A. Background information on the Zika virus

1. Where did Zika virus come from?
Zika was first found in a monkey in Uganda’s Zika forest in 1947. The first human outbreak was in Nigeria in the 1960s and sporadic cases were reported over the next 50 years. It is likely that cases were more frequent but were attributed to dengue or chikungunya. In 2007 the first large outbreak in humans occurred on the island of Yap in Micronesia and was followed by outbreaks in other Pacific Islands. The WHO website has a detailed map of Zika virus history. The 2014 FIFA World Cup in Brazil may have brought Zika to the Americas with an outbreak in Bahia, Brazil in April 2015. (The strain that appeared in Brazil is closely related to the circulating Asian strain.) Subsequently, there has been spread of Zika virus in Brazil northward through South and Central America and into Mexico and the Caribbean. It is likely that anywhere in the Americas, or elsewhere, where there is dengue and chikungunya we will see Zika virus in the next year as the virus is carried by the same Aedes spp mosquitoes.
2. Where are Zika virus infections occurring now? Where are the CDC Travel Alerts?
Between 1 January 2007 and 26 May 2016, 69 countries and territories have reported autochthonous (local) transmission or indication of transmission of Zika virus. Four countries and territories (Cook Islands, French Polynesia, Easter Island – Chile and Yap) reported a Zika virus outbreak that is now over. In addition eight countries and territories (Argentina, Canada, Chile, France, Italy, New Zealand, Portugal and the United States) have reported locally acquired infection, probably through sexual transmission.

The 48 destinations with a Centers for Disease Control and Prevention (CDC) Travel Alert are: Argentina, American Samoa, Aruba, Barbados, Belize, Bolivia, Bonaire, Brazil, Cape Verde, Colombia, Costa Rica, Cuba, Curacao, Dominica, the Dominican Republic, Ecuador, El Salvador, Fiji, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Kosrae, Marshall Islands, Martinique, Mexico, New Caledonia, Nicaragua, Panama, Papua New Guinea, Paraguay, Peru, Puerto Rico, Samoa, St Barthelemy, St Lucia, St Martin, St Vincent and the Grenadines, Suriname, Tonga, Trinidad/Tobago, US Virgin Islands and Venezuela.

It is expected that the list of countries with local Zika transmission will continue to grow. The World Health Organization (WHO) has stated that the virus is likely to reach the United States and all the other countries of the Americas except Canada and Chile – every place that has the Aedes mosquitoes that carry the virus. PAHO (Pan American Health Organization, the WHO regional office for the Americas) has an excellent interactive site that shows the current Zika situation in each country and allows you to see the marked regional differences in the Zika epidemic as well as periodic PAHO Zika updates.

The CDC reports that the process to add countries to the list of locations under the Zika Travel Alert is quite complicated. CDC consults with staff from the Pan American Health Organization (PAHO), WHO and experts from the Ministry of Health in countries reporting new cases prior to adding a country to the Zika travel alert.

A country may be added to the alert when there is laboratory confirmation of a Zika case in a patient with no travel history to an area with known Zika transmission and no evidence of sexual transmission; this is also known as autochthonous (locally acquired) transmission. The timeliness of adding countries to the list is somewhat dependent upon harmonizing CDC’s travel alert with information published by PAHO/WHO. Countries that had transmission in the past, such as Yap, but do not have evidence of ongoing transmission in the last two years are not included.
Countries and Territories with Active Zika Virus Transmission *(Updated 26 May 2016)*


<table>
<thead>
<tr>
<th>Caribbean</th>
<th>South America</th>
<th>North &amp; Central America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aruba</td>
<td>Argentina</td>
<td>Belize</td>
</tr>
<tr>
<td>Barbados</td>
<td>Bolivia</td>
<td>Costa Rica</td>
</tr>
<tr>
<td>Bonaire</td>
<td>Brazil</td>
<td>El Salvador</td>
</tr>
<tr>
<td>Cuba</td>
<td>Colombia</td>
<td>Guatemala</td>
</tr>
<tr>
<td>Curacao</td>
<td>Ecuador</td>
<td>Honduras</td>
</tr>
<tr>
<td>Dominica</td>
<td>French Guiana</td>
<td>Mexico</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Guyana</td>
<td>Nicaragua</td>
</tr>
<tr>
<td>Grenada</td>
<td>Paraguay</td>
<td>Panama</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>Peru</td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td>Suriname</td>
<td>Oceania/Pacific Islands</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Venezuela</td>
<td>American Samoa</td>
</tr>
<tr>
<td>Martinique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puerto Rico</td>
<td></td>
<td>Africa</td>
</tr>
<tr>
<td>St. Barthelemy</td>
<td>Cape Verde</td>
<td>Marshall Islands</td>
</tr>
<tr>
<td>St. Lucia</td>
<td></td>
<td>New Caledonia</td>
</tr>
<tr>
<td>St. Martin/Sint Maarten</td>
<td></td>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>St. Vincent and Grenadines</td>
<td></td>
<td>Samoa</td>
</tr>
</tbody>
</table>
3. I live in a country that has reported Zika cases but it is not currently included in the CDC Travel Alert. Why isn’t my country on the list and should I still be worried?

In years past, Zika has been reported from many countries in Africa and Asia including Thailand, French Polynesia and Gabon. Countries that are included on CDC’s Zika travel alert must have had recent laboratory confirmation of autochthonous (locally acquired) transmission of Zika virus within the country at a level that the CDC feels is high enough to present a risk to women traveling to that country. Some countries such as Thailand and the Philippines have evidence of limited local transmission currently but that transmission has been halted or is at such low levels that CDC has not deemed it high enough risk to issue a travel alert. Countries in Africa appear to have sporadic outbreaks of Zika that is less likely to cause neuroinvasive disease and significant levels of previous infections that make large outbreaks unlikely.

DoS MED is NOT recommending Medevac for pregnant women from countries with these low levels of Zika transmission. Although protection against mosquito bites is still recommended it is safe for pregnant women to remain in these countries.

If you are pregnant and have traveled to (or are currently posted in) Zika areas that are NOT in the CDC Alert you should still inform your prenatal medical provider that you have been in an area where Zika virus infections have occurred. (See section of Zika in pregnancy).

- If a pregnant woman develops an illness with fever and a rash and report symptoms during, or within two weeks of travel, there may be consideration of doing Zika testing (depending on how active Zika has been in the area) in addition to scheduled ultrasound.
- Pregnant women who have had no symptoms consistent with the infection should be offered routine scheduled ultrasound ensuring assessment for microcephaly.

4. How is Zika virus transmitted and how is it different than dengue and chikungunya?

Zika virus is actually closely related to dengue, it is another of a family of viruses called the flaviviruses that includes dengue, yellow fever, West Nile virus, Japanese encephalitis and others. It is carried by the same mosquitoes, *Aedes egypti* and *Aedes albopictus*, that can carry Yellow Fever, dengue and chikungunya. As you can see from the maps below, these two mosquitoes are found throughout the tropical world but also extend into much of the US. It is very possible for Zika to become established in the US as the weather warms in spring. More recent studies have demonstrated that some other mosquitoes species including the malaria mosquito *Anopheles* and the common backyard pest *Culex* species, can be infected in the laboratory. There is no evidence to date that these mosquitoes are significant vectors for Zika infection.
The illness is very similar to that caused by dengue and chikungunya but generally milder. A brief review of chikungunya, dengue and Zika viruses can be seen in Arboviral Disease Threats as well as prevention measures can be found on the MED Website at Med Alert: Zika.

