

Questions and Answers on vector control for Zika virus

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What do mosquitoes have to do with Zika virus?

Human beings contract Zika through the bite of an infected mosquito. When a mosquito feeds on the blood of an infected person and then goes on to bite other people, Zika virus can be transmitted. Zika is a virus that usually presents with mild or no symptoms.

However, there is growing evidence that Zika may be linked with an unusual rise in microcephaly cases in newborns from mothers affected by Zika in Brazil as well as with an increase in cases of a neurological disorder, Guillain-Barré Syndrome, in a number of countries. There is currently no vaccine available for Zika virus.

What do people need to know about the mosquito that carries Zika?

The main species of mosquito that transmits the Zika virus is called the *Aedes aegypti* mosquito. By understanding more about how this particular mosquito behaves, we can understand better how to combat it. We have known for a long time that the *Aedes* mosquito is the vector for dengue, yellow fever and chikungunya but we now know that it is also responsible for transmitting Zika virus.

The *Aedes* mosquito has the following characteristics:

- It prefers to bite humans rather than domestic animals or livestock;
- It is a domestic mosquito which lives in and around houses, schools and workplaces and which lays its eggs in any object that contains standing water. It prefers to reproduce in artificial containers such as drums, sinks, barrels, tires, flower pots and even water bowls for pets. In certain conditions, the mosquitoes also breed in septic tanks, gutters and drains;
- *Aedes* mosquito larvae can be found even in small amounts of water, e.g. in pools of water that collect amongst garbage;
- It is most active at mid-morning and before dusk, but can bite at other times, for example at night time.
- It has a short range, which means it does not usually fly more than 100 meters, although it has been known to fly up to 400 meters in search of food;
- The female *Aedes* mosquito lays around 100-150 eggs every 3 or 4 days;
- The mosquito eggs stick to the sides of containers and hatch when they come into contact with water. The development of the mosquito from egg to adult takes 7-10 days, dependent on temperature. Once it emerges as an adult mosquito, the insect can live up to 6 weeks.
- The *Aedes* mosquito eggs can resist drought conditions for over a year and then evolve into mosquito larvae when conditions become wet again.

How does the mosquito become infected with Zika virus?

The *Aedes* mosquito can only lay eggs when it has consumed blood. When the mosquito meets that need for blood by biting a person who is already infected with Zika, the mosquito itself becomes infected with the virus. For the rest of its life the mosquito can transmit Zika to anybody it bites.

What can people do to protect themselves and their families from being infected with Zika virus?

1. 'No' Mosquitoes means 'No Zika' – eliminate breeding sites:

The most effective way to protect people from Zika is through eliminating places where the mosquitoes

can breed in and around homes, workplaces and the local community. All members of the community need to participate to:

- keep homes, surroundings and workplaces free from objects where water can collect such as drums, basins, old tires, bottles, flower pots and others;
- avoid refuse being left to accumulate and create sites where water can collect and mosquitoes breed. Trash should be put into closed plastic bags which are then put inside closed containers;
- cover water tanks and other containers that hold water for household and outdoor use with well-fitting lids. If the health authorities are conducting vector control activities in the community, they should be allowed access to treat these household containers with WHO approved chemical or biological products that prevent mosquitoes breeding in them;
- regularly scrub the sides of basins and other containers. Containers that are not being used should be put face-down.

2. Take personal protective measures to avoid being bitten:

- Wear clothes (preferably light) that cover as much of the body as possible;
- Use insect repellents that contain DEET (diethyltoluamide) or IR 3535 or Icaridin. These repellents may be applied to the skin or to clothes and should be used in strict accordance with label instructions. There is no evidence that use of insect repellents needs to be restricted for pregnant women as long as they use the products as directed on the label.
- Use physical barriers. Close windows and doors or use mesh screens or treated netting materials to cover them.
- If you take a nap during the day, sleep under mosquito nets.
- Households can choose to use insecticide sprays or vaporizers available in local shops for domestic use.

3. Pregnant women should take additional personal protective measures to protect themselves from Zika

- Pregnant women should ensure that they attend all scheduled ante-natal check-ups where they can receive information on how to protect themselves from Zika.
- Since Zika can be transmitted through sex, pregnant women's sex partners living in or returning from areas where local transmission of Zika virus occurs should practice safe sex, wearing condoms, or abstaining throughout the pregnancy.
- To avoid an increased risk of being bitten, it is preferable that another member of the family or community be responsible for clearing out potential mosquito breeding grounds such as drains and garbage piles.

