



May 2018

# ZIKA SUPPLEMENTAL FUNDING

## Status of HHS Agencies' Obligations, Disbursements, and the Activities Funded

Accessible Version

# GAO Highlights

Highlights of [GAO-18-389](#), a report to congressional committees

## Why GAO Did This Study

Zika—a virus primarily transmitted through mosquito bites—can cause symptoms that include fever, rash, and joint and muscle pain. In pregnant women, the Zika virus can be passed to the fetus and cause severe brain defects. In response to an outbreak in the United States and its territories, Congress appropriated \$932 million in September 2016 through the Zika Response and Preparedness Act to HHS and its agencies to prevent, prepare for, and respond to the Zika virus and its related health conditions, and conduct related research.

The act also included a provision that GAO study the activities supported with the appropriated funds. This report describes (1) the status of funds obligated and disbursed from the Zika supplemental funding appropriated to HHS and its agencies; and (2) how selected awardees used their Zika supplemental funding, and their experiences with applying for and managing the funding. To do this work, GAO reviewed agency documents on Zika supplemental funding and activities, and interviewed officials from the HHS agencies and selected awardees. To select awardees, GAO identified states based on the amount of initial Zika supplemental funding they received from CDC, the Centers for Medicare & Medicaid Services, and the Health Resources and Services Administration; and selected states with the highest and lowest funding. In total, GAO selected 12 awardees: 10 states, as well as one county and one city from 2 of the 10 states.

GAO provided a draft of this report to HHS. In response, HHS provided technical comments, which were incorporated as appropriate.

View [GAO-18-389](#). For more information, contact Marcia Crosse at (202) 512-7114 or [crossem@gao.gov](mailto:crossem@gao.gov).

May 2018

## ZIKA SUPPLEMENTAL FUNDING

### Status of HHS Agencies' Obligations, Disbursements, and the Activities Funded

#### What GAO Found

As of September 30, 2017, Department of Health and Human Services' (HHS) agencies had obligated nearly all of the \$932 million of Zika supplemental funding Congress appropriated in 2016 through the use of multiple funding mechanisms, including cooperative agreements, grants, and contracts. Four HHS agencies had small unobligated balances as of the September 30, 2017, obligation deadline; these balances cannot be used to incur new obligations, but may be used to adjust award amounts in future years. Disbursement of the obligated funds was ongoing, with about 21 percent of the Zika supplemental funding (approximately \$195.5 million) disbursed as of December 31, 2017. The agencies have until September 30, 2022, to disburse the remainder.

#### Zika Supplemental Obligations as of September 30, 2017

In dollars (rounded)

HHS agency	Total supplemental funding	Amount obligated	Unobligated balance
Biomedical Advanced Research and Development Authority	245,000,000	245,000,000	0
Centers for Disease Control and Prevention	394,000,000	393,706,358	293,642
Centers for Medicare & Medicaid Services	75,000,000	74,982,493	17,508
Health Resources and Services Administration	66,000,000	65,978,442	21,558
National Institutes of Health	152,000,000	151,998,591	1,409
<b>Total</b>	<b>932,000,000</b>	<b>931,665,883</b>	<b>334,117</b>

Source: GAO analysis of Department of Health and Human Services (HHS) data. | GAO-18-389

The 12 awardees GAO interviewed—officials from 10 states and two local entities—funded multiple activities with their Zika supplemental funding, and had varying experiences applying for and managing the funds.

- Awardees told GAO that they used their funding to support such activities as collection of information about individuals affected by the Zika virus (human surveillance), mosquito control activities, laboratory capacity building, public outreach, and health care services. For example, Florida used Zika supplemental funding in its state-run laboratories to purchase materials for testing Zika virus-related specimens.
- A majority of the awardees GAO spoke with reported positive experiences applying for and managing the Zika supplemental funding, including good communication with agency officials and awardees' familiarity with the mechanisms used to make the awards. However, some awardees noted challenges, such as time frames to use the funding that varied among multiple awards and identifying the activities that could be funded. These challenges added administrative burdens to applying for and managing the Zika supplemental funding while officials were responding to the outbreak, according to the awardees. In October 2017, the Centers for Disease Control and Prevention (CDC) issued a new notice of funding opportunity that agency officials said is intended to help minimize the administrative burden on states and certain localities during emergencies—such as preparing applications—by pre-approving public health departments in these jurisdictions to be eligible to rapidly receive future awards.

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**Abbreviations**

BARDA	Biomedical Advanced Research and Development Authority
BRFSS	Behavioral Risk Factor Surveillance System

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CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare & Medicaid Services
ELC	Epidemiology and Laboratory Capacity for Infectious Diseases
HHS	Department of Health and Human Services
HRSA	Health Resources and Services Administration
NIH	National Institutes of Health
PHPR	Public Health Preparedness and Response
PHSSEF	Public Health and Social Services Emergency Fund
PRAMS	Pregnancy Risk Assessment Monitoring System

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May 14, 2018

The Honorable Roy Blunt  
Chairman

The Honorable Patty Murray  
Ranking Member

Subcommittee on Labor, Health and Human Services, Education, and  
Related Agencies  
Committee on Appropriations  
United States Senate

The Honorable Tom Cole  
Chairman

The Honorable Rosa DeLauro  
Ranking Member

Subcommittee on Labor, Health and Human Services, Education, and  
Related Agencies  
Committee on Appropriations  
House of Representatives

The Zika virus outbreak in 2015 affected individuals infected with the virus in ways that had not been seen with other infectious disease outbreaks. Zika—a virus primarily transmitted through mosquito bites—can cause symptoms that include fever, rash, conjunctivitis (red eyes), and joint and muscle pain, though many infected individuals do not have symptoms or will only experience mild symptoms. However, in this outbreak, the Zika infection in pregnant women has been linked to adverse pregnancy and birth outcomes: the virus can be passed to the fetus and cause a birth defect of the brain called microcephaly and other severe brain defects, according to the Centers for Disease Control and Prevention (CDC).<sup>1</sup> CDC officials note that this is the first time in more than 50 years that an

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<sup>1</sup>Microcephaly is a rare nervous system disorder that causes a baby's head to be smaller than expected and not fully developed, which can lead to impaired thought processes, delayed motor function, and other adverse outcomes. A study published in December 2017 found that 19 children ages 19 to 24 months born with microcephaly and with laboratory evidence of Zika virus infection experienced problems including an inability to sit independently, difficulties with sleeping and feeding, seizures, and hearing and vision problems. Ashley Satterfield-Nash et al., "Health and Development at Age 19-24 Months of 19 Children Who Were Born with Microcephaly and Laboratory Evidence of Congenital Zika Virus Infection During the 2015 Zika Virus Outbreak—Brazil, 2017," *Morbidity and Mortality Weekly Report*, vol. 66, no. 49 (Dec. 15, 2017): 1347-1351.



infectious pathogen has been identified as the cause of birth defects. The virus is also linked to other problems, such as miscarriage, stillbirth, and other birth defects, as well as Guillain-Barré syndrome, an uncommon sickness of the nervous system.<sup>2</sup> In the western hemisphere, the first cases of locally transmitted Zika virus disease were confirmed in Brazil in May 2015; in the continental United States, the first locally transmitted cases were confirmed in Florida during June to August 2016.<sup>3</sup> The World Health Organization declared the Zika virus a Public Health Emergency of International Concern from February to November 2016, and maintains that it is a significant, enduring public health challenge.

As of January 24, 2018, about 5,600 cases involving Zika virus disease have been reported in the United States and about 37,000 cases have been reported in the U.S. territories, primarily in Puerto Rico. In response to the outbreak, Congress appropriated \$932 million in September 2016 through the Zika Response and Preparedness Act to the Department of Health and Human Services (HHS) and its agencies for activities such as responding to the Zika virus, developing vaccines, and reimbursement for health care costs related to the Zika virus.<sup>4</sup> Specifically, the act appropriated \$394 million to CDC, \$152 million to the National Institutes of Health (NIH), and \$387 million to HHS's Public Health and Social Services Emergency Fund (PHSSEF), of which \$386 million was allocated to additional HHS agencies—the Biomedical Advanced Research and Development Authority (BARDA) within the Office of the Assistant Secretary for Preparedness and Response, the Centers for Medicare & Medicaid Services (CMS), and the Health Resources and Services Administration (HRSA).<sup>5</sup> The agencies had until September 30, 2017, to obligate the funding, for example, by awarding a contract or a

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<sup>2</sup>Guillain-Barré syndrome is a rare disorder in which the body's immune system attacks the nervous system outside the brain and spinal cord, causing muscle weakness and in some cases paralysis, although most people recover.

<sup>3</sup>While the continental United States' first locally transmitted case was identified in Florida, locally transmitted Zika virus was reported in December 2015 in Puerto Rico.

<sup>4</sup>Zika Response and Preparedness Act, Pub. L. No. 114-223, div. B, tit. I, 130 Stat. 857, 901 (2016). For the purposes of this report, we refer to funding appropriated in the Zika Response and Preparedness Act as Zika supplemental funding.

<sup>5</sup>The remaining \$1 million appropriated to HHS's PHSSEF was to be divided equally between HHS's Office of Inspector General and GAO for oversight activities. Pub. L. No. 114-223, § 104, 130 Stat. at 904. Throughout this report we use "agency" to refer to agencies within HHS and the Office of the Secretary, except for HHS's Office of Inspector General.

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grant to an entity (awardee). Agencies have until September 30, 2022, to disburse, or spend, the funding.

The Zika Response and Preparedness Act included a provision that we study activities supported with funds appropriated by the act. In this report, we describe

1. the status of obligations and disbursements of Zika supplemental funding by HHS agencies; and
2. how selected awardees used their Zika supplemental funding, and their experiences with applying for and managing the funding.

To describe the status of obligations and disbursements of Zika supplemental funding by HHS agencies, we analyzed BARDA, CDC, CMS, HRSA, and NIH obligation data as of September 30, 2017—the date funding had to be obligated—and disbursement data as of December 31, 2017—the first full quarter of data available at the time of our review. Each agency provided tabulated data that included information such as the award title, awardee name and location, award amount, award time frame, and the funding mechanism the agency used to award the funding. We interviewed officials from each agency to discuss the status of the agencies' obligations and disbursements of the Zika supplemental funding, the different mechanisms used to award the funding, and the various factors that influenced the obligation and disbursement of the funding to awardees. We also reviewed documentation of the funding opportunity announcements to obtain information such as the activities allowed under each type of award. To determine the reliability of the data provided, we compared the tabulated award amounts received from CDC and HRSA to the actual notices of award provided by both agencies, and compared NIH award data to the amounts reported in NIH's online database. We also obtained information from BARDA, CMS, and NIH officials regarding the underlying financial data systems used to compile the data and the controls in place for recording and maintaining the data. We reviewed the data from each agency for data discrepancies and obtained the information necessary to resolve the discrepancies from relevant agency officials. Furthermore, we interviewed officials from HHS's Office of the Assistant Secretary for Financial Resources on the accuracy of the data and the steps the office takes to verify agencies' obligation and disbursement data. On this basis, we determined that the data were sufficiently reliable for the purposes of our reporting objectives.

Additionally, to describe the various factors that can affect the disbursement of funding after obligation, we interviewed officials representing selected awardees. To select awardees, we first identified states that were awarded Zika supplemental funding from HHS agencies (45 states) based on our review of the amount of initial Zika supplemental funding they received from CDC, CMS, and HRSA. From those 45 states, we judgmentally selected 10 states—5 states with the highest funding and 5 states with the lowest funding—which included the 2 states that experienced local Zika virus transmissions (Florida and Texas). Our selected states with the highest funding were Arizona, California, Florida, Louisiana, and Texas. Our selected states with the lowest funding were Alaska, Colorado, Iowa, Kansas, and Oklahoma.<sup>6</sup> To obtain perspectives of awardees at the local level, we judgmentally selected two local awardees within 2 of the selected states—Houston, Texas, and Los Angeles County, California. For each selected state or jurisdiction, we interviewed state, county, or city officials who could provide information about their Zika supplemental funding. The perspectives of the 12 awardees we interviewed cannot be generalized to other awardees.

To describe how selected awardees used their Zika supplemental funding and gain their perspectives on applying for and managing this funding, we reviewed documentation from the 12 selected awardees to identify the activities they funded. We also interviewed officials from the selected awardees (state officials and officials from one county and one city) about their experiences with using the Zika supplemental funding and to obtain examples of awardees' Zika activities. We conducted site visits to Florida and Texas, because at the time of our work, they alone had reported local Zika virus transmissions.<sup>7</sup> Additionally, we reviewed CDC and CMS documents to determine the amount of funding received and the purpose of the funding for each of the selected awardees. We also interviewed

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<sup>6</sup>In determining states' respective funding levels under the Zika Response and Preparedness Act, we excluded funding awarded by NIH and BARDA to entities other than states. We also excluded a \$44 million appropriation to CDC for the Public Health Emergency Preparedness cooperative agreement program. The Zika Response and Preparedness Act specified that this amount was to restore fiscal year 2016 funds that HHS had reprogrammed for Zika response activities prior to its enactment, which could be used for purposes other than Zika-related activities. See Pub. L. No. 114-223, 130 Stat. at 902.

<sup>7</sup>We planned to conduct a site visit to Puerto Rico, as it was the territory with the most Zika disease cases and also had reported active Zika transmissions. However, we were not able to speak to officials in Puerto Rico due to ongoing recovery efforts following hurricanes Irma and Maria.

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CDC officials regarding any changes the agency has made to its plans for awarding funding in the future.

We conducted this performance audit from April 2017 to May 2018 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

During a disease outbreak, including the Zika virus, HHS is the lead federal agency for public health and medical response, and it leverages national public health and medical resources to prepare for and respond to the outbreak.<sup>8</sup>

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### Zika Virus Transmission and Prevention

The Zika virus is primarily transmitted to humans by infected mosquitoes, but can also be transmitted from mother to child during pregnancy or around the time of birth, or from person-to-person through sexual contact or blood transfusion. According to CDC, once an individual has been infected with the Zika virus, they are likely to be protected from future infections. The *Aedes aegypti* mosquitoes are reportedly the primary mosquito spreading the Zika virus, while the *Aedes albopictus* mosquitoes, which share many of the same traits as *Aedes aegypti*, also

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<sup>8</sup>Within HHS, the Office of the Assistant Secretary for Preparedness and Response leads and coordinates national preparedness and response to outbreaks in the United States. Within that office, BARDA coordinates and supports advanced research and development, manufacturing, and initial procurement of medical countermeasures, such as vaccines, drugs, therapies, and diagnostic tools. CDC monitors and responds to outbreaks by, for example, conducting studies to learn about the link between infection and health outcomes, monitoring and reporting cases of infection, and providing guidance to travelers and health care providers. According to officials, NIH funds and carries out basic and applied research to develop diagnostics, vaccines and therapeutics, as well as epidemiological studies to better understand disease progression and long-term health effects.

have the ability to spread the virus.<sup>9</sup> Local transmission of the virus has occurred in American Samoa, Florida, Puerto Rico, Texas, and the U.S. Virgin Islands. Travel-associated cases of Zika virus infection have been reported in every state, with the largest numbers of cases reported in California, Florida, New York, and Texas.<sup>10</sup>

There is no vaccine to prevent the Zika virus, so CDC guidance recommends preventing the spread of the virus by protecting against mosquito bites by wearing protective clothing, using insect repellent, and staying in places with air conditioning and window and door screens to keep mosquitoes outside, among other actions. Mosquito control in the United States is implemented and overseen at the state and local levels by entities such as mosquito control districts and health agencies. Federal agencies support such control entities with funding and subject matter experts, and may regulate some control methods such as pesticides.

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### Zika Funding Prior to September 2016

In April 2016, the Office of Management and Budget and the Secretary of Health and Human Services announced that they had identified \$589 million—\$510 million of it from existing Ebola virus disease resources within HHS, the Department of State, and the U.S. Agency for International Development—that could quickly be redirected and spent on immediate efforts to control and respond to the spread of the Zika virus. According to HHS, out of the \$589 million, \$374 million was redirected to domestic Zika virus control activities. HHS reports that almost all of this funding (\$354 million) was distributed to three HHS agencies, as follows:

- CDC received \$222 million for various activities including field staff, state response teams, Zika virus testing, tracking of pregnant women who were infected with the Zika virus, and grants for mosquito control and other Zika prevention activities;

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<sup>9</sup>Edward B. Hayes, “Zika Virus Outside Africa,” *Emerging Infectious Diseases*, vol.15, no. 9 (2009): 1347–50; and National Science and Technology Council, *A Strategy for Integrating Best Practices with New Science to Prevent Disease Transmission by Aedes Mosquito Vectors* (Washington, D.C.: December 2016).

<sup>10</sup>CDC’s case counts for travel-associated cases of Zika virus infection, by state, also include cases where the Zika virus was transmitted sexually, through a laboratory, and person-to-person through an unknown route.

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- BARDA received \$85 million for private sector development of Zika vaccines, treatments, and technologies to protect the blood supply, and other countermeasures; and
  - NIH received \$47 million for Zika medical countermeasure development, including clinical trials on the leading Zika vaccine candidate.

Additionally, according to HHS officials, in August 2016, the Secretary of Health and Human Services notified Congress of the department's intent to redirect an additional \$81 million in unobligated HHS funds for Zika vaccine development activities. Of this amount, \$34 million was drawn from accounts at NIH and \$47 million was drawn from funds transferred from other HHS agencies and reprogrammed from within PHSSEF.<sup>11</sup> From these redirected funds, \$34 million (i.e., the amount drawn from other NIH accounts) was to be used by NIH to continue clinical trials on its lead Zika vaccine candidate. The remaining \$47 million was to be used by BARDA for continued private sector Zika vaccine development.