Zika virus can be sexually transmitted from infected men but this appears to be uncommon (see questions below)

There is a strong possibility that Zika virus can be spread through blood transfusions. To date, there have been no confirmed blood transfusion-transmission cases in the United States. There have been suspected cases of Zika transmission through blood transfusion in Brazil. These reports are currently being investigated. During the Zika virus outbreak in French Polynesia in 2013-2014, 2.8% of blood donors tested positive for Zika. In previous outbreaks elsewhere, the virus has also been found in blood donors.

Currently, Zika virus poses a low risk to the blood supply in the continental United States, but this could change depending on how many people become infected with the virus. Since blood donors may not know they have been infected, special testing is being done on blood donors in Puerto Rico due to the number of cases on the island, similar testing is planned for the US mainland if Zika transmission becomes established in the US. Organ donations also require Zika testing in the endemic areas.
Figure 3. Approximate Ranges of A. aegypti and A. albopictus in the United States (as of March 2016).
These mosquitoes may not be present in all areas, and vector density may vary considerably within these ranges.

PROTECT YOUR FAMILY AND COMMUNITY:
HOW ZIKA SPREADS

Most people get Zika from a mosquito bite

A mosquito bites a person infected with Zika virus

The mosquito becomes infected

A mosquito will often live in a single house during its lifetime

More members in the community become infected

More mosquitoes get infected and spread the virus

The infected mosquito bites a family member or neighbor and infects them

Other, less common ways, people get Zika:

During pregnancy
A pregnant woman can pass Zika virus to her fetus during pregnancy. Zika can cause microcephaly, a severe birth defect that is a sign of incomplete brain development

Through sex
Zika virus can be sexually transmitted by a man to his partners

Through blood transfusion
There is a strong possibility that Zika virus can be spread through blood transfusions
B. Zika Virus Infection: Symptoms, diagnosis and treatment

5. What are the symptoms of Zika infection?

The exact incubation period for a Zika virus infection is still being determined but appears to be a few days to a week after the bite of an infected mosquito.

Zika infection has often been called “dengue light” as the symptoms are so similar to dengue (and chikungunya) but typically much less severe. The main symptoms of Zika infection are low-grade fever (< 38.5°C or 101.3°F), transient arthritis/arthralgia (joint aches and pain) with possible joint swelling (mainly in the smaller joints of the hands and feet) and maculopapular (red bumps) rash that often starts on the face and then spreads throughout the body, conjunctival suffusion (red eyes) or bilateral non-purulent conjunctivitis (eye inflammation without pus) with general non-specific symptoms such as myalgia (muscle aches), asthenia (weak and tired) and headaches.

Clinical symptoms of Zika disease appear after an incubation period ranging between 3 and 12 days. The disease symptoms are usually mild and short lasting (2–7 days), and infection may go unrecognized or be misdiagnosed as dengue. Association with a post infection neurological complication called Guillain-Barré syndrome has been recently described in a small number of patients. There are no hemorrhagic (bleeding) manifestations and people are rarely ill enough to require hospitalization, there are not long term infections and there have been very rare deaths associated with Zika infection.

World Health Organization (WHO) interim case definition for Zika Virus Disease (12 Feb 2016)

Suspected case
- A person presenting with rash and/or fever and at least one of the following signs or symptoms:
  - Arthralgia (Joint pain) or
  - Arthritis (joint swelling); or
  - Conjunctivitis (non-purulent/hyperemic in lay terms a red eye without pus/discharge).

Probable case
- A suspected case with presence of IgM antibody against Zika virus[$a$] and an epidemiological link[$b$]

Confirmed case
- A person with laboratory confirmation of recent Zika virus infection:
  - presence of Zika virus RNA or antigen in serum or other samples (e.g. saliva, tissues, urine, whole blood, semen); OR
  - IgM antibody against Zika virus positive and PRNT90 (confirmatory test) for Zika virus with titer ≥20 and Zika virus PRNT90 titer ratio ≥ 4 compared to other flaviviruses; and exclusion of other flaviviruses

Notes
[a] With no evidence of infection with other flaviviruses
[b] Contact with a confirmed case, or a history of residing in or travelling to an area with local transmission of Zika virus within two weeks prior to onset of symptoms.
Like dengue, serosurveys (blood testing for antibodies) demonstrate that only about 20% of those infected even develop symptoms i.e. ~80% of infections are asymptomatic seroconversions (blood tests show Zika antibodies indicating an infection occurred even though there were no symptoms).

Rarely, some people who have had Zika infection develop Guillain-Barre Syndrome afterwards, this is an autoimmune condition that can cause an ascending paralysis (and follows a number of other common infections as well). This is not directly due to Zika infection but is an abnormal activation of the immune response to the infection called a post infectious sequela. It is typically a reversible condition; a minority of patients develops permanent neurologic problems.

Symptoms of Zika
Most people with Zika won’t even know they have it. The illness is usually mild with symptoms lasting for several days to a week.
The most common symptoms of Zika are
- Fever
- Rash
- Joint Pain
- Red eyes
6. **How is Zika infection diagnosed?**

Clinical symptoms of Zika are very similar to other related viruses and so blood testing is usually performed to confirm the diagnosis. Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) is a test for Zika RNA that is the best way to make the diagnosis but only reference labs can usually perform this assay. The CDC has recently developed a Trioplex PCR that will be able to test for chikungunya, dengue and Zika viruses. This test is being rapidly deployed to national laboratories in the affected areas. On 29 April 2016 Quest diagnostics a commercial laboratory received clearance to offer Zika PCR testing under Emergency Use Authorization. DoS MED will continue to use CDC for Zika testing but some physicians’ offices may choose to use this private sector option. On 10 May 2016 CDC modified its recommendations after test results for urine and serum specimens from 66 individuals with Zika virus disease with both specimens collected on the same date indicated approximately twice as many urine specimens (61) tested positive as serum specimens (31).

<table>
<thead>
<tr>
<th>Days after onset</th>
<th>Serum IgM No. positive/No. tested (%)</th>
<th>Serum RT-PCR No. positive/No. tested (%)</th>
<th>Urine RT-PCR No. positive/No. tested (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0/1 (0)</td>
<td>0/1 (0)</td>
<td>1/1 (100)</td>
</tr>
<tr>
<td>1</td>
<td>2/7 (29)</td>
<td>6/7 (85)</td>
<td>7/7 (100)</td>
</tr>
<tr>
<td>2</td>
<td>3/12 (25)</td>
<td>8/12 (67)</td>
<td>11/12 (92)</td>
</tr>
<tr>
<td>3</td>
<td>5/10 (50)</td>
<td>4/10 (40)</td>
<td>10/10 (100)</td>
</tr>
<tr>
<td>4</td>
<td>3/12 (25)</td>
<td>8/12 (67)</td>
<td>12/12 (100)</td>
</tr>
<tr>
<td>5</td>
<td>9/13 (69)</td>
<td>5/13 (39)</td>
<td>11/13 (85)</td>
</tr>
<tr>
<td>6</td>
<td>2/2 (100)</td>
<td>0/2 (0)</td>
<td>2/2 (100)</td>
</tr>
<tr>
<td>7</td>
<td>4/4 (100)</td>
<td>0/4 (0)</td>
<td>3/4 (75)</td>
</tr>
<tr>
<td>9</td>
<td>2/3 (67)</td>
<td>0/3 (0)</td>
<td>3/3 (100)</td>
</tr>
<tr>
<td>14</td>
<td>1/1 (100)</td>
<td>0/1 (0)</td>
<td>0/1 (0)</td>
</tr>
<tr>
<td>20</td>
<td>1/1 (100)</td>
<td>1/1 (100)</td>
<td>1/1 (100)</td>
</tr>
<tr>
<td>Range of days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>22/55 (40)</td>
<td>31/55 (56)*</td>
<td>52/55 (95)*</td>
</tr>
<tr>
<td>6–10</td>
<td>8/9 (89)</td>
<td>0/9 (0)*</td>
<td>8/9 (89)*</td>
</tr>
<tr>
<td>11–15</td>
<td>1/1 (100)</td>
<td>0/1 (0)</td>
<td>0/1 (0)</td>
</tr>
<tr>
<td>16–20</td>
<td>1/1 (100)</td>
<td>0/1 (0)</td>
<td>1/1 (100)</td>
</tr>
</tbody>
</table>

**Table 1. Results of Zika virus IgM antibody testing of serum specimens and RT-PCR testing of serum and urine specimens for Zika virus RNA, by days after symptom onset for 66 persons with travel-associated Zika virus disease — Florida, 2016.**

IgM antibody tests (such as ELISAs) are very difficult to interpret because of previous infections with dengue or immunizations with Yellow Fever or Japanese Encephalitis vaccines are common in patients in the affected areas and they will cross react with Zika antibodies. A technically difficult test called the Plaque Reduction Neutralization Test (PRNT) can be performed at the CDC and is much more specific than the ELISA assays that most countries have. It is unlikely that many smaller countries will have the technical ability to perform this assay.

