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Report to Congressional Committees

April 2021

GLOBAL HEALTH SECURITY

USAID and CDC Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset

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GAO Highlights

Highlights of GAO-21-359, a report to congressional committees

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Why GAO Did This Study

The outbreak of Coronavirus Disease 2019 (COVID-19) in December 2019 demonstrated that infectious diseases can lead to catastrophic loss of life and sustained damage to the global economy. USAID and CDC have led U.S. efforts to strengthen GHS—that is, global capacity to prepare for, detect, and respond to infectious disease threats and to reduce or prevent their spread across borders. These efforts include work related to the multilateral GHSA initiative, which aims to accelerate progress toward compliance with international health regulations and other agreements.

House Report 114-693 contained a provision for GAO to review the use of GHS funds. In this report, GAO examines, for the 5 fiscal years before the onset of the COVID-19 pandemic, (1) the status of USAID's and CDC's GHS funding and activities and (2) U.S. agencies' assessments, at the end of fiscal year 2019, of GHSA partner countries' capacities to address infectious disease threats and of challenges these countries faced in building capacity.

GAO analyzed agency, interagency, and international organization documents. GAO also interviewed agency officials in Washington, D.C., and Atlanta, Georgia, and in Ethiopia, Indonesia, Senegal, and Vietnam. GAO selected these four countries on the basis of factors such as the presence of staff from multiple U.S. agencies. In addition, GAO analyzed interagency assessments of countries' capacities to address infectious disease threats in fiscal year 2019 and compared them with baseline assessments from 2016 and 2017.

View GAO-21-359. For more information, contact David Gootnick at (202) 512-3149 or gootnickd@gao.gov.

What GAO Found

As of March 31, 2020, the U.S. Agency for International Development (USAID) and the Centers for Disease Control and Prevention (CDC) had obligated a combined total of more than $1.2 billion and disbursed about $1 billion for global health security (GHS) activities, using funds appropriated in fiscal years 2015 through 2019. USAID and CDC supported activities to help build countries' capacities in 11 technical areas related to addressing infectious disease threats. The obligated funding supported GHS activities in at least 34 countries, including 25 identified as Global Health Security Agenda (GHSA) partner countries.

U.S.-Supported Activities in Ethiopia to Strengthen Global Health Security

Equipment for roadshows to raise community awareness of anthrax prevention in hard-to-reach areas.

Community members at a roadshow, pledging commitment to vaccinate livestock annually and avoid eating or sharing meat from sick or dead animals.

Source: Tegegne Shiferaw, MPH, BSc. | GAO-21-359

U.S. officials' assessments of 17 GHSA partner countries' capacities to address infectious disease threats showed that at the end of fiscal year 2019, most countries had some capacity in each of the 11 technical areas but faced various challenges. U.S. interagency country teams produce biannual capacity assessments that USAID and CDC headquarters officials use to track the countries' progress. According to fiscal year 2019 assessment reports, 14 countries had developed or demonstrated capacity in most technical areas. In addition, the reports showed the majority of capacities in each country had remained stable or increased since 2016 and 2017. The technical area *antimicrobial resistance* showed the largest numbers of capacity increases—for example, in the development of surveillance systems. GAO's analysis of the progress reports found the most common challenges to developing GHS capacity were weaknesses in government institutions, constrained resources, and insufficient human capital. According to agency officials, some challenges can be overcome with additional U.S. government funding, technical support, or diplomatic efforts, but many other challenges remain outside the U.S. government's control.

This is a public version of a sensitive report that GAO issued in February 2021. Information that USAID and CDC deemed sensitive has been omitted.

Contents

Tables

Figures

Abbreviations

AMR	antimicrobial resistance
CDC	Centers for Disease Control and Prevention
COVID-19	Coronavirus Disease 2019
Ebola	Ebola Virus Disease
EOC	emergency operation center
FAO	Food and Agriculture Organization
GHS	global health security
GHSA	Global Health Security Agenda
HHS	Department of Health and Human Services
IHR	International Health Regulations
JEE	Joint External Evaluation
OIE	World Organization for Animal Health
State	Department of State
U.S. GHS Strategy	*United States Government Global Health Security Strategy*
USAID	U.S. Agency for International Development
WHO	World Health Organization

