDbKa7KBlc
- Creole https://www.youtube.com/watch?v=eYbGYoJ9guo

CDC. Spotlight on California Birth Defects Monitoring Program
https://www.cdc.gov/about/24-7/cdcresponders-zika/California.html Examines California's use of its birth defects monitoring systems to identify congenital defects due to Zika virus.

CDC. Symptoms (of Zika virus)
https://www.cdc.gov/zika/symptoms/symptoms.html
A general description of symptoms of Zika virus infection. Available in multiple languages

CDC. Treatment for Zika
https://www.cdc.gov/zika/symptoms/treatment.html
Treat the symptoms; there are no medications for the virus.

CDC. What to Know if Your Baby May Have Been Affected by Zika But Has No Related Health Conditions at Birth
https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Affected-By-Zika-No-Related-Conditions.pdf An educational fact sheet useful for patient counseling. Also available in Spanish at https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Affected-By-Zika-No-Related-Conditions-sp.pdf

CDC. What to Know if Your Baby Was Born with Congenital Zika Syndrome
https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Congenital-Zika-Syndrome.pdf An educational fact sheet useful for patient counseling. Also available in Spanish at https://www.cdc.gov/pregnancy/zika/family/documents/WhattoKnow-Congenital-Zika-Syndrome-sp.pdf

CDC. Zika Pregnancy Registry: How Health Departments Can Participate
https://www.cdc.gov/pregnancy/zika/materials/documents/ZikaPRegTesting508.PDF More information about health department reporting is available from the CDC at **Technical and Clinical Information** https://www.cdc.gov/pregnancy/zika/research/technical-clinical.html

CDC. Zika Pregnancy Registry: Tribal Health Care Providers: How to Contribute
https://www.cdc.gov/zika/pdfs/Zika_PregnancyRegistry_tribal.pdf

Emerging Infectious Diseases (January 2018). Zika Virus Testing and Outcomes during Pregnancy, Florida, USA, 2016. Emerging Infectious Diseases, 2018;24(1):1-8.
https://wwwnc.cdc.gov/eid/article/24/1/17-0979_article This article describes Florida's experience responding to a 2016 Zika outbreak and offers advice to reduce backlogs in testing and results reporting.

Florida Department of Health. Zika Free Florida.
https://zikafreefl.org/healthcare-providers/ This website contains assorted information for healthcare providers. Providers may opt to join Zika Care Connect (https://www.zikacareconnect.org/), which provides information about caring for patients affected by Zika.

Indiana State Department of Health. Coordinating Care Before and After Delivery for Your Zika-Positive Pregnant Patient.
http://www.cste.org/resource/resmgr/Zika/Coordinating_Care_Before_and.pdf Guidance for clinical care, testing, and data entry into the US Zika Registry.

International Society of Ultrasound in Obstetrics and Gynecology (ISUOG). ISUOG Interim Guidance on Ultrasound for Zika Virus Infection In Pregnancy: Information for Healthcare Professionals
https://www.isuog.org/uploads/assets/uploaded/5c16a7d6-f70d-4737-95a7f4447c961364.pdf

MA Department of Public Health. Clinical Advisory Zika Virus Updated: August 3, 2017
http://www.mass.gov/eohhs/docs/dph/infectious-disease/dph-zika-advisory.pdf

MA Department of Public Health. Webinar on Zika practice and guidelines. Beyond microcephaly: Post-delivery follow-up for Zika-exposed infants.
http://bit.ly/2zeZe7U Registered users can access a discussion of potential medical and social services for Zika-exposed infants. (Online registration is available.)

MA Department of Public Health. Zika Practice and Guidelines. Recognizing and Diagnosing Zika-associated Birth Defects.
http://www.mass.gov/eohhs/docs/dph/infectious-disease/dph-infant-zika-advisory.pdf Strategies for determining if there are birth defects due to Zika virus exposure during pregnancy.

Medscape Expert Commentary: Advising Pregnant Women about Zika
http://www.medscape.com/viewarticle/858892 A video with an obstetrician-gynecologist on the Pregnancy and Birth Defects Team for CDC's 2016 Zika virus response.

Update: Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure — United States (Including U.S. Territories), July 2017. MMWR, 2017;66(29):781-793.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6629e1.htm?s_cid=mm6629e1_w CDC no longer recommends routine Zika virus testing for asymptomatic pregnant women without ongoing exposure to Zika virus. Because of this change, it is critical that pediatric healthcare providers ask about possible maternal and congenital Zika virus exposure for every newborn.

US Zika Pregnancy Registry: How to participate
http://www.medscape.com/viewarticle/866032?src=par_cdc_stm_mscpedt&faf=1 A video overview of the US Zika Pregnancy Registry and how to participate.

Washington State Department of Health. Zika Resources for Healthcare Providers and Clinical Labs
https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/ZikaVirus/HealthcareProvidersClinicalLabs Guidance for laboratorians and clinicians on detecting and diagnosing Zika virus.

Washington State Department of Health. Provider Guidance: Infants with Anomalies Consistent with Congenital Zika Virus Syndrome Unsupported by Testing (2016-06-09).
http://www.cste.org/resource/resmgr/Zika/Guidance_for_incomp_neg_test.pdf The purpose of this checklist is to provide LHJs with guidance on testing and follow-up for infants with anomalies consistent with congenital Zika syndrome when 1) mothers previously tested negative for Zika virus and all maternal exposure occurred completely within the testing window or 2) mothers have not completed the testing algorithm.

Washington State Department of Health. Zika Virus: Testing and Care for Pregnant Women (text of a video).
http://www.cste.org/resource/resmgr/Zika/Zika_provider_video_script_2.pdf

WHO (2016). Psychosocial Support for Pregnant Women and for Families with Microcephaly and Other Neurological Complications in the Context of Zika Virus. Interim Guidance for Health-care Providers.
http://who.int/csr/resources/publications/zika/psychosocial-support/en/ Although focused on microcephaly, many of the described supports—accurate information, supportive communication, etc.—also apply to other neurological conditions that may be associated with Zika virus.

Zika for Pediatricians: Critical Update
http://www.medscape.com/viewarticle/859635 A pediatrician on the Pregnancy and Birth Defects Team for CDC's 2016 Zika virus response reviews what we know about Zika virus, congenital microcephaly, and other birth defects..

Forms

Sample health department forms for Zika virus surveillance and testing.

Alabama Department of Public Health. Requisition Form for Laboratory Testing
http://www.alabamapublichealth.gov/mosquito/assets/bcl_requisiton_form-fillable.pdf

CDC. National Birth Defects Prevention Study. Collaboration Request Form
https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-collaboration-request-form.pdf Application form for participating in this study.

Indiana State Department of Health Laboratories. Arbovirus (Human) Submission Form
http://www.cste.org/resource/resmgr/Zika/Arbovirus_Human_Submission_F.pdf

Washington State Department of Health. Letter for Women with a Positive IgM ELISA Test Result for Zika Virus Antibodies. Positive for Zika Virus (2017-06-16)
http://www.cste.org/resource/resmgr/Zika/Ltr_for_Women_Testing_Pos_fo.pdf

Washington State Department of Health. Zika Virus Detailed Laboratory Ordering Guidance.
http://www.cste.org/resource/resmgr/Zika/Detailed_Lab_Ordering_Guidan.pdf

Washington State Department of Health. Zika Virus Intake Form
https://www.doh.wa.gov/Portals/1/Documents/5410/ZikaVirusIntakeForm.pdf

Washington State Department of Health. Zika Virus Test Request
https://www.doh.wa.gov/Portals/1/Documents/5230/ZikaRequisitionForm.pdf

Educational Materials

These fact sheets and webpages reflects efforts to provide Zika virus test advice to the public.

CDC. For Women: A Positive Zika Virus Test. What Does it Mean for Me?
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/TestResults-WOMEN-fs.pdf

CDC. For pregnant women: What does a positive Zika test mean for me?
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/zika-positive-test.pdf

CDC. For Men: A Positive Zika Virus Test. What Does it Mean for Me?
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/TestResults-MEN-fs.pdf

CDC. Make Sure to Get Your Zika Test Results
https://www.cdc.gov/zika/pdfs/TestResultsCard.pdf

CDC. Testing for Zika virus
https://www.cdc.gov/zika/symptoms/diagnosis.html
General information about testing recommendations.