From 3 Jan to 5 March 2016, Zika virus testing was performed by the CDC in the US for 4,534 people who traveled to or moved from areas with active Zika virus transmission:
- 3,335 (73.6%) were pregnant women
- Among 1,541 tested who reported symptoms, 182 (11.8%) had confirmed Zika.
- Only 7 asymptomatic pregnant women (0.3%) had confirmed Zika infection

These data (MMWR 22 April 2016) suggest that in the current U.S. setting, the likelihood of Zika virus infection among asymptomatic people is low.

At this time staff that are assigned in a Zika endemic area and have an illness that may be Zika should come to the Health Unit for guidance. Acute illness is best evaluated by local Ministry of Health labs so that a determination of Zika vs dengue vs chikungunya can be made in a timely fashion. If local laboratories are unavailable and testing is needed at CDC then blood and/or urine samples should be sent with the required Zika lab request (DoS ISO 3428.6).
There is currently no rapid test for Zika like we have for malaria, dengue and chikungunya. Improvements in diagnostic tests are a focus of the current WHO and CDC Zika virus efforts.

7. **How is Zika infection treated?**

Like dengue and chikungunya, there are no antiviral therapies available to treat Zika infections. Since the illness is more mild most people can be treated with bedrest and acetaminophen or with ibuprofen or naproxen if dengue has been ruled out. There are no current therapies for a woman who is pregnant to prevent infection of her fetus.

Pharmaceutical companies have reports of drugs that have looked promising in animal models of Zika infections but none has approached the point of human trials at this time.

8. **Is there a vaccine for treatment of prevention of the Zika virus?**

Currently there is no vaccine for Zika available but there are excellent vaccines for related flaviviruses like Yellow Fever, Japanese Encephalitis and dengue. So there is a considerable experience in working with this family of viruses and vaccine development is being ramped up quickly. Multiple different agencies are working on Zika vaccines and Dr Anthony Fauci from the National Institute of Allergy and Infectious Diseases announced that a trial of a candidate vaccine will be starting in SEP 2016. An optimistic estimate is that an efficacious vaccine will be identified for production in early 2017.

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**TABLE. Zika virus testing outcomes among persons with specimens tested at CDC’s Arboviral Diseases Branch, by Zika virus infection status, reported symptoms, and pregnancy status** — United States, January 3–March 5, 2016

<table>
<thead>
<tr>
<th>Testing outcome</th>
<th>≥1 Zika virus-associated symptom§</th>
<th>≥1 other symptom only§</th>
<th>No symptoms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (%)</td>
<td>No. (%)</td>
<td>No. (%)</td>
<td>No. (%)</td>
</tr>
<tr>
<td>All persons tested</td>
<td>1,541 (100)</td>
<td>436 (100)</td>
<td>2,557 (100)</td>
<td>4,534 (100)</td>
</tr>
<tr>
<td>Confirmed Zika virus infection</td>
<td>182 (11.8)</td>
<td>8 (1.8)</td>
<td>7 (0.3)</td>
<td>197 (4.3)</td>
</tr>
<tr>
<td>Recent unspecified flavivirus infection</td>
<td>41 (2.7)</td>
<td>3 (0.7)</td>
<td>11 (0.4)</td>
<td>55 (1.2)</td>
</tr>
<tr>
<td>No Zika virus infection</td>
<td>1,318 (85.5)</td>
<td>425 (97.5)</td>
<td>2,539 (99.3)</td>
<td>4,282 (94.4)</td>
</tr>
<tr>
<td>Total</td>
<td>1,541 (100)</td>
<td>436 (100)</td>
<td>2,557 (100)</td>
<td>4,534 (100)</td>
</tr>
<tr>
<td>Pregnant women§</td>
<td>18 (2.9)</td>
<td>3 (1.0)</td>
<td>7 (0.3)</td>
<td>28 (0.6)</td>
</tr>
<tr>
<td>Confirmed Zika virus infection</td>
<td>9 (1.5)</td>
<td>0 (0)</td>
<td>10 (0.4)</td>
<td>19 (0.6)</td>
</tr>
<tr>
<td>Recent unspecified flavivirus infection</td>
<td>9 (1.5)</td>
<td>0 (0)</td>
<td>10 (0.4)</td>
<td>19 (0.6)</td>
</tr>
<tr>
<td>No Zika virus infection</td>
<td>593 (95.7)</td>
<td>287 (99.0)</td>
<td>2,408 (99.3)</td>
<td>3,288 (98.6)</td>
</tr>
<tr>
<td>Total</td>
<td>620 (100)</td>
<td>290 (100)</td>
<td>2,425 (100)</td>
<td>3,335 (100)</td>
</tr>
<tr>
<td>Other persons (excluding pregnant women)</td>
<td>164 (17.8)</td>
<td>5 (3.4)</td>
<td>0 (0)</td>
<td>169 (14.1)</td>
</tr>
<tr>
<td>Confirmed Zika virus infection</td>
<td>32 (3.5)</td>
<td>3 (2.1)</td>
<td>1 (0.8)</td>
<td>36 (3.0)</td>
</tr>
<tr>
<td>Recent unspecified flavivirus infection</td>
<td>32 (3.5)</td>
<td>3 (2.1)</td>
<td>1 (0.8)</td>
<td>36 (3.0)</td>
</tr>
<tr>
<td>No Zika virus infection</td>
<td>725 (78.7)</td>
<td>138 (94.5)</td>
<td>131 (99.2)</td>
<td>994 (82.9)</td>
</tr>
<tr>
<td>Total</td>
<td>921 (100)</td>
<td>146 (100)</td>
<td>132 (100)</td>
<td>1,199 (100)</td>
</tr>
</tbody>
</table>

* Determined at the time of illness onset (or date of specimen collection, among asymptomatic persons).
* As of April 11, 2016.
§ Fever, rash, arthralgia, or conjunctivitis.
¶ Headache, myalgia, vomiting, diarrhea, edema, oral ulcers, chills, influenza-like illness, or malaise.
C. Possible Complications of Zika Virus Infection: Fetal Deformities

Possible Complications of Zika Virus Infection: Fetal Deformities

CDC Fact Sheet: Zika virus testing for pregnant women living in an area with Zika.

CDC Fact Sheet: A Positive Zika Virus Test. What does it mean for me?