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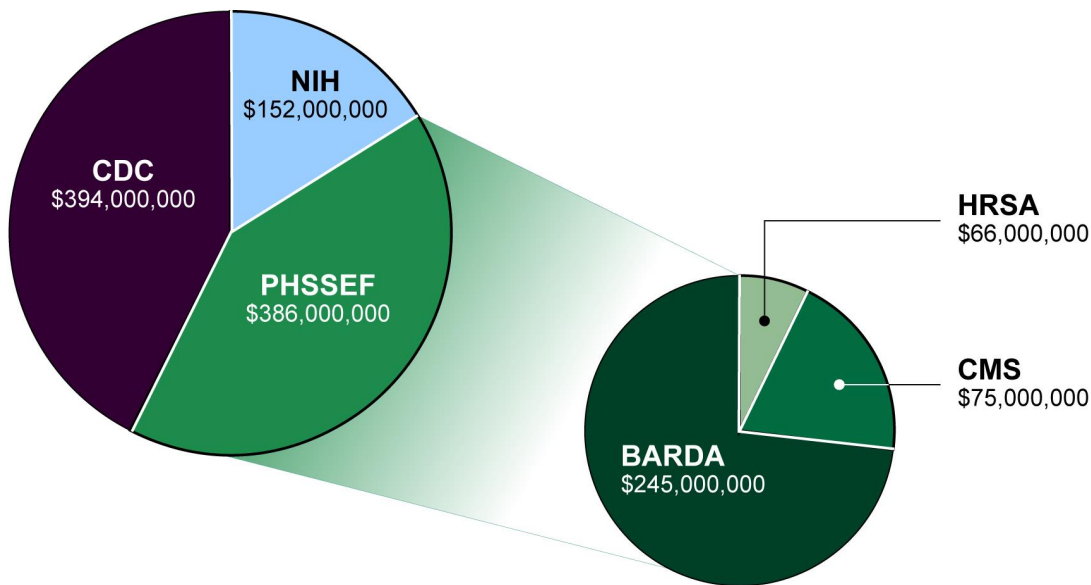
## September 2016 Zika Supplemental Funding

In September 2016, Congress appropriated \$932 million to HHS and its agencies in the Zika Response and Preparedness Act. Of that amount, \$394 million was appropriated directly to CDC and \$152 million was appropriated directly to NIH. The remainder was appropriated to HHS's PHSSEF, from which HHS allocated \$245 million to BARDA within the Office of the Assistant Secretary for Preparedness and Response, \$75 million to CMS, and \$66 million to HRSA. (See fig. 1.)

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<sup>11</sup>Reprogramming is the shifting of funds within an appropriation or account to use them for purposes other than those contemplated at the time of appropriation; it is the shifting of funds from one object class to another or from one program activity to another. See GAO, *A Glossary of Terms Used in the Federal Budget Process*, [GAO-05-734SP](#) (Washington, D.C.: Sept. 1, 2005).

**Figure 1: Total Zika Supplemental Funding by Agency**



Legend:  
 BARDA = Biomedical Advanced Research and Development Authority  
 CDC = Centers for Disease Control and Prevention  
 CMS = Centers for Medicare & Medicaid Services  
 HRSA = Health Resources and Services Administration  
 NIH = National Institutes of Health  
 PHSSEF = Public Health and Social Services Emergency Fund

Source: Department of Health and Human Services document. | GAO-18-389

Note: BARDA is within the Office of the Assistant Secretary for Preparedness and Response. The Zika supplemental funding remained available for obligation until September 30, 2017, for the following purposes:

- CDC: to prevent, prepare for, and respond to the Zika virus, health conditions related to the virus, and other vector-borne diseases, domestically and internationally.<sup>12</sup>
- NIH: for research on the virology, natural history, and pathogenesis of the Zika virus infection, and preclinical and clinical development of vaccines and other medical countermeasures for the Zika virus and other vector-borne diseases, domestically and internationally.

<sup>12</sup>Additionally, CDC was directed to use \$44 million of the funding appropriated by the Zika Response and Preparedness Act to restore fiscal year 2016 funds that were reprogrammed from the Public Health Emergency Preparedness cooperative agreement program for Zika virus response prior to the act's enactment.

- PHSSEF: for various activities, including to prevent, prepare for, and respond to the Zika virus, health conditions related to the virus and other vector-borne diseases, domestically and internationally; and to develop necessary countermeasures and vaccines, including the development and purchase of vaccines, therapeutics, diagnostics, necessary medical supplies, and administrative activities.
- BARDA: HHS allocated funding to BARDA to support further development of Zika vaccine candidates, diagnostics, and pathogen reduction technologies initiated in fiscal year 2016 to advance these projects toward licensure or approval by the Food and Drug Administration.
- CMS: HHS allocated funding to CMS for expenses to support states, territories, tribes, or tribal organizations with active or local transmission cases of the Zika virus, as confirmed by CDC. The funding was allocated to reimburse the costs of health care for health conditions related to the Zika virus, other than costs that are covered by private health insurance, of which not less than \$60 million were for territories with the highest rates of Zika virus transmission.
- HRSA: HHS allocated \$20 million for projects of regional and national significance in Puerto Rico and other U.S. territories, \$40 million to expand the delivery of primary health services in Puerto Rico and the other territories, and \$6 million to be used to assign National Health Service Corps members to Puerto Rico and the other territories to provide primary health services in areas affected by the Zika virus or other vector-borne diseases through the National Health Service Corps Loan Repayment Program.<sup>13</sup>

Agencies have until September 30, 2022, to disburse the Zika supplemental funding appropriated by the Zika Response and Preparedness Act.

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<sup>13</sup>The National Health Service Corps offers financial and other support to primary care providers and sites in underserved communities.



## HHS Agencies Have Obligated Nearly All of the Zika Supplemental Funding; Disbursements Are Ongoing

### Agencies Obligated Nearly All of Their Zika Supplemental Funding as of September 30, 2017, Primarily Through Cooperative Agreements, Grants, and Contracts

We found that as of September 30, 2017—the end of the Zika supplemental appropriation’s period of availability—nearly all Zika supplemental funding had been obligated, primarily through cooperative agreements, grants, and contracts.<sup>14</sup> BARDA obligated 100 percent of its Zika supplemental funding, while CDC, CMS, HRSA, and NIH obligated over 99 percent of their funding.<sup>15</sup> (See table 1.)

**Table 1: Zika Supplemental Funding Obligations as of September 30, 2017**

In dollars (rounded)

HHS agency	Total supplemental funding	Amount obligated	Unobligated balance
Biomedical Advanced Research and Development Authority (BARDA)	245,000,000	245,000,000	0
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Centers for Medicare & Medicaid Services	75,000,000	74,982,493	17,508
Health Resources and Services Administration	66,000,000	65,978,442	21,558
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<b>Total</b>	<b>932,000,000</b>	<b>931,665,883</b>	<b>334,117</b>

Source: GAO analysis of Department of Health and Human Services (HHS) data. | GAO-18-389

<sup>14</sup>A cooperative agreement is an alternative assistance instrument used instead of a grant whenever substantial federal involvement with the recipient during performance is anticipated. For grants, an agency’s involvement is essentially administrative, which includes standard federal stewardship responsibilities, such as reviewing performance to ensure that the objectives, terms, and conditions of the grant are accomplished.

<sup>15</sup>These unobligated balances are not available after September 30, 2017, to incur new obligations. However, agencies can use unobligated balances to correct errors in recording obligations properly incurred during the period of availability or to cover legitimate cost adjustments in future years, such as those that may arise from contract modifications within the general scope of a prior year contract.

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Note: BARDA is within the Office of the Assistant Secretary for Preparedness and Response.

Three of the five agencies had obligated over half of their Zika supplemental funding by January 31, 2017, 4 months after enactment of the appropriation. For example, according to CDC officials, using cooperative agreements with application processes familiar to the awardees helped enable the agency to obligate its funding soon after receiving the appropriation.<sup>16</sup> Some agencies began obligating later in the one-year obligation time frame based on their approach to obligating the Zika supplemental funding. For example, CMS withheld a portion of its supplemental funds in the event additional awardees became eligible for funding within the obligation time frame—eligibility included having active or local transmission of the Zika virus.

Agency officials told us that they used cooperative agreements, grants, and contracts to award Zika supplemental funding to existing and new awardees. The agencies also used other mechanisms to obligate the Zika supplemental funding, such as interagency agreements, intramural research awards, and funding used within the agency for travel and other expenses.<sup>17</sup> According to officials, agencies used these mechanisms to award Zika supplemental funding in the following ways.

- BARDA executed new contracts and modified existing contracts through the agency’s typical contracting process, officials said, for research in the areas of Zika clinical diagnostics and vaccine development. BARDA did not use any Zika supplemental funding to support internal administrative or personnel costs. (See app. I for the contracts BARDA awarded with its Zika supplemental funding.)
- CDC generally obligated Zika supplemental funding to current awardees through existing cooperative agreements, according to agency officials. (See app. II through VII for the cooperative agreements CDC used to award Zika supplemental funding to existing awardees.) CDC also awarded funding through contracts and interagency agreements, and obligated about \$24 million for internal

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<sup>16</sup>Although CDC generally used existing mechanisms familiar to awardees, agency officials explained that the application process still needed to be completed—from creating and publishing notices of funding opportunities to issuing notices of award—prior to the obligation of funding.

<sup>17</sup>Intramural research entails government scientists working in their institutes’ and centers’ own laboratories and clinics. An interagency agreement occurs when one agency either places an order directly against another agency’s contract or uses the contracting services of another agency to obtain supplies or services.

CDC expenses, such as salaries and benefits, travel, supplies, and equipment. (See app. VIII for the contracts and interagency agreements CDC awarded with its Zika supplemental funding.)

- CMS created a new program—the Zika Health Care Services Program—to award its Zika supplemental funding through cooperative agreements, according to agency officials. The purpose of the 3-year program is to support prevention activities and treatment services for women (including pregnant women), children, and men adversely or potentially affected by the Zika virus.<sup>18</sup> CMS awarded funding through the Zika Health Care Services Program to those states, territories, tribes, or tribal organizations with active or local transmission of the Zika virus, as confirmed by CDC. CMS awarded funding to the health departments in American Samoa, Florida, Puerto Rico, and the U.S. Virgin Islands in January 2017. In June 2017, CMS awarded funding to the health department in Texas, the only new state or territory with local transmission of the Zika virus.<sup>19</sup> In both CMS award rounds, only states and territories received awards, because they were the only areas with active or local transmission of the Zika virus. CMS retained about \$3.6 million of the Zika supplemental funding to use for administrative support services, as well as for travel for monitoring and oversight. (See app. IX for the awards CMS made with its Zika supplemental funding.)
- HRSA generally obligated Zika supplemental funding through grants to existing awardees, according to agency officials. HRSA did not retain any Zika supplemental funding for internal activities. (See app. X for the grants HRSA awarded.)
- NIH used grants and contracts to award its Zika supplemental funding to new and existing awardees. NIH also used about \$95 million of the Zika supplemental funding for internal activities—studies conducted by NIH researchers. According to NIH officials, the somewhat unique aspects of the Zika virus as an arbovirus infectious disease led NIH to

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<sup>18</sup>According to CMS documentation, the Zika Health Care Services Program is intended to address four critical components of a comprehensive response to Zika: (1) increase access to contraceptive services for women and men; (2) increase access to and reduce barriers to diagnostic testing, screening, and counseling for pregnant women and newborns; (3) increase access to appropriate specialized health care services for pregnant women, children born to mothers with maternal Zika virus infection, and their families; and (4) improve provider capacity and capability. Awardee needs may vary and some awardees may not have unmet needs across each of the four areas.

<sup>19</sup>According to officials, CMS issued supplemental awards to each of the five grantees in September 2017, using additional remaining funds.

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focus on vaccines as a priority, along with development of diagnostics, therapeutics, vector control, and surveillance.<sup>20</sup> (See app. XI for NIH's Zika supplemental awards.)

For more information on the funding provided by CDC, CMS, and HRSA—the only agencies that provided funding for states and territories—and the number of reported Zika cases by state or territory, see an interactive graphic at <https://www.gao.gov/products/GAO-18-389>.

Officials from all five agencies cited coordination initiatives through regular interagency or organizational teleconferences and participation in working groups. According to CMS officials, during the Zika virus response, CDC, CMS, HRSA, and other federal partners held interagency Zika coordination calls to discuss ongoing developments related to the Zika virus. Additionally, because CMS and HRSA were both awarding funding for perinatal health care services, officials said they collaborated to ensure that activities available through the CMS grants complemented the activities available through HRSA's Special Projects of Regional and National Significance. In addition, HRSA officials reported conducting joint site visits with CDC and CMS, as well as streamlining reporting requirements to reduce grantee reporting burden. Furthermore, BARDA officials said that they awarded and administered a contract for CDC on the development of a vector control product. CDC provided the funding and topical subject matter expertise for the award, and BARDA provided management services for the contract, because of BARDA's experience with these types of contracts. BARDA and NIH officials also reported collaborating on vaccine development. BARDA officials explained that while the vaccine development process requires that different agencies support multiple vaccine development candidates, the two agencies coordinated to avoid redundancy.

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<sup>20</sup>Arthropod-borne viruses (arboviruses) are transmitted to humans primarily through the bites of infected mosquitoes and ticks.

Surveillance is the systematic and continuous collection, analysis, and interpretation of data, closely integrated with the timely and coherent dissemination and assessment of the results by those who have the right to know so that action can be taken. For more information about Zika disease surveillance, see GAO, *Emerging Infectious Diseases: Actions Needed to Address the Challenges of Responding to Zika Virus Disease Outbreaks*, [GAO-17-445](https://www.gao.gov/products/GAO-17-445) (Washington, D.C.: May 23, 2017).

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## Agencies Had Disbursed About 21 Percent of the Zika Supplemental Funding as of December 31, 2017

We found that as of December 31, 2017, the HHS agencies had disbursed about 21 percent (approximately \$195.5 million of \$932 million) of the Zika supplemental funding. According to agency officials and selected awardees we spoke with, various factors can affect the disbursement of funding after obligation. These factors include time to draw down funding from the federal agencies, allowing for program implementation and a planning period, and awardees' internal administrative processes and unique characteristics, as described below.

**Drawdown procedures.** CDC officials said that awardees draw down federal funding on their individual schedules based upon how they manage their federal funding. Some awardees draw down on a daily basis, as needed, while others draw down on a biweekly or monthly basis. Additionally, drawdowns for personnel costs coincide with payroll schedules, which could be biweekly or monthly. For example, in the case of monthly payroll, two awardees told us that the federal funding for a particular month's expenses would be drawn down the following month. Furthermore, selected awardees we spoke with said that they draw down federal funding after they have incurred an expense, such as when they receive an invoice. For example, Los Angeles County officials reported that in order to draw down the funds for the organization that is responsible for servicing their vector control activities, they have to first receive an invoice from the organization, which the county pays with its own funds. Only then can the county draw down the federal funding. This process usually results in at least a 3-month period between receiving the invoice and drawing down the federal funding, officials said.

**Program implementation and planning period.** According to CMS officials, the agency awarded funding to health departments in American Samoa, Florida, Puerto Rico, Texas, and the U.S. Virgin Islands from the Zika Health Care Services Program, which was a new collaboration between CMS and these specific awardees. The officials said that the steps awardees needed to take to stand-up new programs—such as budget review and approval processes, selection of key personnel to administer the grant, grant activities related to contracting, and hiring and procurement—can delay start-up and implementation of the grant programs.

Additionally, CMS gave awardees in the Zika Health Care Services Program a 3-month planning period after they received their notices of award to amend their activities.<sup>21</sup> For example, Texas officials reported that they used the 3-month planning period to work on executing contracts with the local health departments in three counties bordering Mexico. Texas officials explained that collaborating with the local health departments entailed determining the greatest potential benefit of the use of the funds, because the award itself was not enough to cover all of the costs of direct health care services associated with the Zika virus.

**Awardees' processes and characteristics.** Local administrative processes for spending federal supplemental funds can result in varied disbursement time frames. For example, California received Zika supplemental funding for an award that required an amendment to an administrative contract, which state officials said takes about 7 to 8 months for internal state approval. Additionally, certain awardees' characteristics affect disbursements. For example, Houston officials said the city was eligible for and was directly awarded a CDC cooperative agreement, but because it does not conduct vector control activities itself, the city had to negotiate a contract with the surrounding county to conduct these activities, adding additional time before it could begin disbursements.

