



Zika Virus: What You Need to Know About its Vector – The *Aedes aegypti* Mosquito

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The Zika virus, originally from Africa, first appeared in the Western hemisphere on Chile's Easter Island in 2014 and was initially found on the mainland in Brazil in April 2015. Since then, it has spread very rapidly throughout Latin America and is now found as far north as northeastern Mexico. Though infection of healthy adults does not produce symptoms as severe as other mosquito-borne diseases like dengue or chikungunya, it appears to be linked to microcephaly in babies born to mothers infected in the first trimester of pregnancy. To date, the incidence of microcephaly, a condition in which children are born with an abnormally small head and potential issues in brain development, in Brazil has increased significantly since the Zika virus began to circulate there.

Below are some answers to common questions about the mosquito that infects humans with the Zika virus. If you have other questions or would like more information, please contact ESA's Washington Office (contact information at the end of the document).

Why have large-scale outbreaks of Zika and other viruses like dengue and chikungunya – not seen in decades, if ever – emerged in the last few years in many Caribbean and South and Central American nations?

These viruses are all primarily carried by the same mosquito, the yellowfever mosquito, *Aedes aegypti*. This mosquito had been the target of international eradication efforts in the Americas (circa 1947-1970) that had been quite successful. However, as the mosquito population shrank to very low levels, eradication efforts were abandoned, and the mosquito resurged. As it did, the pathogens carried by this mosquito, and accompanying human diseases, exploded soon thereafter.

Meanwhile, travel directly between Africa and South America has increased dramatically in the last 20 years. Africa and South America have some of the same mosquito vector species and are at similar latitudes, making it more likely that people who acquire a virus in Africa will travel to South America and deliver the virus to a mosquito there.

What areas are most at risk for the types of mosquitos that can carry Zika?

The mosquito carrying Zika is mostly problematic in municipalities, often in urban centers. This is because these mosquitoes are container-breeding mosquitoes and lay their eggs in water-filled containers, such as flowerpots and bird baths, which are often near people. These mosquitoes also feed on humans more than other mammals. Few Caribbean and South/Central American cities are using best practices in mosquito management, and often haphazardly and/or incompletely control mosquitoes. As a result people living in cities are more at risk of this mosquito-borne disease. As international travelers visit these locations, the risk of spreading the disease is magnified.

Do we understand how to control these mosquitoes?

The protocols and best practices for mosquito control, often referred to as Integrated Vector Management programs or IVM, are well known – they're just not being utilized. Areas of municipal mosquito control that need improvement include mosquito sampling/identification/mapping for

decision making, improved decision tools (e.g. models and thresholds), better execution of control efforts, and improved community involvement programs.

Why have previous control efforts failed?

The real problem with previous implementation efforts is that they have not been sustainable. We know how to control mosquitoes and how to organize our efforts for efficient control, but we have so far not been able to structure programs that persist for decades over wide areas. Traditional approaches to mosquito management programs have not worked for different reasons: programs have been too limited in scope; government programs are eventually discontinued, and are limited to the jurisdiction of the government; and multi-institution programs are limited to the duration of the funding.

What can we do to improve our efforts to control the spread of Zika?

We know how to control the mosquito, but we rely on funding sources to support these measures. Inevitably, a funding source dries up and management efforts suffer. There is a pressing need for sustainable programs that will upgrade existing mosquito management programs, maintain those programs, and allow for incorporation of novel approaches to mosquito management. Such a program must address critical issues in research, as well as those in implementation of integrated vector management programs. Zika is not the only virus transmitted by this mosquito and, unless this mosquito population can be meaningfully controlled, other viruses will cause future outbreaks.

What is the scientific community doing to address the challenges of Zika and other mosquito-borne diseases?

The Entomological Society of America (ESA) and Sociedade Entomológica do Brasil (SEB) are hosting a critical new entomological summit with participation from leaders throughout the Americas. The purpose of this summit will be to explore how, as professional scientific societies, we can marshal our collective entomological expertise to address mosquito-borne disease in the Americas. Our hope is if we band together, we will form a novel transnational coalition that can enhance existing efforts as well as develop new initiatives that may significantly contribute to reducing the public health crisis caused by this insect. The summit will be held on March 13, 2016 in Maceió, Brazil.

Sources and Additional Background:

- More information on the ESA and SEB summit is available at <http://entomologychallenges.org/grand-challenges-summit-on-aedes-aegypti-mosquito-in-brazil/>.
- Additional details are available in a briefing paper on the summit at <https://entomologychallenges.files.wordpress.com/2016/01/brazil-summit-briefing.pdf>.

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The Entomological Society of America (ESA) is the largest organization in the world serving the professional and scientific needs of entomologists and individuals in related disciplines. Founded in 1889, ESA is a not-for-profit professional society, with nearly 7,000 members affiliated with educational institutions, health agencies, private industry, and government.