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April 14, 2021

The Honorable Chris Coons
Chairman
The Honorable Lindsey Graham
Ranking Member
Subcommittee on State, Foreign Operations, and Related Programs
Committee on Appropriations
United States Senate

The Honorable Barbara Lee
Chairwoman
The Honorable Hal Rogers
Ranking Member
Subcommittee on State, Foreign Operations, and Related Programs
Committee on Appropriations
House of Representatives

The first reported outbreak of Coronavirus Disease 2019 (COVID-19), in December 2019, heightened concerns about global health security (GHS)—that is, global capacity to prepare for, detect, and respond to infectious disease threats and to reduce or prevent their spread across borders. Other new or reemerging diseases, such as Ebola Virus Disease (Ebola) and Zika virus, have also posed threats over the past 15 years. Outbreaks can spread rapidly across the globe, jeopardizing health and security and overwhelming health systems. As the world has experienced since the onset of the COVID-19 pandemic, such outbreaks can lead to catastrophic loss of life as well as sustained damage to the economy, societal stability, and global security.[1]

The U.S. government has expressed its commitment to GHS. In 2014, after the outbreak of Ebola in West Africa, President Obama announced a U.S. government strategy to address Ebola that included, as one of its four pillars, strengthening GHS. Also in 2014, the United States and other nations launched the Global Health Security Agenda (GHSA), a multilateral initiative to accelerate progress toward a world safe and secure from infectious disease threats. In May 2019, the U.S. government published the *United States Government Global Health Security Strategy* (U.S. GHS Strategy), which further emphasized the U.S. commitment to

[1]The World Health Organization declared COVID-19 a global pandemic on March 11, 2020.

the GHSA. This strategy identifies the U.S. Agency for International Development (USAID) and the Department of Health and Human Services' (HHS) Centers for Disease Control and Prevention (CDC) as the lead U.S. agencies for activities aimed at building international GHS capacity.[2] According to a 2019 report, the U.S. government pledged $1 billion to support activities in countries with which it had partnered to build health security capacity through the GHSA, known as GHSA partner countries.[3]

House Report 114-693 contained a provision for us to review the use of funds provided to promote GHS and to address emerging health threats overseas. This report examines, for the 5 fiscal years before the onset of the COVID-19 pandemic, (1) the status of USAID's and CDC's GHS funding and activities and (2) U.S. agencies' assessments, at the end of fiscal year 2019, of GHSA partner countries' capacities to address infectious disease threats and of any challenges these countries faced in building capacity.[4]

This report is a public version of a sensitive report that we issued in February 2021.[5] USAID and CDC deemed some of the information in our February report to be sensitive, which must be protected from public disclosure. Therefore, this report omits sensitive information about capacity scores assigned to specific countries, certain country-specific examples, names of countries associated with certain other examples, and some challenges that countries faced. Although the information in this report is more limited than that in the sensitive report, this report addresses the same objectives and uses the same methodology.

[2]According to agency officials, U.S. agencies' activities to strengthen GHS and their activities to address the GHSA are complementary and constitute a comprehensive approach to addressing threats from infectious diseases.

[3]Global Health Security Agenda, *Advancing the Global Health Security Agenda: Results and Impact of U.S. Government Investments* (August 2019).

[4]In this report, *GHS activities* refers to activities that USAID and CDC officials identified as being related to GHS and the GHSA, including activities that USAID and CDC fund through awards to implementing partners. The agencies may sometimes refer to such activities as projects.

[5]GAO, *Global Health Security: USAID and CDC Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset*, GAO 21-213SU (Washington, D.C.: Feb. 4, 2021).

To address these objectives, we analyzed relevant agency documents and data, reviewed interagency and international organizations' documents, and interviewed agency officials regarding USAID's and CDC's GHS efforts overseas in fiscal years 2015 through 2019.