Officials also noted that awardees' personnel hiring issues can affect disbursement time frames. For example, CMS officials said that some territories experienced delays in carrying out activities due to provider shortages, particularly among specialists needed to care for children with developmental delays and birth defects caused by the Zika virus. CMS officials noted that island jurisdictions, such as the U.S. territories, can find hiring more difficult due to a shortage of health care professionals available within the territory, thus requiring individuals to be recruited from outside the territory, which adds time to the process and raises costs. In addition, Florida officials in Miami-Dade County reported that the

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<sup>21</sup>CMS provided awardees with a 3-month planning period to fine tune the request for all specific activities funded under the award. CMS officials said that they provided this period because there was a limited time provided to submit an application due to the Zika virus being a public health emergency. According to CMS officials, the 3-month planning period enabled awardees to fully analyze and identify a comprehensive set of needs, to fine tune the request for all specific activities funded under the award; to begin the process for staffing, contracting, establishing reimbursement methodologies, and other procurement efforts; to ensure that CMS funding is coordinated with funding from other federal agencies; and to ensure non-duplication of funding from all sources.

necessary staff surge during the Zika response was challenging to fill, noting that it was particularly difficult to find phlebotomists and nurses, because they were in high demand.<sup>22</sup>

Standard vaccine development processes also influenced the rate of disbursement. Due to the long duration of the vaccine development process, BARDA officials said, disbursements to certain awardees have occurred at varying intervals. For example, some contract invoices are received on a monthly basis, or twice a month if the company is a small business. The invoices are then reviewed and if deemed acceptable, they are processed for payment.

The 2017 hurricane season may have affected certain awardees' use of their Zika supplemental funding, which prompted agencies to respond by approving various types of short-term relief for administrative, financial management, and audit requirements for awardees affected by the hurricanes. Three agencies—CDC, CMS, and HRSA—awarded Zika supplemental funding to areas affected by hurricanes Harvey, Irma, and Maria in 2017: Florida, Puerto Rico, Texas, and the U.S. Virgin Islands. CDC officials told us, for example, that because of the hurricanes they granted extensions at the request of the awardees for submitting financial and progress reports, and continuation of activities. Similarly, CMS offered hurricane-affected awardees of the Zika Health Care Services Program the option to extend the deadline for deliverables, if necessary. CMS officials told us that grant activities had been affected by the hurricanes, and all grantees had communicated the intent to fully resume activities as soon as they are able to do so. Due to the 3-year project period for grantees, CMS officials said that the affected entities can still accomplish programmatic responsibilities, even if there is a temporary halt in project activities. Furthermore, HRSA officials said that they provided Puerto Rico and the U.S. Virgin Islands with extensions on required program, financial, and audit reports.<sup>23</sup>

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<sup>22</sup>A phlebotomist is an individual trained to draw blood for tests, transfusions, research, or blood donations.

<sup>23</sup>On October 26, 2017, the Office of Management and Budget released a memorandum to federal agencies with guidance for administrative relief for grantees affected by hurricanes Harvey, Irma, and Maria. Under certain circumstances, agencies could provide flexibility with application deadlines, provide no-cost extensions on expiring awards, allow expenditure of award funds for salaries and other project activities, and waive prior approval requirement waivers, among other actions.

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## Selected Awardees Undertook Multiple Activities with Zika Supplemental Funding, and Had Varying Experiences Applying for and Managing Funds

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### Selected Awardees Used Zika Supplemental Funding for Activities Including Surveillance, Vector Control, Laboratory Capacity, and Health Care Services

Selected awardees we spoke with used Zika supplemental funding for a variety of activities. Collectively, the activities included four primary types: medical surveillance, vector control, laboratory capacity building, and providing health care services, as described below.<sup>24</sup>

- Medical surveillance activities include identifying and reporting Zika virus disease cases to CDC, as well as reporting Zika virus infections in pregnant women and infants to the U.S. Zika Pregnancy Registry.<sup>25</sup>
- Vector control activities include detecting and monitoring *Aedes aegypti* and *Aedes albopictus* mosquito distribution and mosquito control, and monitoring of insecticide resistance and management.
- Laboratory capacity building activities include developing laboratory capacity to perform Zika virus testing.
- Health care service activities for those selected awardees that received funding from CMS (Florida and Texas) included increasing access to contraceptive services for men and women; increasing access to and reducing barriers to diagnostic testing, screening, and counseling for pregnant women and newborns; and increasing access to appropriate specialized health care services for pregnant women,

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<sup>24</sup>The selected awardees we spoke with are Alaska; Arizona; California; Colorado; Florida; Iowa; Kansas; Louisiana; Oklahoma; and Texas; as well as Houston, Tex., and Los Angeles County, Calif.

<sup>25</sup>CDC collaborated with state, tribal, local, and territorial health departments to establish the U.S. Zika Pregnancy Registry as an enhanced national surveillance system to monitor pregnancy and fetal/infant outcomes among pregnancies with laboratory evidence of possible recent Zika virus infection. The U.S. Zika Pregnancy Registry includes data from all 50 states, Washington, D.C., and all U.S. territories except Puerto Rico; pregnancies in Puerto Rico are monitored separately by the Zika Active Pregnancy Surveillance System.



children born to mothers with maternal Zika virus infection, and their families.

Table 2 provides examples of the types of activities funded by the selected awardees we interviewed. This table does not include a comprehensive list of all of the awardees' Zika activities—see appendixes II through VI, and appendix IX for more information on the Zika supplemental funding CDC and CMS awarded to states, territories, and local jurisdictions.

**Table 2: Examples of Activities of Selected Awardees That Received Direct Zika Supplemental Funding from CDC and CMS**

Awardee	Funding received, in dollars, by award type	Examples of activities
Alaska	ELC: 36,867	Alaska's Zika activities include ensuring that procedures are in place to assist in the monitoring of potential Zika cases among pregnant women and their infants; and overseeing the development and dissemination of outreach materials.
Arizona	ELC: 5,161,956 Birth defects: 200,000 BRFSS: 26,000 PHPR: 388,273	Arizona's activities include using a Zika Pregnancy Registry coordinator to assist the local health jurisdictions with interviewing patients, contacting providers, and ensuring timely follow-up for individuals at critical points in time for data collection, as well as transmitting the data to CDC in a timely fashion. Additionally, Arizona officials said that funding will be used for prevention efforts, including producing materials, such as posters, to hand out at events.
California	ELC: 12,496,481 Birth defects: 360,000 PHPR: 2,658,839	California's Zika activities include providing consultation, training, and operational support to detect, monitor, and control <i>Aedes aegypti</i> and <i>Aedes albopictus</i> mosquitoes; providing on-site technical assistance in the event of local transmission; and conducting field-based pesticide resistance testing. According to state officials, California is also conducting education and outreach activities.
Colorado	ELC: 230,065	Colorado's Zika activities include using staff to build and maintain relationships necessary for long-term follow-up of patients and consistent data transmission to the U.S. Zika Pregnancy Registry.
Florida	ELC: 38,298,440 Birth defects: 360,000 BRFSS: 124,976 PHPR: 4,999,979 PRAMS: 40,000 CMS: 2,991,000	Florida's Zika activities include supporting the prevention of active transmission of Zika through source reduction, communication, and control, including the application of ground adulticide treatments, ground larvicide treatments, and aerial adulticide treatments. Additionally, staff will support Zika epidemiology and outreach projects, including involvement with active surveillance, response to any local introductions, follow-up with potentially Zika infected infants, as well as assistance with development and distribution of Zika and mosquito bite prevention outreach to targeted audiences.

Awardee	Funding received, in dollars, by award type	Examples of activities
Houston, Texas	ELC: 2,475,899 Birth defects: 199,804	Houston's Zika activities include providing staff to improve surveillance to monitor the incidence of women and infants who meet the U.S. Zika Pregnancy Registry case definition, identify and report all data to the registry in a timely manner, increase provider support and education, and gather follow-up clinical data on infants to identify developmental delays. According to city officials, Houston also will use the funding for education and outreach, to investigate all reports of suspected Zika exposure and infection, to establish and provide Zika testing for the 16 counties served by the Houston Health Department Bureau of Laboratory Services, and to partner with Harris County, Texas, for vector control activities.
Iowa	ELC: 372,847	According to state officials, Iowa's Zika activities include surveillance and case follow-up.
Kansas	ELC: 85,658	According to state officials, Kansas' Zika activities include staff to work on submitting data to the U.S. Zika Pregnancy Registry, and to follow-up on pregnant women and infants.
Los Angeles County, California	ELC: 1,750,283 Birth defects: 360,000 PHPR: 504,855	Los Angeles County's Zika activities include assigning staff to conduct Zika testing and prepare testing reports, including distinguishing Zika from chikungunya and dengue infections. According to county officials, Los Angeles County also developed hospital protocols and conducted patient tracking and follow-up with pregnant women.
Louisiana	ELC: 3,559,243 Birth defects: 200,000 BRFSS: 100,000 PHPR: 1,437,361	Louisiana's Zika activities include staff to provide outreach to obstetricians and pediatricians in the state to disseminate information regarding the U.S. Zika Pregnancy Registry, proper diagnosis and clinical management of Zika, and how to participate in the registry; and follow-up with health care providers and patients to collect clinical information at designated time intervals on pregnant women and infants meeting the registry inclusion criteria from the point of case identification through 12 months after delivery. According to state officials, Louisiana also added Zika exposure as a risk factor for hearing loss to the state's newborn hearing screening form, and added congenital Zika virus as a maternal risk factor on the state's birth certificate application.
Oklahoma	ELC: 18,121 Birth defects: 108,262	According to state officials, Oklahoma added congenital Zika virus disease (including congenital Zika syndrome) as an automatic qualifier for the Sooner Start Early Intervention program.
Texas	ELC: 18,654,908 Birth defects: 360,000 BRFSS: 124,854 PHPR: 5,000,000 CMS: 2,491,000	According to state officials, Texas' Zika activities include awareness and education of the state's population about Zika risks and prevention; funding to local health departments for surveillance, case investigation, and vector control; providing education and outreach to health care providers to improve the quality of the data within the U.S. Zika Pregnancy Registry; and providing pesticide resistance training. Most of the laboratory funding is used by state-run or associated laboratories.

Legend:

CDC = Centers for Disease Control and Prevention

CMS = Centers for Medicare & Medicaid Services

ELC = Epidemiology and Laboratory Capacity for Infectious Diseases cooperative agreement

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Birth defects = Surveillance, Intervention, and Referral to Services Activities for Infants with Microcephaly or other Adverse Outcomes Linked with the Zika Virus cooperative agreement

BRFSS = Behavioral Risk Factor Surveillance System cooperative agreement

PHPR = Public Health Preparedness and Response Cooperative Agreement for All-Hazards Public Health Emergencies

PRAMS = Pregnancy Risk Assessment Monitoring System cooperative agreement

Source: CDC, CMS, and awardee documentation, and interviews with state, county, and city officials. | GAO-18-389

Of the awardees we spoke with, Florida and Texas were the only states that had experienced local mosquito-borne transmission of the Zika virus. Other selected awardees—which included Arizona, Los Angeles County, and Louisiana—were primarily responding to travel-related cases of Zika virus disease. The following are additional examples of activities funded using Zika supplemental funding. For more information on the types of activities authorized under each award, see appendixes II-VI and IX.

**Florida.** Florida, which has a centralized health department with county-based offices, used Zika supplemental funding for laboratory capacity and vector control activities, among other activities. According to state officials, funding for state-run laboratories was used for purchasing materials, such as those used for testing urine for the Zika virus, and funding staff located in counties to assist with handling Zika samples and testing, data entry, and result reporting to surveillance networks. Additionally, Florida used Zika supplemental funding for local vector control activities. For example, Miami-Dade County officials said that they purchased mosquito traps and removed mosquito breeding grounds, including plants, tires, and other objects that can hold standing water. (See fig. 2 for examples of the mosquito control activities in Miami-Dade County.)

Through CMS's Zika Health Care Services Program, Florida received funding for, among other things, two part-time advanced registered nurse practitioners to provide consultation and technical assistance in family planning clinics, and assist in the prescribing and management of various birth control methods. Florida also funded a health educator for Zika prevention and response duties, which included assisting local health care organizations in the development of educational programming to ensure that health care services are provided in accordance with CDC guidelines. The health educator's duties also included ensuring that pregnant women with the Zika virus and infants with congenital Zika infection are referred to proper care and other available programs and resources.

Figure 2: Examples of Vector Control Activities in Miami-Dade County, Florida

Mosquito “Flowerpot” Trap



**Employment of mosquito control traps:** According to officials, Miami-Dade Mosquito Control Division employs a mosquito control trap that resembles a flower pot and uses larvicide on a floating gauze strip to kill mosquitoes and prevent their offspring from hatching or fully maturing. As of August 2017, there were about 300 of these traps in use by the agency in the areas of Miami-Dade County with identified Zika virus transmission.

Bromeliad plants



**Removal of Bromeliad plants:** According to officials, the Bromeliad—a member of the pineapple family that flourishes in tropical climates—is common throughout the Miami area in both public and residential areas. Bromeliads were a source of significant mosquito breeding in the Miami Beach botanical gardens, which had thousands of the plants; all of the plants were removed from the gardens in a two-day period.

Source: Interviews with officials in Miami-Dade County, Florida. | GAO-18-389

**Texas.** Texas officials said that the state used a CDC award to rapidly identify cases and conduct data analysis of Zika-related birth defects, to enhance surveillance of Zika virus-related birth defects by improving the Texas Birth Defects Registry database, and to facilitate remote access to electronic records. Texas also disseminated prevention materials and interviewed mothers of children with Zika-related birth defects about their

experience in dealing with the health system in order to help identify developmental outcomes of the children.

Texas intends to use its CMS Zika Health Care Services Program funding—awarded on June 30, 2017—to increase clients’ access to contraceptives; for care management, including counseling on Zika virus testing for pregnant women and their families; and for counseling to refer clients for services and support. State officials provided the following information on some of the activities intended for the program.

1. Increasing clients’ access to contraceptives: Community health workers and case management staff will assist clinic providers with informing women and their partners about contraceptive availability and about the potential Zika virus risks during pregnancy. They will also work with the women to determine what messages work best with their partners regarding contraceptives.
2. Care management that includes pre- and post-test counseling on Zika virus testing for pregnant women and their families: Officials said that this activity is important because the CDC testing algorithm is complex, the results from various tests can be confusing, and there can be false positives from the tests. Generally, doctors do not have the time to go through the complexities of these issues with clients, such as how to understand the laboratory tests and results.
3. Counseling to refer clients for services and supports: This can include counseling about various types of resources to support clients pre-delivery, after delivery, and during the infant’s first year of life.


**Arizona.** According to state officials, Zika supplemental funding was used to create an action plan with counties, and increase the state’s ability to raise public awareness about the threat of the Zika virus, its transmission routes, and prevention measures. Officials stated that Arizona’s border with Mexico makes communicating about Zika more complex, because individuals frequently cross the border for a variety of reasons including work, school, and to visit family, and do not necessarily consider themselves to be travelers. Additionally, the state used funding to increase the amount of personal protective equipment for the vector surveillance staff, and set up vector control contracts that could be accessed if the Zika virus spread locally, and in the event that vector control could not be handled at the local level. However, this contracting mechanism was not used, because there was no local transmission of the Zika virus in Arizona. According to state officials, Arizona plans to ask for an extension to use the funding in the next mosquito season. The state health department also sponsored training on mosquito identification.

**Los Angeles County.** County officials said that some funding was used to support personnel involved with Zika surveillance, testing, and case management. This included the detection of cases—individuals diagnosed with Zika infection—and also the dissemination of information to Los Angeles County’s Maternal and Child Health group, which follows pregnant women through delivery and then transfers the cases to the county’s Children’s Medical Services group. For example, according to officials, once a case is identified, information is shared with the relevant vector control district about the location of the case, and the vector control district can then conduct inspection and abatement activities to reduce the risk of a local outbreak. Los Angeles County officials found that this process takes about one week from finding out about a case to completion of inspection and abatement. This included 1 day to get information to the vector control district and 1 to 5 days for completing inspection and abatement. The funding was also used to provide funds to the vector control districts to augment *Aedes* mosquito detection efforts and support outreach activities, according to county officials.

**Louisiana.** Louisiana officials said they used a CDC award, in part, to provide equipment and mileage reimbursement for nurses, who served as clinical liaisons between the birth defects surveillance program and hospitals and physicians statewide, to help enable rapid surveillance activities.

Awardees also funded other activities, such as outreach campaigns. See figure 3 for examples of outreach funded with Zika supplemental funding.

**Figure 3: Examples of Zika Outreach Activities**



**Communication campaign:** Arizona Zika supplemental funding was used for prevention efforts, including producing materials to provide at events such as posters and handouts.

**Text message campaign:** Another health department, the Los Angeles County Department of Public Health, created a free text messaging and web-based public health awareness campaign to educate about and help prevent Zika virus and mosquito-borne infections. Once registered, subscribers received eight messages (two per week for four weeks). The messages covered general information, symptoms and testing, mosquito control, protecting children, travel, and pregnancy.