CDC. Symptoms.
https://www.cdc.gov/zika/symptoms/symptoms.html
Guidance on what you can do if you suspect you have been infected with Zika virus.

CDC. What You Should Know About Zika Virus Testing: For Pregnant Women Who Have Ongoing Exposure to Zika but No Symptoms
https://www.cdc.gov/zika/pdfs/Living_in.pdf

CDC. Zika Virus Testing for Pregnant Women Living in an Area with Zika Risk
https://www.cdc.gov/pregnancy/zika/pregnancy/documents/ZIKA-ClinicVisit-Checklist.pdf A checklist of questions in English. https://www.cdc.gov/pregnancy/zika/pregnancy/documents/ZIKA-ClinicVisit-Checklist-sp.pdf A checklist of questions in Spanish.

Massachusetts Department of Public Health. The Latest Information and Recommendations Related to Zika Virus
https://www.mass.gov/zika-virus

MATERNAL AND CHILD HEALTH

Maternal And Child Health

Given Zika virus's sexual transmissibility, birth control and sexual risk reduction are important elements of a prevention and control strategy. In addition, infants born to Zika-exposed women require special attention, involving multiple medical, laboratory, and social/family services, at birth and as an infected child grows.

ACOG. Practice Advisory Interim Guidance for Care of Obstetric Patients During a Zika Virus Outbreak (updated through 2017).
https://www.acog.org/Clinical-Guidance-and-Publications/Practice-Advisories/Practice-Advisory-Interim-Guidance-for-Care-of-Obstetric-Patients-During-a-Zika-Virus-Outbreak A compilation of guidance documents related to caring for pregnant women affected by Zika.

Alabama Department of Public Health. Healthcare Providers.
http://www.alabamapublichealth.gov/mosquito/healthcare-providers.html This web page provides information for healthcare providers with potentially Zika-exposed patients.

Preventing Zika Virus Infection in Pregnant Women: An Urgent Public Health Priority. American Journal of Public Health, 2016;106(4):589-590
http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2016.303124 Guidance will change as our understanding of the biology of the virus and the epidemiology of disease manifestations change. A global commitment will be needed.

California Department of Public Health (CDPH). Updated Zika Guidance for Healthcare Providers Caring for Pregnant Women
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/UpdatedZikaGuidanceforHCPsCaringforPregnantWomen.pdf
Released August 2, 2017. There are some differences between California's guidance and CDC's July 24, 2017, updated guidance. For example, CDPH has decided to maintain the previous recommendations to test all asymptomatic pregnant women with possible, recent Zika virus exposure, regardless of whether the exposure is ongoing.

California Department of Public Health. Evaluation and Follow-up for Suspected Congenital Zika Virus Infection – Fetus, Newborn and Infant
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/ZikaVirusInformationforHCPs.pdf Clinical guidance on evaluating patients with suspected Zika-related congenital abnormalities.

California Department of Public Health. Zika Virus Exposure Patient Self-Assessment Form
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/ZikaVirusExposureSelfAssesmentForm.pdf A checklist for patients to identify Zika virus exposure risks, possible symptoms of Zika virus infection, and risk factors for Zika virus transmission.

California Department of Public Health. Zika Screening Algorithm For Children and Adults
https://www.cdph.ca.gov/programs/cid/dcdc/cdph%20document%20library/ZikaAlgorithmPoster.pdf

CDC. Evaluation for Infants with Possible Congenital Zika Virus Infection.
https://www.cdc.gov/pregnancy/zika/testing-follow-up/documents/pediatric-evaluation-follow-up-tool.pdf
A graphic summary of CDC's October 2017 interim guidance.

MMWR. Update: Interim Guidance for Health Care Providers Caring for Pregnant Patients with Possible Zika Virus Exposure – United States (including US Territories), July 2017
https://www.cdc.gov/mmwr/volumes/66/wr/mm6629e1.htm?s_cid=mm6629e1_e

Maine Health Alert Network System. New Guidance for Testing Pregnant Women for Zika Virus – July 2017.
http://www.cste.org/resource/resmgr/Zika/Zika_HAN_update_July_2017_5.pdf A summary of key recommendations from CDC's guidance for testing pregnant women for Zika virus.

March of Dimes. Zika Care Connect
https://www.zikacareconnect.org/ Zika Care Connect (ZCC) provides healthcare professionals with a searchable network and the latest medical information from CDC about caring for patients affected by Zika. The ZCC website allows anyone to search for medical specialists in their local area.

HealthDay. Zika Hijacks Pregnant Woman's Immune System
https://consumer.healthday.com/diseases-and-conditions-information-37/zika-1007/zika-hijacks-pregnant-woman-s-immune-system-725712.html
This August 2017 article describes how Zika virus exploits pregnancy-related immune suppression to replicate and to infect the fetus unchallenged.

Awareness, Beliefs, and Actions Concerning Zika Virus Among Pregnant Women and Community Members — U.S. Virgin Islands, November–December 2016. MMWR, 2017;66(34):909-913.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6634a4.htm?s_cid=mm6634a4_e This article details results from a late 2016 survey of US Virgin Islands residents. Respondents were generally aware of the dangers of Zika virus but did not often take steps to prevent exposure. They did, however, support pesticide spraying.

Pregnancy Outcomes After Maternal Zika Virus Infection During Pregnancy — U.S. Territories, January 1, 2016–April 25, 2017. MMWR, 2017;66(23):615-621.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6623e1.htm In US territories, 5 percent of women with confirmed Zika virus infection during pregnancy had a fetus or baby with Zika virus-associated birth defects. Among the women with confirmed Zika infection during the first trimester, 8 percent, or nearly 1 in 12, had a fetus or baby with Zika virus-associated birth defects. This report, the first from the US territories, represents the largest number of completed pregnancies with laboratory confirmation of Zika virus infection to date.

Evaluation of Placental and Fetal Tissue Specimens for Zika Virus Infections – 50 States and the District of Columbia, June-December, 2016. MMWR, 2017;66(24):636-643.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6624a3.htm?s_cid=mm6624a_w

Update: Interim Guidance for the Diagnosis, Evaluation, and Management of Infants with Possible Congenital Zika Virus Infection — United States, October 2017. MMWR, 2017;66(41):1089-1099.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6641a1.htm?s_cid=mm6641a1_e This updated guidance addresses concerns about the unknown sensitivity and specificity of currently available diagnostic tests for congenital Zika virus infection and recognizes additional clinical findings associated with congenital Zika virus infection.

Population-Based Surveillance of Birth Defects Potentially Related to Zika Virus Infection — 15 States and U.S. Territories, 2016. MMWR, 2018;67(3):91-96.
https://www.cdc.gov/mmwr/volumes/67/wr/mm6703a2.htm?s_cid=mm6703a2_w
In 15 US jurisdictions, researchers found 2,962 infants and fetuses that met the case definition. Prevalence of birth defects strongly linked to Zika virus infection increased significantly in areas with local Zika virus transmission.

Pregnancy Outcomes After Maternal Zika Virus Infection During Pregnancy – US Territories, January 1, 2016 – April 25, 2017. MMWR, 2017;66(23):615-621.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6623e1.htm?s_cid=mm6623e1_w

Zika Virus-Associated Neonatal Birth Defects Surveillance — Texas, January 2016–July 2017. MMWR, 2017;66(31):835-836.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6631a5.htm?s_cid=mm6631a5_w Texas authorities enhanced surveillance for Zika infections among pregnant women following reports of local transmission in November 2016. Yet, Zika testing was not performed in 57% of the women giving birth during this study period.

NJ Department of Health. Maternal Child Health Provider Resource List
http://www.nj.gov/health/cd/documents/Provider%20Resource%20Table%207.25.16.pdf This is a list of resources and contact information for pregnant women and infants affected by Zika.

NJ Department of Health. Zika Delivery Packet
http://www.nj.gov/health/cd/documents/njdoh_zika_delivery_packet_8.9.17.pdf The delivery packet helps to streamline the process for evaluating and testing Zika-exposed mothers and their infants at time of delivery and prior to discharge.

