

USAID's Fight to Tackle the Zika Mosquito is Proving Effective in El Salvador

In a quiet neighborhood an hour outside of El Salvador's capital city, San Salvador, Marisela Ortega leans over Dalila Lissette Castillo's kitchen water tank. Ortega scours the dark water like a detective, shining her flashlight on the tank's rim. After several minutes of inspecting thoroughly, she lifts her head and smiles.

"It's clean," Ortega says.

Castillo smiles back at Ortega, who has visited Castillo's house every 30 days since July to inspect and treat for larvae of the *Aedes aegypti* mosquito. While all mosquitoes can be annoying, this particular mosquito species transmits dangerous viruses, including Zika, dengue and chikungunya.

In 2015-2016, the Zika virus was rapidly spreading across the Americas. The virus, which is often asymptomatic, has been linked to serious birth defects, including microcephaly and neurological damage. With the number of babies born with microcephaly skyrocketing in Latin America and the Caribbean, the World Health Organization declared Zika a global health emergency in February 2016.

Global health professionals and country governments spun into action, determined to quickly find a way to dramatically slow down the spread of the Zika virus. In September 2016, the United States Agency for International Development (USAID) introduced the Zika AIRS Project (ZAP), implemented by Abt Associates, as a vector control response to the emerging infectious disease.



Vector Control technicians inspect water tanks for mosquito larvae.



Ortega explains to household owner Dalila Castillo the importance of keeping her home environment free of standing water to prevent breeding sites for the *Aedes aegypti* mosquito.

ZAP targets the areas with the highest incidence of Zika to protect the most vulnerable, using vector control. While little is known about the long-lasting effects of the virus that is primarily transmitted by the mosquito, it also can be passed from an infected pregnant woman to her fetus, as well as transmitted sexually between infected partners, further increasing the potential impact of disease.

As of November 2016, the Zika virus is no longer considered a global health emergency, however, millions remain vulnerable with 50 countries in the region at risk of infection. ZAP is helping country governments to plan and implement vector control strategies to reduce disease outbreaks and respond to arboviruses quickly. ZAP works across the Latin America and Caribbean region in cooperation with other countries.

"Before ZAP, there wasn't a program for countries to learn from each other about vector control. ZAP is building relationships among the countries," said Carmen Vilanova, ZAP El Salvador's Chief of Party.

Currently, ZAP works in nine countries, including the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Paraguay and Peru as well as provides technical support to Ecuador, Guyana and Barbados.

Ortega is one of 350 project technicians in El Salvador working to eliminate breeding sites for the *Aedes aegypti*. The *Aedes* mosquito prefers to live in close proximity to households and is a container breeder, which means that it tends to lay eggs in places that collect water, such as buckets, tires, animal dishes, flower pots, and discarded coconut shells. This mosquito can breed in large or small amounts of water, including in something as small as a bottle cap or in water on a piece of plastic.

To tackle the spread of the virus, ZAP is larviciding with Bti, a biological or a naturally occurring bacteria that specifically targets the larvae of the mosquito. Bti can be used around homes and in containers where water can collect. Treated water can be used for any household needs including showering, cooking, drinking; it is safe for pets to drink.

Ortega calculates the amount of Bti needed to apply to Castillo's tank based on its volume and treats the water. Afterwards, she reminds Castillo to keep storage water containers covered and to check all water containers inside and outside the home once a week for mosquito eggs and larvae, overturning containers where water naturally collects to prevent mosquitoes from laying eggs. The treated water must not be emptied completely to avoid removing the Bti.

"Since Ms. Ortega began visiting I've become more responsible and more conscious of keeping things clean and free of standing water," says Castillo, a math teacher for 6-9 year olds. "Every day I talk to the schoolchildren about picking up trash and being responsible with water to be sure we don't have breeding sites for mosquitoes."



Entomological technicians set an ovitrap in households to measure mosquito density.



Vector Control technician Marisela Ortega calculates the amount of Bti needed in a household water tank.

Before Ortega leaves she puts a smiley face sticker on a report card she fills out each time she inspects Castillo's house. The smiley face means that the house was free of mosquito larvae, while an unhappy face means the household needs to work harder at keeping the water basins clean and to ensure that the surrounding environment does not have trash or standing water where mosquitoes can breed.

In June 2017, ZAP began door-to-door community awareness campaigns in El Salvador, hiring community health workers to encourage households to

eliminate breeding sites in and around their homes. Many households in El Salvador, and other Latin American countries, have large storage containers to store water for domestic use, which can become ideal breeding sites for the *Aedes aegypti*. In cooperation with El Salvador's Ministry of Health (MOH), ZAP applies larvicide to such water containers to reduce mosquito population density and disease transmission rates.

In Mejicanos, El Salvador's fifth largest city, Mayor Simon Paz has gone door to door himself, explaining the benefits ZAP is bringing to the community to encourage households to accept the vector control technicians into their home.

"Densely populated areas create a lot of opportunity for disease to spread rapidly," said Paz. "Reinforcing community mobilization prevention methods are most beneficial in reducing disease."

ZAP hires technicians who live in the community, which builds trust between the community and the project and encourages community members to participate in fighting arboviruses.