Sources: Interviews with Arizona and Los Angeles County officials; Arizona Department of Health Services. (photo) | GAO-18-389

## Selected Awardees Had Mixed Experiences Applying for and Managing the Zika Supplemental Funding

While a majority of the 12 selected awardees we spoke with reported positive experiences with the process of applying for and managing the Zika supplemental funding, some awardees cited aspects of the process that were challenging. The awardees we spoke with received much of their supplemental funding from CDC and noted that the process went well: there was good communication with CDC officials; CDC’s Epidemiology and Laboratory Capacity for Infectious Diseases cooperative agreement process to apply for Zika supplemental funds was more streamlined than the regular application process; and awardees

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said they were familiar with the mechanisms, which helped them navigate the process.<sup>26</sup>

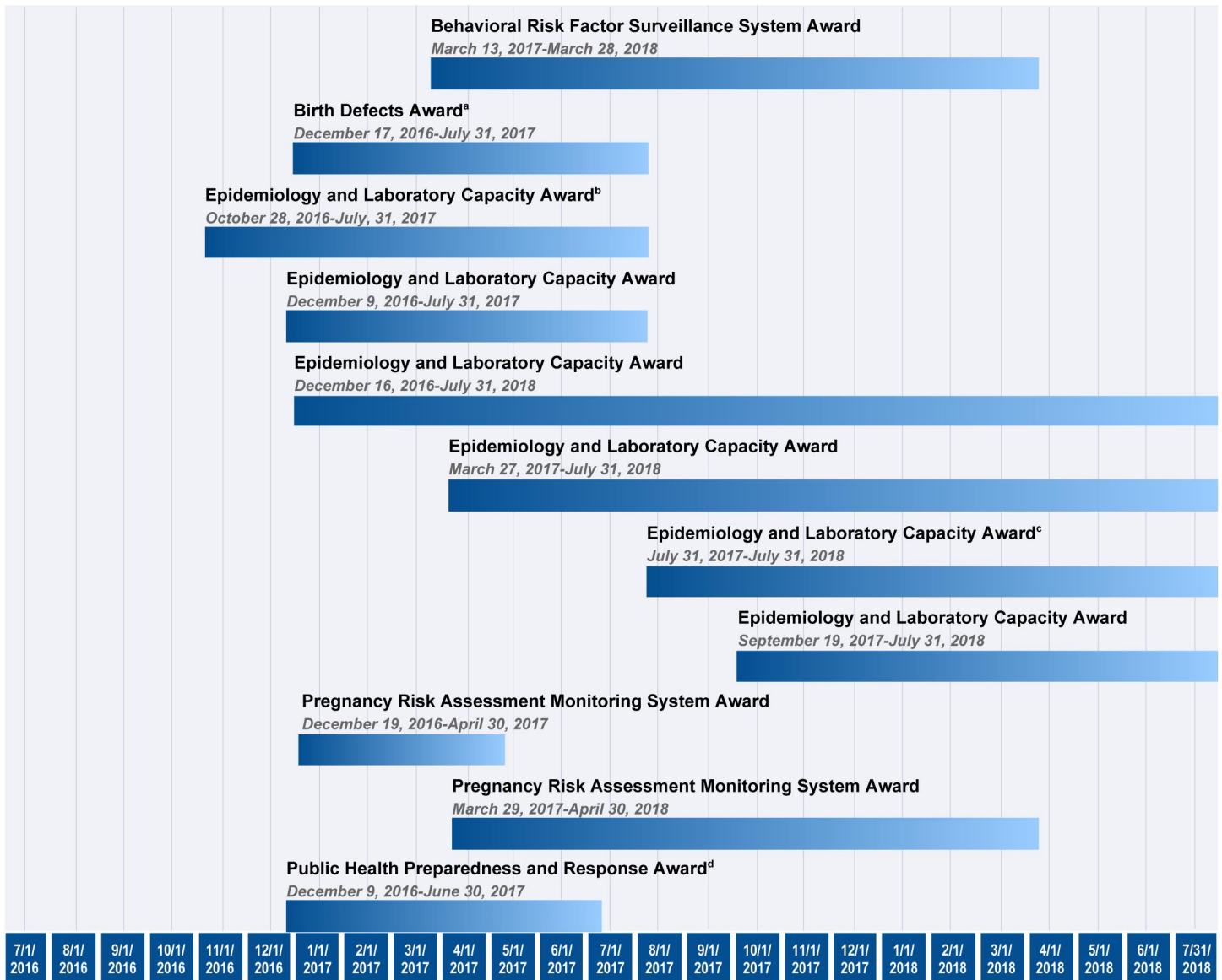
Awardees we spoke to also cited some challenges to applying for and managing the Zika supplemental funding. These awardees noted that various time frames among multiple awards and restrictions on authorized activities under the awards added administrative burdens that officials had to deal with while responding to the outbreak. Florida officials said that the state received funding from different federal agencies, from different cooperative agreement awards, with different deadlines, and different rules on what the funding could be used for. For example, CDC distributed Zika supplemental funds to states and certain localities and territories through five cooperative agreements—some of which had multiple application rounds. Florida officials said that they had to track funding separately and identify the activities that could be funded under each award—administrative requirements that were burdensome during an emergency response. Figure 4 presents the period of time Florida had to use the Zika supplemental funding from multiple awards received from CDC.

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<sup>26</sup>Awardees annually apply for and receive funding through CDC's Epidemiology and Laboratory Capacity for Infectious Diseases cooperative agreement. CDC provided additional awards through this cooperative agreement using its Zika supplemental funding.



**Figure 4: Timeline of Florida’s Zika Supplemental Funding Awards**



Source: Centers for Disease Control and Prevention. | GAO-18-389

<sup>a</sup>The title of the birth defects award is the Surveillance, Intervention, and Referral to Services Activities for Infants with Microcephaly or other Adverse Outcomes Linked with the Zika Virus award. According to officials from the Centers for Disease Control and Prevention (CDC), Florida received a no-cost extension for this award, which extends the period Florida has to use the funding to July 31, 2019.

<sup>b</sup>The title of this award is the Epidemiology and Laboratory Capacity for Infectious Diseases award.

<sup>c</sup>For this Epidemiology and Laboratory Capacity for Infectious Diseases award, CDC officials said that Florida could not begin using the funding until August 1, 2017.

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<sup>d</sup>The title of this award is the Public Health Preparedness and Response Cooperative Agreement for All-Hazards Public Health Emergencies. According to CDC officials, Florida received a no-cost extension for this award, which extends the period Florida has to use the funding to June 30, 2018.

In addition, awardees we spoke with cited challenges with adjusting their plans when federal funding was more or less than anticipated. For example, CDC officials said that they provided average award amount ranges as guidance for awardees as part of the application process for one of CDC's cooperative agreements.<sup>27</sup> Los Angeles County officials said that they applied for an amount that was near the limit, and county officials said that they had to adjust the activities they planned to fund when they received less than what they applied for. Iowa officials said that without knowing exactly how much funding would be available it was difficult to know what to apply for and made staffing changes difficult. Iowa officials had to adjust their initial plan when they later received additional unexpected funding.

In October 2017, CDC issued a new notice of funding opportunity that, according to agency officials, was intended to help minimize the administrative burden on these awardees (e.g., preparing applications and other paperwork) during significant public health emergencies by pre-approving public health departments in these jurisdictions to rapidly receive future awards.<sup>28</sup> This new notice of funding opportunity will be used to establish a list of awardees, with existing emergency preparedness and response capacity, that would be pre-approved for funding by CDC when a public health threat occurs, including infectious disease threats.<sup>29</sup> It requires that awardees have structures and plans in place to receive funding, as well as plans to respond to a public health threat. According to CDC officials, awards could potentially be provided within 2 weeks to pre-approved awardees after supplemental appropriations are enacted. According to CDC officials, as of February 2018, the agency had approved all 64 applicants for the notice of funding

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<sup>27</sup>The approximate award range provided by CDC as guidance for three activities within the cooperative agreement was (1) \$0 to \$10,000,000; (2) \$0 to \$6,000,000; and (3) \$0 to \$550,000.

<sup>28</sup>According to CDC officials, they began thinking about creating the notice of funding opportunity during the 2009 H1N1 response.

<sup>29</sup>The notice of funding opportunity is open to all of CDC's Epidemiology and Laboratory Capacity for Infectious Diseases (ELC) and Public Health Emergency Preparedness awardees, as well as five tribes, which CDC defines as federally or state recognized American Indian or Alaska Native tribal governments serving a population of at least 50,000 members.

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opportunity.<sup>30</sup> This means that CDC will consider these approved applicants for future funding if an emergency occurs and funding becomes available.

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## Agency and Third-Party Comments

We provided a draft of this report to HHS for review and comment. HHS provided technical comments, which we incorporated as appropriate.

We also provided relevant draft portions of this report to the Zika supplemental funding awardees we interviewed. Specifically, we provided the excerpts to officials in Alaska; Arizona; California; Colorado; Florida; Houston, Texas; Iowa; Kansas; Los Angeles County, California; Louisiana; Oklahoma; and Texas. All but one awardee responded. Awardees provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Health and Human Services, and to other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-7114 or [crossem@gao.gov](mailto:crossem@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix XII.



Marcia Crosse  
Director, Health Care

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<sup>30</sup>According to CDC officials, as of December 2017, all of the ELC and Public Health Emergency Preparedness awardees had applied, but no tribes had applied. Agency officials told us that they were contacting the tribes to ensure they were aware of the opportunity. They also said that the application process for the notice of funding opportunity will be reopened at a later date and eligible tribes that are interested in applying will have the opportunity to do so at that time.

# Appendix I: Biomedical Advanced Research and Development Authority's Zika Supplemental Awards

The Biomedical Advanced Research and Development Authority (BARDA), within the Department of Health and Human Services' Office of the Assistant Secretary for Preparedness and Response, executed contracts to obligate its Zika supplemental funding for research in the areas of (1) vaccine development, (2) diagnostic development, and (3) pathogen reduction systems.

Table 3 presents information for each award as it was provided to us by BARDA.

**Table 3: Biomedical Advanced Research and Development Authority's Zika Supplemental Funding Contracts**

Awardee	Activity description	Award (in dollars)
Battelle	Battelle will develop a passive transfer murine model to evaluate Zika vaccines.	1,468,809
Battelle	Battelle will conduct natural history studies for Zika infections in NHPs.	2,383,446
Cerus Corp <sup>a</sup>	This project will advance the INTERCEPT Blood System for pathogen reduction in donated red blood cells. It is already licensed and marketed for use platelets and plasma. The INTERCEPT Blood System is designed to reduce the risk of transfusion-transmitted infections by inactivating a broad range of pathogens such as viruses, bacteria, and parasites that may be present in donated blood. As a part of this project, a Phase 3 clinical study to evaluate safety and efficacy in acute care is being conducted in Puerto Rico.	57,421,416
InBios International Inc.	InBios is developing 2 different Zika IgM diagnostic tests under this contact, a semi-automated test for use in clinical laboratories, which is available under Emergency Use Authorization (EUA), and an easy-to-use lateral flow test for use in point of care settings. Development of both tests are funded through EUA to FDA 510(K) filing.	4,354,808
Moderna Therapeutics Inc <sup>a</sup>	Moderna is presently conducting a Phase 1 trial at three different clinical sites across the U.S. (first and second cohorts have been fully immunized) for an investigational mRNA Zika vaccine. Enrollment continues, and immunogenicity data (unblinded) from this study is expected later this year. Work is also ongoing at Moderna to scale up manufacturing in preparation for a large Phase 2/3 trial to initiate soon after the Phase 1 trial is completed in 2017.	109,112,211

**Appendix I: Biomedical Advanced Research  
and Development Authority's Zika  
Supplemental Awards**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Orasure Technologies Inc.	Orasure is developing a point of care Zika IgM diagnostic test for use in informing the care of pregnant women. The test is an easy-to-use lateral flow test. Development of data to support consideration by the FDA for an Emergency Use Authorization and continued development through FDA 510(K) clearance is included in the contract.	2,612,925
Sanofi Pasteur Inc <sup>b</sup>	Sanofi will complete Zika defined preclinical vaccine development activities. In addition, the Zika case definition study is being conducted in Central and South America. (As of 22 September 2017, 1,131 subjects have been enrolled).	7,500,000
Siemens Healthcare Diagnostics Inc.	Siemens is developing a laboratory Zika IgM blood test for use on 3 automated platforms in their Centaur product line. These are high throughput fully automated blood analysers. When available, this test will greatly increase the Zika testing capacity in the U.S. BARDA is fund work to support consideration of an Emergency Use Authorization by the FDA and continued development to FDA 510(K) approval.	8,945,785
Takeda Vaccines Inc. <sup>a</sup>	Takeda is developing a Zika whole-virus inactivated vaccine which will be adjuvanted with aluminum hydroxide.	51,200,600

Source: Biomedical Advanced Research and Development Authority (BARDA). | GAO-18-389

<sup>a</sup>This awardee received more than one award and funding amounts for awards for the same awardee and activity were added together in this table.

<sup>b</sup>Prior to September 30, 2017, Sanofi Pasteur decided to no longer develop a Zika vaccine. Non-Zika supplemental funding was de-obligated, according to BARDA officials, but the Zika supplemental funding was maintained by the agency to continue support of a Zika case definition study being conducted in Central and South America.

## Appendix II: Centers for Disease Control and Prevention—Epidemiology and Laboratory Capacity for Infectious Diseases Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through the Epidemiology and Laboratory Capacity for Infectious Diseases (ELC) cooperative agreement. CDC awarded Zika supplemental funding for the ELC cooperative agreement for the following activities:

- Zika vector surveillance and control,
- Zika epidemiology and laboratory surveillance, and
- U.S. Zika Pregnancy Registry.<sup>1</sup>

The Zika supplemental funding awarded through the ELC cooperative agreement was to further support and strengthen activities to protect the public's health, especially pregnant women, through epidemiologic surveillance and investigation, improving mosquito control and monitoring, and strengthening laboratory capacity. The funding will also support participation in the U.S. Zika Pregnancy Registry to monitor pregnant women with the Zika virus disease and their infants.

For each award, we present information as it was provided to us by CDC, as well as the activities funded. Table 4 provides information on ELC Zika supplemental funding awarded to states and territories, and table 5 presents information on awards to local health departments.

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<sup>1</sup>Not all awardees received funding for each activity.

**Appendix II: Centers for Disease Control and  
Prevention—Epidemiology and Laboratory  
Capacity for Infectious Diseases Awardees**

**Table 4: Epidemiology and Laboratory Capacity for Infectious Diseases Cooperative Agreement’s Zika Supplemental Funding for States and Territories, by Awardee and Activity Funded**

<b>State/territory</b>	<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Alabama	Alabama Department of Public Health	Zika vector surveillance and control	343,980
		Zika epidemiology and laboratory surveillance	584,738
		U.S. Zika Pregnancy Registry	549,996
		<b>Total</b>	<b>1,478,714</b>
Alaska	Alaska State Department of Health & Social Services	Zika epidemiology and laboratory surveillance	14,874
		U.S. Zika Pregnancy Registry	21,993
		<b>Total</b>	<b>36,867</b>
American Samoa	American Samoa Government	Zika vector surveillance and control	180,822
		Zika epidemiology and laboratory surveillance	454,563
		U.S. Zika Pregnancy Registry	136,200
		<b>Total</b>	<b>771,585</b>
Arizona	Arizona Department of Health Services	Zika vector surveillance and control	1,438,817
		Zika epidemiology and laboratory surveillance	3,615,719
		U.S. Zika Pregnancy Registry	107,420
		<b>Total</b>	<b>5,161,956</b>
Arkansas	Arkansas Department of Health	Zika vector surveillance and control	493,698
		Zika epidemiology and laboratory surveillance	129,539
		U.S. Zika Pregnancy Registry	516,579
		<b>Total</b>	<b>1,139,816</b>
California	Public Health Foundation Enterprises (California)	Zika vector surveillance and control	4,285,687
		Zika epidemiology and laboratory surveillance	7,058,745
		U.S. Zika Pregnancy Registry	1,152,049
		<b>Total</b>	<b>12,496,481</b>
Colorado	Colorado Department of Public Health and Environment	Zika epidemiology and laboratory surveillance	163,688
		U.S. Zika Pregnancy Registry	66,377
		<b>Total</b>	<b>230,065</b>
Connecticut	Connecticut State Department of Public Health	Zika epidemiology and laboratory surveillance	175,820
		U.S. Zika Pregnancy Registry	338,526
		<b>Total</b>	<b>514,346</b>
Delaware	Delaware Health & Social Services	Zika epidemiology and laboratory surveillance	12,791
		U.S. Zika Pregnancy Registry	435,759
		<b>Total</b>	<b>448,550</b>
Federated States of Micronesia	Federated States of Micronesia - FSM	Zika vector surveillance and control	68,717
		Zika epidemiology and laboratory surveillance	144,129
		U.S. Zika Pregnancy Registry	120,000
		<b>Total</b>	<b>332,846</b>
Florida	Florida Department of Health	Zika vector surveillance and control	25,590,915
		Zika epidemiology and laboratory surveillance	11,411,188
		U.S. Zika Pregnancy Registry	1,296,337
		<b>Total</b>	<b>38,298,440</b>
Georgia	Georgia Department of Public Health	Zika vector surveillance and control	302,612
		Zika epidemiology and laboratory surveillance	319,435
		U.S. Zika Pregnancy Registry	103,913
		<b>Total</b>	<b>725,960</b>
Guam	Guam Department of Public Health and Social Services	Zika vector surveillance and control	146,700
		Zika epidemiology and laboratory surveillance	299,191

