

Zika

*Before the 2015 arrival of Zika virus in the Western Hemisphere, a mosquito bite had never before been linked to a devastating birth defect. The White House requested **\$1.9 billion** in emergency funding in **February** to combat, contain and respond to the virus and its impacts with research and development toward a vaccine, diagnostics and improved vector control, as well as for public education and health services in affected areas. The U.S. Centers for Disease Control and Prevention's confirmation in April that Zika infection during pregnancy causes microcephaly and other neurological birth defects followed months of accumulating evidence, as well as calls for sufficient funding to mount research- and public-health-driven responses to the continuing spread of the virus and its impacts. In **May**, the U.S. Senate responded with a measure providing **\$1.1 billion**, representing the amount of the President's request, with the subtraction of funding that the Administration had moved to Zika responses from other programming, including towards Ebola responses, in the intervening months. The U.S. House of representatives responded, also in **May**, with legislation allocating **\$622 million** in existing public health funds to some responses to the spread of the virus. This **updated** paper explores the evolving nature of the spread, impact and scientific knowledge of the Zika virus, and of the public health needs the current outbreak has highlighted, while the U.S. funding response to Zika remains unresolved.*



BACKGROUND

1947-2007 - The Zika virus, discovered in a sentinel monkey in the Zika forest of Uganda during surveillance for yellow fever in **1947**, was first detected in humans five years later only through blood tests for other illnesses in the region. It wasn't until **1964** that scientists confirmed the virus caused illness in humans, with a painless rash its most outstanding symptom. The virus continued to appear in sporadic human cases across tropical sub-Saharan Africa and then in tropical Asia. When the virus jumped from Asia to Micronesia, causing the first recorded large outbreak of disease in **2007**, Zika virus disease had previously been confirmed in only **14** cases of illness. The finding then that the virus caused more than a hundred confirmed and probable illnesses on one small island of **11,250** people suggested incidence of the virus had been under-reported in places with little public health infrastructure, but also suggested the potential for accelerated transmission of the virus where no previous exposure provided population immunity.

2013-2015 - The virus continued to spread in other Pacific island groups, including French Polynesia, where it caused thousands of suspected infections in 2013 through 2015. In **May** 2015, following reports of **7,000** cases of illness with skin rash across Brazil, tests confirmed the Zika virus was now being locally transmitted in the Western Hemisphere for the first time. Within two months, health authorities in a north-eastern part of Brazil reported neurological disorders, including 49 confirmed cases of the paralyzing Guillain-Barre syndrome, associated with a history of Zika, chikungunya or dengue infection. On **October 30**, health authorities noted an unusual rise in the numbers of babies born with microcephaly – **54** between the preceding **August** and the end of that month. When, in **late November** investigators in French Polynesia released a report of a marked increase of neurological malformations in fetuses and babies there from **2014 to 2015** with at least **17** cases that included microcephaly, Brazil had already declared a public health emergency. In the months that followed, as the numbers of babies born with microcephaly continued to rise in Brazil, the virus spread through Latin America and the Caribbean as well as the West African island nation of Cabo Verde.

2016 - In **January** 2016, a woman in Hawaii who had travelled to Brazil early in her pregnancy gave birth to a child with microcephaly, and the CDC advised pregnant women to avoid travel to places where Zika transmission is ongoing. The agency has since confirmed that the virus is also sexually transmitted. On **Feb. 1**, the World Health Organization declared that the spread of Zika infection and accompanying increases in microcephaly and other neurological disorders is a Public Health Emergency of International Concern. The agency called for immediately accelerated research to develop mosquito control, diagnostic, and prevention tools, including a vaccine. The WHO also released a plan calling for **\$56 million** to fund an international, coordinated strategy to protect women in affected areas from Zika infection, strengthen vector control and public health education, build capacities to monitor and track spread of the virus, provide access to diagnostic and family planning tools in areas where the virus is being transmitted, and prepare to meet critical health care needs anticipated to arise on an increasingly large and unprecedented scale in the months ahead. On **Feb. 8**, President Obama asked Congress to provide **\$1.9 billion** in emergency funding for Zika readiness and responses at home and abroad, including through mosquito control, vaccine and diagnostic research and development, community and clinical outreach, and health services for low-income women. In **early April**, with no response from Congress, the White House moved **\$589 million** (\$510 million from funding dedicated to Ebola control, and \$79 million within the Department of Health and Human Services from its strategic drug

stockpile and other prevention programs responding to emerging and resurging health threats) to Zika responses. In **mid-April**, the CDC confirmed that Zika virus causes neurological birth defects that include microcephaly, and anticipated confirming that Zika virus is a cause of Guillain-Barre syndrome. The agency continues to investigate risks and rates of risks associated with the virus.