NJ Department of Health. Zika FAQ For Healthcare Providers
http://www.nj.gov/health/cd/documents/Zika%20FAQ%20for%20New%20Jersey%20Healthcare%20Providers7.17.17.pdf Frequently asked questions about Zika for NJ healthcare providers.

Vital Signs: Update on Zika Virus–Associated Birth Defects and Evaluation of All US Infants with Congenital Zika Virus Exposure — US Zika Pregnancy Registry, 2016. MMWR, 2017;66(13):366-373.
https://www.medscape.org/viewarticle/884536
Alternative site: https://www.cdc.gov/mmwr/volumes/66/wr/mm6613e1.htm. CDC and Medscape have a free continuing education activity focused on Zika virus. Continuing medical education credits, American Board of Internal Medicine maintenance of certification credits, and continuing education credits are all available for obtaining a minimum 75% score on a multiple-choice test about this article. A free Medscape account is necessary to participate. New en

Zap Zika Video Series
https://www.youtube.com/watch?v=v1dPqn0iCBM
A series of short YouTube videos about mosquito control.

Investigating Cases of Congenital Zika Virus

Zika virus testing following a stillbirth or newborn death is extremely important. The immediate postpartum period is a sensitive time for the family, and follow-up can be challenging in a hospital with pathologists unused to this testing need. Communication with CDC's Infectious Disease Pathology Branch is advisable. Reach them at pathology@cdc.gov or 404-639-3043.

Zika Testing After a Stillbirth Or Newborn Death

Obtaining test specimens after a stillbirth or newborn death can be challenging, and communication with the CDC Infectious Disease Pathology Branch may be necessary to determine the appropriate specimen matrix and test assay. The branch can be contacted at pathology@cdc.gov or 404-639=3043. (If using e-mail, include brief clinical information and relevant digital images, if available.)

CDC. Collecting & Submitting Specimens at Time of Birth for Zika Virus Testing
https://www.cdc.gov/zika/hc-providers/test-specimens-at-time-of-birth.html Laboratory testing for congenital Zika virus infection is recommended for infants born to mothers with laboratory evidence of Zika virus infection during pregnancy and infants with clinical findings suggestive of congenital Zika virus syndrome and a maternal epidemiologic link suggesting possible transmission, regardless of maternal Zika virus test results.

Longitudinal Birth Defects Case Follow-up

The national Pregnancy Risk Assessment Monitoring System now tracks outcomes associated with neonatal Zika infections. CDC also supports state and local surveillance systems that focus on Zika-related impacts.

CDC. Pregnancy Risk Assessment Monitoring System (PRAMS)
https://www.cdc.gov/prams/index.htm PRAMS now has a special supplement for states to monitor Zika virus testing among pregnant women in the first and second trimesters of pregnancy, prenatal Zika counseling, and practices employed to prevent or reduce the risk of prenatal Zika virus infection.

Infection-related Microcephaly After the 2015 and 2016 Zika Virus Outbreaks In Brazil: A Surveillance-based Analysis. The Lancet, 2017;390:861-870.
http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31368-5.pdf Zika outbreaks in different locations and populations show wide variance in the incidence of microcephaly. See also the associated editorial, **Risk of Zika-related Microcephaly: Stable or Variable? (Same issue, pp. 824-826), at** http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31478-2.pdf
This commentary emphasizes the need for more long-term follow-up to better understand the occurrence of microcephaly.

Health and Development at Age 19–24 Months of 19 Children Who Were Born with Microcephaly and Laboratory Evidence of Congenital Zika Virus Infection During the 2015 Zika Virus Outbreak — Brazil, 2017. MMWR, 2017; 66(49):1347-1351.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6649a2.htm?s_cid=mm6649a2_e By two years of age, children with Zika infections have severe health and developmental challenges, including seizures, an inability to sit independently, and problems sleeping, feeding, hearing and seeing.

Case Management and Linkage

Case management and long-term follow-up of Zika-infected infants requires collaboration and coordination among medical and social service professionals.

CDC. Additional Resources for Healthcare Providers
https://www.cdc.gov/pregnancy/zika/testing-follow-up/additional-resources.html This webpage describes Zika Care Connect, a set of resources for clinicians caring for patients affected by Zika virus.

CDC. 2017 Forum on Diagnosis, Evaluation and Management
https://www.cdc.gov/pregnancy/zika/testing-follow-up/webcast-clinicalevalution.html Here you can access the July 2016 webcast, Clinical Evaluation & Management of Infants with Congenital Zika Infection, which includes three presentations:

- **Welcome: Clinical Evaluation and Management of Infants with Congenital Zika Infection** https://www.youtube.com/watch?v=6P6008JbfIE
- **Caring for Children with Complex Medical Needs** https://www.youtube.com/watch?v=R9rfmc4011o
- **Presentations of Group Discussions** https://www.youtube.com/watch?v=5qnTj5BRMtY

The Zika virus and pregnancy: evidence, management, and prevention. Journal of Maternal-Fetal and Neonatal Medicine, 2017;30(4):386-396.
http://www.tandfonline.com/doi/full/10.3109/14767058.2016.1174210 Zika virus infection can have profound impacts on the fetus and newborn. Obstetric healthcare providers must keep abreast of evolving management and prevention practices.

Update: Interim Guidance for the Diagnosis, Evaluation, and Management of Infants with Possible Congenital Zika Virus Infection — United States, October 2017. MMWR, 2017;66(40):1089-1122.
https://www.cdc.gov/mmwr/volumes/66/wr/pdfs/mm6641.pdf See page 1094 and following for a discussion of case management and care linkages. A key point to note is that management and follow-up require oversight from a responsible primary care physician.

Vital Signs: Update on Zika Virus–associated Birth Defects and Evaluation of All US Infants with Congenital Zika Virus Exposure — U.S. Zika Pregnancy Registry, 2016. MMWR, 2017;66 (13:366-373.
https://www.cdc.gov/mmwr/volumes/66/wr/mm6613e1.htm#contribAff This article describes recommendations for follow-up care for infants born to women with evidence of prenatal Zika virus infection.

Resources for Parents

Find information for parents about current recommendations for managing the health of (possibly) Zika-infected children, including recommended follow-up testing and clinical evaluations and possible social service needs.

CDC. Ideas for Talking to Your Children About Zika.
https://www.cdc.gov/zika/parents/talking-to-your-children.html Available in multiple languages.

CDC. Zika Activity Book: Mosquito Bites are Bad! (For Children in Areas with Zika)
https://www.cdc.gov/zika/pdfs/zika-activity-book.pdf
Available in Spanish at https://www.cdc.gov/zika/pdfs/spanish/zika-activity-book-sp.pdf.

CDC. Zika Activity Book: Mosquito Bites are Bad! (For Children in the United States)
https://www.cdc.gov/zika/pdfs/zika-activity-book-us.pdf Available in Spanish at https://www.cdc.gov/zika/pdfs/spanish/zika-activity-book-us-sp.pdf

CDC. Zika Pregnancy Registry: What Parents Need to Know
https://www.cdc.gov/pregnancy/zika/research/documents/pregreg-parents.pdf Information for parents about this surveillance resource.

CDC. The US Zika Pregnancy and Infant Registry.
https://www.cdc.gov/pregnancy/zika/research/registry.html This provides more information about the purposes and uses of the Zika Pregnancy registry.

Maine Center for Disease Control and Prevention. Zika Infographic for Pregnant Women.
http://www.cste.org/resource/resmgr/Zika/Zika_infographic_SE.pdf

Educational Materials

The following are educational materials for the public.

Bedsider. Birth Control Methods
https://www.bedsider.org/methods A review of birth control methods on a website recommended by the CDC.

California Department of Public Health. Protect Yourself and Your Unborn Baby From Zika. (Ad Banner)
https://www.cdph.ca.gov/Programs/CID/DCDC/PublishingImages/Zika/Sample-Ad---Half-Page-Banner-Long.png

CDC. Going to the American tropics?
https://www.cdc.gov/chikungunya/pdfs/Arbovirus_outbound-508_072115-11x14.pdf An infographic for travelers to the American tropics.

CDC. Mosquito Bite Prevention for Travelers
https://www.cdc.gov/chikungunya/pdfs/fs_mosquito_bite_prevention_travelers.pdf An infographic for travelers.

