



Dengue Fever Frequently Asked Questions (FAQ)

(Full List)

1 June 2016

Hawaii Island Outbreak

1. [Where on the Big Island are the cases located?](#)
2. [Could it spread to the other islands?](#)
3. [Is it safe to travel to the Big Island and the rest of Hawaii?](#)
4. [How many cases have there been?](#)
5. [Do I have the symptoms of dengue?](#)
6. [What type of dengue viruses have been identified in this outbreak?](#)
7. [Can I get tested for dengue?](#)
8. [Can I get mosquitoes tested for dengue? Can someone come and spray my property for mosquitoes?](#)
9. [What are the authorities looking for when they check out my property for mosquitoes? Could I get cited for something not related to the outbreak?](#)
10. [What substance is used in the spraying of mosquitoes?](#)
11. [Is the spray dangerous to my pets?](#)
12. [What is being done to stop dengue from spreading?](#)
13. [Can the Department of Health release the locations of confirmed dengue cases? I understand that the names of people may need to be kept private, but why can't the locations be disclosed?](#)
14. [What does it mean if the number of potentially infectious cases drops to zero? Does that mean the outbreak is over?](#)
15. [Who do I contact with other questions about dengue fever?](#)

General Questions about Dengue Fever

1. [What is dengue fever?](#)
2. [How do you get it?](#)
3. [What are the symptoms of dengue fever?](#)
4. [When do symptoms start?](#)
5. [How does your doctor or other healthcare provider determine if you have contracted dengue fever?](#)
6. [Is it possible to be infected with dengue virus but have no symptoms?](#)
7. [Can people who are infected but have no symptoms spread the virus to mosquitoes?](#)
8. [What is the treatment for dengue fever?](#)
9. [Do pregnant women or breastfeeding mothers need to take extra precautions?](#)

10. [If you get dengue fever once, can you get it again?](#)
11. [How can you keep from getting it?](#)
12. [Do people who have contracted dengue fever need to be quarantined?](#)

MOSQUITOES

1. [Are all mosquitoes alike?](#)
2. [Do all mosquitoes bite?](#)
3. [Can dengue be passed from the female mosquito to her offspring?](#)
4. [What are common mosquito breeding sites to watch for?](#)
5. [What is the life-cycle of an Aedes mosquito?](#)
6. [What steps should be taken to reduce mosquito nuisance at home?](#)
7. [If I have contracted the dengue virus, how long am I infectious to mosquitoes?](#)
8. [Can mosquitoes pass dengue to other mosquitoes, or pets and domestic animals?](#)
9. [What steps can be taken for immediate temporary control?](#)
10. [How can I protect my children from mosquito bites?](#)

USING REPELLENTS SAFELY

1. [Why should I use insect repellent?](#)
2. [When should I use mosquito repellent?](#)
3. [How often should repellent be reapplied?](#)
4. [Which mosquito repellents work best?](#)
5. [What are some general considerations to remember when using insect repellents?](#)
6. [What are guidelines for using a repellent on children?](#)
7. [Can insect repellents be used by pregnant or nursing women?](#)
8. [What are some reactions to be aware of when using insect repellents?](#)
9. [Where can I get more information about repellents?](#)

Hawaii Island Outbreak

Where on the Big Island are the cases located?

The investigation is ongoing, and the Department of Health (DOH) is still investigating possible areas where cases may have been exposed to infected mosquitoes. Current investigations have identified South Kona (in particular Hookena and Honaunau) as an area of particular concern, but the entire island is considered to be at risk. All islands in the state should be vigilant and take measures to reduce mosquito breeding grounds.

Could it spread to the other islands?

Dengue is not normally present in the State of Hawaii, and it's important to keep it that way. The *Aedes* mosquitoes which can spread dengue fever are present statewide; this is why, when a possible dengue case (travel-related or otherwise) is reported to us, DOH promptly does an in-depth investigation to make sure disease doesn't spread. No matter where you are, though, it is a good idea to avoid mosquitoes and protect yourself from mosquito bites (see "[How can you keep from getting it?](#)" on page 9).

Is it safe to travel to the Big Island and the rest of Hawaii?

Absolutely, yes. The Big Island and the rest of Hawaii remain safe destinations for visitors and residents. The current outbreak is very small by global standards, and minor compared to other popular tropical tourist destinations.