Now

GLOBALLY: By **mid-May**, the numbers of countries reporting local and person-to-person transmission of Zika virus continued to rise with **60** countries and territories reporting mosquito-borne Zika virus transmission, and **10**, including the United States, reporting sexual transmission of the virus. The numbers of countries and territories reporting Zika-related neurological defects among newborns had risen to **10** by **May 19**, and now includes Puerto Rico, while **13** countries and territories where Zika was circulating have reported rising incidence of Guillain-Barre syndrome, and or had laboratory confirmation of the virus among Guillain-Barre cases. **U. S. TERRITORIES AND STATES:** By Mid-May, when the number of Zika cases in Puerto Rico reached **803**, United States territories had reported a total of **836** cases of Zika Virus, **122** of those cases among pregnant women, and **five** cases of Guillain Barre syndrome. While the rate of risks of microcephaly and other impacts associated with Zika virus infection remain unknown, the unmet need for contraception in Puerto Rico is reflected in estimates that two thirds of pregnancies there are unintended. In the U.S., 44 states and the District of Columbia have reported **544** cases of Zika virus, **157** of those cases among pregnant women, and **one** case of Guillain-Barre syndrome in a Zika-infected person. While all cases in the U.S. were acquired through travel or sexual transmission, a Zika-infected traveler returning to parts of the country with established populations of *Aedes* mosquitoes could initiate local virus transmission. The CDC's estimates have projected the potential for the mosquito to breed in 29 states across the country, as far north as Connecticut on the East Coast, and Ohio in the Midwest.

THE NEED

The wide geographical distribution of the mosquito that spreads Zika, lack of population immunity in areas where the virus is spreading, and lack of a vaccine all challenge control of the virus, while the mildness of the symptoms as well as inadequate diagnostic tools complicate surveillance and efforts to monitor potential impacts. The WHO recommends prioritizing the development of tests that can diagnose Zika, dengue and chikungunya viruses. The development of innovative mosquito control technologies also is needed. A protective vaccine is an urgent priority to respond to future epidemics.

Health officials say the approaching rainy season in Puerto Rico when the mosquito that carries Zika multiplies could bring hundreds of thousands of Zika infections with thousands of those among pregnant women. Needs there include screens for windows in regions where they have not previously been used, "prevention kits" for women that include condoms to protect against sexual transmission of the virus, insect repellent and educational material, and answering unmet needs for contraception. While knowledge of the potential impacts of Zika is still accumulating, the plight the spread of the virus poses to communities, families and particularly to women of child-bearing age would be difficult to overstate. Ongoing needs can be expected to include broad and comprehensive education of the general public as well as public health officials and providers; strengthened infrastructure and resources to provide prenatal care, addressing ethics around public policy, cultural influences and medical practice surrounding management of pregnancies with severe malformations, and the potential need to address a wide range of health impacts, including birth defects, in unprecedented numbers across settings where health and public service gaps already challenge capacities to detect, prevent, and monitor the spread of disease. These needs are expected to be duplicated in varying degrees everywhere the virus may be transmitted, while developments in West Africa in the wake of the Ebola crisis there have continued to show that challenges caused by infectious diseases can be ongoing and unforeseen well past control of their initial outbreaks.

ONGOING

The current Zika outbreak demonstrates once again the potential for infectious diseases to move swiftly from obscurity to crises of global proportions. Strongly supported and comprehensive efforts in basic science, applied epidemiology, clinical care delivery, and surveillance are essential to improve domestic and global capacities to combat, predict, and prevent current and future worldwide crises caused by emerging infectious diseases.

Released May 20, 2015

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