CDC. Pregnant? Protect Yourself from Mosquito Bites
https://stacks.cdc.gov/view/cdc/37913
A Zika prevention poster produced by the CDC.

CDC. Protecting Camp Staff and Campers
https://www.cdc.gov/zika/pdfs/camp-administrators.pdf A fact sheet.

CDC. Protecting Children in Areas with Zika.
https://stacks.cdc.gov/view/cdc/42957 A fact sheet.

CDC. Protecting Children in Puerto Rico from Zika
https://stacks.cdc.gov/view/cdc/40401

CDC. Recently in the American Tropics?
https://www.cdc.gov/chikungunya/pdfs/Arbovirus_inbound_11x14_508.pdf A Zika prevention poster.

CDC. Spring Break on Your Mind?
https://www.cdc.gov/zika/pdfs/SpringBreak-colleges.pdf A Zika prevention poster.

CDC. Travelers Can Protect Themselves from Zika
https://www.cdc.gov/zika/pdfs/ZPK_Poster.pdf
A Zika prevention poster.

CDC. What We Know. And What We Don't Know
https://www.cdc.gov/zika/pdfs/zika-what-we-know-infographic.pdf A Zika prevention poster. This website is archived for historical purposes and information is not being updated.

NJ Department of Health. Zika Advisory
http://www.nj.gov/health/cd/documents/topics/zika/zika_virus_infection_and_pregnancy.pdf Advisory for people traveling to areas where Zika virus is spreading.

VECTOR RESEARCH AND MANAGEMENT

Vector Research and Management

The primary vector of Zika virus is the *Aedes aegypti* mosquito, which lays eggs in association with temporary pools of water. Both natural (e.g., tree holes) and human-made (e.g., plant pot saucers) containers can serve as mosquito breeding sites, potentially bringing mosquitoes closer to areas of human habitation. Mosquito prevention and control involves a careful mix of environmental spraying on the population level, use of mosquito repellents on the personal level, and alteration of human behavioral and environmental actions.

Mosquito Trapping/Field Collection Methods

Per CDC, adult mosquito monitoring is used to determine the abundance of adult vector mosquitoes and to identify areas where control measures are needed. It is also useful to assess the effectiveness of intervention methods. Currently, testing mosquitoes for Zika virus is not recommended, as this virus does not have a known animal reservoir outside of humans in the United States, and there is no expected advantage to be obtained over good human surveillance programs.

ASTHO. Before the Swarm. 2014.
http://www.astho.org/Programs/Environmental-Health/Natural-Environment/Before-the-Swarm/
Guidelines for emergency management of vector-borne disease outbreaks.

Local Mosquito-borne Transmission of Zika Virus: Miami-Dade and Broward Counties, June-August 2016. MMWR, 2016;65(38):1032-1038
https://www.cdc.gov/mmwr/volumes/65/wr/mm6538e1.htm An account of the initial Florida case investigations.

CDC. Mosquitoes: Characteristics Of Anophelines And Culicines.
https://www.cdc.gov/nceh/ehs/Docs/Pictorial_Keys/Mosquitoes.pdf An illustrated guide for mosquito speciation.

CDC. Surveillance and Control of *Aedes aegypti* and *Aedes albopictus* in the United States
https://www.cdc.gov/chikungunya/pdfs/Surveillance-and-Control-of-Aedes-aegypti-and-Aedes-albopictus-US.pdf This 16-page guide is intended primarily for mosquito control officials.

Florida Medical Entomology Laboratory. Identification Guide to Common Mosquitoes of Florida.
http://fmel.ifas.ufl.edu/fmel---mosquito-key/
This guide includes quick genera keys, species identification tables, and information on basic mosquito anatomy.

Georgia's Collaborative Approach to Expanding Mosquito Surveillance in Response to Zika Virus: A Case Study
https://www.ncbi.nlm.nih.gov/pubmed/28511272
Mosquito This case study describes and evaluates Georgia's mosquito surveillance capacity before and after the declaration of Zika virus as a public health emergency. This brings you to the abstract of the journal article. You may need help from a hospital, medical/public health school, or health department librarian to obtain the complete article.

A Rapid Identification Guide for Larvae of the most Common North American Container-inhabiting Aedes Species of Medical Importance. Journal of the American Mosquito Control Association, 2013;29(3):203-221.
http://dx.doi.org/10.2987/11-6198R.1 or http://www.bioone.org/doi/full/10.2987/11-6198R.1

Illinois Department of Public Health. Mosquitoes Surveillance and Control.
http://www.dph.illinois.gov/topics-services/diseases-and-conditions/zika/mosqSurv This website provides a comprehensive overview of mosquito surveillance and control strategies.

Microsoft News. Building a Better Mosquito Trap: How a Microsoft Research Project Could Help Track Zika's Spread.
https://news.microsoft.com/features/building-a-better-mosquito-trap-how-a-microsoft-research-project-could-help-track-zikas-spread/
Some health departments are working with Microsoft on Project Premonition, which employs a new, relatively low-cost mosquito trap that can analyze mosquito and environmental data at the time of capture. The project is also testing the use of drones to identify mosquito habitats.

Mosquito Ecology. Field Sampling Methods.
http://www.springer.com/gp/book/9781402066658
This 2008 textbook is a standard reference for mosquito sampling and vector surveillance.

National Pesticide Information Center (NPIC)
http://npic.orst.edu/pest/mosquito/diseases.html
The NPIC is a good general clearinghouse of information on mosquito-borne diseases and mosquito pesticides. It also provides links to local and state resources.

Resistance Testing

To assure effective mosquito control spraying, authorities must know if local mosquitoes are susceptible to chemicals available for use. Yet, not all jurisdictions have the resources for insecticide-resistance testing and must therefore rely on data from other sources.

CDC. Insecticide Resistance
https://www.cdc.gov/zika/vector/insecticide-resistance.html This webpage includes a 22-minute video explaining how to conduct the CDC-developed test "Bottle Bioassay," a simple, low-cost test that provides information to inform the use of mosquito pesticides. (CDC is providing insecticide-resistance test kits to first-time users.)

WHO Pesticide Evaluation Scheme
http://www.who.int/whopes/resistance/en/ This webpage details WHO guidelines for insecticide-resistance testing. However, it is important to note that much of the WHO testing is international, and the organization's recommended chemicals, doses, and guidelines differ from those applicable in the continental United States.

Environmental Control after Local Transmission

What steps should be taken when a human case of Zika virus infection is likely due to local transmission via mosquito bite? After getting a detailed local travel history, an examination of areas of likely exposure should reveal possible and actual mosquito breeding sites. Treatment and remediation procedures will then be necessary.

Armed Forces Pest Management Board (AFPMB). Armed Forces Pest Management Board Technical Guide No. 47. *Aedes* Mosquito Vector Control
http://www.acq.osd.mil/eie/afpmb/docs/zika/TG47.pdf This guide serves as a quick reference for the identification, surveillance, and control of the mosquito species that transmit Zika, dengue, and chikungunya viruses.

AFPMB. Department of Defense Guidance for the Surveillance, Control and Testing of *Ae. aegypti, Ae. albopictus* or *Ae. polynesiensis* for Zika Virus.
http://www.acq.osd.mil/eie/afpmb/docs/zika/Strategy_Control_Zika_Virus.pdf This memorandum establishes a Department of Defense strategy for vector surveillance, testing, and control on military installations and housing areas where the named mosquitos are present.

Alabama Department of Public Health. Vector Control.
http://www.alabamapublichealth.gov/mosquito/vector-control.html This webpage provides information about vector biology, control options, and strategies for limiting mosquitoes breeding opportunities.

The American Mosquito Control Association (AMCA). Best Practices for Integrated Mosquito Management: A Focused Update. January 2017.
http://c.ymcdn.com/sites/www.mosquito.org/resource/resmgr/docs/Resource_Center/Training_Certification/12.21_amca_guidelines_final_.pdf
Best practices from a definitive source.

American Public Works Association (APWA). A Message from Philip Mann, PE. Emergency Management Technical Committee Chairperson, 2016-2017
http://www.apwa.net/library/groups-and-committees/technical-committees/emergency-management/emergmgmtcmtechair'smessage.pdf A letter urging public works agencies to work with first responders, health departments and other entities to plan for emergency response, including response to possible Zika virus outbreaks.