CDC Doctor’s Visit Checklist: For Pregnant Women Who Traveled to an Area with Zika

CDC Doctor’s Visit Checklist: For Pregnant Women Living in an Area with Zika

9. How does the Zika virus affect pregnant women and fetuses?

Scientists at the CDC have concluded, after careful review of existing evidence, that Zika virus is a cause of microcephaly and other severe fetal brain defects. In the report published in the New England Journal of Medicine, the CDC authors describe a rigorous weighing of evidence using established scientific criteria to come to this conclusion. The report notes that no single piece of evidence provides conclusive proof that Zika virus infection is a cause of microcephaly and other fetal brain defects. Rather, increasing evidence from a number of recent studies and a careful evaluation using established scientific criteria supports the authors’ conclusions. It appears that as Zika virus moved from Africa into the Pacific Islands that it may have mutated to a strain that is more “neurotropic” (infection favors neurologic tissues) which may explain the lack of neurologic disease in Zika cases that have occurred in Africa.

Pregnant women have the same risk as the rest of the population of being infected with Zika virus and usually do not appear to have a more severe illness than others. Like the rest of the population only ~20% of pregnant women infected with Zika develop symptoms, and in those with symptoms the illness is usually mild.

As the wave of Zika has passed through northeast Brazil in 2015 it has been followed by reports of a marked increase in cases of microcephaly. From 22 Oct 2015 to 14 May 2016, 7534 suspected cases of microcephaly and other congenital malformations of the central nervous system have been reported from Brazil. Of these, 1384 have been confirmed as microcephaly, and in 207 cases laboratory tests have confirmed a link with the Zika virus. 51/246 miscarriages or stillbirths had microcephaly. This may represent as much as 20 times the number of microcephaly cases seen historically. It appears that there may have been underreporting previously with just 147 cases in 2014, a case rate of 0.5 per 10,000 births (which is 1/10 the rate reported in other countries). Brazil also redefined its cutoff from 33 cm to the WHO 31.5 cm which markedly reduces the number of suspect cases.

Microcephaly and other fetal malformations potentially associated with Zika virus infection or suggestive of congenital infection have been reported from local transmission in Cabo Verde (2 cases), Colombia (7 cases), French Polynesia (8 cases), Martinique (3 cases), Panama (4 cases) and Puerto Rico (1 case). Two additional cases, each linked to a Latin American visit, were detected in the US and one in Slovenia.
Table 3. Countries, territories and areas reporting microcephaly and/or CNS malformation cases potentially associated with Zika virus infection

<table>
<thead>
<tr>
<th>Reporting country or territory</th>
<th>Number of microcephaly and/or CNS malformation cases suggestive of congenital infections or potentially associated with a Zika virus infection</th>
<th>Probable location of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>1434(^5)</td>
<td>Brazil</td>
</tr>
<tr>
<td>Cabo Verde</td>
<td>3</td>
<td>Cabo Verde</td>
</tr>
<tr>
<td>Colombia</td>
<td>7</td>
<td>Colombia</td>
</tr>
<tr>
<td>French Polynesia</td>
<td>8</td>
<td>French Polynesia</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>1</td>
<td>Marshall Islands</td>
</tr>
<tr>
<td>Martinique</td>
<td>3(^6)</td>
<td>Martinique</td>
</tr>
<tr>
<td>Panama</td>
<td>4</td>
<td>Panama</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>1</td>
<td>Puerto Rico</td>
</tr>
<tr>
<td>Slovenia(^7)</td>
<td>1</td>
<td>Brazil</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
<td>Colombia</td>
</tr>
<tr>
<td>United States of America(^8,9)</td>
<td>2</td>
<td>Brazil; Mexico, Belize or Guatemala (undetermined)</td>
</tr>
</tbody>
</table>

Reported cases of chikungunya, dengue, Zika virus, and microcephaly in Pernambuco state, Brazil by EW, 2015 to 2016, From Pernambuco State Sec’y of Health
Even with under and over reporting of cases, there appears to be an increase in cases in microcephaly in the region but it has been suggested reporting “suspected” cases actually confuses the true incidence of microcephaly. Intensive research efforts are being focused on what effects Zika can have on fetuses. Brazilian, Colombian and US investigators have studied tissue from fetuses. Pathological changes consistent with viral damage were seen in these brains. The current opinion is that Zika virus is causing these brain deformities in fetuses.

According to analysis by Brazilian public health, the greatest risk of microcephaly and malformations appears to be associated with infection during the 1st trimester of pregnancy but problems may occur with infection in the 2nd and 3rd trimesters as well. Health authorities in Brazil, Pan American Health Organization (PAHO) and United States CDC are conducting research to clarify the cause, risk factors, and consequences of microcephaly. There have been some reports that appear to have documented an increase in microcephaly cases in Brazil PRIOR to the arrival of Zika in the Americas.

The Colombian Ministry of Health is following a cohort of >600 pregnant women diagnosed with Zika virus with the PAHO and CDC to further understand the relationship between maternal Zika infection and fetal deformities. In addition, CDC reports that research studies are being established in other locations to explore the role Zika virus plays in development of congenital birth defects. As the outbreak of Zika is more recent in Colombia there has been a great effort to follow pregnant women prospectively to determine if Zika infections are causing fetal abnormalities there. There are now documented cases of microcephaly occurring in Colombia and other countries besides Brazil. Over the next few months we are likely to have significantly more data from Colombia and other countries.

Investigators at John Hopkins University recently completed a study using human stem cells and neural development. In the study the authors exposed the cells to Zika virus and then analyzed their genetic expression. Three days after exposure, 90% of cortical neural progenitor cells (early fetal brain cells)—found to be the most vulnerable ones—were infected and were producing new copies of the virus. Many of the cells died and others showed genetic changes that impaired further growth.

At this time other fetal deformities that have been associated with Zika are cerebral calcifications (calcium deposits in the baby’s brain) and a number of visual disturbances and eye problems, including blindness. The range of potential effects from Zika infection during pregnancy is an evolving subject that is currently being investigated in the entire world with Zika infections. The likelihood of miscarriage also appears to be higher in Zika infections but this risk is also being assessed currently.

The majority of women infected with Zika during pregnancy give birth to healthy babies. In a retrospective study done in French Polynesia and reported in the journal Lancet it was estimated that 95/10,000 women infected with Zika during the first trimester had babies with microcephaly i.e. slightly less than 1%. Early studies in Brazil have shown ~25% of babies were affected in some Brazilian states but interpretation of these has been difficult, the more carefully planned studies in Colombia should be critical in determining the true incidence of congenital abnormalities.

10. What does MED recommend for pregnant women living in areas with circulating Zika virus?

MED takes recommendations from the CDC and interprets them for the unique situation of our DoS beneficiaries abroad. If you are pregnant and in one of the Zika affected countries in the CDC Travel Alert you should talk to the medical provider at post about the Zika risk in the specific area in which you are living. Many of the countries with Zika in the Travel Alert have it confined to only a small area while other countries are having a widespread outbreak.

If you are in a Zika threat region you should come to the Health Unit and discuss Zika and possible effects on your baby. MED maintains a registry of pregnant women in the Zika affected areas and you will be asked to sign a statement saying that you have been informed about the Zika risk. This form will be made as part of your permanent health record in MED. Pregnant women will be offered medical evacuation or curtailment. See Foreign Programs Zika in Pregnancy FAQs. The CDC has made recommendations for pregnant women in the flyer below. Remember, although bednets are very important for malaria prevention they have proven to be less important for Aedes mosquitoes in air conditioned or screened homes. Similarly, use of larvicides is most important if there are areas with undrained standing water with mosquito larva. These are uncommon in embassy housing and it is far more important to focus on elimination of smaller mosquito breeding sites in and around homes.

If Zika moves into your area later in your pregnancy you will be offered an opportunity to leave then. Women who had traveled to regions in which Zika virus is active and who report symptoms during or within two weeks of travel should be offered a test for Zika virus infection. (Testing can be obtained in the host nation or samples may be sent to the CDC reference lab.)