All travel involves at least some risk, but visitors can, in general, reduce their risk by protecting themselves against mosquitoes and mosquito bites by using mosquito repellent containing DEET and covering up with appropriate clothing no matter where they go (see "[How can you keep from getting it?](#)" on page 9), especially when going into areas where mosquito activity is likely.

How many cases have there been?

The investigation is still ongoing. We are still actively seeking cases and following up on reported illnesses, so the number of cases continues to change. Visit the DOH Dengue Outbreak 2015-2016 webpage for updates and information (<http://health.hawaii.gov/docd/dengue-outbreak-2015/>).

Do I have the symptoms of dengue?

If you think you may have symptoms related to dengue (which can include fever, severe headaches, pain behind the eyes, joint and/or muscle pain, and rash), you should contact your doctor or healthcare provider and avoid exposure to mosquitoes (see "[What are the symptoms of dengue fever?](#)" on page 7).

If you are ill and are worried you might have dengue fever, it is important that you be evaluated by a healthcare provider. Many of the initial symptoms of dengue are the same or very similar to those of other conditions and require specific treatment (like leptospirosis, Zika, or chikungunya); additionally, a small number of individuals with dengue can go on to have severe dengue (see below), and it is important that individuals with dengue be monitored by a healthcare provider to ensure that they are not progressing to severe dengue.

What type of dengue viruses have been identified in this outbreak?

There are four closely related dengue viruses (DENV 1, DENV 2, DENV 3, and DENV 4). The current 2015 Hawaii Island outbreak involves DENV 1 serotype virus.

Can I get tested for dengue?

If you are concerned you might have dengue, you should contact your healthcare provider and avoid exposure to mosquitoes. If you have symptoms of dengue fever, your healthcare provider will contact DOH to order blood tests to confirm the diagnosis. These tests are done by the DOH State Laboratories on Oahu, which is doing so at no charge for the duration of the outbreak.

If you are ill and less than a week has passed since the start of symptoms, a test can be conducted to determine the presence of virus. If you were ill and more than a week has passed since the time of illness, or if you suspect you had dengue at an earlier time, an antibody test can determine whether you were previously infected with dengue. However, determining which dengue virus type you had is not possible after the first week of illness. For more information on

the process that goes into confirming a diagnosis, please see [“How does your doctor or other healthcare provider determine if you have contracted dengue fever?”](#) on page 7.

If you are ill and are worried that you might have dengue fever, it is important that you be evaluated by a healthcare provider. If you do not have a provider, please go to a community health center for care. Many of the initial symptoms of dengue can overlap with other conditions that require specific treatment (like leptospirosis); additionally, a small number of individuals with dengue can go on to have severe dengue (see below), and it is important that individuals with dengue be monitored by a healthcare provider to ensure that they are not progressing to severe dengue.

If you have limited income and do not have a primary care provider, you may seek medical help at a neighborhood health center if you are not in need of immediate urgent care. Individuals needing immediate urgent care should call 911 or go to the emergency room.

If you think you might have had dengue recently, but didn't see a healthcare provider (or were not tested for dengue by your provider), contact DOH (see [“Who do I contact with other questions about dengue fever?”](#) on page 6).

Can I get mosquitoes tested for dengue? Can someone come and spray my property for mosquitoes?

Mosquito testing for individuals is not something that the DOH is able to offer. Department staff have been conducting on-going assessments for mosquito activity and may as a precaution be spraying in areas; DOH necessarily is prioritizing areas of concern identified through our investigations. However, everyone can help in reducing risk from mosquitoes around their homes and businesses (see [“What steps should be taken to reduce mosquito nuisance at home?”](#) on page 10). Individuals or businesses who additionally wish to have their property sprayed against mosquitoes may choose to use private pest control services.

What are the authorities looking for when they check out my property for mosquitoes? Could I get cited for something not related to the outbreak?

When we get a report of a person with possible dengue or other mosquito-borne virus infection (such as Zika or chikungunya), DOH and local vector control staff may survey and/or treat areas around the case's home or work to look for any -mosquito problems in that area. Because a mosquito may travel up to 200 yards or more, this could cover several properties. When they survey those areas, they are looking for places with heavy mosquito activity. They especially keep an eye out for possible mosquito breeding grounds, such as puddles, spare tires, uncovered water catchment systems, etc., and provide information on what you can do to help.