ASTHO. Communicating about Effective Mosquito Control: Tailor Made for Our Community
http://www.astho.org/Programs/Environmental-Health/Natural-Environment/AsthoMosquitoCommGuide011509/ This 2008 guide outlines strategies for educating different audiences about mosquito prevention and control. It includes fact sheets templates.

CDC. Mosquitoes of Public Health Importance and Their Control
https://stacks.cdc.gov/view/cdc/7613 While published in 1963, this continues to provide a good overview of control options.

Healthmap.
http://www.healthmap.org/zika/#timeline
A graphic timeline of the 2016 Zika outbreak.

NACCHO. Mosquito Control Capabilities in the US, October 2017.
https://www.naccho.org/uploads/downloadable-resources/Mosquito-control-in-the-U.S.-Report.pdf
This document reports the results of an electronic NACCHO survey to assess mosquito surveillance and control capacity among the 2,000 or so US vector control programs. Fully 84% of respondents reported needing to strengthen at least one core competency.

National Pesticide Applicator Certification Core Manual.
http://www.ag.utah.gov/documents/CoreManual.pdf
A technical manual for individuals working toward certification as a pesticide applicator.

National Institute of Allergy and Infectious Diseases. VectorBase
https://www.vectorbase.org A source of mosquito information (under "Organisms") and images (under "Downloads").

Sound the Mosquito Alarm, Across the USA
https://consumer.healthday.com/general-health-information-16/bites-and-stings-news-65/sound-the-mosquito-alarm-across-the-usa-726701.html
A report of a CDC survey showing that 75% of counties in the lower 48 US states could host one or both of *Aedes albopictus* and *Aedes aegypti* mosquito species.

Zika in the US: What Environmental Health and Pest Management Professionals Need to Know
https://www.neha.org/sites/default/files/eh-topics/vectors-pests/Zika-NEHA-March-2016.pdf
A power point presentation from National Environmental Health Association member, Sarah Michaels, who is on the New Orleans Mosquito & Termite Control Board.

Tip and Toss

One of the leading strategies for reducing or eliminating container breeding mosquitos is to "tip and toss" peri-domestic containers to drain small pools of water.

"Tip and Toss" – A Homeowner's Guide to Preventing Mosquito-borne Disease
http://www.wcu.edu/WebFiles/PDFs/Mosquito_Tip_and_Toss.pdf A fact sheet from Western Carolina University.

Tip n' Toss Campaign to Prevent Spread of Zika in Georgia.
https://dph.georgia.gov/press-releases/2016-04-06/tip-n-toss-campaign-prevent-spread-zika-georgia
A March 30, 2016, press release from the Georgia Department of Public Health.

"Tip and Toss:" How to prevent the spread of mosquitoes
http://www.wcnc.com/news/health/tip-and-toss-how-to-prevent-the-spread-of-mosquitoes/432002588
This news segment from the NBC affiliate in Charlotte, NC, reports on Mecklenburg County efforts to educate the public about eliminating mosquito breeding sites.

NJ Department of Health. Don't Grow Mosquitoes
https://www.youtube.com watch?v=eMJm2psraWo&feature=youtu.be This YouTube video discusses ways to decrease mosquito breeding habitats in and around the home.

Larviciding, Adulticiding

Chemical pesticides can be used to reduce or eliminate larval and adult populations of vector mosquito species.

Biomedical Advanced Research and Development Authority. BARDA Backs Food-grade Compound As Repellent Against Zika-Carrying Mosquitoes
https://globalbiodefense.com/2017/05/30/barda-backs-food-grade-compound-as-repellent-against-mosquitoes/ A May 30, 2017 notice of a BARDA award to support development of a "novel toxicant and repellent for arthropod-borne virus vectors."

CDC. Information on Aerial Spraying.
https://www.cdc.gov/zika/vector/aerial-spraying.html
Information about aerial spraying for mosquito control. Also available in Spanish at https://espanol.cdc.gov/enes/zika/vector/aerial-spraying.html

CDC. Did You Know: Important Information about Aerial Spraying for Mosquito Control
https://stacks.cdc.gov/view/cdc/40510 A poster available in Portuguese can be downloaded at https://stacks.cdc.gov/view/cdc/40508 A poster in Spanish can be downloaded at https://stacks.cdc.gov/view/cdc/40509

CDC. Get Rid of Mosquitoes at Home
https://stacks.cdc.gov/view/cdc/42594/Share
Simple ideas for mosquito control around the home

CDC. Information on Aerial Spraying
https://www.cdc.gov/zika/vector/aerial-spraying.html
The webpage answers common questions about aerial mosquito spraying and mosquito control, including questions about the impact of spraying on organic farming, human health, animals and the environment.

CDC. Prevent Mosquito Bites
https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html This webpage describes things everyone can do to reduce mosquito populations. Available in multiple languages.

CDC. Larvicides Kill Young Mosquitoes
https://www.cdc.gov/zika/pdfs/larvicide-wallet-card-english.pdf or at https://stacks.cdc.gov/view/cdc/40660 A larvicide dunk use wallet card. Available in multiple languages:

- Bengali https://stacks.cdc.gov/view/cdc/40649
- Chinese https://stacks.cdc.gov/view/cdc/40650
- Japanese https://stacks.cdc.gov/view/cdc/40651
- Korean https://stacks.cdc.gov/view/cdc/40652
- Marshallese https://stacks.cdc.gov/view/cdc/40653
- Russian https://stacks.cdc.gov/view/cdc/40654
- Samoan https://stacks.cdc.gov/view/cdc/40655
- Spanish https://stacks.cdc.gov/view/cdc/40656
- Tagalog https://stacks.cdc.gov/view/cdc/40657
- Tongan https://stacks.cdc.gov/view/cdc/40658
- Palauan https://stacks.cdc.gov/view/cdc/40659

CDC. Mosquito Control During an Outbreak.
at https://stacks.cdc.gov/view/cdc/47517/
A poster in Portuguese can be downloaded at https://stacks.cdc.gov/view/cdc/47515 A poster available in Spanish can be downloaded at https://stacks.cdc.gov/view/cdc/47516

CDC. Mosquito Control: Keep Mosquitoes Out of Your Septic Tank
https://www.cdc.gov/zika/pdfs/SepticTankFactSheetEnglishNCEZID.pdf
or at https://stacks.cdc.gov/view/cdc/38476
A poster available in Portuguese can be downloaded at https://stacks.cdc.gov/view/cdc/42648
A poster in Spanish can be downloaded at https://stacks.cdc.gov/view/cdc/42649

CDC. Mosquito Control: Protect Your Family Outside Your Home
https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html This is a webpage with information on a variety of measures one can employ to protect against mosquito bites.

CDC. Mosquito Control: What State and Local Mosquito Control Programs Do
https://www.cdc.gov/zika/pdfs/Mosquito_Control.pdf
A poster available in English.

CDC. Mosquito Control: What You Need to Know about Aerial Spraying
https://www.cdc.gov/zika/pdfs/AerialSpraying-FactSheet.pdf or at https://stacks.cdc.gov/view/cdc/40784 A poster in Portuguese can be downloaded at https://stacks.cdc.gov/view/cdc/40782 A poster in Spanish can be downloaded at https://stacks.cdc.gov/view/cdc/40783

CDC. Mosquito Control: What You Need to Know about Filling Tree Holes
https://www.cdc.gov/zika/pdfs/TreeHoles-FactSheet.pdf A factsheet with do's and don'ts about filling tree holes to prevent them from becoming mosquito breeding sites.