Pregnant women who had no clinical symptoms suggestive of Zika infection should be offered routine scheduled ultrasound to check the fetus' head size or check for calcium.

- For those leaving a Zika affected area: Testing should be offered between 2-12 weeks after the pregnant woman returns from travel to areas with ongoing Zika transmission.
- For those who remain in a Zika affected area: CDC recommends IgM serology at the onset of prenatal care and again in the second trimester.
In homes with air conditioning and/or screens bednets are generally not as important as they are in malaria prevention. Day sleepers may benefit from bednet use.

Water treatment tabs are not recommended by DoS MED for embassy housing but may be used by facilities staff for stagnant water areas.
11. I am pregnant and live in, or will be traveling to, another country that has Zika that is not on the CDC Travel Alert, why is this so? Should I be worried?

In the last nine years Zika has been circulating in a number of other countries in Asia, the Pacific Islands and Africa. Some countries have had large outbreaks, some reported sporadic cases and others have had no cases but have people with antibodies consistent with a prior infection. While Zika is still a concern in all these areas, the CDC currently does not assess the level of risk as high enough to warrant a Travel Alert to areas to most of these areas in Africa, Asia with the exception of a few of the Pacific Islands. CDC has no special precautions advising pregnant women not to travel to these regions that do not have a Travel Alert. Some countries, like Canada and the US, have had only imported cases but have not had evidence of local transmission i.e. the patients with Zika brought from abroad but have not infected mosquitoes in these other countries so they are not on the threat list even if they have had hundreds of cases.

Travelers and residents should continue to take measures to prevent mosquito biting. If other countries are added to the CDC Travel Alert on Zika virus additional MED guidance will follow.

If you are pregnant and have traveled to (or are currently posted in) Zika areas that are not in the CDC Alert you should still inform your prenatal medical provider that you have been in an area where Zika virus infections have occurred.

- If a pregnant woman develops an illness with fever and a rash and report symptoms during, or within two weeks of travel, there may be consideration of doing Zika testing (depending on how active Zika has been in the area) in addition to scheduled ultrasound.
- Pregnant women who have had no symptoms consistent with the infection should be offered routine scheduled ultrasound ensuring assessment for microcephaly.
- Even if a pregnant woman has no symptoms of Zika virus infection after leaving one of the affected areas she should have Zika antibody testing performed within 12 weeks of returning to determine if she may have been infected. Even if antibody tests determine there has been a recent Zika infection while pregnant the vast majority of babies are born healthy.

12. Am I required to leave an area if I am pregnant and living in one of the countries on the CDC Travel Alert? What about areas at altitude?

Within a nation’s borders, ecologic factors, such as temperature, precipitation, vegetation, and human population density define suitable habitats for Aedes mosquitoes to live and breed. Where habitat is unsuitable, the mosquito is likely to be absent, and risk for mosquito-borne Zika virus transmission is likely to be negligible. Countries like Mexico, Brazil and Peru are all on the CDC Travel Advisory but are large and have many areas, even at low altitudes, with no reported cases of Zika. Aedes mosquitoes and Zika cases may be absent or at most sporadic in areas making it very reasonable to stay at post while practicing careful attention to prevention of mosquito bites. However, if there is moderate to intense Zika transmission in your area MED will strongly suggest (but does not require) that you return to the US for the duration of your pregnancy.
In other areas there will be essentially zero risk of Zika transmission. Although *Aedes* range has extended with climate change and there is some debate as to where they can be found, *Aedes* mosquitoes are rare above 1700 meters (5600 feet) and absent above 2000 meters (6500 feet). The CDC revised its Zika Travel Notices in the *Morbidity and Mortality Weekly Report (MMWR)* on 11 March 2016 that there is minimal (~1% likelihood) risk for mosquito borne Zika above 2000 m. MED will not authorize Medevac from those posts in Zika affected countries that are above 2000 meters.

(Some cities that will NOT have a Zika threat due to altitude include:

<table>
<thead>
<tr>
<th>Location</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bogotá, Colombia</td>
<td>2625m</td>
</tr>
<tr>
<td>La Paz, Bolivia</td>
<td>3640m</td>
</tr>
<tr>
<td>Mexico City, Mexico</td>
<td>2240m</td>
</tr>
<tr>
<td>Quito, Ecuador</td>
<td>2850m</td>
</tr>
<tr>
<td>Sucre, Bolivia</td>
<td>2750m</td>
</tr>
</tbody>
</table>

13. Should pregnant women travel to areas where Zika is circulating?

The CDC, WHO and MED recommend pregnant women avoid unnecessary travel to these areas but not all areas in a country with Zika will have transmission. If you plan on traveling to an area in a country where there is no Zika transmission then you can safely make your trip. Check with MED before travel for the latest information (there may be limited information for some countries).

DoS official travel and PCS should be deferred during pregnancy and direct hires may terminate an assignment. If a pregnant woman must travel to one of the Zika areas then this should be discussed with a medical provider before departure and careful attention to Personal Protective Measures to prevent biting is crucial. Any travel in the Zika areas should be mentioned to the pregnant woman’s prenatal provider.

14. I was in one of the Zika areas while I was pregnant and am concerned about my developing child what should I do?

*The most important thing is to recognize that most women who are pregnant and get infected with Zika deliver healthy babies.* If you were in an area of Zika risk you should inform your prenatal medical provider that you were in a Zika area. Since there is no treatment for Zika virus this would mainly be screening to ensure that your baby is developing normally.

The CDC has been closely monitoring pregnant women in the US who have been Zika infected: Among nine pregnant women with confirmed Zika virus disease, no hospitalizations or deaths were reported. All nine women reported at least one of the four most commonly observed symptoms (fever, rash, conjunctivitis, or arthralgia), all women reported rash, and all but one woman had at least two symptoms. Among the six pregnant women with Zika virus disease who reported symptoms during the first trimester, outcomes included two early pregnancy losses, two elective pregnancy terminations, and delivery of an infant with microcephaly; one pregnancy is
continuing. Among two women with Zika virus infection who had symptoms during the second trimester of pregnancy, one apparently healthy infant has been born and one pregnancy is continuing. One pregnant woman reported symptoms of Zika virus infection in the third trimester of pregnancy, and she delivered a healthy infant.

A recent prospective study in Brazil reported in the New England Journal of Medicine showed fetal ultrasound abnormalities in 12 of 42 women (29%) with Zika infection during pregnancy; 7 of the 42 fetuses (17%) that were studied had microcephaly, cerebral atrophy, or brain calcifications.

The CDC has recently updated recommendations for pregnant women in the Zika affected areas. **Pregnant women who had no clinical symptoms** indicative of a Zika infection should still be offered routine scheduled ultrasound to check the fetus' head size or check for calcium, two signs of microcephaly.

- For those **leaving a Zika affected area**: CDC recommends IgM antibody testing at 2-12 weeks of pregnancy should be obtained
- For those who **remain in a Zika affected area**: CDC recommends IgM serology at the onset of prenatal care and again in the second trimester
- At this time, no more invasive testing (such as amniocentesis) is recommended for asymptomatic pregnant women who traveled in a Zika affected area and have a negative antibody test

If a **pregnant woman develops Zika infection** or has an ultrasound that is concerning for Zika infection:

- Amniocentesis should be offered to pregnant women with recent travel to an area with Zika virus transmission, reporting 2 or more symptoms within 2 weeks of travel and a positive or inconclusive maternal serum test.
- For pregnant women with recent travel to an area with Zika virus transmission and ultrasound findings of microcephaly or intracranial calcifications, amniocentesis may also be considered. Consultation with a maternal-fetal medicine (high-risk obstetrics) specialist should be considered.


15. What does MED recommend to women of childbearing age with respect to becoming pregnant in areas where Zika virus is circulating?