**Appendix II: Centers for Disease Control and  
Prevention—Epidemiology and Laboratory  
Capacity for Infectious Diseases Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
		U.S. Zika Pregnancy Registry	266,201
		<b>Total</b>	<b>712,092</b>
Hawaii	Hawaii State Department of Health	Zika vector surveillance and control	273,306
		Zika epidemiology and laboratory surveillance	987,937
		<b>Total</b>	<b>1,261,243</b>
Illinois	Illinois Department of Public Health	Zika epidemiology and laboratory surveillance	598,160
		U.S. Zika Pregnancy Registry	566,770
		<b>Total</b>	<b>1,164,930</b>
Indiana	Indiana State Department of Health	Zika epidemiology and laboratory surveillance	43,407
		U.S. Zika Pregnancy Registry	83,111
		<b>Total</b>	<b>126,158</b>
Iowa	Iowa Department of Public Health	Zika epidemiology and laboratory surveillance	261,681
		U.S. Zika Pregnancy Registry	111,166
		<b>Total</b>	<b>372,847</b>
Kansas	Kansas Department of Health and Environment	Zika epidemiology and laboratory surveillance	36,734
		U.S. Zika Pregnancy Registry	48,924
		<b>Total</b>	<b>85,658</b>
Kentucky	Kentucky Cabinet for Health & Family Services	Zika epidemiology and laboratory surveillance	249,384
		U.S. Zika Pregnancy Registry	164,822
		<b>Total</b>	<b>414,206</b>
Louisiana	Louisiana State Office of Public Health	Zika vector surveillance and control	1,450,246
		Zika epidemiology and laboratory surveillance	1,872,956
		U.S. Zika Pregnancy Registry	236,041
		<b>Total</b>	<b>3,559,243</b>
Maine	Maine Department of Health & Human Services	Zika epidemiology and laboratory surveillance	274,351
		U.S. Zika Pregnancy Registry	144,876
		<b>Total</b>	<b>419,227</b>
Marshall Islands	Republic of the Marshall Islands Ministry of Health	Zika vector surveillance and control	119,610
		Zika epidemiology and laboratory surveillance	91,293
		U.S. Zika Pregnancy Registry	83,418
		<b>Total</b>	<b>294,321</b>
Maryland	Maryland Department of Health and Mental Hygiene	Zika vector surveillance and control	137,817
		Zika epidemiology and laboratory surveillance	604,224
		U.S. Zika Pregnancy Registry	453,970
		<b>Total</b>	<b>1,196,011</b>
Massachusetts	Massachusetts Department of Public Health	Zika epidemiology and laboratory surveillance	434,761
		U.S. Zika Pregnancy Registry	546,183
		<b>Total</b>	<b>980,944</b>
Michigan	Michigan Department of Health & Human Services	Zika epidemiology and laboratory surveillance	277,714
		U.S. Zika Pregnancy Registry	218,757
		<b>Total</b>	<b>496,471</b>
Minnesota	Minnesota Department of Health	Zika epidemiology and laboratory surveillance	344,105
		U.S. Zika Pregnancy Registry	95,231
		<b>Total</b>	<b>439,336</b>
Mississippi	Mississippi State Department of Health	Zika vector surveillance and control	1,311,838
		Zika epidemiology and laboratory surveillance	447,215
		U.S. Zika Pregnancy Registry	249,701
		<b>Total</b>	<b>2,008,754</b>



**Appendix II: Centers for Disease Control and  
Prevention—Epidemiology and Laboratory  
Capacity for Infectious Diseases Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Missouri	Missouri Department of Health & Senior Services	Zika epidemiology and laboratory surveillance	169,373
		U.S. Zika Pregnancy Registry	124,903
		<b>Total</b>	<b>294,276</b>
Montana	Montana State Department of Public Health & Human Services	Zika epidemiology and laboratory surveillance	17,137
Nebraska	Nebraska Department of Health and Human Services	Zika epidemiology and laboratory surveillance	21,073
		U.S. Zika Pregnancy Registry	456,365
		<b>Total</b>	<b>477,438</b>
Nevada	Nevada Division of Public and Behavioral Health	Zika epidemiology and laboratory surveillance	227,645
		U.S. Zika Pregnancy Registry	95,409
		<b>Total</b>	<b>323,054</b>
New Hampshire	New Hampshire Department of Health and Human Services	Zika epidemiology and laboratory surveillance	123,684
		U.S. Zika Pregnancy Registry	114,811
		<b>Total</b>	<b>238,495</b>
New Jersey	New Jersey Department of Health	Zika vector surveillance and control	67,500
		Zika epidemiology and laboratory surveillance	733,627
		U.S. Zika Pregnancy Registry	1,080,245
		<b>Total</b>	<b>1,881,372</b>
New Mexico	New Mexico Department of Health	Zika vector surveillance and control	490,684
		Zika epidemiology and laboratory surveillance	843,826
		U.S. Zika Pregnancy Registry	513,799
		<b>Total</b>	<b>1,848,309</b>
New York	Health Research, Inc. (New York State)	Zika epidemiology and laboratory surveillance	1,469,169
		U.S. Zika Pregnancy Registry	642,324
		<b>Total</b>	<b>2,111,493</b>
North Carolina	North Carolina Department of Health and Human Services	Zika epidemiology and laboratory surveillance	137,539
		U.S. Zika Pregnancy Registry	74,359
		<b>Total</b>	<b>211,898</b>
North Dakota	North Dakota State Department of Health	Zika epidemiology and laboratory surveillance	46,648
Northern Mariana Islands	Commonwealth Healthcare Corporation	Zika vector surveillance and control	16,882
		Zika epidemiology and laboratory surveillance	93,355
		U.S. Zika Pregnancy Registry	97,780
		<b>Total</b>	<b>208,017</b>
Ohio	Ohio State Department of Health	Zika epidemiology and laboratory surveillance	411,193
		U.S. Zika Pregnancy Registry	97,757
		<b>Total</b>	<b>508,950</b>
Oklahoma	Oklahoma State Department of Health	Zika epidemiology and laboratory surveillance	18,121
Oregon	Oregon Health Authority, Public Health Division	Zika epidemiology and laboratory surveillance	134,598
		U.S. Zika Pregnancy Registry	159,138
		<b>Total</b>	<b>293,736</b>
Palau	Republic of Palau	Zika vector surveillance and control	90,000
		Zika epidemiology and laboratory surveillance	21,401
		U.S. Zika Pregnancy Registry	35,000
		<b>Total</b>	<b>146,401</b>
Pennsylvania	Pennsylvania State Department of Health	Zika epidemiology and laboratory surveillance	700,766
		U.S. Zika Pregnancy Registry	280,035
		<b>Total</b>	<b>980,801</b>

**Appendix II: Centers for Disease Control and Prevention—Epidemiology and Laboratory Capacity for Infectious Diseases Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Puerto Rico	Puerto Rico Department of Health	Zika epidemiology and laboratory surveillance	2,038,276
		U.S. Zika Pregnancy Registry	741,967
		<b>Total</b>	<b>2,780,243</b>
Rhode Island	Rhode Island Department of Health	Zika epidemiology and laboratory surveillance	212,557
		U.S. Zika Pregnancy Registry	140,879
		<b>Total</b>	<b>353,436</b>
South Carolina	South Carolina Department of Health and Environmental Control	Zika epidemiology and laboratory surveillance	136,644
		U.S. Zika Pregnancy Registry	283,230
		<b>Total</b>	<b>419,874</b>
South Dakota	South Dakota Department of Health	U.S. Zika Pregnancy Registry	168,893
Tennessee	Tennessee State Department of Health	Zika epidemiology and laboratory surveillance	497,947
		U.S. Zika Pregnancy Registry	550,000
		<b>Total</b>	<b>1,047,947</b>
Texas	Texas Department of State Health Services	Zika vector surveillance and control	3,662,766
		Zika epidemiology and laboratory surveillance	13,978,845
		U.S. Zika Pregnancy Registry	1,013,297
		<b>Total</b>	<b>18,654,908</b>
Utah	Utah Department of Health	Zika epidemiology and laboratory surveillance	206,704
		U.S. Zika Pregnancy Registry	45,242
		<b>Total</b>	<b>251,946</b>
Vermont	Vermont Agency of Human Services	Zika epidemiology and laboratory surveillance	15,661
Virginia	Virginia Department of Health	Zika epidemiology and laboratory surveillance	708,799
		U.S. Zika Pregnancy Registry	189,447
		<b>Total</b>	<b>898,246</b>
U.S. Virgin Islands	Virgin Islands Department of Health	Zika vector surveillance and control	984,690
		Zika epidemiology and laboratory surveillance	865,970
		U.S. Zika Pregnancy Registry	1,169,735
		<b>Total</b>	<b>3,020,395</b>
Washington	Washington State Department of Health	Zika epidemiology and laboratory surveillance	476,691
		U.S. Zika Pregnancy Registry	118,618
		<b>Total</b>	<b>595,309</b>
West Virginia	West Virginia Department of Health and Human Services	Zika epidemiology and laboratory surveillance	168,241
		U.S. Zika Pregnancy Registry	108,262
		<b>Total</b>	<b>276,503</b>
Wisconsin	Wisconsin Department of Health Services	Zika epidemiology and laboratory surveillance	443,218
		U.S. Zika Pregnancy Registry	113,636
		<b>Total</b>	<b>556,854</b>

Source: Centers for Disease Control and Prevention. | GAO-18-389

In addition to states and territories, six large city and county local health departments—Chicago, the District of Columbia, Houston, Los Angeles County, New York City, and Philadelphia—received ELC Zika supplemental awards.

**Appendix II: Centers for Disease Control and Prevention—Epidemiology and Laboratory Capacity for Infectious Diseases Awardees**

**Table 5: Epidemiology and Laboratory Capacity for Infectious Diseases Cooperative Agreement’s Zika Supplemental Funding for Local Health Departments, by Awardee and Activity Funded**

<b>City/county</b>	<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Chicago	City of Chicago Department of Public Health	Zika epidemiology and laboratory surveillance	157,889
		U.S. Zika Pregnancy Registry	182,496
		<b>Total</b>	<b>340,385</b>
District of Columbia	District of Columbia Department of Health	Zika epidemiology and laboratory surveillance	839,959
		U.S. Zika Pregnancy Registry	219,113
		<b>Total</b>	<b>1,059,072</b>
Houston	Houston Department of Health and Human Services	Zika vector surveillance and control	1,250,000
		Zika epidemiology and laboratory surveillance	723,104
		U.S. Zika Pregnancy Registry	502,795
		<b>Total</b>	<b>2,475,899</b>
Los Angeles County	County of Los Angeles Department of Public Health	Zika vector surveillance and control	614,952
		Zika epidemiology and laboratory surveillance	585,331
		U.S. Zika Pregnancy Registry	550,000
		<b>Total</b>	<b>1,750,283</b>
New York City	New York City Department of Health & Mental Hygiene	Zika epidemiology and laboratory surveillance	854,650
		U.S. Zika Pregnancy Registry	521,554
		<b>Total</b>	<b>1,376,204</b>
Philadelphia	Philadelphia Department of Public Health	Zika epidemiology and laboratory surveillance	237,516
		U.S. Zika Pregnancy Registry	215,103
		<b>Total</b>	<b>452,619</b>

Source: Centers for Disease Control and Prevention. | GAO-18-389

# Appendix III: Centers for Disease Control and Prevention—Birth Defects Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through the Surveillance, Intervention, and Referral to Services Activities for Infants with Microcephaly or other Adverse Outcomes Linked with the Zika Virus (birth defects) cooperative agreement.<sup>1</sup>

The Zika supplemental funding awarded through the birth defects cooperative agreement was to provide additional resources to better establish, enhance, and maintain rapid population-based surveillance of microcephaly and other adverse outcomes (especially central nervous system defects) possibly linked to Zika virus infection during pregnancy using an active case-finding methodology; participation in centralized pooled clinical and surveillance data projects; ensuring affected infants and families are referred to services; and assessing health and developmental outcomes of these children.

Table 6 presents information for each award as it was provided to us by CDC.

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<sup>1</sup>The birth defects award for cities and counties is the Surveillance, Intervention, and Referral to Services Activities for Infants with Microcephaly or other Adverse Outcomes Linked with the Zika Virus - High Risk Local Areas Cooperative Agreement.

**Appendix III: Centers for Disease Control and  
Prevention—Birth Defects Awardees**

**Table 6: Birth Defects Cooperative Agreement Zika Supplemental Funding by Awardee**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
Alabama	Alabama Department of Public Health	199,952
American Samoa	American Samoa Government	200,000
Arizona	Arizona Department of Health Services	200,000
Arkansas	Arkansas Children’s Hospital Research	200,000
California	California Department of Public Health	360,000
California	County of Los Angeles Department of Public Health	360,000
Federated States of Micronesia	Federated States of Micronesia - FSM	137,437
Florida	Florida Department of Health	360,000
Georgia	Georgia Department of Public Health	280,000
Guam	Guam Department of Public Health and Social Services	163,340
Hawaii	Hawaii State Department of Health	200,000
Illinois	City of Chicago Department of Public Health	100,000
Illinois	Illinois Department of Public Health	180,000
Indiana	Indiana State Department of Health	200,000
Iowa	University of Iowa	100,000
Kentucky	Kentucky Cabinet for Health & Family Services	200,000
Louisiana	Louisiana State Office of Public Health	200,000
Marshall Islands	Republic of the Marshall Islands Ministry of Health	200,000
Massachusetts	Massachusetts Department of Public Health	100,000
Minnesota	Minnesota Department of Health	100,000
Mississippi	Mississippi State Department of Health	200,000
Missouri	Missouri Department of Health & Senior Services	200,000
Nebraska	Nebraska Department of Health and Human Services	77,427
Nevada	Southern Nevada Health District	200,000
New Jersey	New Jersey Department of Health	280,000
New York	Health Research, Inc. (New York State)	359,999
New York	New York City Department of Health & Mental Hygiene	352,287
North Carolina	North Carolina Department of Health and Human Services	280,000
Northern Mariana Islands	Commonwealth Healthcare Corporation	200,000
Ohio	Ohio State Department of Health	280,000
Oklahoma	Oklahoma State Department of Health	108,262
Pennsylvania	Pennsylvania State Department of Health	280,000
Pennsylvania	Philadelphia Department of Public Health	174,093
Puerto Rico	Puerto Rico Department of Health	200,000
Rhode Island	Rhode Island Department of Health	100,000

**Appendix III: Centers for Disease Control and  
Prevention—Birth Defects Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
South Carolina	South Carolina Department of Health and Environmental Control	200,000
Tennessee	Tennessee State Department of Health	200,000
Texas	Houston Health Department	199,804
Texas	Texas Department of State Health Services	360,000
U.S. Virgin Islands	Virgin Islands Department of Health	199,885
Utah	Utah Department of Health	100,000
West Virginia	West Virginia Department of Health and Human Services	192,150
Wisconsin	Wisconsin Department of Health Services	100,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

# Appendix IV: Centers for Disease Control and Prevention—Behavioral Risk Factor Surveillance System Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through the Behavioral Risk Factor Surveillance System (BRFSS) cooperative agreement.

The Zika supplemental funding awarded through the BRFSS cooperative agreement was to conduct a rapid population-based assessment of women and couples using or in need of contraceptives in order to provide comprehensive contraceptive services related to Zika virus exposure.

Table 7 presents information for each award as it was provided to us by CDC.

**Table 7: Behavioral Risk Factor Surveillance System Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee	Award (in dollars)
Alabama	Alabama Department of Public Health	104,641
Arizona	Arizona Department of Health Services	26,000
District of Columbia	District of Columbia Department of Health	116,618
Florida	Florida Department of Health	124,976
Georgia	Georgia Department of Public Health	100,000
Guam	Guam Department of Public Health and Social Services	73,111
Louisiana	Louisiana State Office of Public Health	100,000
Maryland	Maryland Department of Health and Mental Hygiene	65,139
Mississippi	Mississippi State Department of Health	100,000
New Mexico	New Mexico Department of Health	125,000
New York	Health Research, Inc. (New York State)	125,000

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**Appendix IV: Centers for Disease Control and  
Prevention—Behavioral Risk Factor  
Surveillance System Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
Puerto Rico	Puerto Rico Department of Health	124,294
Texas	Texas Department of State Health Services	124,854
U.S. Virgin Islands	Virgin Islands Department of Health	50,756

Source: Centers for Disease Control and Prevention. | GAO-18-389



# Appendix V: Centers for Disease Control and Prevention—Pregnancy Risk Assessment Monitoring System Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through the Pregnancy Risk Assessment Monitoring System (PRAMS) cooperative agreement.

The Zika supplemental funding awarded through the PRAMS cooperative agreement was to assess maternal behaviors and experiences related to Zika virus exposure among recently pregnant women who deliver a live-born infant in the United States.

Table 8 presents information for each award as it was provided to us by CDC.

**Table 8: Pregnancy Risk Assessment Monitoring System Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee <sup>a</sup>	Award (In dollars)
Alabama	Alabama Department of Public Health	29,993
Connecticut	Connecticut State Department of Public Health	40,000
District of Columbia	District of Columbia Department of Health	29,916
Florida	Florida Department of Health	40,000
Georgia	Georgia Department of Public Health	40,000
Illinois	Illinois Department of Public Health	40,000
Indiana	Indiana State Department of Health	30,000
Massachusetts	Massachusetts Department of Public Health	40,000
Missouri	Missouri Department of Health & Senior Services	30,000
New Jersey	New Jersey State Department of Health & Senior Services	40,000
New York	Health Research, Inc. (New York State)	30,000

**Appendix V: Centers for Disease Control and  
Prevention—Pregnancy Risk Assessment  
Monitoring System Awardees**

<b>State/territory</b>	<b>Awardee<sup>a</sup></b>	<b>Award (In dollars)</b>
Pennsylvania	Pennsylvania State Department of Health	29,830
Puerto Rico	Puerto Rico Department of Health	830,000
South Carolina	South Carolina Department of Health and Environmental Control	39,975
Tennessee	Tennessee State Department of Health	40,000
Virginia	Virginia Department of Health	39,953
Wisconsin	Wisconsin Department of Health Services	24,171

Source: Centers for Disease Control and Prevention. | GAO-18-389

<sup>a</sup>These awardees received more than one award and funding amounts for awards for the same awardee were added together in this table.

# Appendix VI: Centers for Disease Control and Prevention—Public Health Preparedness and Response Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through the Public Health Preparedness and Response (PHPR) Cooperative Agreement for All-Hazards Public Health Emergencies.