CDC. Mosquito Control: What You Need to Know about Indoor Spraying
https://www.cdc.gov/zika/pdfs/IndoorSpraying-FactSheet.pdf or at https://stacks.cdc.gov/view/cdc/40755
A poster in Portuguese can be downloaded at https://stacks.cdc.gov/view/cdc/40753 A poster in Spanish can be downloaded at https://stacks.cdc.gov/view/cdc/40754

CDC. Mosquito Control: What You Need to Know about Outdoor Spraying
https://www.cdc.gov/zika/pdfs/OutdoorSpraying-FactSheet.pdf or at https://stacks.cdc.gov/view/cdc/40725/Print A poster in Portuguese is available at https://stacks.cdc.gov/view/cdc/40723 A poster in Spanish is available at https://stacks.cdc.gov/view/cdc/40724

CDC. Mosquito Control: What You Need to Know about Truck Spraying
https://www.cdc.gov/zika/pdfs/TruckMounted-FactSheet.pdf or at https://stacks.cdc.gov/view/cdc/41815 A poster in Portuguese is available at https://stacks.cdc.gov/view/cdc/41813 A poster in Spanish is available at https://stacks.cdc.gov/view/cdc/41814

CDC. Mosquito Control: What You Need to Know about Using Adulticides
https://www.cdc.gov/zika/pdfs/Adulticide-FactSheet.pdf A poster available in English.

CDC. Mosquito Control: What You Need to Know about Using Larvicides
https://www.cdc.gov/zika/pdfs/Larvicides-FactSheet.pdf or at https://stacks.cdc.gov/view/cdc/40648/Share A poster in Portuguese is available at https://stacks.cdc.gov/view/cdc/40646 A poster in Spanish is available at https://stacks.cdc.gov/view/cdc/40647

CDC. Mosquito Control & Bite Prevention Educational Flip Book
https://www.cdc.gov/zika/pdfs/flipBook.pdf or at https://stacks.cdc.gov/view/cdc/41688/Share This is available in English.

CDC. Mosquito Control: What You Need to Know about BTI
https://www.cdc.gov/zika/pdfs/BTI_Fact_Sheet.pdf or at https://stacks.cdc.gov/view/cdc/42886 A poster about the use of Bacillus thuringiensis for mosquito control. Available only in English.

CDC. Zika prevention takes a community. Do your part.
https://www.cdc.gov/zika/pdfs/ProtectCommunity-OnePager.pdf or at https://stacks.cdc.gov/view/cdc/42338 Mosquito control strategies that communities can consider.

EPA. Pesticide General Permit (PGP) Factsheet: Mosquito Control Activities, February 2012
https://www.epa.gov/sites/production/files/2015-09/documents/pgp_factsheet_mosquitocontrol.pdf
An EPA fact sheet about mosquito control activities that require National Pollutant Discharge Elimination System permits.

EPA. Repellents: Protection Against Mosquitoes, Ticks and Other Arthropods
https://www.epa.gov/insect-repellents
This is the EPA's homepage regarding insect repellents, with links to many related topics:

- **Disease Risk from Mosquito and Tick bites:** https://www.epa.gov/insect-repellents/risk-disease-mosquito-and-tick-bites
- **What is an insect repellant?** https://www.epa.gov/insect-repellents/what-insect-repellent
- **Find the Repellent that is Right for You:** https://www.epa.gov/insect-repellents/find-repellent-right-you
- **Regulation of Skin-Applied Repellents:** https://www.epa.gov/insect-repellents/regulation-skin-applied-repellents
- **Repellency Awareness Graphic:** https://www.epa.gov/insect-repellents/repellency-awareness-graphic
- **Skin-Applied Repellent Ingredients:** https://www.epa.gov/insect-repellents/skin-applied-repellent-ingredients
- **Using Insect Repellents Safely and Effectively:** https://www.epa.gov/insect-repellents/using-insect-repellents-safely-and-effectively

WHO. Mosquito control: Can It Stop Zika At Its Source?
http://www.who.int/emergencies/zika-virus/articles/mosquito-control/en/ Mosquito control is complex, costly, and blunted by the spread of insecticide resistance. Moreover, some control measures are not readily accepted by the public. Integrated approaches that tackle all mosquito life stages and fully engage professional partners and the public are key to success.

Environmental Health Professionals Conduct Mosquito Surveillance

The following articles describe environmental health professionals' mosquito surveillance activities.

California Department of Public Health. California Mosquito-borne Virus Surveillance and Response Plan (March 2017)
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/2017CAMBVirusSurveillanceResponsePlan.pdf

California Department of Public Health. Guidance for Surveillance of and Response to Invasive *Aedes* Mosquitoes and Dengue, Chikungunya, and Zika in California
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/InvasiveAedesSurveillanceandResponseinCA.pdf

Canadian Broadcast Corporation News (Aug. 22, 2017) Mosquito Responsible for Majority of Zika Infections Found in Canada for First Time
http://www.cbc.ca/news/canada/windsor/mosquito-responsible-for-majority-of-zika-infections-found-in-canada-for-first-time-1.4257135 This CBC news articles reports that ten mosquito species new to Canada have been found there in the past few years, suggesting species' range expansion.

CDC. Mobile Vector Surveillance? There's an App for That
https://www.cdc.gov/globalhealth/stories/mobile-vector-surveillance.html CDC is using its Epi InfoTM platform to create a mobile app for vector surveillance.

CDC. State Coordination Task Force Sustained Zika Response in 2017 Vector Issues National Webinar.
https://www.cdc.gov/Zika/pdfs/SCTF-Vector-Issues-Sustainment-Transcript-3-28-17.pdf This webinar transcript discusses vector-related aspects of the Zika outbreak, focusing on mosquito control in public health policy, prevention and control activities.

Citizen Science. Invasive Mosquito Project
http://www.citizenscience.us/imp/ Description of a USDA-sponsored project that engages the public to map the distribution of invasive mosquito vector species.

The Crowd and the Cloud: Citizen Science Homepage.
http://crowdandcloud.org The Crowd and the Cloud is a National Science Foundation-funded movement that engages the public in scientific endeavors. To see its relevance to Zika virus, click on the link, then click on "Watch the Episodes." Click on Episode 3 (Viral vs. Virus).

Reported Distribution of *Aedes (Stegomyia) aegypti* and *Aedes (Stegomyia) albopictus* in the United States, 1995-2016 (Diptera: Culicidae). Journal of Medical Entomology, 2016;53(5):1169-1175.
https://academic.oup.com/jme/article/53/5/1169/1751696 Based on mosquito trapping records, this article asserts that finding *Aedes aegypti* and/or *Aedes albopictus* species in a location once does not mean it is an established species. A mosquito species is more likely to be established if it is found multiple times in multiple successive years.

NPR. Here's Really Where Zika Mosquitoes are Likely in the US.
http://www.npr.org/sections/health-shots/2016/06/13/481606093/heres-really-where-zika-mosquitoes-are-likely-in-the-u-s This is a newscast text based on the Journal of Medical Entomology article cited above.

USDA Wants Citizen Scientists to Help Fight Zika
http://www.denverpost.com/2016/05/16/usda-wants-citizen-scientists-to-help-fight-zika/ A Denver Post article describing how the USDA is exploring the use of crowdsourcing as a budget-conscious way of mapping US mosquito populations.

Zika Virus Replication in the Mosquito *Culex quinquefasciatus* in Brazil. Emerging Microbes & Infections, 2017;6:e69.
https://www.nature.com/emi/journal/v6/n8/pdf/emi201759a.pdf This article describes laboratory and field evidence that *Culex quinquefasciatus* mosquitoes can carry and possibly transmit the Zika virus.

Citizen Science. Resources for Training
http://www.citizenscience.us/imp/resources.php
This provides additional information about the use of "citizen scientists" to extend mosquito surveillance capacity. Included are a PowerPoint presentation, tests and other materials to educate students about mosquito-borne diseases and to train them to collect and identify mosquitoes.

Forms

The following form can be adapted for use in local mosquito surveys.

Citizen Science. Invasive Mosquito Project Data Collection Form
http://www.citizenscience.us/imp/collectionform.php
The form used by students conducting mosquito surveys in their communities.

Educational Materials

Professional organizations have developed different forms of educational materials relating to mosquito prevention and control for the public and for professionals.

Alabama Department of Public Health. Zika Virus. A Guide for Public Health Environmentalists, Municipalities, and County Commissions
http://www.alabamapublichealth.gov/mosquito/assets/ZIKAGuideEnvironmentalistsMunicipalitiesCounties.pdf Environmental health, mosquito identification and mosquito life history information for multiple audiences.

Alabama Department of Public Health. Avoid the Bite: Reducing Mosquito Exposure
http://www.alabamapublichealth.gov/mosquito/avoid-the-bite.html This webpage provides information about reducing the risks of mosquito bites.