What actions can public authorities take to control or eliminate the Aedes mosquito?

During outbreaks, public authorities may carry out mosquito control operations, such as insecticide spraying. Insecticides may also be used as larvicides to treat water containers or other bodies of standing water. PAHO/WHO recommended insecticides for adult mosquitoes and larvae are safe and effective for public health use as long as they are applied correctly. Measures taken by public authorities to control the mosquito population may include the following.

Fogging or space spraying

Outdoor spraying or 'fogging' with equipment mounted on vehicles is carried out early morning or late afternoon when the temperature is cooler. Public authorities should give people information about the spraying in advance so that they can leave their doors and windows open to allow the insecticides inside their homes. Indoor space spraying with portable hand-carried equipment can be carried out any time of the day. This type of spraying kills adult mosquitoes that are in the immediate vicinity and works over a 24-hour period.

Selective Indoor residual spraying (IRS) for Aedes mosquitoes

IRS is when trained vector control workers spray insecticide inside houses and dwellings. The insecticide, which is usually effective for a three-month period, is sprayed on to selected surfaces and kills adult

mosquitoes that land on those surfaces to rest. The insecticide is sprayed under furniture, on some walls, around containers and on other possible mosquito resting sites on the interior or exterior of the premises.

When insecticides are applied inside homes by health professionals or others it is important that:

- Kitchen utensils and food and water for human and animal consumption are well covered or kept in closed spaces;
- Residents leave during the treatment and keep the home closed for at least 20 minutes after spraying.

Larviciding

Larvicides are an important tool to combat the mosquitoes that transmit Zika and other viruses. This is especially the case in cities and towns with water supply problems, where people tend to store water in outdoor containers. Larviciding kills mosquitoes while they are still in the larval stage through the introduction of insecticides into standing water where the female *Aedes* mosquito may have laid her eggs. Recommended PAHO/WHO larvicides, properly added according to technical guidelines, can be safely used in water-storage containers and should not significantly affect the taste, odor or color of the water.

Are new tools being developed to control the mosquitoes that transmit Zika and other diseases?

New tools are being developed to combat the *Aedes* mosquito. These include amongst others Wolbachia, sterile insect technique, genetically-modified mosquitoes, Attractive Toxic Sugar Baits, lethal traps, and long-lasting larvicides. The WHO led Vector Control Advisory Group (VCAG) is reviewing new vector control technologies and will shortly make recommendations to the Organization on the future implementation of these technologies for the control of the *Aedes* mosquito.

Are the insecticides that are being used for vector control safe for people and animals?

WHO conducts risk evaluations on insecticides and larvicides that are used for vector control. Only those products recommended by WHO for public health use should be used and these should always be administered in line with recommended doses and formulations.

If the authorities spray insecticides, isn't that enough on its own to kill the mosquitoes?

While mosquito control operations carried out by health authorities are important to reduce the risk of transmission of Zika and other diseases, physically controlling and eliminating the mosquito's breeding sites has the most impact on the vector population. This is a responsibility shared by everyone – authorities, the public and private sector, NGOs, families and individuals.

An integrated approach to vector control tackles all the life stages of the mosquito through individual and community action to eliminate existing and potential breeding sites, as well as via the killing of adult mosquitoes using insecticide spraying. Some countries affected by Zika are using biological methods as part of this integrated approach e.g. by introducing larvae-devouring fish into water storage containers.

What about insecticide resistance? Are insecticides still effective against *Aedes* mosquitoes?

Health authorities carry out periodic surveillance for insecticide resistance. When they detect resistance in an area, they have strategies to modify the use of insecticides so that they can still be effective.

If we carry out all these vector control measures, can we eliminate *Aedes* mosquitoes and eradicate the diseases they transmit?

More than half of the world's population lives in areas where *Aedes aegypti* - the principle mosquito that transmits Zika, dengue, chikungunya and yellow fever – is found. The mosquito is extremely adaptable, exploiting changes in the way humans live such as rapid unplanned urbanization and dramatic increases in international travel and trade.

The most effective way to control the mosquitoes that carry Zika and other diseases is to integrate classic vector control methods with committed individual and community engagement in eliminating sites where the mosquitoes can breed. As new tools become available, countries will be encouraged to introduce them

on a small scale to assess their impact before they are potentially scaled-up. In emergency situations, the appropriate use of chemical insecticides is recommended.

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