MED follows the CDC recommendations that women considering pregnancy take measures to avoid mosquito bites. If you are concerned about potential risk then you should take measures to prevent pregnancy until the Zika risk has diminished in the area.

If a woman should develop Zika and desires pregnancy later there is no evidence that there is danger to any future pregnancy. The [CDC recommends](https://www.cdc.gov/zika/pregnancy/index.html) that a woman who has had Zika take measures to prevent pregnancy for at least 8 weeks after onset of Zika symptoms.
16. I just returned from an area with active Zika virus infections and desire pregnancy. At what point is it safe to become pregnant after my travel? I am a woman who travels to Zika risk areas and am not using birth control, are there any recommendations for me?

The CDC has addressed this first question in the MMWR on 25 March.

For men and women without symptoms of Zika virus but who had possible exposure to Zika from recent travel or sexual contact, CDC recommends healthcare providers advise their patients wait at least 8 weeks after their possible exposure before attempting pregnancy in order to minimize risk. Since the incubation period for Zika is up to about a week after being bitten by an infected mosquito and the infection generally lasts a few days, a woman who has remained free of Zika symptoms should be outside a period of Zika infection 4 weeks after leaving an affected area but this has NOT been clearly studied or defined at this time. The 8 weeks recommended by CDC includes an additional safety period.

There are no known persistent Zika infections in healthy women that should endanger a developing child after a few weeks out of the active Zika areas.

For those women of reproductive age who are not using birth control but travel to Zika risk areas, MED will check a serum (or urine) pregnancy test for you prior to your travel to ensure that you are not early in pregnancy. It is recommended that you use barrier protection while you are in the Zika area (or with a sexual partner who is from the Zika risk area).

17. I just delivered a baby and am now in a Zika area, is my newborn safe to stay here? Could my baby develop neurologic symptoms if he/she were to be infected with Zika?

Everything should be done to prevent any child from getting Zika or any other circulating mosquito borne illness such as malaria, dengue and chikungunya. The primary prevention is keeping a child covered and when they are sleeping, keeping an impregnated mosquito net over the bassinet or crib.

Fortunately, it appears that even newborns have a mild illness if they should become infected with the Zika virus so there are no recommendations for curtailment of families with newborns or older children. Children in outbreaks appear to have an even milder illness than adults and even infection acquired shortly after birth appears to be mild.

On 26 Feb CDC issued new guidance in the MMWR reiterating that a child born to a mother who was in a Zika affected area and has normal head circumference and a normal newborn exam does NOT warrant any special Zika testing. If abnormalities are noted then expert consultation should be obtained to determine what additional testing is indicated.

Although Zika virus RNA has been detected in breast milk, transmission of Zika infection through breastfeeding has not been documented. Based on available evidence, the benefits of breastfeeding infants outweigh any theoretical risk. CDC encourages mothers with Zika virus infection and mothers living in areas with Zika to breastfeed their infants.

Newborn babies and young children whose brains are still developing are of greatest concern because of the Zika associated neurologic effects that are seen in developing fetuses.
Although data are lacking on long term effects of Zika infection on newborns we can be somewhat reassured that most problems occur when women are Zika infected during their 1st or early 2nd trimester. Older fetuses and newborns may already be past the age where Zika damages their neurologic tissues but only ongoing studies will be able to provide a definitive answer to this concern.

18. I have children living in or traveling to a Zika affected area. Should I be worried?

The CDC published an update about Zika in children in the journal Pediatrics in March 2016.  

There is no evidence to date that children of any age have more severe illness with Zika than adults. Unlike dengue, in which children are the most likely to develop severe or hemorrhagic disease Zika has not been associated with more severe disease in children.

The effects of Zika on children are being closely watched now but we have good evidence from the large French Polynesia and Yap outbreaks that children tolerate Zika infection well and do not appear to have post infectious complications. Among the 38 cases of Guillain-Barre syndrome diagnosed during the French Polynesia outbreak, none occurred among children. One death was reported in a 15 year old girl in Colombia who had underlying sickle cell disease.

Newborn babies and young children whose brains are still developing are of greatest concern because of the Zika associated neurologic effects that are seen in developing fetuses but no serious disease has been reported in babies who acquire infection after birth. Although data are lacking on long term effects of Zika infection on newborns we can be somewhat reassured that most problems occur when women are Zika infected during their 1st or early 2nd trimester as Zika appears to mainly affect neuro progenitor cells in the fetus. Older fetuses and newborns may already be past the age where Zika damages their neurologic tissues but only ongoing studies will be able to provide a definitive answer to this concern.
D. Possible Complications of Zika Virus Infection: Guillain-Barré syndrome and other neurologic disease

19. Does Zika virus infection cause Guillain-Barré syndrome (GBS)?

Guillain-Barré syndrome is a rare disorder where a person’s own immune system damaged the nerve cells, causing muscle weakness and sometimes, paralysis. These symptoms can last a few weeks or several months. While most people fully recover from GBS, some people have permanent damage and in rare cases, people have died.

<table>
<thead>
<tr>
<th>Countries, territories or areas reporting GBS potentially related to Zika virus infection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported increase in incidence of GBS cases, with at least one GBS case confirmed with previous with Zika infection</td>
</tr>
<tr>
<td>Brazil</td>
</tr>
<tr>
<td>Colombia</td>
</tr>
<tr>
<td>Dominican Republic</td>
</tr>
<tr>
<td>El Salvador</td>
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<tr>
<td>French Polynesia</td>
</tr>
<tr>
<td>Honduras</td>
</tr>
<tr>
<td>Suriname</td>
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<tr>
<td>Venezuela</td>
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</tbody>
</table>

During 2015-16, 13 countries and territories have reported an increased incidence of GBS and/or laboratory confirmation of a Zika virus infection among GBS infected individuals.

Between October 2013 and April 2014, French Polynesia experienced a wide spread Zika virus outbreak with estimates of over 40,000 cases. During the outbreak, 42 patients were admitted to hospital with GBS, a 20-fold increase in incidence of GBS compared with the previous four years. Of the 42 patients, 16 (38%) required admission to an intensive care unit and 12 (29%) received mechanical ventilation. No deaths were reported. The majority of cases (88%) reported symptomatic Zika virus infection in the days that preceded the onset of neurological symptoms.

Temporal association between Zika cases (blue columns) and GBS (red line) during the French Polynesian outbreak. Musso. *Zika virus*. ClinMicrobioRev 29:487–524. 30Mar2016
During an outbreak of Zika in French Polynesia in 2014, GBS was noted in less than half of one percent of cases. A causal relationship between Zika and GBS cases in French Polynesia has been strongly suggested in a case control study reported in the journal Lancet (Published Online February 29, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00562-6).

CDC has begun conducting a study in Brazil that began in late January to further define the relationship exists between Zika virus infection and Guillain-Barre Syndrome.

20. What about other neurologic illness that may be Zika associated?

On 10 April, Brazilian researchers reported at the American Academy of Neurology Meeting two cases of acute disseminated encephalomyelitis (ADEM) that may have been associated with Zika virus infection. The team from Recife discussed six cases of neurologic illness that occurred after illness with fever and rash. Guillain Barre Syndrome was diagnosed in four patients but two others developed acute disseminated encephalomyelitis (ADEM), which causes swelling of the brain and spinal cord as it destroys the myelin, which is the coating around nerve fibers. In both cases, brain scans showed signs of damage to the brain’s white matter. These attacks are usually reversible but at the time of the hospital discharge both patients had not yet made a full recovery.

Aside from the Zika effects in pregnancy, it appears likely GBS, ADEM and some other neurologic findings may be found in a small number of those who are infected with Zika virus. The full spectrum of rare neurologic sequelae caused by Zika is not known, like much with this disease this is an area of intense scrutiny and we will have more information about these problems by 2017.