The purpose of these surveys is solely to combat the ongoing dengue outbreak and prevent the spread of other mosquito-borne illnesses. These DOH and local vector control teams are not issuing citations and are not investigating other issues, such as building permits, plants grown on the property (unless they find standing water in them), or immigration status.

What substance is used in the spraying of mosquitoes?

The spray that is used is Aqua Reslin, which targets live adult mosquitoes. Although we recommend people and pets stay away from treated areas for several hours as a safeguard, the U.S. Environmental Protection Agency (EPA) has determined that the spray poses no health risk to humans or their pets.

Is the spray dangerous to my pets?

One of the active ingredients in Aqua Reslin can be toxic to fish, such as ornamental fish in ponds. The substance has been used as a flea treatment in dogs and cats, but as a precaution it is advisable to keep them away from sprayed areas for several hours.

What is being done to stop dengue from spreading?

DOH is actively investigating reported cases, as well as working to identify any other cases and evaluate for on-going spread of disease. Department staff are also assessing areas of concern for the presence of mosquitoes and may as a precaution spray areas specifically related to our ongoing investigation.

DOH, Hawaii County, and many other partners are reaching out to residents and visitors to *Fight the Bite!* by helping to get rid of mosquitoes and keep from getting bitten (see "[How can you keep from getting it?](#)" on page 9, and "[What steps should be taken to reduce mosquito nuisance at home?](#)" on page 10).

Can the Department of Health release the locations of confirmed dengue cases? I understand that the names of people may need to be kept private, but why can't the locations be disclosed?

We appreciate the desire to have exact information regarding locations, but many or most of the locations can be used to identify a person who is likely a patient, and patient confidentiality is something we must protect.

Also, people regularly travel around their island (whether for work, school, shopping, etc.), and we have the mosquitoes that can carry and spread dengue throughout the state. That's why a single location of dengue cases does not necessarily represent where each of those cases was bitten and infected. Regardless of the location of these cases, residents across the Big Island should always keep mosquitoes from breeding around where they live and work and keep from getting bitten by them.

Maps of outbreak areas of concern can be found at the following links:

http://health.hawaii.gov/docd/files/2016/03/dengue_info_map.jpg

<http://www.hawaiicounty.gov/active-alerts>

What does it mean if the number of potentially infectious cases drops to zero? Does that mean the outbreak is over?

Even if the number of potentially infectious people drops to zero, there is still a risk of infection because the dengue virus is passed from mosquito to human, not human to human. Even when the current number of potentially infectious people is low or zero, still-infectious mosquitoes may remain in the area.

Infectious mosquitoes that carry the dengue virus can live for several weeks, and can transmit dengue to new cases. This is why “fight the bite” preventive measures are crucial. There would have to be a prolonged period with no new infections before the outbreak could be declared over.

Who do I contact with other questions about dengue fever?

If you have general questions about dengue fever, recommendations about avoiding mosquitoes, or the ongoing Big Island dengue investigation, call Aloha United Way’s 2-1-1 hotline.

If you are ill and are worried you might have dengue fever, it is important you see a healthcare provider. If you do not have a provider, you can go to a community health center for care. Many of the early symptoms of dengue can be the same as with other conditions (like Zika or leptospirosis) that require specific treatment.

Additionally, a small number of individuals with dengue can go on to have severe dengue (see [“What is dengue fever?”](#) on page 6), and it is important that individuals with dengue be monitored by a healthcare provider to ensure that they are not progressing to severe dengue.

If you think you might have had dengue recently, but didn’t see a healthcare provider (or were not tested for dengue by your provider), contact:

- Hawaii County: 808-974-6001 or 808-322-4880
- On other islands: DOH Disease Outbreak Control Division at 808-586-4586

If you have specific mosquito concerns (on your property or elsewhere in your community), contact:

- Hawaii County: 808-974-6001 or 808-322-4880
- City & County of Honolulu: 808-586-8021
- Maui County: 808-873-3560
- Kauai County: 808-241-3306

General Questions about Dengue Fever

What is dengue fever?