- To examine the status of USAID's and CDC's funding and activities, we analyzed USAID's and CDC's data on funding that they had obligated and disbursed as of March 31, 2020, for GHS activities from funds appropriated in fiscal years 2015 through 2019—the most recent data at the time of our analysis.[6] We used data on awards to the organizations that implemented these activities—known as implementing partners—to determine the distribution of funding among USAID and CDC implementing partners as well as across countries.[7] We also conducted data testing to check for missing or anomalous data and obvious errors, reviewed related documentation, and discussed the accuracy and completeness of the data with USAID and CDC officials. We found these data to be sufficiently reliable for the purpose of describing the status of GHS funding and activities.[8]
- To examine U.S. agencies' assessments, at the end of fiscal year 2019, of GHSA partner countries' capacities to address infectious disease threats and of challenges the countries faced in building capacity, we reviewed indicator scores in fiscal year 2019 GHSA capacity gains progress reporting submitted by U.S. interagency teams in GHSA partner countries to USAID and CDC on November 1, 2019, for 17 countries where the U.S. government provided GHS support. We used this information to describe the 17 countries' GHS capacity, as assessed by these GHSA country teams, before the

[6]USAID and CDC used funds appropriated for GHS to support their internal operating expenses, but the agencies primarily used the funds to award contracts, grants, or cooperative agreements to implementing partners to carry out GHS activities overseas. In this report, *implementing partners* refers to entities such as nongovernmental organizations and host-country governments that are awarded U.S. government contracts, grants, or cooperative agreements to carry out GHS activities overseas. Nongovernmental organizations include international humanitarian aid organizations, international and local private voluntary organizations, and other entities.

[7]Our analysis of the distribution of funding among USAID and CDC implementing partners and across countries does not include USAID's and CDC's internal operating expenses.

[8]The scope of our work begins with fiscal year 2015 because it was the first year that both USAID and CDC provided funding for GHS activities. USAID used appropriated funding for various GHS-related activities to address infectious disease threats before fiscal year 2015, according to USAID officials; CDC did not receive an appropriation for GHS until fiscal year 2015, according to CDC officials.

official onset of the COVID-19 pandemic. We also compared the fiscal year 2019 indicator scores with baseline indicator scores submitted in calendar years 2016 and 2017 to identify any changes. In addition, we met with USAID and CDC headquarters officials to discuss both agencies' processes for analyzing the assessed indicator scores and how, if at all, the agencies use the scores to make decisions about funding and activities. Further, we reviewed challenges identified in the fiscal year 2019 GHSA capacity gains progress reporting, and we categorized these challenges to determine the types that occurred most frequently among the countries.

- To address both of our objectives, we analyzed documents related to USAID's and CDC's GHS activities in four countries—Ethiopia, Senegal, Indonesia, and Vietnam. We selected the four countries, on the basis of our review of U.S. agencies' GHS funding and activities data and documents, to reflect activities that accounted for a significant amount of total GHS funding; the presence of staff from multiple U.S. agencies; and diversity among the countries' locations in Africa and Asia, where USAID and CDC provided GHS assistance. We interviewed USAID and CDC officials in Washington, D.C., and Atlanta, Georgia, respectively. In addition, in December 2019, we met with U.S. agency officials, implementing partner organizations, international organizations, and host government officials when we visited Addis Ababa, Ethiopia, and Dakar, Senegal. In March 2020, we conducted teleconferences with U.S. agency officials in Jakarta, Indonesia, and in Hanoi, Vietnam.

See appendix I for more details of our scope and methodology.

The performance audit on which this report is based was conducted from February 2019 to February 2021 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. We subsequently worked with USAID and CDC from November 2020 to April 2021 to prepare this version of the original sensitive report for public release. This public version was also prepared in accordance with generally accepted government auditing standards.

Background

Infectious Disease Threats

New and reemerging diseases can spread quickly across the globe. In addition to COVID-19, such diseases in recent years have included avian influenza in Asia; Ebola, yellow fever, and cholera in Africa; the Middle East Respiratory Syndrome in the Middle East; and Zika virus in the Americas. Numerous other outbreaks, including Rift Valley fever, Crimean–Congo hemorrhagic fever, and Lassa fever, have also threatened the global community.[9]

Many pathogens of global health security concern are zoonotic—that is, transmissible between animals and humans. Over the last 60 years, such pathogens have accounted for more than 70 percent of emerging infectious diseases. Population growth has caused people to live in closer proximity to one another and to animal reservoirs of zoonotic pathogens, increasing the opportunity for pathogens to cross between animals and humans. Environmental changes have also altered the distribution of mosquitos and other disease vectors.[10] Furthermore, the misuse of antibiotics and emergence of pathogens with antimicrobial resistance (AMR) affect the human, animal, and agricultural sectors. Finally, the deliberate or accidental release of dangerous pathogens from laboratories or other facilities remains an ongoing global health security threat.