Remember, there have been well over 100,000 of cases of Zika virus in the Americas and we can assume many times that number of cases without symptoms. There have been hundreds of cases of GBS but there have been only a handful of these other rare neurologic cases in non-pregnant individuals who have been infected with Zika.

To put this into perspective, West Nile Virus, another mosquito borne illness present in the US, caused neuroinvasive disease in 1360 Americans and death in 119 Americans just in 2015.
E. Sexual Transmission of Zika

21. What are the current recommendations regarding sexual transmission of Zika virus?

Sexual transmission occurs uncommonly but appears to be more frequent than we had believed previously. Multiple cases had been described in the US and Europe in 2016 but all transmissions have been from symptomatic cases and all have been from men to women and one documented case of male to male transmission in a gay couple after engaging in unprotected anal intercourse. Fortunately, at this time there have been no documented sexual transmissions from a person who is Zika infected but has no symptoms. A UK report of a 62 yo man who had PCR evidence of Zika virus in his semen 27 and 62 days after his initial infection raises the question of just how long transmission may occur to a sexual partner.

The CDC has been updating recommendations and has a poster summarizing recs about Zika and sexual transmission. CDC issued Interim Guidelines for Prevention of Sexual Transmission of Zika Virus on 23 Feb 2016. There are currently few studies addressing the shedding of Zika virus in body fluids. It is clear that Zika virus may be found in the saliva, urine and semen but it is unclear for how long an individual may shed virus and the degree of shedding in those with or without symptoms.

Transfusion-derived, placental, and perinatal transmission of Zika virus have been demonstrated, but frequency is unknown. Sexual transmission of Zika virus from infected women to their sexual partners has not been reported.

At this time, testing of men for the purpose of assessing risk for sexual transmission is not recommended. Current understanding of the incidence and duration of shedding of Zika virus in the male genitourinary tract is limited to 1 case report in which Zika virus may have persisted longer than in blood.

Until more is known, CDC continues to recommend that pregnant women and women trying to become pregnant take the following precautions:

- Women desiring pregnant should consult with their healthcare professional before traveling to these areas and strictly follow steps to prevent mosquito bites during the trip.

CDC issued interim recommendations for men and their pregnant partners on 5 Feb 2016:

- Men who reside in or have traveled to an area of active Zika virus transmission who have a pregnant partner should abstain from sexual activity or consistently and correctly use condoms during sex (i.e.
vaginal or anal intercourse, or fellatio) for the duration of the pregnancy.

- Pregnant women should discuss their male partner’s potential exposures to mosquitoes and a history of Zika-like illness with their health care provider; providers can consult CDC’s guidelines for evaluation and testing of pregnant women.

**CDC Issued interim recommendations for men and their nonpregnant sex partners 5 Feb 2016:**

Men who reside in or have traveled to an area of active Zika virus transmission who are concerned about sexual transmission of Zika virus might consider abstaining from sexual activity or using **condoms consistently and correctly during sex for 8 weeks after leaving the Zika threat area.**

Couples considering this personal decision should take several factors into account:

- Most infections are asymptomatic, and when illness does occur, it is usually mild with symptoms lasting from several days to a week; disease requiring hospitalization is rare.
- The risk for acquiring mosquito borne Zika virus in areas of active transmission depends on the duration and extent of exposure to infected mosquitoes and the steps taken to prevent bites (http://www.cdc.gov/zika/prevention).
- After infection, Zika virus might persist in semen when it is no longer detectable in blood

**MEDs recommendations to those returning from TDY to a Zika affected area.** The following is the opinion of MED Infectious Diseases and is NOT the CDC recommendation:

The problem in making recommendations about sexual transmission is that the data are inadequate to give a definitive answer that will assure you of no risk. That said, there are a few things that should be emphasized. Many TDY travelers to the Zika affected areas work all day in an office setting, maybe exercise or walk a little outside and then sleep in air conditioned quarters for a period of days to weeks. They may have minimal or no mosquito biting throughout their stay and are really at minimal risk of acquiring Zika.

If you are returning home after this type of visit it is perfectly reasonable to resume regular sexual relations with your partner who is not pregnant. Even in the unlikely, worst case scenario, that you were Zika infected, sexual transmission is uncommon. In the even more unlikely event that you transmitted the virus to your partner he or she still has an 80% chance of having no symptoms of infection. If your partner were to develop a symptomatic case of Zika this is a relatively mild illness, not Ebola! So, this becomes a vanishingly small risk that I think most couples would consider acceptable.

The US DOD and UK Public Health have recommended that when a man has returned from a Zika affected area and has had no symptoms of infection that he use 28 days of barrier protection to prevent infection in his partner, the CDC recs of 25 March suggest 8 weeks of condom use. If the man has had Zika infection then the latest CDC recs are for 6 months after the start of illness.

If your partner is pregnant that vanishingly small risk of transmitting Zika to her and possibly affecting your baby may be more risk than you are willing to take and then use of barrier protection for the
remainder of the pregnancy is recommended all guidance from. It is important to consider how likely you were to have acquired Zika while TDY.

If you were working for weeks to months outside in a community with numerous Zika cases and had a fair number of mosquito bites, you should be more concerned about a Zika infection without symptoms that could be transmitted to your partner.

If you were working in an embassy for a few days or weeks, mainly in an office setting and air conditioned hotel, and had few or no bites then your chances of having Zika infection without symptoms and transmitting to your partner is slight.

22. I am a man who is currently in or recently visited the Zika areas. I have no symptoms of Zika but I am concerned about transmitting Zika to my partner who desires pregnancy. Can I get tested to make sure I am not infected? Can my semen be tested?

Current CDC recommendations do not recommend checking asymptomatic men for Zika infection as a negative serologic assay does not rule out the possibility of you being Zika infected. The PCR testing of semen is currently a research tool and is not performed routinely in the CDC or commercial labs and is also NOT recommended in CDC guidance. As in question 22 the recommendations are for using barrier protection for 8 weeks if a man was in a Zika risk area.

Currently some commercial labs in the US are qualified to perform Zika testing that can be ordered even if it is not recommended for that patient with current guidelines. These tests are very expensive (>500). MED will not cover the cost for testing that is not recommended by CDC guidance.
F. Preventing Zika Infections and Mosquito Control Measures

23. Zika is not at my post but my family occasionally travels into areas where Zika is present. What does MED recommend?

If a member of your family is pregnant she should probably not join the rest of the family on trips to areas where there is active Zika transmission reported. However, the CDC Zika Travel Alert does not suggest non pregnant individuals avoid traveling to these areas. Zika is a milder illness than dengue or chikungunya, which are often in the same areas and if you are taking precautions to prevent mosquito bites for those illnesses you would also be protected against Zika. If you are very concerned about becoming infected with Zika despite use of personal protective measures then you should avoid travel to those areas.

24. What is best to prevent biting from Aedes mosquitoes? (See The Threat from Mosquito borne viral diseases)

Here’s what you can do outside of your home:

- **Use air conditioning or window/door screens to keep mosquitoes out.** Do not leave doors propped open.
- **Eliminate potential mosquito breeding sites in and around your home.** Once a week, empty and scrub, turn over, cover, or throw out any items that hold water like tires, buckets, planters, toys, pools, birdbaths, flowerpot saucers, or trash containers. Mosquitoes lay eggs near water.
  - Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitoes cannot get inside to lay eggs.
  - For containers without lids, use wire mesh with holes smaller than an adult mosquito.
  - Use larvicides to treat large containers of water that will not be used for drinking and cannot be covered or dumped out.
- **Use an outdoor flying insect spray** where mosquitoes rest. Mosquitoes rest in dark, humid areas like under patio furniture, or under the carport or garage. When using insecticides, always follow label instructions.
  - If you have a septic tank, repair cracks or gaps. Cover open vent or plumbing pipes. Use wire mesh with holes smaller than an adult mosquito.