Dengue fever is a viral illness spread to people primarily by *Aedes* mosquitoes the saem mosquitoes that spread [Zika](#) and [chikungunya](#)). There are four closely related dengue viruses (DENV 1, DENV 2, DENV 3, and DENV 4). These viruses are spread to humans by the bite of an infected mosquito. The disease occurs mainly in tropical Asia, Africa, the Caribbean, and the South Pacific. It is most common during the rainy season in areas infested with infected mosquitoes. Sometimes, persons arriving from other countries may enter the United States with dengue fever and infect local mosquitoes, as happened in Hawaii in 2001 and 2011. The current 2015 Hawaii Island outbreak involves DENV serotype 1.

How do you get it?

The dengue virus is spread through the bite of infected *Aedes* mosquitoes, which are found throughout Hawaii. A mosquito can become infected if it feeds on someone who is already infected with the virus. This is why it is so important to stay away from mosquitoes when you are infected. When an infected mosquito bites a new person, that mosquito can transmit the dengue virus to that new person. Dengue CANNOT be spread directly from person to person. It is estimated that there are over 100 million cases of dengue worldwide each year.

What are the symptoms of dengue fever?

The symptoms of dengue fever include sudden onset of fever; severe headaches; eye, joint, and muscle pain; and rash. The rash usually appears on the hands, arms, legs and feet 3 to 4 days after the fever begins. Minor bleeding problems can also occur. The symptoms usually go away completely within 1 to 2 weeks. Sometimes, people with dengue fever have blood clotting problems. When this happens, the illness is called severe dengue. Severe dengue is a very serious illness with abnormal bleeding and very low blood pressure (shock).

When do symptoms start?

The symptoms usually start 5 to 7 days after being bitten by infected mosquitoes, but the onset can range from 3 – 14 days.

How does your doctor or other healthcare provider determine if you have contracted dengue fever?

Your healthcare provider will consider if your symptoms are what would be expected for dengue fever. If that is likely, then your doctor will contact DOH to request and coordinate testing of your blood for the virus (if within 7 days from the start of your symptoms) or antibodies (if greater than 7 days from the start of your symptoms).

For the duration of the dengue fever outbreak, dengue diagnostic tests are being conducted by the DOH State Laboratories on Oahu for free (although the clinical laboratory where your blood is drawn may charge a nominal processing fee for the visit, blood draw, etc.). Public and private healthcare facilities send patient samples to the DOH State Laboratories to be tested for dengue on a daily basis, and the turnaround time for conducting these tests there is typically less than one business day after receiving the patient sample.

In the absence of an outbreak, testing is normally sent to and completed by Mainland commercial labs.

Is it possible to be infected with dengue virus but have no symptoms?

Yes. As many as 50-75% of all dengue-infected people have no clinical signs or symptoms of the disease. Some infected people experience fever but their other symptoms are mild and non-specific, making their dengue infection difficult to diagnose. Ill persons who suspect they have dengue should see a healthcare provider.

Can people who are infected but have no symptoms spread the virus to mosquitoes?

Some evidence suggests that it is possible for people with no symptoms (asymptomatic) but infected with dengue virus to transmit the virus to mosquitoes who bite them, although the role of asymptomatic transmission in dengue-affected areas is still unclear. Such risk makes it all the more important that everyone take steps against mosquitoes (e.g., eradicating mosquito breeding grounds, covering up exposed parts of the body, and using insect repellent) to avoid being bitten and infected in the first place.

What is the treatment for dengue fever?

There is no specific treatment to treat dengue fever. It is treated by addressing the symptoms:

- a. Get plenty of bed rest.
- b. Drink fluids to prevent dehydration.
- c. Take medicine such as acetaminophen (Tylenol®) or paracetamol to reduce fever and pain. *Do NOT take aspirin and other non-steroidal anti-inflammatory drugs (for example, ibuprofen such as Advil® or Motrin®) because they can make bleeding problems worse.*
- d. If you are taking medicine for another medical condition, talk to your healthcare provider before taking any other medication.
- e. Avoid being bitten by mosquitoes during the first week of illness, to prevent the spread of dengue to mosquitoes which may then infect other people.

There is currently no vaccine for dengue fever approved for use in the United States. Individuals with dengue should seek out medical care.