Alabama Department of Public Health. Mosquito-borne Diseases
http://www.alabamapublichealth.gov/mosquito/ A website with information about mosquito-borne diseases, mosquito trapping, and case counts of mosquito-borne diseases among Alabama residents.

Alabama Department of Public Health. Skeeter Beaters Coloring Book (for Elementary School Students)
http://www.alabamapublichealth.gov/mosquito/assets/zikacoloringbookenglish.pdf A coloring book with each picture containing educational messages.

Alabama Department of Public Health and Alabama Environmental Health Association Zika Virus Video Contest for Alabama Teens.
http://www.alabamapublichealth.gov/mosquito/zika-video-contest.html Announcement and winning entries of a Zika prevention and control video contest.

Alabama Department of Public Health. Zika Virus
http://www.alabamapublichealth.gov/mosquito/zika.html A webpage with a broad range of Zika-related information, including surveillance data, public education materials and more.

The American Mosquito Control Association. Surveillance and Control Program Awarded by the CDC
http://www.mosquito.org/page/training
Announcement of AMCA funding from CDC to create training and certificate programs for mosquito surveillance and control. Several training modules are available via this webpage.

APHA. Protect Yourself from Mosquito-borne Diseases
http://getreadyforflu.org/mosquitoes.htm

APHA. Zika Virus: How to Keep Your Family Safe.
http://getreadyforflu.org/zikafactstext.htm

Association of Public Health Laboratories. APHL Responds to Zika
https://www.aphl.org/programs/preparedness/Crisis-Management/Pages/Zika.aspx An overview of APHL activities to support Zika response.

ASTHO. Zika virus: Information for States and Territories
http://www.astho.org/Zika/

CDC. Mosquitoes and Hurricanes
https://www.cdc.gov/zika/vector/mosquitoes-and-hurricanes.html Advice for the general public available in English and Spanish.

CDC. Bed Net Use Wallet Card
https://www.cdc.gov/zika/pdfs/bed-net-use-wallet-cards-english.pdf Available in multiple languages. Use the same link but instead of typing "English" you can use Bengali, Chinese, Japanese, Marshallese, Russian, Samoan, Spanish, Tagalog, or Tongan. Alternatively, you can use https://stacks.cdc.gov/view/cdc/40645 (English). To see other languages, insert these numbers into the url: 40635 (Bengali), 40636 (Chinese), 40637 (Japanese), 40638 (Marshallese), 40639 (Russian), 40640 (Samoan), 40641 (Spanish), 40642 (Tagalog), 40643 (Tongan), or 40644 (Portuguese). Advice for professionals and the general public on everything from preventing mosquito bites to insecticide resistance.

CDC. How to Protect Against Mosquito Bites
https://www.cdc.gov/zika/pdfs/MosqPrevInUS.pdf
A graphic flyer available in English.

CDC. Insect Repellent Wallet Card, Look for One of These Active Ingredients
https://www.cdc.gov/zika/pdfs/Zika-Repellant-Cards-Public.pdf Available in English.

CDC. Mosquito Bite Prevention (United States)
https://www.cdc.gov/chikungunya/pdfs/fs_mosquito_bite_prevention_us.pdf or, https://stacks.cdc.gov/view/cdc/39250 A graphic flyer, available in English. Advice for the general public.

CDC. Mosquito Prevention Door Hanger
https://www.cdc.gov/zika/pdfs/DoorHanger-ForStates.pdf or https://stacks.cdc.gov/view/cdc/40087 Available in English.

CDC. Use an EPA-registered Insect Repellent
https://www.cdc.gov/zika/pdfs/Zika-Repellent-Cards-accordion.pdf A wallet card, available in English at https://stacks.cdc.gov/view/cdc/45761; available in Portuguese at https://stacks.cdc.gov/view/cdc/45759; and available in Spanish at https://stacks.cdc.gov/view/cdc/45760

CDC. Stop Mosquito Bites. Don't Stop Outdoor Activities
https://www.cdc.gov/zika/pdfs/FS-Outdoors.pdf or at https://stacks.cdc.gov/view/cdc/39871 A graphic flyer available in English.

CDC. Zika: Protecting Children from Mosquito Bites at Camp
https://www.cdc.gov/zika/pdfs/protecting-children-camp.pdf A graphic flyer also available at https://stacks.cdc.gov/view/cdc/40585 in English; at https://stacks.cdc.gov/view/cdc/40583 in Portuguese: and at https://stacks.cdc.gov/view/cdc/40584 in Spanish.

CDC. Protect Yourself from Mosquito Bites
https://www.cdc.gov/zika/pdfs/Zika_protect_yourself_from_mosquito_bites.pdf or at https://stacks.cdc.gov/view/cdc/39498 A graphic flyer.

CDC. Protect Yourself From Mosquito Bites Outside
https://www.cdc.gov/zika/pdfs/LowLit_FS Long SleevesPants.pdf or at https://stacks.cdc.gov/view/cdc/42494 A graphic flyer.

CDC. Protect Yourself and Your Family From Mosquito Bites
https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html A webpage with information (available in English and Spanish) for the general public. The Spanish version is available at https://espanol.cdc.gov/enes/zika/prevention/prevent-mosquito-bites.html

CDC. Treat Clothing with Permethrin to Prevent Mosquito Bites
https://www.cdc.gov/zika/pdfs/Permethrin.pdf or at https://stacks.cdc.gov/view/cdc/41805 A graphic flyer, available in multiple languages.

- Bengali https://stacks.cdc.gov/view/cdc/41798
- Chinese https://stacks.cdc.gov/view/cdc/41796
- Japanese https://stacks.cdc.gov/view/cdc/41793
- Korean https://stacks.cdc.gov/view/cdc/41802
- Marshallese https://stacks.cdc.gov/view/cdc/41794
- Palauan https://stacks.cdc.gov/view/cdc/41801
- Portuguese https://stacks.cdc.gov/view cdc/41803
- Russian https://stacks.cdc.gov/view/cdc/41797
- Samoan https://stacks.cdc.gov/view/cdc/41795
- Spanish https://stacks.cdc.gov/view/cdc/41804
- Tagalog https://stacks.cdc.gov/view/cdc/41799
- Tongan https://stacks.cdc.gov/view/cdc/41800

CDC. Vector Control For Environmental Health Professionals (VCEPH)
https://www.cdc.gov/nceh/ehs/elearn/vcehp.html
Find information about CDC's free VCEHP training courses, which qualify for continuing education units from the National Environmental Health Association. The Journal of Environmental Health article, "Innovative Vector and Pest E-Learning for Environmental Health Professionals [2016;79(5):30-32], provides background information about the courses: https://www.cdc.gov/nceh/ehs/docs/jeh/2016/dec-vcehp-training.pdf. And a two-page fact sheet about the program can be found at: https://www.cdc.gov/nceh/ehs/docs/factsheets/vcehp-factsheet.pdf

NEHA. Vector Control Tools and Resources for Environmental Health Professionals. Journal of Environmental Health, 2016;78(10):44-46.
https://www.cdc.gov/nceh/ehs/docs/jeh/2016/june-vcehp.pdf This journal column, written by a fellow in CDC's Environmental Health Services Branch, highlights a set of online vector control courses and other resources: Vector Control for Environmental Health Professionals; Vector Control Program Performance Assessment and Improvement Reports; Vector Control Population Health Driver Diagram; and Enhancing Environmental Health Knowledge: Vectors and Public Health Pests. Connect to the resources at: www.cdc.gov/nceh/ehs/topics/vectorcontrol.htm.

ESA. Fact Sheet on Zika and the Aedes aegypti Mosquito
www.entsoc.org/press-releases/fact-sheet-zika-and-aedes-aegypti-mosquito This fact sheet notes that there is no evidence that genetically-modified mosquitoes in Brazil (released to stop the spread of dengue) had a role in facilitating Brazil's Zika virus outbreak. It also discusses the safety of the larvicide, pyriproxifen.

Indiana State Department of Health. Fight the Bite
http://www.cste.org/resource/resmgr/Zika/Zika_Brochure_Fight_the_Bite.pdf This brochure provides general information about reducing the risk of mosquito bites at home and while traveling, and about Zika and pregnancy.

