

# The Atlantic

## Zika Is a Delayed Epidemic

What it means when an outbreak's worst effects occur in the long-term.



Daniele Santos, 29, combs the hair of her son Juan Pedro who is 2-months old and born with microcephaly, at their house in Recife, Brazil, in February 2016.

Nacho Doce / Reuters

JULIE BECK

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Zika is a disease that seems to keep evolving, and escalating. The mosquito-borne virus many thought would be a milder version of dengue has turned out to be a serious neurological threat, causing the birth defect microcephaly (which often includes brain damage), and Guillain-Barré, an autoimmune disorder that attacks

the nervous system. It's also been linked to inflammation of the brain and spinal cord, and it may be that the virus specifically targets nerve cells.

Though Zika is not a super-new virus—it was first discovered in 1947 in Uganda's Zika forest—the scope and seriousness of this outbreak is unusual in the disease's history. For the first 60 years scientists were aware of it, the virus just caused “mild illness across equatorial Africa and Asia,” according to a timeline of Zika published by the World Health Organization.

The first outbreak was in 2007, on the Micronesian island of Yap. According to the WHO, 73 percent of Yap's 11,000 or so residents were infected with Zika, but there were no neurological complications reported from the outbreak.

Then came the outbreak in French Polynesia, from 2013 to 2014, which was linked to higher numbers of Guillain-Barré. And now: the outbreak of the Americas, which began in Brazil in 2015. There are now 42 countries and territories with active local transmission of the virus, according to the Centers for Disease Control and Prevention, 34 of them in North and South America.

“Human Zika virus infection appears to have changed in character while expanding its geographical range,” the WHO paper concludes. “The change is from an endemic, mosquito-borne infection causing mild illness across equatorial Africa and Asia, to an infection causing, from 2007 onwards, large outbreaks, and from 2013 onwards, outbreaks linked with neurological disorders.”

“If Zika didn't produce any of these, we would not be talking about this issue now,” says Marcos Espinal, the director of communicable diseases for the Pan-American Health Organization, the WHO's regional office for the Americas. “Zika, in most cases, is a very mild disease.”

**“Human Zika virus infection appears to have changed in character while expanding its geographical range.”**

Which means the problem is not the suffering inflicted by the initial infection; there probably won't even be any suffering for most, since four out of five people never experience any symptoms. The danger is what might happen later—the fetuses that get microcephaly, the people whose brains and spinal cords swell and possibly sustain damage, the people temporarily paralyzed by Guillain-Barré, the ones who die because the Guillain-Barré stops their breath (as it can sometimes do) and they're unable to get to a hospital with a respirator.

Zika is an epidemic on delay, with the worst of the outbreak's effects trailing in the wake of the mosquitoes that carry the virus. In Brazil, the first reports of "an illness characterized by skin rash" appeared in March of 2015, according to the WHO; the first reports of neurological problems appeared in July. Until those neurological symptoms show up in a population, Zika presents a lot like its viral family members dengue and chikungunya. And there was no commercially available diagnostic test for Zika then, so when it first appeared, there was no good way to know that the country was seeing something new.

"It makes it harder to track, that's for sure," says Peter Hotez, the dean of the National School of Tropical Medicine at Baylor College of Medicine. "We weren't really able to track the course of Zika in Brazil until we saw this big cluster of microcephaly cases. That means that we have to be proactive and preventive once we know where the virus is or where it's going. You can't wait for the neurologic sequelae to show up, because by then the horse has left the barn."

There's a veritable stampede now in Brazil, with more than 7,000 cases of microcephaly or central nervous system malformation reported between October 2015 and early April 2016. And as the summer approaches, the *Aedes aegypti* mosquito is expected to gallop north, with Zika riding along.

"What are we doing right now as the virus is moving into Haiti, where it's going to decimate Haiti, and as it moves into the Gulf Coast?" Hotez asks. He recently wrote an op-ed in *The New York Times* cautioning that for the Gulf Coast of the U.S., Zika could be "a catastrophe to rival Hurricane Katrina" if preventive measures aren't taken.