Do pregnant women or breastfeeding mothers need to take extra precautions?

It is possible for a pregnant woman who is infected with dengue virus to infect her unborn baby or her newborn baby at birth. It is especially important that pregnant mothers receive proper medical attention if infected with the dengue virus. Like everyone else, pregnant women should focus on avoiding becoming infected by getting rid of standing water where mosquitoes can breed, covering up exposed areas of the body to avoid being bitten, and using repellent containing DEET, picaridin, IR3535, or oil of lemon eucalyptus, which are approved for pregnant women.

The risk of a mother passing the virus to her newborn through breastmilk is considered low, and the health benefits of breastfeeding are much greater than the likelihood of spreading disease. Breastfeeding mothers should talk with their pediatrician about concerns or questions they have regarding breastfeeding and dengue risk.

If you get dengue fever once, can you get it again?

Yes. There are four major types of dengue viruses (DENV 1, DENV 2, DENV 3, and DENV 4). Having dengue fever with one type of dengue virus will not protect you from the other three types.

If you want to get tested for dengue fever after more than a week has passed from the time you were ill, an antibody test can determine whether you were previously infected with dengue. However, determining which dengue virus type you had is not possible after the first week of illness.

How can you keep from getting it?

- When traveling to areas that have dengue fever, try to avoid exposure to mosquitoes. *Aedes* mosquitoes are usually most active in the early morning hours after daybreak, in the late afternoon before dark, and any time during the day when indoors or in shady areas.
- Make sure screens on windows and doorways don't have holes.
- Mosquito netting over beds may be helpful if you tend to take naps during the early morning and evening hours or during the day when these mosquitoes are active.
- Use mosquito repellents with 20-30% DEET and wear appropriate clothing, such as long-sleeved shirts and long pants to reduce exposure to mosquito bites.
- Mosquitoes like dark colors; if possible, wear white or light colored clothing when you are likely to be exposed to biting mosquitoes.

Do people who have contracted dengue fever need to be quarantined?

Dengue fever cases do NOT require quarantine, because dengue fever is not spread from person to person. However, people infected with dengue must be careful to avoid mosquitoes.

The most effective way to prevent future cases is to get rid of mosquitoes which might bite infected persons and then spread the virus to uninfected persons. Quarantines are extreme measures used for serious fatal diseases spread by direct human-to-human contact.

MOSQUITOES

Are all mosquitoes alike?

No. Mosquitoes have been around for millions of years. In that time, they've diversified into about 3,000 species worldwide. They have successfully adapted to climates from the arctic to the tropics. Some mosquitoes bite humans while others prefer other animals and some even just sip plant nectar; some transmit diseases, while others do not; some are active during the day, others at night; some prefer to breed in clean water, others in dirty ponds and swamps.

In Hawaii, the *Aedes aegypti* (Yellow Fever Mosquito) and *Aedes albopictus* (Asian Tiger Mosquito or Forest Day Mosquito) carry and spread the dengue virus. Other *Aedes* members can transmit dengue, but are not found in Hawaii. These mosquitoes are most active in the early morning after sunrise and the late afternoon before sunset.

Do all mosquitoes bite?

No. Only the females bite. Female mosquitoes require the protein of a blood meal for development of their eggs – they do not feed on blood for their own nourishment. Since blood is only required to build eggs, the males do not take blood, but rather feed on plant nectar.

Females may feed one to three times to obtain a full blood meal. The speed of digestion of the blood-meal may take 2-3 days in tropical areas, and then the eggs are fully developed. After laying the eggs, the female mosquito is ready to take another blood-meal. So the female mosquito feeds several times during its lifetime.

Can dengue be passed from the female mosquito to her offspring?

A female Aedes mosquito can lay from 50 to 300 eggs in a lifetime. There is some evidence that an infected female mosquito can pass the dengue virus to her eggs, but transmission by an infected mosquito to a human and from an infected human to a mosquito remain the primary concerns. Eliminating mosquito breeding grounds and avoiding being bitten are the most effective courses of action.

What are common mosquito breeding sites to watch for?