NACCHO. Mosquito Surveillance and Control Assessment in Zika Virus Priority Jurisdictions
www.naccho.org/uploads/downloadable-resources/VectorAssessment2016NACCHO.pdf This slide deck presents the results of a 2016 NACCHO/CDC survey of surveillance and control competencies of ten jurisdictions at high risk of Zika virus transmission.

NACCHO. Zika in the United States
https://www.naccho.org/uploads/downloadable-resources/Zika-In-the-U.S.-Infographic-DigitalVersion-FINAL-1.pdf This infographic, dated July 2017, examines the critical role of local Zika virus response capacity.

NJ Department of Health. #ZapZika Poster
http://www.nj.gov/health/cd/documents/Zap%20Zika%20Poster%2011x17--Eng.pdf Basic Zika virus prevention information for travelers. Available in English, Spanish at http://www.nj.gov/health/cd/zika/documents/zika_poster_spanish.pdf, Portuguese at http://www.nj.gov/health/cd/zika/documents/zika_poster_poruguese.pdf and Creole at http://www.nj.gov/health/cd/zika/documents/zika_poster_creole.pdf.

NJ Department of Health. ZapZika: Safeguarding Campers from Mosquitoes Webinar
https://register.gotowebinar.com/register/7077344526217441283 An hour-long webinar for youth camp staff.

ESA. Predicting Shifts in the Range of Invasive Insect Species in the Face of Climate Change. Entomology Today, 28 July 2017.
https://entomologytoday.org/2017/07/28/predicting-shifts-in-the-range-of-invasive-insect-species-in-the-face-of-climate-change/ This news article discusses a study on the range expansion of an invasive species of leafminer and notes that temperature tolerance and inter-species competition are key limiting factors.

Public Health Officials Prep for Zika as Funding Cuts Loom. Emergency Management, 1 June 2017.
http://www.govtech.com/em/health/Public-Health-Officials-Prep-for-Zika.html

NACCHO. Summer Is Here and So Are the Mosquitoes: Why Local Vector Control Is Key to Combating Zika
http://nacchopreparedness.org/summer-is-here-and-so-are-the-mosquitoes-why-local-vector-control-is-key-to-combating-zika/ This article stresses the need for core vector control competencies at the local level.

ESA. What Can an Entomologist Do for You?
https://www.entsoc.org/sites/default/files/images/SciPol/What%20Can%20an%20Entomologist%20Do%20For%20You.jpg An infographic for the general public.

ESA. What is Gene Drive?
www.entsoc.org/sites/default/files/files/Science-Policy/ESA-FactSheet-Gene-Drive.pdf This infographic explains a method to enhance the inheritance of a preferred trait (e.g., reduced ability to carry a pathogen) in a specific species (e.g., *Aedes aegypti* mosquitoes).

POLICY AND POSITION STATEMENTS

Policy and Position Statements

Health jurisdictions can use these policy statements to support efforts to develop or explain their own policy initiatives.

American Mosquito Control Association (AMCA). Build Comprehensive Vector Programs
http://c.ymcdn.com/sites/www.mosquito.org/resource/resmgr/docs/Legislation/Position_Papers/2017_Position_Papers/federal_funding_issue_paper-.pdf

AMCA. Federal Funding for Mosquito Control: Advance Innovation and Discovery
http://c.ymcdn.com/sites/www.mosquito.org/resource/resmgr/docs/Legislation/Position_Papers/2017_Position_Papers/federal_funding_issue_paper_.pdf

AMCA. New Homeland Security Threat: Defending the United States from Mosquito-transmitted Diseases
http://c.ymcdn.com/sites/www.mosquito.org/resource/resmgr/docs/Legislation/Position_Papers/2015-2016_Position_Papers/federal_funding_issue_paper_.pdf

APHA. Addressing the Urgent Threat of Global Climate Change to Public Health and the Environment. Policy Number 20078, November 6, 2007.
https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/08/14/08/addressing-the-urgent-threat-of-global-climate-change-to-public-health-and-the-environment

APHA. Discarded Tires as Sources of Arbovirus Vectors. Policy Number 9416, January 1, 1994.
https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/30/14/13/discarded-tires-as-sources-of-arbovirus-vectors

APHA. Maximizing Public Health Protection with Integrated Vector Control. Policy Number 200013, January 1, 2000.
https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/14/12/01/maximizing-public-health-protection-with-integrated-vector-control

APHA. Prevent, Response, and Training for Emerging and Re-emerging Infectious Diseases, Including Bioterrorism. Policy Number 200016, January 1, 2000.
https://apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/08/10/43/prevent-response-and-trng-for-emerging-and-reemerging-infectious-disease-including-bioterrorism

CSTE. Zika Virus Disease and Congenital Zika Virus Infection Interim Case Definition and Addition to the Nationally Notifiable Diseases.
https://www.cste2.org/docs/Zika_Virus_Disease_and_Congenital_Zika_Virus_Infection_Interim.pdf

CSTE. Zika Virus Disease and Zika Virus Infection Without Disease, Including Congenital Infections Case Definitions and Addition to the Nationally Notifiable Diseases List
http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16_ID_01_edited7.29.pdf

NACCHO. Arbovirus Surveillance, Prevention, and Control. Policy 14-07.
https://www.naccho.org/uploads/downloadable-resources/14-07-Arbovirus-Surveillance-Prevention-and-Control.pdf

NACCHO. Collaboration in Infectious Disease Prevention and Control. Policy 07-01.
https://www.naccho.org/uploads/downloadable-resources/07-01-Collaboration-in-Infectious-Disease-Prevention-and-Control.pdf

NACCHO. Local Epidemiology and Surveillance. Policy 04-11.
https://www.naccho.org/uploads/downloadable-resources/04-11-Local-Epidemiology-and-Surveillance.pdf

NACCHO. Mosquito Control. Policy 07-10.
https://www.naccho.org/uploads/downloadable-resources/07-10-Mosquito-Control.pdf

NACCHO. Vector-borne Disease. Policy 14-05
https://www.naccho.org/uploads/downloadable-resources/14-05-Vector-Borne-Disease.pdf

PAHO. PAHO Statement on Zika Virus Transmission and Prevention (February 2, 2016)
http://www.paho.org/hq/index.php?option=com_content&view=article&id=11605&Itemid=0&lang=en

ESA. Position Statement on Insecticide Resistance Management (Approved June 29, 2016)
https://www.entsoc.org/sites/default/files/files/EntSocAmerica_PolicyStatement_InsecticideResistanceMgt.pdf Examines barriers to effectively monitor and evaluate resistance among pest species.

ESA. Effective Mosquito Management with an IPM Approach (September 6, 2016)
http://www.entsoc.org/sites/default/files/files/EntSocAmerica_Mosquito-Management-Recommendations.pdf

APPENDIX: ACRONYMS

Appendix: Acronyms

ACOG: American College of Obstetrics and Gynecology
AFPMB: Armed Forces Pest Management Board
AMCA: American Mosquito Control Association
APHA: American Public Health Association
APHC: Army Public Health Center
APHL: Association of Public Health Laboratories
APWA: American Public Works Association
ASPR-TRACIE: Assistant Secretary for Preparedness and Response – Technical Resources, Assistance Center, and Information Exchange
ASTHO: Association of State and Territorial Health Officials
BTI: *Bacillus thuringiensis* pesticide
CIDRAP: Center for Infectious Disease Research and Policy
CSTE: Council of State and Territorial Epidemiologists
CONUS: Continental United States
EID: Emerging infectious disease
EPA: Environmental Protection Agency
ESA: Entomological Society of America
FAQs: Frequently asked questions
FDA: US Food and Drug Administration
ICE: Immigration and Customs Enforcement
IFRC: International Federation of Red Cross and Red Crescent Societies
ISUOG: International Society of Ultrasound in Obstetrics and Gynecology
MMWR: Morbidity and Mortality Weekly Report
NACCHO: National Association of County and City Health Officials
NAS: National Academies of Science
NEHA: National Environmental Health Association
NIH: National Institutes of Health
NIOSH: National Institute of Occupational Safety and Health
NPHIC: National Public Health Information Coalition
NPR: National Public Radio
PAHO: Pan American Health Organization
UNICEF: United Nation's International Children's Fund
USDA: United States Department of Agriculture
WHO: World Health Organization