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With no vaccine on the near-term horizon (Espinal says one is slated to go to clinical trial in September), the only real option to get out in front of the outbreak is mosquito control, which is difficult. "It means going house to house, getting rid of all the standing water in containers, doing garbage collection, getting rid of all the discarded tires and things, putting in window screens and going into homes and doing the insecticidal spray," Hotez says. "It's not fun work; it's hard work and in the past when it's been successful, it's required pretty intrusive military-style campaigns." In Brazil, the actual military is involved in mosquito-control efforts, Espinal says.

This immediate control is needed to minimize the impact of Zika's delayed effects. We're still in the thick of this outbreak, and it's impossible to know exactly how far its tendrils will reach, what the consequences will be, or even what the full range of possible consequences are, given that new associations seem to keep popping up.

"We still don't know yet the full rainbow of complications that this virus may produce," Espinal says.

Plus, though this round of Zika may be particularly bad because "the population of the Americas were totally naïve, so they didn't have any immunity," Espinal says, even if governments do all the right things and get it under control, it could still come back—probably at lower levels, but still. That's what happened with chikungunya and dengue.

It will likely take some time for the long-term effects of the epidemic to fully make themselves known. It's safe to say that in some countries, there will be a generation of kids that has higher-than-usual rates of microcephaly, though just how that will affect their lives, it's hard to say. Other neurological complications may linger, or

they may be resolved fairly quickly. What about kids who get infected? “Are there going to be long term cognitive consequences of pediatric exposure? We don’t know,” Hotez says. But on the whole, “I think there’s going to be a significant amount of long-term [neurological] deficits,” he predicts.

This sort of delay is not unheard of—as my colleague Adrienne LaFrance recently wrote, Zika bears striking similarities to rubella, which also caused congenital defects in babies born to infected mothers during a 1964 outbreak. Gerald Oppenheimer, a professor of public health at the City University of New York, also compares it to the influenza outbreak of 1918. Some researchers have suggested that the mid-20th century epidemic of coronary heart disease in the United States is connected to that influenza outbreak—that the immune response developed by survivors of influenza may have increased their risk for coronary heart disease.

“There’s no direct proof of this, but there seems to be a pattern there,” Oppenheimer says. Studying Zika’s connection to neurological disorders has also been an exercise in tracking patterns. Other connections may yet pop up as time goes on.

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## “Each epidemic has its own little shop of horrors that you have to sort out.”

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The physiological effects are only one facet of the epidemic’s long-term impact. Zika could be a real drain economically, especially given that it’s expected to hit poor areas hardest. Mosquito control can be expensive, for one thing. For another, children with microcephaly are going to need specialized care—“not only a doctor or a pediatrician,” Espinal says, “it’s going to require a neurologist, it’s going to require special neurosurgeons and so on for special situations.”

Several countries—Brazil, Ecuador, Jamaica, Colombia, and El Salvador—have advised women to delay getting pregnant for anywhere from six months to “indefinitely,” according to the *New York Times*. Lower birth rates could have unforeseen social effects for these countries. Or it may balance out, Oppenheimer

says. “Often what happens is that, as happened during the Second World War, and the Great Depression, women postpone marriage or giving birth,” he says. “Then after the war was over, we had the baby boom in the United States. So somehow we compensate. That’s a possibility—that in the longer run it may not make a difference.”

“Really all you can do is just very careful surveillance,” Oppenheimer says.

Zika is something new and unique, but “each epidemic is unique,” Hotez says. “Each epidemic has its own little shop of horrors that you have to sort out. And Zika has told us what the shop of horrors is. It’s vertical transmission to the unborn baby, and microcephaly, number one, and number two, you also have some other late neurologic sequelae. Knowing that, you have to then plan accordingly.”

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### ABOUT THE AUTHOR



JULIE BECK is a senior associate editor at *The Atlantic*, where she covers health.

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