According to CDC officials, the Zika supplemental funding awarded through the PHPR cooperative agreement was to enable identified state, territorial, and local jurisdictions to address Zika virus disease planning and operational response gaps.

Table 9 presents information for each award as it was provided to us by CDC.

**Table 9: Public Health Preparedness and Response Cooperative Agreement for All-Hazards Public Health Emergencies Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee	Award (in dollars)
Alabama	Alabama Department of Public Health	522,093
American Samoa	American Samoa Government	453,009
Arizona	Arizona Department of Health Services	388,273
Arkansas	Arkansas Department of Health	212,707
California	California Department of Public Health	2,658,839
California	County of Los Angeles Department of Public Health	504,855
Federated States of Micronesia	Federated States of Micronesia - FSM	289,088
Florida	Florida Department of Health	4,999,979
Georgia	Georgia Department of Public Health	203,738
Guam	Guam Department of Public Health and Social Services	134,614
Hawaii	Hawaii State Department of Health	58,603
Kentucky	Kentucky Cabinet for Health & Family Services	428,132

**Appendix VI: Centers for Disease Control and Prevention—Public Health Preparedness and Response Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
Louisiana	Louisiana State Office of Public Health	1,437,361
Marshall Islands	Republic of the Marshall Islands Ministry of Health	86,300
Maryland	Maryland Department of Health and Mental Hygiene	288,558
New Jersey	New Jersey Department of Health	933,995
New York	Health Research, Inc. (New York State)	1,086,913
New York	Public Health Solutions (NYC)	1,294,244
Northern Mariana Islands	Commonwealth Healthcare Corporation	86,976
Puerto Rico	Puerto Rico Department of Health	3,931,723
Texas	Texas Department of State Health Services	5,000,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

# Appendix VII: Centers for Disease Control and Prevention—Other Cooperative Agreements’ Awardees

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through additional cooperative agreements.

Tables 10-17 present information for each award as it was provided to us by CDC.

## Administrative Support for the Zika Supplemental for Sentinel Enhanced Dengue Surveillance System Project

The Zika supplemental funding awarded through the Sentinel Enhanced Dengue Surveillance System Project cooperative agreement was to support sites working to provide new information on dengue and other acute febrile illnesses in Puerto Rico, which is located in the subtropics and where dengue epidemiology is similar to dengue endemic areas worldwide. The Zika supplemental funding was for two studies: (1) pregnant women with Zika infection, and (2) postnatal Zika infection by following 0-5 year old children.

**Table 10: Sentinel Enhanced Dengue Surveillance System Project Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee	Award (in dollars)
Puerto Rico	Ponce School of Medicine	500,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

## Vector-Borne Disease Regional Centers of Excellence

The Zika supplemental funding awarded through the Vector-Borne Disease Regional Centers of Excellence cooperative agreement is to establish regional centers of excellence aimed at building the capacity to address the problem of emerging and exotic vector-borne diseases in the United States, including Zika virus infection.

**Table 11: Vector-Borne Disease Regional Centers of Excellence Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee	Award (in dollars)
California	University of California – Davis	8,000,000
Florida	University of Florida	9,999,628
New York	Cornell University	9,999,936
Texas	University of Texas Medical Branch, Galveston	9,995,253
Wisconsin	University of Wisconsin	9,999,491

Source: Centers for Disease Control and Prevention. | GAO-18-389

## Enhancing Capacity for Vector Surveillance and Control to Prevent Zika, Dengue and Chikungunya Infection in Puerto Rico

The Zika supplemental funding awarded through the Enhancing Capacity for Vector Surveillance and Control to Prevent Zika, Dengue and Chikungunya Infection in Puerto Rico cooperative agreement is to fund activities to increase the surveillance and control of vectors, specifically *Aedes aegypti* mosquitoes (the vector of dengue, chikungunya, and Zika). The purpose of the program is to establish a vector control unit to oversee and implement comprehensive vector control activities in Puerto Rico.

**Table 12: Enhancing Capacity for Vector Surveillance and Control to Prevent Zika, Dengue and Chikungunya Infection in Puerto Rico Cooperative Agreement’s Zika Supplemental Funding by Awardee**

State/territory	Awardee	Award (in dollars)
Puerto Rico	Puerto Rico Science, Technology & Research Trust	14,000,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

## Immunization Grants-CDC Partnership: Strengthening Public Health Laboratories

The Zika supplemental funding awarded through the Immunization Grants-CDC Partnership: Strengthening Public Health Laboratories cooperative agreement is to promote quality and safe public health laboratory practice, improve public health laboratory infrastructure, strengthen the public health laboratory system, and develop a well-trained public health laboratory workforce.

**Table 13: Immunization Grants-CDC Partnership: Strengthening Public Health Laboratories Cooperative Agreement’s Zika Supplemental Funding by Awardee**

Awardee	Award (in dollars)
Association of Public Health Laboratories (APHL)	250,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

## Building Capacity of the Public Health System to Improve Population Health through National, Nonprofit Organizations

According to CDC officials, the Zika supplemental funding awarded through the Building Capacity of the Public Health System to Improve Population Health through National, Nonprofit Organizations cooperative agreement is to ensure national capacity for responding to the Zika outbreak and meeting the needs of those affected, such as by reaching out to specialized constituents to ensure they were informed on epidemiology and practice guidelines.

**Table 14: Building Capacity of the Public Health System to Improve Population Health through National, Nonprofit Organizations Cooperative Agreement’s Zika Supplemental Funding by Awardee**

Awardee	Award (in dollars)
American Academy of Pediatrics	740,000
Association of State & Territorial Health Officials (ASTHO)	1,150,000
Council of State & Territory Epidemiologists (CSTE)	500,000
March of Dimes Birth Defects Foundation	914,757
National Association of City & County Health Officials (NACCHO) <sup>a</sup>	900,000
National Indian Health Board (NIHB)	500,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

<sup>a</sup>This awardee received more than one award and funding amounts for these awards were added together in this table.

## Strengthening the Public Health System in the U.S.-Affiliated Pacific Islands

The Zika supplemental funding awarded through the Strengthening the Public Health System in the U.S.-Affiliated Pacific Islands cooperative agreement is to provide capacity building assistance through a regional, nonprofit organization to strengthen the U.S.-Affiliated Pacific Islands’ public health leadership, workforce, and public health systems and infrastructure in response to Zika virus within the U.S. Pacific territories.

**Table 15: Strengthening the Public Health System in the U.S.-Affiliated Pacific Islands Cooperative Agreement’s Zika Supplemental Funding by Awardee**

Awardee	Award (in dollars)
Pacific Island Health Officers Association (PIHOA) <sup>a</sup>	400,000

Source: Centers for Disease Control and Prevention. | GAO-18-389

<sup>a</sup>This awardee received more than one award and funding amounts for these awards were added together in this table.

## Pan American Health Organization: Building Capacity and Networks to Address Emerging Infectious Diseases in the Americas

The Zika supplemental funding awarded through the Pan American Health Organization: Building Capacity and Networks to Address Emerging Infectious Diseases in the Americas cooperative agreement is for various activities including technical assistance, such as to develop standard operating procedures for diagnostic and integrated surveillance activities, as well as to support the development, implementation, and evaluation of diagnostic and surveillance guidelines.

**Table 16: Pan American Health Organization: Building Capacity and Networks to Address Emerging Infectious Diseases in the Americas Cooperative Agreement’s Zika Supplemental Funding by Awardee**

Awardee	Award (in dollars)
Pan American Health Organization	500,000

Source: Centers for Disease Control and Prevention. | GAO-18-389



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## Global Health Security Partner Engagement: Expanding Efforts and Strategies to Protect and Improve Public Health Globally

According to CDC officials, the Zika supplemental funding awarded through the Global Health Security Partner Engagement: Expanding Efforts and Strategies to Protect and Improve Public Health Globally cooperative agreement is for enhanced surveillance for pregnant women in Colombia, including laboratory testing and case investigations.

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**Table 17: Global Health Security Partner Engagement: Expanding Efforts and Strategies to Protect and Improve Public Health Globally Cooperative Agreement's Zika Supplemental Funding by Awardee**

Awardee	Award (in dollars)
Vysnova Partners, Inc.	999,790

Source: Centers for Disease Control and Prevention. | GAO-18-389

# Appendix VIII: Centers for Disease Control and Prevention—Contracts and Interagency Agreements

This appendix presents information on Zika supplemental funding awards made by the Centers for Disease Control and Prevention (CDC) through additional contracts and interagency agreements.

Tables 18 and 19 present information for each award as it was provided to us by CDC, as well as the activity funded.

**Table 18: Centers for Disease Control and Prevention Zika Supplemental Funding Contracts by Awardee and Activity Funded**

Awardee	Activity funded	Award (in dollars)
AB Sciex	Laboratory Capacity, Acceleration, Equipment	21,403.00
ABT Associates <sup>a</sup>	Public Health Outreach and Control	10,658,187.99
ABT Associates <sup>b</sup>	Public Health Emergency Preparedness	(1,082,005.00)
Agilent Technologies	Laboratory Capacity, Acceleration, Equipment	32,440.49
Air Science USA	Laboratory Capacity, Acceleration, Equipment	7,355.99
Alivepromo, Inc	Public Health Emergency Preparedness	728,736.08
All Business Machines, Inc	Laboratory Capacity, Acceleration, Equipment	66,823.20
Altus Technical Solutions	Laboratory Capacity, Acceleration, Equipment	108,000.00
Amdex Corporation	Public Health Emergency Preparedness	261,424.80
American Toner & Ink	Public Health Emergency Preparedness	3,827.25
AP&G Co, Inc	Vector Surveillance and Control	32,505.80
Applied Medical Technologies, Inc.	Laboratory Capacity, Acceleration, Equipment	7,889.16
Aprisa Technology	Vector Surveillance and Control	8,671.23
Arist Medical Sciences University	Laboratory Capacity, Acceleration, Equipment	52,800.00
Aspen Commercial Group	Vector Surveillance and Control; Surveillance, Epidemiology, and Public Health Investigations	818,731.41
Aspen Commercial Group	Laboratory Capacity, Acceleration, Equipment	71,139.96
Atlanta Biologicals	Laboratory Capacity, Acceleration, Equipment	6,173.82
AUS Marketing Research Systems, Inc.	Surveillance, Epidemiology, and Public Health Investigations	100,000.00

**Appendix VIII: Centers for Disease Control and  
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<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Battelle Memorial Institute	Laboratory Capacity, Acceleration, Equipment	187,952.00
Becton, Dickson & Co. <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	404,651.87
BioAnalytical Instruments <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	450,766.67
BioAnalytical Instruments	Surveillance, Epidemiology, and Public Health Investigations	25,200.00
Biocare Medical	Laboratory Capacity, Acceleration, Equipment	55,366.00
Biocold Environmental, Inc	Laboratory Capacity, Acceleration, Equipment	15,025.00
Bio-Nuclear	Laboratory Capacity, Acceleration, Equipment	149,951.19
Bio-Rad Laboratories	Laboratory Capacity, Acceleration, Equipment	24,950.00
Bio-Rad Laboratories	Vector Surveillance and Control	3,741.00
Biotek Instruments <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	75,486.93
Booz Allen Hamilton <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	452,966.45
Booz Allen Hamilton	Public Health Emergency Preparedness	1,145,449.43
Booz Allen Hamilton	Vector Surveillance and Control	3,500.00
Bruker Daltonics	Laboratory Capacity, Acceleration, Equipment	20,281.00
Caduceus Healthcare <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	1,949,351.04
Caduceus Healthcare	Vector Surveillance and Control; Laboratory Capacity, Acceleration, Equipment; Public Health Outreach and Control	374,336.60
Caduceus Healthcare, Inc	Public Health Outreach and Control	249,956.60
Caduceus Healthcare, Inc	Laboratory Capacity, Acceleration, Equipment	483,573.33
Canon <sup>a</sup>	Public Health Emergency Preparedness	69,526.24
Carl Zeiss Microscopy, LLC	Laboratory Capacity, Acceleration, Equipment	194,126.64
Carter Consulting	Surveillance, Epidemiology, and Public Health Investigations	120,497.00
CDI Laboratories, Inc.	Vector Surveillance and Control	16,800.00
Certified Technical Experts <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	229,142.00
Chenega Government Consulting, LLC <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	132,902.62
Chickasaw Health Consulting	Public Health Emergency Preparedness	31,820.00
Chickasaw Management Services, LLC	Public Health Outreach and Control	193,477.20
CNI Advantage, LLC <sup>a</sup>	Public Health Emergency Preparedness	2,068,011.79
CNI Advantage, LLC	Public Health Emergency Preparedness; Surveillance, Epidemiology, and Public Health Investigations	89,403.31
CNI Advantage, LLC <sup>a</sup>	Surveillance, Epidemiology, and Public Health Investigations	7,893,052.52
Communications Professionals, Inc.	Vector Surveillance and Control	15,620.00
Crimson Imaging Supplies, LLC	Public Health Emergency Preparedness	11,073.34
CTG Associates	Public Health Emergency Preparedness	75,699.00
Davis, James	Public Health Emergency Preparedness	6,689.85
Deloitte Consulting	Surveillance, Epidemiology, and Public Health Investigations	1,381,711.80

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<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Diagger Scientific, Inc. <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	21,687.00
Digital Video Group, Inc	Public Health Emergency Preparedness	96,389.90
DOC Development, Inc <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	12,395.72
Eagle Medical Services	Public Health Emergency Preparedness; Surveillance, Epidemiology, and Public Health Investigations	931,963.19
Eagle Medical Services	Surveillance, Epidemiology, and Public Health Investigations	1,999,961.12
Elsevier Limited	Laboratory Capacity, Acceleration, Equipment	5,000.00
EMD Millipore Corporation	Laboratory Capacity, Acceleration, Equipment	22,972.80
Entomological Society of America	Vector Surveillance and Control	151,000.00
Environmental Systems Research Institute	Public Health Emergency Preparedness	49,391.00
Evolution Management, Inc	Public Health Outreach and Control	300,526.00
FedEx	Public Health Emergency Preparedness	37,429.17
Fisher Scientific Company <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	306,124.39
Fisher Scientific Company	Surveillance, Epidemiology, and Public Health Investigations	16,669.48
Fisher Scientific Company	Vector Surveillance and Control	10,125.85
Fitzgerald Industries International, Inc	Laboratory Capacity, Acceleration, Equipment	23,850.00
G2S Corporation	Public Health Emergency Preparedness	39,200.00
G2S Corporation	Public Health Emergency Preparedness; Surveillance, Epidemiology, and Public Health Investigations	3,918,687.12
G2S Corporation <sup>a</sup>	Surveillance, Epidemiology, and Public Health Investigations	3,391,153.86
G2S Corporation	Vector Surveillance and Control	1,509,787.25
GAP Solutions, Inc. <sup>a</sup>	Public Health Emergency Preparedness	626,343.67
GAP Solutions, Inc.	Public Health Outreach and Control	60,408.00
Gem Laser Express, Inc.	Public Health Emergency Preparedness	16,136.82
Geographic Mapping Technologies Corp.	Vector Surveillance and Control	14,850.00
Georgia State University Research Foundation, Inc	Laboratory Capacity, Acceleration, Equipment	1,530,000.00
Government Scientific Source <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	212,643.83
Helmer Scientific	Laboratory Capacity, Acceleration, Equipment	11,679.85
Hyclone Laboratories, Inc	Laboratory Capacity, Acceleration, Equipment	2,716.36
ICF Incorporated <sup>a</sup>	Public Health Outreach and Control	2,304,697.14
IHRC	Laboratory Capacity, Acceleration, Equipment	1,356,070.32
Illumina, Inc <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	101,132.07
Illumina, Inc	Public Health Emergency Preparedness; Vector Surveillance and Control; Public Health Outreach and Control	189,732.00

**Appendix VIII: Centers for Disease Control and  
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<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Impres Technology Solutions	Surveillance, Epidemiology, and Public Health Investigations	59,675.94
InBios International <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	323,184.00
InBios International	Surveillance, Epidemiology, and Public Health Investigations	6,963.00
InBios International	Surveillance, Epidemiology, and Public Health Investigations; Vector Surveillance and Control	18,731.00
JC Gonzalez, Inc. <sup>a</sup>	Vector Surveillance and Control	40,970.70
Johns Hopkins University	Vector Surveillance and Control	500,000.00
Karna	Laboratory Capacity, Acceleration, Equipment	35,668.42
Karna	Public Health Emergency Preparedness	115,000.00
Karna <sup>b</sup>	Surveillance, Epidemiology, and Public Health Investigations	(16,568.10)
Karna	Surveillance, Epidemiology, and Public Health Investigations; Public Health Outreach and Control	2,138,919.00
Leica Microsystems	Laboratory Capacity, Acceleration, Equipment	34,442.52
Leidos, Inc	Surveillance, Epidemiology, and Public Health Investigations	621,000.00
Life Technologies Corporation <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	79,918.85
Life Technologies Corporation	Vector Surveillance and Control	45,776.40
Lonza Walkersville, Inc.	Laboratory Capacity, Acceleration, Equipment	6,483.30
Luminex Corporation	Laboratory Capacity, Acceleration, Equipment	28,086.80
Madison Cloud IT Solutions, LLC	Public Health Emergency Preparedness	14,471.06
Mapbox Inc	Public Health Emergency Preparedness	25,000.00
McKing Consulting Corporation	Surveillance, Epidemiology, and Public Health Investigations	894,403.64
Microoptics Service, Inc	Laboratory Capacity, Acceleration, Equipment	6,384.35
Molecular Devices <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	154,923.70
Mosquito Mate Inc	Vector Surveillance and Control	999,994.02
Multisystems, Inc	Laboratory Capacity, Acceleration, Equipment	10,031.80
Nexcelom Bioscience	Laboratory Capacity, Acceleration, Equipment	139,400.00
Nightingale Corp	Laboratory Capacity, Acceleration, Equipment	3,637.40
Nikon Inc <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	150,978.71
Northrop Grumman <sup>a</sup>	Public Health Outreach and Control	835,000.00
Northrop Grumman	Surveillance, Epidemiology, and Public Health Investigations	175,000.00
Northrop Grumman <sup>a</sup>	Vector Surveillance and Control	729,436.00
NuAire, Inc.	Laboratory Capacity, Acceleration, Equipment	8,698.40
OAG Aviation Worldwide LLC	Public Health Outreach and Control	147,000.00
Onset Computer Corporation	Vector Surveillance and Control	4,500.00