Heavy mosquito nuisance usually means there is a nearby breeding source. Aedes mosquitoes typically lay their eggs on accessible surfaces above the water line/level. Make a systematic and thorough inspection around your home. Common breeding sites are in water found in old tires, clogged roof gutters, cans, bottles, unused swimming pools, unused fish ponds, pineapple lilies (bromeliads), hollow bamboo stumps, hollow tree stumps, uncapped hollow tile walls, uncapped fence pipes, and overflow trays under house plants.

What is the life-cycle of an Aedes mosquito?

Mosquitoes develop through four stages; egg, larva (wiggler), pupa (tumbler) and adult. It takes about 48 hours to finish egg embryonic development. The eggs hatch rapidly when they are flooded. The eggs can also survive during long periods of extreme dryness, sometimes for more than a year. Wigglers take about 7 days or longer to develop into an adult mosquito depending on the temperature and food supply. Mosquito larvae feed on a variety of organic materials and numerous other plant and animal micro-organisms in the water.

The lifespan of an adult stage Aedes mosquito can be as short as a few days to as long as several weeks.

What steps should be taken to reduce mosquito nuisance at home?

- Remove or empty anything that catches or holds standing water, such as old tires, flowerpots, toys, buckets, and plastic tarps on your premises.
- For plants that hold water, flush with a hose once a week.
- Use mosquito-eating fish, such as guppies, in unused swimming pools, constructed fish ponds with no outlet to the environment, or other large containers that cannot be removed or emptied of standing water. To protect Hawaii's rare native species and aquatic habitats, do not release guppies or other alien species into the natural environment.

- Install or repair window screens and doors to keep out mosquitoes. Screens are your best protection against mosquito nuisance inside your home.
- Clean your gutters. Remove leaves and debris so water will drain freely.

Aedes albopictus adults usually rest out of doors, in places such as in bushes, but they can be found indoors in houses and other dwellings. *Aedes aegypti* are most commonly found indoors, and only occasionally outdoors in garden vegetation. These mosquitoes travel less than 200 yards.

If I have been infected with the dengue virus, how long am I infectious to mosquitoes?

A person infected with the dengue virus can transmit the infection to a mosquito starting around the time the first symptoms appear. The risk of transmission is highest when the virus is most strongly present in an infected person, typically in the first few days after fever begins and lasting about a week. After several days, the presence of the virus drops considerably.

Individuals who have been infected with dengue virus should be especially cautious about coming into contact with mosquitoes and should avoid being bitten, in order to prevent their infection from being transmitted to mosquitoes who may go on to spread the virus to other people.

Can mosquitoes pass dengue to other mosquitoes, or pets and domestic animals?

Mosquitoes cannot pass dengue to other adult mosquitoes. The only animals known to be affected when bitten by a mosquito infected with dengue fever are monkeys. Other animals do not carry or spread dengue.

What steps can be taken for immediate temporary control?

- Eliminate adult mosquitoes with insecticide spray labeled for flying insects.
- Use insecticides specifically labeled for controlling mosquito larvae in breeding sites that cannot be emptied or removed. Consult a garden shop or a chemical company for available insecticides.
- Carefully follow the insecticide label's instructions for use

CAUTION: Certain pesticides and their solvents may cause respiratory irritation. Persons with respiratory diseases should consult their physicians before using any pesticide. It is a violation of federal law if pesticides are not applied exactly as the label directs. Insecticides can be harmful to people, pets, wildlife, and the environment when used improperly. For more information on proper pesticide use, go to <http://hdoa.hawaii.gov/pi/pest/faq-for-pesticides>.

How can I protect my children from mosquito bites?

Children (and adults) can wear clothing with long pants and long sleeves while outdoors. DEET or other repellents such as permethrin (not registered for use on skin) can also be applied to clothing, as mosquitoes may bite through thin fabric. Mosquito netting can be used over infant carriers. Also, try to reduce the number of mosquitoes in the area by getting rid of containers with standing water that provide breeding places for mosquitoes.

For information on rainwater catchment systems and “dry” injection wells, go to:
<http://health.hawaii.gov/docd/files/2015/12/dengue-catchment-fact-sheet.pdf>

USING REPELLENTS SAFELY

CAUTION: Always read the entire label before you use insect repellent and apply exactly as the label directs.

Why should I use insect repellent?