Here’s what you can do inside your home:

- **Use air conditioning** when possible.
- **Keep mosquitoes from laying eggs inside your home.** Once a week, empty and scrub, turn over, cover, or throw out any items that hold water like vases and flowerpot saucers.
- **Kill mosquitoes inside your home.** Use an indoor flying insect fogger* or indoor insect spray* to kill mosquitoes and treat areas where they rest. These products work immediately, but may need to be reapplied. Always follow label directions. Only using insecticide will not keep your
home free of mosquitoes.

- Mosquitoes rest in dark, humid places like under the sink, in closets, under furniture, under beds or in closets and the laundry room.
- Use an indoor fogger* or indoor insect spray* to reach and treat areas were mosquitos rest inside the home.

**Here’s what you can do to avoid mosquito bites:**

- keep arms and legs covered with long sleeves and pants.
- Consider spraying clothing with permethrin which repels and kills insects
- use CDC recommended insect repellents on your skin and reapply as directed. (DEET, picaridin and IR3535 are considered safe to use in pregnancy and in children)
- Avoid using products containing oil of lemon eucalyptus in children under the age of 3 years or in pregnant women (not demonstrated harmful but not adequately tested yet)
- Repellants containing DEET in concentrations up to 30% are approved by the American Academy of Pediatrics for use in children older than 2 months of age.
- If you use both sunscreen and insect repellent, apply sunscreen first and then repellent
- insecticide-treated mosquito nets are important for night biting malaria infected mosquitos but should be considered for diminishing Aedes mosquitoes bites in those sleeping during daylight hours.

<table>
<thead>
<tr>
<th>Product</th>
<th>Active ingredient</th>
<th>Brand name examples*</th>
<th>How long it works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical repellants for skin</td>
<td>DEET (20-50%) IR3535 (50-100mg/mL) picaridin (20%)</td>
<td>Avon Bug Guard, Deep Woods Off, Backwoods Cutter, Repel, Sawyer</td>
<td>Check label, varies by product, at most 11 hours for Aedes mosquitoes</td>
</tr>
<tr>
<td>Insect repellant for clothing, curtains, fabric</td>
<td>Permethrin (0.5-1.0%)</td>
<td>Repel, Sawyer</td>
<td>Up to 6 weeks or 6 washings</td>
</tr>
<tr>
<td>Indoor flying insect spray</td>
<td>Imidacloprid, β-Cyfluthrin</td>
<td>Home Pest Insect Killer, Raid, Ortho, HotShot, EcoLogic</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Indoor flying insect fogger</td>
<td>Tetramethrin, Cypermethrin</td>
<td>Hot Shot, Raid, Real Kill, Spectracide</td>
<td>Up to 6 weeks</td>
</tr>
</tbody>
</table>

*Insecticide brand names are provided for information only. The CDC, HHS and DoS cannot recommend or endorse any name brand products
25. What are MED’s recommendations regarding the addition of screens to residential units? MED concurs with CDC’s current guidance for preventing bites, namely that employees “stay in places with air conditioning or that use window and door screens to keep mosquitoes outside”. Use of air conditioning and leaving the windows closed, or screening on windows if the windows are left open, should both be effective alternatives. MED is not recommending that posts are required to purchase screens for air conditioned homes.

26. How long does it take for Aedes mosquitoes to breed? I know I should be looking in standing water for evidence of larva or pupae of mosquitoes but I don’t know what they look like? (Lifecycle modified from CDC poster: Mosquito Lifecycle)
27. Is there a Department or MED policy on posts supplying insect repellent and/or insect prevention measures?

The Department of State Integrated Pest Management Program is managed by the Safety, Health and Environmental Management (SHEM) of the Department of State and the Post Occupational Safety and Health Program (POSHO) at each overseas US mission.

MED supports the principle that post funds could be used to purchase items/medications used to prevent illnesses and diseases which employees and EFMs are at increased risk of contracting due to the specific nature or location of their employment. To prevent mosquito-borne diseases like malaria, chikungunya, dengue and Zika that are not found in the US, MED considers supplying repellents (and, for malaria, bed nets and medications) with post-held funds appropriate.

Post supplied preventive measures ensure that the appropriate strength repellants, permethrin and bednets are available for staff as inadequate preparations are common in both the US and abroad. Although bednets are important for day sleeping individuals, including napping children, use of bednets in screened and/or air conditioned homes has not been demonstrated to have a significant impact in *Aedes* mosquito associated disease.

Some related informational links include:

Pest Management in Your Home
http://obo.m.state.sbu/ops/shem/Documents/Pest%20Management%20in%20you%20home.pdf

28. What are MED’s recommendations regarding use of insect preventing plug-in devices? Are they safe for continuous, long-term use?

Per SHEM: These devices should not be the first response. Pellet-heaters can be used to kill the few adult mosquitoes that get indoors. These often contain pyrethroids as the active ingredient. These should be used judiciously as some people, such as asthmatics, may have an exacerbation from these materials in the air.

Plug in devices are available as pellets, tablets, or liquid that can be used, but post POSHOs should check with SHEM of the particular brands in use to ensure product safety.

These plug-in devices are not recommended for long term use. With this and with sprays, people will be breathing in pesticides. The plug in devices may be harmful for children or those with asthma or respiratory issues and they are ineffective if the root causes are not being addressed, or if used excessively.
G. Additional Information on Zika Virus

29. Where can I find more information?
With all the media attention on Zika there is a great deal of good and bad information on the internet and in printed press. You are urged to use reliable sources of information such as your Medical Provider at post and trusted public health authorities below.

DoS MED links:

Arboviruses in the News: Chikungunya, Dengue and Zika Viruses

DoS MED SOP – Pregnancy in Countries with Zika Virus transmission

DoS MED Foreign Programs’ FAQs Concerning the Zika Virus and Medical Evacuations

DoS MED 3224: Registry and Counseling for Pregnant Women in Zika Virus Threat Areas

Resources from the US CDC:

Centers for Disease Control and Prevention Zika Virus

Aedes egypti factsheet from CDC

Aedes albopictus factsheet from CDC

CDC Fact Sheet: Zika virus testing for pregnant women living in an area with Zika.

CDC Fact Sheet: A Positive Zika Virus Test. What does it mean for me?

CDC Doctor’s Visit Checklist: For Pregnant Women Who Traveled to an Area with Zika

CDC Doctor’s Visit Checklist: For Pregnant Women Living in an Area with Zika


CDC Travel Notices 26 Feb 2016. CDC Issues Advice for Travel to the 2016 Summer Olympic Games


MMWR 18 March 2016. Revision to CDC’s Zika Travel Notices: Minimal Likelihood for Mosquito-Borne Zika Virus Transmission at Elevations Above 2,000 Meters
Resources from WHO:

The WHO Zika app. Provides essential updates on Zika that you can get on your phone


Zika virus media center: http://www.who.int/emergencies/zika-virus/mediacentre/en/

Microcephaly: www.who.int/emergencies/zika-virus/microcephaly/en/


Other Resources:

Pan American Health Organization Zika virus

Center for Infectious Disease Research and Policy (CIDRAP) Zika Virus Super Page

European Center for Disease Prevention and Control Zika Virus

Nature 21 March 2016: Zika and birth defects: what we know and what we don’t.


FAQs Concerning the Zika Virus and Medical Evacuations (from Foreign Programs)

FAQ from DoS MED Intranet site
FAQ from Internet site via DoS FLO site