"I was so nervous to knock the first time on people's doors," said Ortega. "I was afraid they were going to shut the door on me. This job has taught me how to deal with the community. Now people come to my house asking me questions about Zika. When they see me coming, they say, 'Yay, here she comes.' They often welcome me in and offer me something to drink."

Mayor Paz said that although ZAP is one of the newer projects in this municipality, the technicians are trusted by the community. "Aside from the obvious benefits," Paz said, "the project has done a lot to help communities to confront their own problems, to value the work, and to realize they have ownership in tackling the disease. They are more united to face future problems and are very aware of what ZAP is leaving behind."

In El Salvador's San Sebastian municipality, Manuel Cordova, a government Environmental Health Inspector, said ZAP has helped to reduce larvae populations by 50% since the project began larviciding households September 1, 2017.



Dr. Ismael Hernandez says incidences of Zika are reducing thanks to the support of ZAP.

In addition to the door-to-door community awareness and larvicide operations, ZAP also conducts rigorous entomological monitoring and trains local entomologists to better guide and equip country governments on their vector control strategies. ZAP's trainings strengthen government capacity to design entomological surveillance programs and implement vector control.

ZAP has trained 34 people in El Salvador's MOH through a national entomological trainings as well as a regional training, increasing the capacity of the MOH to carry out strong entomological research. ZAP trains participants in entomological

techniques, including how to collect, preserve, and manage mosquito colonies; insecticide resistance monitoring using Centers for Disease Control and Prevention and World Health Organization bioassays; insectary management best practices, analysis and interpretation of entomological data, and mosquito



Technicians count mosquito eggs once a week to measure mosquito density.

dissecting methods. Participants also get hands-on experience by setting BG-Sentinels, Bug-Dorm Cages, Gravid Traps, and using Prokopack aspirators in households.

“ZAP’s workshops are increasing our capacity to conduct entomological surveillance and household visits,” Cordova said. “Up to now, we haven’t a qualified workforce to carry out such interventions.”

ZAP is working to strengthen insecticide resistance management policies in the project countries to establish comprehensive data on *Aedes* vectors to ensure vector control programming decisions are evidence-based and data-driven.

ZAP also trains entomological technicians how to set ovitraps to monitor mosquito density and species composition, as not all mosquitoes carry the Zika virus. Technicians set ovitraps in select households, visiting once every five days to collect papers on which the mosquitoes lay eggs. Once a week, the eggs from all the households are counted to ensure the numbers are

not increasing and that the larviciding is proving effective.

Manuel Antonio Flores, who agreed to have ovitraps set up in his home, welcomes ZAP’s vector control technicians and entomological technicians into his house to larvicide and inspect the ovitraps.

“Four months ago, I was killing 200 to 300 mosquitoes a day. I was itching so much I couldn’t sleep. It was really difficult,” said Flores. “My grandchildren couldn’t come to my home because they really suffered. Since ZAP began visiting my house, my grandchildren can come see me. The vector control team gets an A+.”

Dr. Ismael Hernandez, MOH Basic Comprehensive Health System Coordinator for the Department of Cabañas, said, “ZAP is contributing to health reform. ZAP’s investment in human resources is helping to educate communities and creating capacity within the Ministry of Health to attack the disease. The project is preparing the ground for whatever comes next in fighting a vector.”



Manuel Antonio Flores with his granddaughters. Flores said that before ZAP began larviciding in his home, his grandchildren could not safely visit him due to the high number of mosquitoes.

In addition to building the country's capacity to fight vector borne diseases, the project is providing new income opportunities. In El Salvador, 56% of the technicians are women, increasing the skills of women and reinforcing gender equality in the workforce.

"This job has made a significant difference in my life," said Ortega. "I'm a single mother. My nine-year-old son has a lot of kidney problems. We have to go to the hospital in San Salvador frequently, sometimes twice a month. Sometimes the appointments are \$10-15 but other times the cost has been from \$200 up to \$1500. It's been very difficult. Before this job, I'd have to beg my family for help. They always supported me but it's not easy."



Team Leader Claudia Fuentes motivates vector control technicians before heading out for the day to inspect and treat homes.



ZAP technicians build strong relationships with communities.

Many of the women working on ZAP have similar stories as they support their extended families on one income.

Claudia Fuentes is a ZAP supervisor, overseeing 97 vector control and entomological technicians. "I have a degree in environmental health, so when I heard about this project, I was so excited," said Fuentes. "I'm learning about human resources management, communication work and so much more. It's such a blessing. I'm a single mom. I support my son,

mom and sister. With this job, my dreams have gotten bigger. Now I can see my son growing up with opportunities."

Overall, ZAP is building capacity of country governments to implement effective vector control strategies and improving quality of life. Dr. Maria del Los Angeles Recinos, Director of the Health Facility in the municipality of Ilobasco, said, "ZAP is invigorating our health system with new supplies in vector control. I'm very satisfied because the larvicide is organic and the community can see immediate effects. But the capacity building is important. We need trained entomologists. It's important that we don't leave the data out there. Having good quality data and having it analyzed is important. ZAP is ensuring MOH is not left alone in trying to tackle this disease."