Insect repellents can help reduce exposure to mosquito bites that may carry viruses (e.g., dengue fever, West Nile virus, or Zika virus) that can cause serious illness and even death. Using insect repellent allows you to continue to play and work outdoors with a reduced risk of mosquito bites.

When should I use mosquito repellent?

Apply repellent when you are going to be outdoors. Even if you don't notice mosquitoes, there is a good chance that they are around.

How often should repellent be reapplied?

In general you should re-apply repellent if you are being bitten by mosquitoes. Always follow the directions on the product you are using. Sweating, swimming, or otherwise getting wet may mean that you need to re-apply repellent more often. Repellents containing a higher concentration (higher percentage) of active ingredient usually provide longer-lasting protection.

Which mosquito repellents work best?

CDC recommends using products that have been shown to work in scientific trials and that contain active ingredients which have been registered with the US Environmental Protection Agency (EPA) at <http://www2.epa.gov/insect-repellents/using-insect-repellents-safely-and-effectively> for use as insect repellents on skin or clothing.

Of the active ingredients registered with the EPA, CDC believes that two have demonstrated a greater effectiveness in the peer-reviewed, scientific literature. Products containing these active ingredients usually provide longer-lasting protection than others:

- DEET (N,N-diethyl-m-toluamide)
- Picaridin (KBR 3023)

Oil of lemon eucalyptus [active ingredient: p-menthane 3,8-diol (PMD)], a plant-based repellent, is also registered with EPA. In two recent scientific publications, when oil of lemon eucalyptus was tested against mosquitoes found in the U.S., it provided protection similar to repellents with low concentrations of DEET.

What are some general considerations to remember when using insect repellents?

Always follow the recommendations appearing on the product label.

- Use enough repellent to cover exposed skin or clothing. Don't apply repellent to skin that is under clothing. Heavy application is not necessary to be protected.

- Do not apply repellent to cuts, wounds, or irritated skin.
- After returning indoors, wash treated skin with soap and water. (This may vary depending on the product. Check the label.)
- Do not spray aerosol or pump products in enclosed areas.
- Do not spray aerosol or pump products directly to your face. Spray your hands and then rub them carefully over the face, avoiding eyes and mouth.

What are guidelines for using a repellent on children?

Always follow the recommendations appearing on the product label when using repellent:

- Repellents containing DEET should not be used on infants less than 2 months old, and certain other repellents may not be okay for young children (e.g. oil of lemon eucalyptus should not be used with children less than age 3 years).
- When using repellent on a child, apply it to your own hands and then rub them on your child. Avoid children's eyes and mouth and use it sparingly around their ears. After returning indoors, wash treated skin with soap and water.
- Do not apply repellent to children's hands. (Children may tend to put their hands in their mouths.)
- Do not allow young children to apply insect repellent on themselves; have an adult do it for them.
- Keep repellents out of reach of children.
- Do not apply repellent under clothing. If repellent is applied to clothing, wash treated clothing before wearing again. (This recommendation may vary by product; check label for specific instructions.)
- Follow product instructions – using more won't give you extra protection but may increase risk.

Can insect repellents be used by pregnant or nursing women?

Other than the routine precautions noted earlier, EPA does not recommend any additional precautions for using registered repellents on pregnant or breastfeeding women. Consult your health care provider if you have questions.

What are some reactions to be aware of when using insect repellents?

Use of repellent products may cause skin reactions in rare cases. Most products also note that eye irritation can occur if product gets in the eye. If you suspect a reaction to a product, you should discontinue use, wash the treated skin, and call a poison control center. If product gets in the eyes, flush with water and consult your health care provider or poison control center. If you go to a doctor, take the product with you.

There is a national number to reach a Poison Control Center near you: 1-800-222-1222.

Where can I get more information about repellents?

For more information about using repellents, please consult the Environmental Protection Agency (EPA) at: <http://www2.epa.gov/insect-repellents/using-insect-repellents-safely-and-effectively> or consult the National Pesticide Information Center (NPIC), which is cooperatively sponsored by Oregon State University and the U.S. EPA. NPIC can be reached at: npic.orst.edu or 1-800-858-7378. For information on proper pesticide use, visit the Hawaii Department of Agriculture at: <http://hdoa.hawaii.gov/pi/pest/faq-for-pesticides>.