**Appendix VIII: Centers for Disease Control and  
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<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Pacific Biosciences of California	Public Health Emergency Preparedness; Laboratory Capacity, Acceleration, Equipment; Vector Surveillance and Control; Surveillance, Epidemiology, and Public Health Investigations	168,889.71
Pacific Link International, Corp <sup>a</sup>	Public Health Emergency Preparedness	34,374.00
Panasonic Healthcare Corporation of North America	Laboratory Capacity, Acceleration, Equipment	9,334.00
Premier & Companies	Laboratory Capacity, Acceleration, Equipment	4,653.94
P3S Corporation	Laboratory Capacity, Acceleration, Equipment	115,000.00
Qiagen, Inc <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	175,958.27
Red River Computer Co., Inc	Laboratory Capacity, Acceleration, Equipment	2,473.19
Rentokil North America, Inc	Surveillance, Epidemiology, and Public Health Investigations; Public Health Emergency Preparedness; Public Health Outreach and Control; Vector Surveillance and Control	1,382,575.00
Rentokil North America, Inc <sup>a</sup>	Vector Surveillance and Control	4,700,097.00
Roche Diagnostics Corporation <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	602,679.70
Roche Diagnostics Corporation <sup>a</sup>	Surveillance, Epidemiology, and Public Health Investigations	98,987.30
RTI International	Surveillance, Epidemiology, and Public Health Investigations	67,948.00
Rumph & Associates <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment; Surveillance, Epidemiology, and Public Health Investigations	2,377,501.00
SBC Technology Partners, Inc	Public Health Emergency Preparedness	3,748.75
SDL Government, Inc. <sup>a</sup>	Public Health Outreach and Control	25,155.25
Sheknows LLC	Public Health Outreach and Control	15,000.00
Siemens Healthcare Diagnostics <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	357,540.66
Sigma-Aldrich	Laboratory Capacity, Acceleration, Equipment	5,317.62
Smith Travel Research, Inc	Public Health Outreach and Control	4,950.00
Southland Instruments, Inc.	Laboratory Capacity, Acceleration, Equipment	10,909.00
Springstar <sup>a</sup>	Vector Surveillance and Control	551,294.30
SRA International	Public Health Emergency Preparedness; Public Health Outreach and Control; Vector Surveillance and Control; Laboratory Capacity, Acceleration, Equipment; Surveillance, Epidemiology, and Public Health Investigations	500,000.00
SRA International	Public Health Outreach and Control	1,344,852.00
Steris Corporation	Laboratory Capacity, Acceleration, Equipment	51,836.58
Steris Corporation <sup>a</sup>	Vector Surveillance and Control	52,586.58
Strategic Communications, LLC	Laboratory Capacity, Acceleration, Equipment	2,067.96

**Appendix VIII: Centers for Disease Control and Prevention—Contracts and Interagency Agreements**

<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
Synergy America <sup>a</sup>	Public Health Emergency Preparedness	203,000.00
Synergy Group	Public Health Emergency Preparedness	48,020.29
Tanaq Government Services	Public Health Outreach and Control	284,990.00
Texas A&M Agrilife Research	Vector Surveillance and Control	1,200,923.00
The Cresston Company, LLC	Public Health Outreach and Control	40,194.00
Thermo Electron North America	Public Health Outreach and Control	990,122.21
Thomson Reuters (Scientific) LLC	Public Health Outreach and Control	23,588.00
Three Wire Systems, LLC	Public Health Emergency Preparedness	1,970.00
Three Wire Systems, LLC	Vector Surveillance and Control	19,339.77
Total Solutions	Surveillance, Epidemiology, and Public Health Investigations	550,184.67
Total Solutions	Surveillance, Epidemiology, and Public Health Investigations; Laboratory Capacity, Acceleration, Equipment	1,001,674.00
Triad Technology Partners, LLC	Public Health Outreach and Control	3,564.00
TWD Tradewinds, Inc	Laboratory Capacity, Acceleration, Equipment	145,569.00
Unicom	Surveillance, Epidemiology, and Public Health Investigations	140,158.00
University of Arizona	Vector Surveillance and Control	1,250,000.00
University of New Mexico	Vector Surveillance and Control	1,301,000.00
University of North Carolina at Chapel Hill	Laboratory Capacity, Acceleration, Equipment	3,279,000.00
Veterans4you Corporation	Public Health Emergency Preparedness	3,620.00
VWR International	Laboratory Capacity, Acceleration, Equipment	84,490.13
VWR International	Vector Surveillance and Control	19,203.93
Vysnova	Surveillance, Epidemiology, and Public Health Investigations	7,281,151.00
Westat, Inc	Public Health Outreach and Control	94,026.00
Wright Line, LLC	Laboratory Capacity, Acceleration, Equipment	11,072.98
3M Company	Laboratory Capacity, Acceleration, Equipment	4,918.40

Source: Centers for Disease Control and Prevention (CDC). | GAO-18-389

Note: Awards that included a change in the funding amount are reflected in the table, unless the change resulted in a zero balance. For example, CDC provided funding to one company, but later rescinded the same amount. Therefore, this award does not appear in the table as the resulting award is \$0. CDC officials said that these types of actions are standard, particularly in an emergency situation when the needs of the response are rapidly evolving. Changes to awards can occur because there is a change in need for services, a vendor not having the needed items in stock, a reduction in the price of the contract, changes after the contract was awarded, and administrative corrections of a funding source.

<sup>a</sup>This awardee received more than one award and funding amounts for awards for the same awardee and activity were added together in this table.

<sup>b</sup>This awardee had funding that was rescinded. The rescinded funding was not combined with the awardee's other awards because it was for a different activity.

**Appendix VIII: Centers for Disease Control and Prevention—Contracts and Interagency Agreements**

**Table 19: Centers for Disease Control and Prevention Zika Supplemental Funding Interagency Agreements by Awardee and Activity Funded**

<b>Awardee</b>	<b>Activity funded</b>	<b>Award (in dollars)</b>
BARDA	Vector Control	9,000,000.00
NIH <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	450,000.00
U.S. Department of Commerce	Public Health Outreach and Control	8,574.72
U.S. Department of Energy <sup>a</sup>	Laboratory Capacity, Acceleration, Equipment	779,856.91
U.S. Department of Energy <sup>a</sup>	Public Health Emergency Preparedness	134,278.80
U.S. Department of Energy <sup>a</sup>	Surveillance, Epidemiology, and Public Health Investigations	821,452.78
Verizon Business Services	Public Health Emergency Preparedness	112,000.00

Source: Centers for Disease Control and Prevention (CDC). | GAO-18-389

Note: Awards that included a change in the funding amount are reflected in the table, unless the change resulted in a zero balance. For example, CDC provided \$550,000 to the Health Resources and Services Administration, but later rescinded the same amount. Therefore, this award does not appear in the table as the resulting award is \$0. CDC officials said that these types of actions are standard, particularly in an emergency situation when the needs of the response are rapidly evolving. Changes to awards can occur because there is a change in need for services, a vendor not having the needed items in stock, a reduction in the price of the contract, changes after the contract was awarded, and administrative corrections of a funding source.

<sup>a</sup>This awardee received more than one award and funding amounts for awards for the same awardee and activity were added together in this table.



# Appendix IX: Centers for Medicare & Medicaid Services—Zika Health Care Services Program Awards

This appendix presents information on Zika supplemental funding awards made by the Centers for Medicare & Medicaid Services (CMS) through the Zika Health Care Services Program. The Zika Health Care Services Program is aimed at supporting prevention activities and treatment services for women (including pregnant women), children, and men adversely or potentially affected by the Zika virus. According to CMS documentation, the Zika Health Care Service Program is intended to address four critical components of a comprehensive response to Zika:

1. Increase access to contraceptive services for women and men.
2. Increase access to and reduce barriers to diagnostic testing, screening, and counseling for pregnant women and newborns.
3. Increase access to appropriate specialized health care services for pregnant women, children born to mothers with maternal Zika virus infection, and their families.
4. Improve provider capacity and capability.

CMS awarded funding through the Zika Health Care Services Program, in two award rounds, to states, territories, tribes, or tribal organizations with active or local transmission of the Zika virus, as confirmed by the Centers for Disease Control and Prevention. In January 2017, CMS awarded funding to American Samoa, Florida, Puerto Rico, and the U.S. Virgin Islands. In June 2017, CMS awarded funding to Texas, the only new area with local transmission of the Zika virus. Table 20 presents the awards CMS made through its Zika Health Care Services Program.

Appendix IX: Centers for Medicare & Medicaid  
Services—Zika Health Care Services Program  
Awards

**Table 20: Centers for Medicare & Medicaid Services' Zika Health Care Services Program Awardees**

<b>State/territory</b>	<b>Awardee</b>	<b>Award Amount</b>
American Samoa	American Samoa Government Department of Health	1,791,000
Florida	Florida Department of Health	2,991,000
Puerto Rico	Puerto Rico Department of Health	61,291,000
Texas	Texas Department of State Health Services	2,491,000
U.S. Virgin Islands	U.S. Virgin Islands Department of Health	2,791,000

Source: Centers for Medicare & Medicaid Services. | GAO-18-389

# Appendix X: Health Resources and Services Administration's Zika Supplemental Awards

This appendix presents information on Zika supplemental funding awards made by the Health Resources and Services Administration (HRSA) to health centers and for Special Projects of Regional and National Significance.<sup>1</sup>

- Health centers: HRSA provided awards to health centers through supplemental grant awards to support existing health centers in Puerto Rico and other territories in their efforts to expand the delivery of health care services, including the prevention of Zika and prevention and treatment of Zika-related illness. HRSA also provided supplemental grant awards to existing Health Center Program cooperative agreement awardees for efforts to provide training and technical assistance for Zika-related health center expansion activities.
- Special Projects of Regional and National Significance: HRSA provided awards for Special Projects of Regional and National Significance to support public health departments and other entities in Puerto Rico and other territories in efforts to ensure access to recommended services for pregnant women, infants, and children infected by the Zika virus in the prenatal, perinatal, and neonatal period. Activities include early identification through developmental screening, regular assessments and monitoring, telemedicine, care coordination, enabling services, family engagement and family-to-family support; purchasing of diagnostic equipment and health information technology; and the training of health care providers, care coordinators, and other health care and public health professionals to

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<sup>1</sup>HRSA also provided student loan repayment to qualified health professionals through the National Health Services Corps. We do not present this information by awardee in this appendix, as that data contains personal information.

**Appendix X: Health Resources and Services  
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ensure delivery of comprehensive, interdisciplinary health and social services for this population.

Tables 21 and 22 present information for each award as it was provided to us by HRSA.

**Table 21: Health Resources and Services Administration Zika Supplemental Funding for Health Centers by Awardee**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
American Samoa	American Samoa Government Dept of Health	2,336,253
Hawaii	Pacific Islands Primary Care Association	250,000
Puerto Rico	Asociacion de Salud Primaria de Puerto Rico, Inc	750,000
Puerto Rico	Municipality of San Juan (HOMIS)	1,058,362
Puerto Rico	Consejo de Salud de Puerto Rico, Inc.	2,556,580
Puerto Rico	Centro de Servicios Primarios de Salud Inc	1,555,327
Puerto Rico	Concilio de Salud Integral de Loiza, Inc	1,577,352
Puerto Rico	Centro de Salud Familiar (PALMIERI)	1,563,775
Puerto Rico	Corporacion de Servicios Medicos Primarios y Prevencion de Hatillo	1,895,792
Puerto Rico	Centro de Salud de Lares, Inc.	1,668,179
Puerto Rico	Castaner General Hospital	1,428,258
Puerto Rico	Costa Salud Community Health Centers Inc	1,517,755
Puerto Rico	Corporacion de Servicios de Salud y Medicina Avanzada - COSSMA	1,938,143
Puerto Rico	Morovis Community Health Center, Inc.	1,482,153
Puerto Rico	Barceloneta Primary Health Services, Inc.	1,540,884
Puerto Rico	Camuy Health Services, Inc.	1,542,118
Puerto Rico	Salud Integral en la Montana, Inc.	2,089,258
Puerto Rico	Migrant Health Center, Western Region, Inc.	1,821,303
Puerto Rico	NeoMed Center Inc	2,285,262
Puerto Rico	HPM Foundation, Inc.	1,590,023
Puerto Rico	PryMed Medical Care, Inc.	1,532,746
Puerto Rico	Patillas Community Governing Board	1,868,331
Puerto Rico	Corporacion SANOS	1,266,725
U.S. Virgin Islands	Frederiksted Health Care Inc.	1,459,507
U.S. Virgin Islands	St. Thomas East End Medical Center Corporation	1,425,914

Source: Health Resources and Services Administration. | GAO-18-389

Note: The Zika Response and Preparedness Act required that \$40 million be used to expand the delivery of primary health services in Puerto Rico and other territories. According to officials from the Health Resources and Services Administration, the Pacific Islands Primary Care Association in Hawaii was funded to support health centers within the Pacific Basin based on their Zika-related needs.

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**Table 22: Health Resources and Services Administration Zika Supplemental Funding for Special Projects of Regional and National Significance by Awardee**

<b>State/territory</b>	<b>Awardee</b>	<b>Award (in dollars)</b>
American Samoa	Dept of Health <sup>a</sup>	923,142
California	Children's Hospital of Los Angeles	333,333
Florida	University of Miami	333,333
Illinois	American Academy of Pediatrics	250,000
Indiana	Indiana University	333,333
New Mexico	Family Voices, Inc	250,000
Puerto Rico	Parents Training Parents	150,000
Puerto Rico	Puerto Rico Department of Health <sup>a</sup>	16,202,850
U.S. Virgin Islands	Virgin Islands Advocacy, Inc	150,000
U.S. Virgin Islands	Virgin Islands Department of Health Group <sup>a</sup>	1,074,008

Source: Health Resources and Services Administration. | GAO-18-389

Note: The Zika Response and Preparedness Act required that \$20 million be awarded for projects of regional and national significance in Puerto Rico and other territories. The projects located in California, Florida, Illinois, Indiana, and New Mexico focus on the territories.

<sup>a</sup>This awardee received more than one award and funding amounts for these awards were added together in this table.

# Appendix XI: National Institutes of Health Zika Supplemental Awards

The National Institutes of Health (NIH) awarded Zika supplemental funding to support research to better understand Zika and its complications, and inform the development of new interventions. The three primary activities of funding include (1) vaccine development; (2) Zika in Infants and Pregnancy study; and (3) diagnostics, therapeutics, vector control, and other interventions.<sup>1</sup> NIH used contracts, grants, intramural research awards, and other awards to provide funding for research on the Zika virus and its complications.

Tables 23-26 present information for each award as it was provided to us by NIH.

**Table 23: National Institutes of Health’s Zika Supplemental Funding Contracts**

Awardee	Activity description	Award (in dollars)
Advanced Bioscience Laboratories	Support the production and development of a recombinant subunit vaccine consisting of a portion of the Zika virus envelope protein developed by Hawaii Biotech.	455,190.00
Advanced Bioscience Laboratories	PCSs to develop a vaccine production master cell bank for MVA-CHIK/Zika vaccine (Sementis).	445,190.00
American Type Culture Collection	Reagent purchases to support ZIP studies in various countries.	1,370,000.00
Battelle	Support the development of virus neutralizing assay for the assessment of Zika Vaccines.	880,000.00
Baylor College of Medicine	Conduct an epidemiological trial in Guatemala to study the prevalence of microcephaly in a newborn population, viral transmission of Zika and to follow patients diagnosed with ZIKV infection for the development of neurologic manifestations of disease.	5,702,861.00

<sup>1</sup>The Zika in Infants and Pregnancy study aims to improve understanding of the health effects of Zika virus infection in pregnant women and infants by following 10,000 pregnant women for the duration of their pregnancies and their infants at several intervals for at least one year after birth.

**Appendix XI: National Institutes of Health Zika Supplemental Awards**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Deloitte Consulting LLP	Enhance the U.S. Government's partners' (NIH, BARDA, CDC, WRAIR (DoD) and FDA) capabilities in developing vaccine candidates and advancing the most promising to licensure. The ultimate objective is to accelerate the process and reduce costs, not only for Zika but for other vaccines for emerging or reemerging vector borne infectious diseases.	64,589.70
Emory University - Vaccine Trial and Evaluation Units (VTEU)	To Support study of U.S. travelers infected with Zika virus while abroad.	980,000.00
Emory University	Support T-cell assays of samples from 16-0033/34 trials to assess vaccine response.	258,122.01
Saint Louis University - Vaccine Trial and Evaluation Units (VTEU)	Support Phase 1 ZPIV Clinical Trials.	2,479,304.00
Southern Research Institute	Support the testing of vaccine candidates against Zika virus infection in the Indian Rhesus macaque model.	1,319,631.00
Southern Research Institute	Southern Research Institute to manufacture and test monoclonal antibody and synthetic compounds as therapeutics against Zika infection.	400,000.00
St. Jude Children's Research Hospital	To continue support the Zika in Infants and Pregnancy (ZIP) study in Colombia.	962,066.00
The Emmes Corporation	Data management and support for clinical studies with NIAID developed Inactivated Zika Vaccine.	3,000,000.00
University of Alabama at Birmingham	Support the Zika in Infants and Pregnancy (ZIP) study in Peru.	997,527.00

Source: National Institutes of Health. | GAO-18-389

**Table 24: National Institutes of Health's Zika Supplemental Funding Grants**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Beth Israel Deaconess Medical Center	To support the development of Biocryst drug (BCX4430) against Zika virus.	599,666
Boston University Medical Campus	Study effects of pre-existing dengue virus immunity on Zika virus infection.	246,750
Boston University Medical Campus	Study innate placental defense against Zika infection.	258,196
Colorado State University	Study how different cells contribute to sexual and mosquito transmission of Zika.	227,250
Colorado State University	Predicting genetic determinants of Zika virus emergence.	227,875
Colorado State University	Support the study of Zika virus urogenital tropism, pathogenesis and sexual transmission.	211,838
Colorado State University	Support the development of a rapid assay for Zika virus in biofluids and insect vectors.	222,546
Colorado State University	Study virus-host interactions and mechanisms of viral pathogenesis which will provide insights to identify novel targets for antiviral drug development or virus attenuation for vaccine production.	222,436

**Appendix XI: National Institutes of Health Zika  
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<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Columbia University Health Sciences	Support the development of point of care molecular diagnostics differentiating Zika virus from other arbovirus.	434,850
Duke University	Support the Generation of Zika virus-specific recombinant antibodies for the development of Zika Assays.	198,750
Duke University	Study Zika virus infections related birth defects in pregnant rabbit models.	235,406
Emory University	Continue study of Dengue-Zika cross reactivity in vaccine development.	286,546
Emory University	Support the repurposing of drugs to prevent and inhibit Zika virus infections.	234,000
Fred Hutchinson Cancer Research Center	Supplement to develop novel designs and methods of analysis for upcoming Zika vaccine trials.	99,635
Fundacao Oswaldo Cruz	Continue support natural history study (ZIP) study in pregnant women in Brazil.	1,322,941
George Washington University	Examine genes participating in innate immune response to ZIKV and identify and characterize effector mechanisms involved in controlling ZIKV.	8,576
Georgia Institute of Technology	To develop Zika Virus Vaccines based on Nanoscale Constructs Presenting the Envelope Protein.	250,187
Harvard Medical School	Development of small molecule inhibitors against enveloped virus entry as potential Zika therapeutics.	500,867
Harvard Medical School	Manufacture a VSV vaccine for efficacy studies in mice and NHPs. Conduct efficacy studies in mice against lethal challenge and congenital disease.	299,999
Icahn School of Medicine at Mount Sinai	To study the infection mechanism of Zika virus.	254,250
Icahn School of Medicine at Mount Sinai	Study host determinants in resistance to Zika virus infection.	254,250
Infectious Disease Research Institute	Development of an Innovative, Effective, RNA-based Vaccine for Zika Virus.	178,600
JHU	To construct a protein-protein interaction (PPI) network between the Zika virus (ZIKV) and the human proteome in order to identify host proteins that play roles in ZIKV life cycle.	245,282
Johns Hopkins University	Methods for Reducing Spatial Uncertainty and Bias in Zika Disease Surveillance.	938,706
Johns Hopkins University	Development of novel Zika vaccine platform using virus-derived chemokine-like molecules.	286,125
Mayo Clinic Rochester	Development of mucosal Single-Cycle Vaccines against Zika Virus.	198,750
Mount Sinai School of Medicine	Study the enhancement of Zika virus infection caused by antibodies to West Nile virus.	252,993
Mount Sinai School of Medicine	Study Zika virus envelop protein mutations.	274,277
New York State Univ	Support Structure-based Design of Zika Virus Inhibitors Targeting Envelope Glycoprotein.	199,089
New York State University, Stony Brook	Study of Zika virus pathogenesis in endothelial cells.	235,543
Nirmidas Biotech, Inc.	Develop a Nanoscale Plasmonic-Gold diagnostic platform to differentiate Zika virus infection from other Flavivirus infections.	190,525



**Appendix XI: National Institutes of Health Zika  
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<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Ohio State University	Develop plant-derived, resistance-breaking mosquitocides.	193,125
Oregon Health & Science University	Determining the role of host lipids in Zika virus infection.	231,000
Pennsylvania State University-Univ Park	To investigate the potential role of native and introduced mosquito taxa in the United States to mediate Zika virus invasion and transmission.	235,800
Purdue University	To Study the structure of the Zika virus epitope involved in virus neutralization, which will improve the design of Zika vaccines.	373,831
Research Triangle Institute	Continue clinical data center support for the ZIP studies.	400,000
Rockefeller University	Continued development of a therapeutic mAb for Zika virus. This supplement focuses on developing an expression cell line and evaluating mAb in NHPs.	699,999
South Dakota State	Develop a Zika virus capsid dimerization assay that will be the platform to screen libraries for inhibitors of Zika virus infection.	179,239
Stanford University	Support Nucleotide library (Roche) screening for potential antiviral activity against Zika.	305,080
Stanford University	Study the diagnostic signatures of Zika virus infection.	219,762
State University of New York at Albany	Study the role of Post-transcription RNA Modifications on Zika Virus Gene Expression.	226,813
Texas A&M Agrilife Research	Study social-ecological factors influencing receptivity to Zika virus and the efficacy of interventions in communities along the Texas-Mexico border.	222,750
Texas Tech University Health SCIS Center	To study Zika virus infection in individuals previously exposed to West Nile Virus.	191,250
Texas Tech University Health SCIS Center	Identify ZIKV host factors with an improved CRISPR-based genome-wide knockout screen.	191,250
UC Davis	Develop a novel platform for rapid generation of therapeutic and prophylactic antibody against Zika virus, by site-specific ligation of the virus-capturing ligands to clinical grade intravenous-immunoglobulins.	196,250
University of Alabama at Birmingham	Support the development of high throughput screening (HTS) against ZIKV, using approach developed for screening Dengue.	157,657
University of Alabama at Birmingham	Support the study of Zika virus in semen, as part of ZIP study in Brazil.	457,241
University of California at Davis	Imaging and study of trafficking of Neurotropic Virus in Maternal/Fetal Nonhuman Primates.	193,000
University of California San Diego	To study Zika Virus Pathogenesis and Selective Autophagy Induction to Inhibit Virus Production.	232,500
University of California, Berkeley	Continue operations of the Zika in Infants and Pregnancy (ZIP) study in Nicaragua.	830,000
University of California, Davis	Supplement Zika natural history study in Peru, including simulation models to systematic assess different strategies for controlling and mitigating ZIKV disease burden.	356,436
University of California, Davis	Develop a nonhuman primate model of fetal Zika virus infection and disease.	308,800
University of California, Davis	Support the development of Zika fetal infection models in non-human primate (Rhesus macaque) for therapeutic testing.	1,478,154

**Appendix XI: National Institutes of Health Zika  
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<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
University of California, Davis	To study the potential of Culex quinquefasciatus as a vector of the Zika virus.	171,750
University of California, Los Angel	Study the viral kinetics, immunity and transmission of Zika Virus.	201,907
University of California, San Francisco	Support the identification of diagnostic and prognostic biomarkers for Zika infection.	198,125
University of California, San Francisco	Study the role of Zika infection in human pregnancy.	197,523
University of California, San Francisco	Support the study of maternal and fetal cell receptors susceptible to Zika infection and geographical virulence.	397,293
University of California, San Francisco	To study antiviral immunity in the Zika virus mosquito vector.	237,750
University of Colorado, Denver <sup>a</sup>	To continue support the Zika in Infants and Pregnancy (ZIP) study in Guatemala.	589,999
University of Colorado, Denver	Study noncoding RNA production in Zika virus infection.	229,125
University of Connecticut Storrs	To support the rapid development and testing of Zika virus vaccine candidates.	192,254
University of Hawaii at Manoa	Study the modulation of the blood-testis barrier by Zika virus.	231,000
University of Kentucky	Develop novel formulations of double-stranded RNA molecules as tool to further study RNA interference (RNAi) as potential vector control.	210,000
University of Maryland Baltimore	Rapid Phenotyping of the ZIKV Genome.	231,750
University of Miami School of Medicine	Continue support effort to develop point-of-care Zika diagnostic.	167,617
University of Michigan	To elucidate the molecular mechanisms of the flaviviral nonstructural protein 1 (NS1), a multi-functional virulence protein.	673,901
University of North Carolina Chapel Hill	Support the development and testing of nanoparticle planform for vaccine and adjuvant delivery.	529,300
University of North Carolina Chapel Hill	Study Zika virus in the human genital tract and implications for transmission.	207,868
University of North Carolina Chapel Hill	Study viral and host determinants of Zika virus tissue tropism.	228,000
University of North Carolina Chapel Hill	Structure based design of recombinant Zika virus antigens for serodiagnosis.	233,250
University of North Texas Hlth Sci Ctr	Prevention of Zika transmission with novel Aedes personal protective measures.	276,530
University of Oklahoma Hlth Sciences Ctr	Support development of olive baboon animal model for the study of Zika virus biology and pathogenesis.	222,000
University of Pennsylvania	Support the study of host factors impacting Zika infection via genetic screening.	235,388
University of Pennsylvania	To study mechanisms of Zika virus infection and anti-viral innate immunity.	40,240
University of Pittsburgh at Pittsburgh	Support the development of a Novel, Sensitive ZIKV-Specific Sero-diagnostic Assay Utilizing Biologically Inspired Synthetic Molecules.	703,978
University of Pittsburgh at Pittsburgh	Pre-clinical evaluation of a Zika virus vaccine.	193,332
University of Puerto Rico Med Sciences	To continue support the Zika in Infants and Pregnancy (ZIP) study in Puerto Rico.	830,284

**Appendix XI: National Institutes of Health Zika  
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<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
University of Rochester	Support the study of Single-cycle infectious Zika viruses for the development of a live-attenuated vaccine.	180,457
University of Southern California	To study the role autophagy for Zika virus lifecycle.	247,500
University of Texas	To understand the mechanisms that mediate Zika virus replication in specific tissues by manipulating the host ubiquitin system, and identify host factors that can potentially be targeted for therapeutic intervention.	193,750
University of Texas Med Br Galveston	Preclinical development of candidate Zika virus vaccines using mouse models.	196,250
University of Texas Med Br Galveston	To study microbial interplay between ZIKA virus and the native microbiome in mosquitoes.	235,500
University of Texas Medical Br Galveston	Develop a novel system using human fetal brain neural stem cell to model ZIKV infection.	228,650
University of Texas Medical Br Galveston	Develop second generation platforms to deliver zika vaccines, and characterize newly collected zika virus strains in tissue culture, mosquito vectors and animal models for transmission and pathogenesis.	163,282
University of Washington	Support the development of a rapid and specific diagnostic for immunoglobulin response to Zika Virus exposure.	188,696
University of Washington	Study mechanisms of sexual Zika virus transmission and early immunopathogenesis.	232,063
University of Washington	Targeting Zika Virus infection with Chloroquine and related Drugs.	232,625
University of Wisconsin	To support the study of Zika virus using systems biology to better understand the host-pathogen response.	190,106
University of Wisconsin	To study evolution of biological transmission for ZIKV including determining whether or not Wolbachia biocontrol is a sustainable method for ZIKV control and prevention.	229,500
University of Wisconsin	Examine the impact of DENV immunity on pregnancy in ZIKV infected rhesus macaques.	753,026
University of Wisconsin	Define South American Zika virus susceptibility and pathogenicity in adult and neonatal nonhuman primates, and testing of hyperimmune sera as potential Zika therapeutic.	1,569,399
University of Wisconsin-Madison	To perform functional analysis of Zika virus induced birth defects.	229,500
University of Wisconsin-Madison	Development of nonhuman Primate Model to Assess Fetal Zika Virus Infection Complications.	221,550
UTMB	Accelerate development and acquisition of reagents (cDNA clone, serum, antibodies), small animal model development and characterization of virus and mosquito vectors for Zika research.	499,999
Vanderbilt University <sup>a</sup>	Support efforts to establish a stable cell line for the optimized production of human monoclonal antibody-based prophylaxis.	1,327,897
Wadsworth Center	Study the efficiency of repurposed therapeutics against Flavivirus in mouse models.	238,240
Wadsworth Center	Study the efficiency of repurposed therapeutics against Zika.	235,470

**Appendix XI: National Institutes of Health Zika Supplemental Awards**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Wadsworth Center	Develop a high throughput screen assay for the identification of orthosteric inhibitors of the critical viral protease consisting of NS2B and NS3 proteins of flaviviruses. As the NS2B-NS3 interactive segments are conserved, an inhibitor would have a broad spectrum of antiviral activity.	523,552
Wadsworth Center	Identifying genetic correlates of Zika virus infection and transmission in U.S. mosquitoes.	181,504
Washington University in St. Louis	Development of Zika vaccine in gorilla adenovirus platform.	190,625
Washington University in St. Louis	Support the development of mAb that can discriminate between Zika and Dengue virus.	530,000
Weill Medical Coll of Cornell Univ	Mapping the RNA modification N6-methyladenosine during Zika virus infection.	263,750
Yale University	Continue studies of <i>Aedes aegypti</i> and <i>Aedes albopictus</i> as Zika virus vector.	252,460
Yale University	Study mechanisms of innate host defense against sexual Zika virus transmission.	251,250
Yale University	Support the Zika in Infants and Pregnancy (ZIP) study in Brazil.	891,134
Yale University	Support neurological evaluation in adults in Salvador, Brazil as part of the ZIP study.	315,063

Source: National Institutes of Health. | GAO-18-389

<sup>a</sup>These awardees received more than one award and funding amounts for awards for the same awardee and activity were added together in this table.

**Table 25: National Institutes of Health’s Zika Supplemental Funding Intramural Awards**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
Battelle	To perform PCR testing of clinical studies to evaluate vaccine efficacy.	8,135,441.00
Bioqual	Conduct preclinical studies of Zika vaccine in nonhuman primate models.	1,464,000.00
Johns Hopkins University	Conduct clinical evaluation and data management of NIAID DIR developed Dengue-Zika Chimera Vaccine studies in normal and immunocompromised adults.	4,099,000.00
Leidos Biomedical Research, Inc.	To conduct clinical trials for NIAID VRC developed DNA Vaccine.	48,635,750.00
Leidos Biomedical Research, Inc.	Manufacturing and clinical evaluation of NIAID DIR developed live attenuated Dengue-Zika Chimera Vaccine in Brazil.	11,664,304.09
The Emmes Corporation	To provide clinical data management and monitoring support for phase 2 DNA Vaccine studies.	11,390,893.00
Various	Labor, material, and supplies to support the preclinical development and testing of Zika vaccines at NIAID intramural laboratories.	9,593,809.09

Source: National Institutes of Health. | GAO-18-389

**Appendix XI: National Institutes of Health Zika Supplemental Awards**

**Table 26: Other National Institutes of Health Zika Supplemental Funding Awards**

<b>Awardee</b>	<b>Activity description</b>	<b>Award (in dollars)</b>
AI Biosciences, Inc.	Support the development of rapid and low-cost point-of-care assay for Zika virus diagnosis.	224,955
Crosslife Technologies, Inc.	Development of a rapid paper strip nucleic acid test for the point-of-care detection of Zika virus.	299,574
L2 Diagnostics, LLC	Support the development of rapid, low-cost point of care diagnostic for detection of Zika virus RNA.	225,000
Springstar, Inc.	To modify the CDC autocidal gravid ovitrap (AGO) into a design amenable to large-scale, low cost production for development of improved vector control strategies.	618, 531
United States Dept. of Agriculture	Zika workshop support in collaboration with USDA-Scientific consultation on Zika Virus Vaccine Development.	75,000
United States Dept. of Agriculture	Zika workshop support in collaboration with USDA-Consultation on the Ethics of ZikV Human Challenge Trials.	75,000
University of Oxford, The	Printing of Zika-specific supplement in the JOURNAL OF INFECTIOUS DISEASES to disseminate research findings.	83,250

Source: National Institutes of Health. | GAO-18-389

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# Appendix XII: GAO Contact and Staff Acknowledgments

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## GAO Contact

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## Staff Acknowledgments

In addition to the contact named above, Karen Doran (Assistant Director), Sarah Resavy (Analyst-in-Charge), and Hannah Grow made key contributions to this report. Also contributing were Muriel Brown, Christine Davis, and Drew Long.

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# Appendix XIII: Accessible Data

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## Data Tables

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**Data Table for Figure 1: Total Zika Supplemental Funding by Agency**

<b>Agency</b>	<b>Zika supplemental funding</b>
BARDA	\$245,000,000
CDC	\$394,000,000
CMS	\$75,000,000
HRSA	\$66,000,000
NIH	\$152,000,000
Total	\$932,000,000

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