U.S. GHS Efforts

According to the U.S. GHS Strategy, the U.S. government recognizes the growing need to address epidemic-prone infectious disease threats—whether naturally occurring, unintentional, or deliberate—that pose a risk to all countries. The strategy states that global health security does not focus on specific infectious disease threats but instead focuses on early identification of a threat, regardless of the specific pathogen and its mode of emergence. The strategy also notes that the U.S. government has

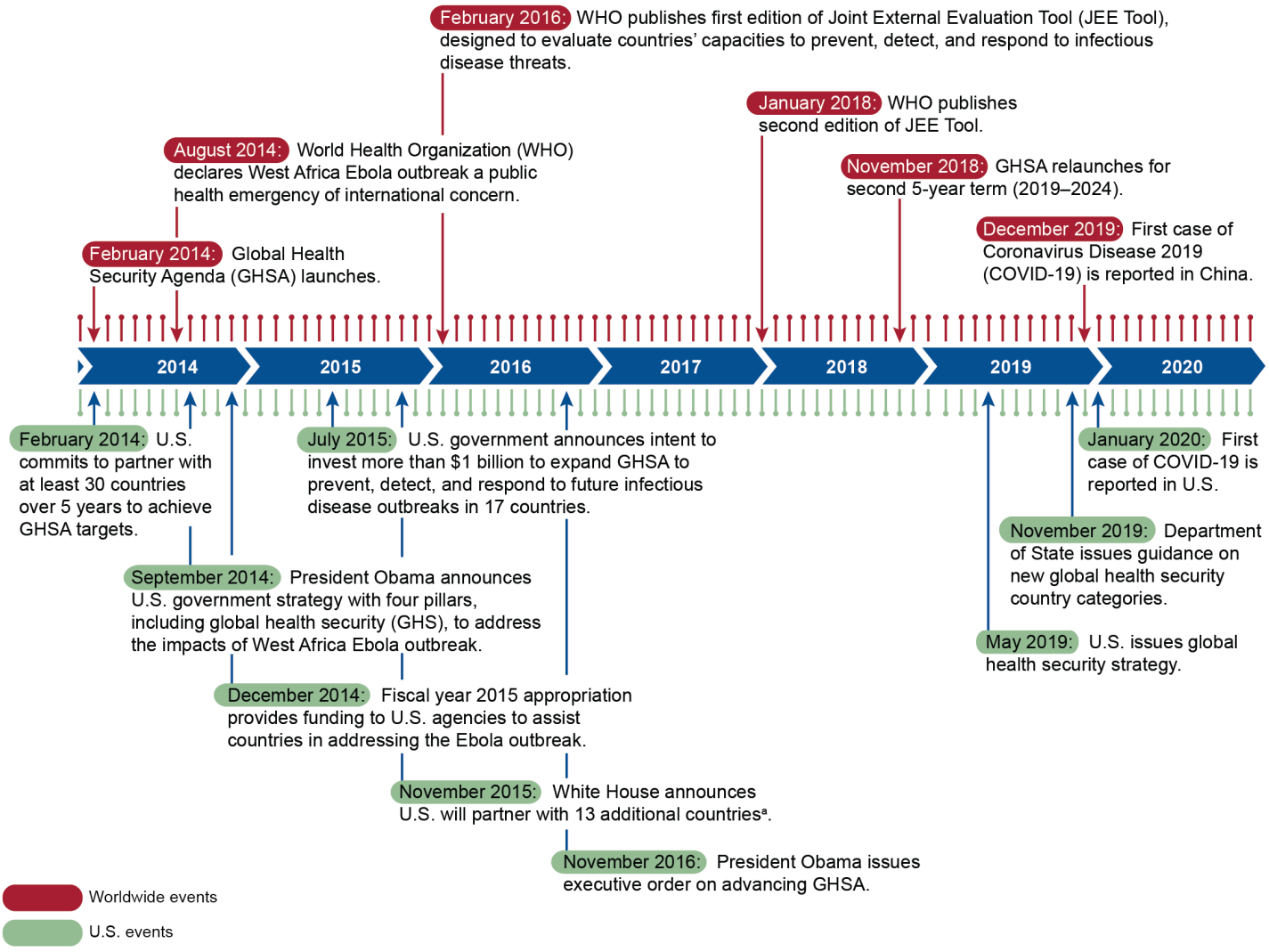
[9]For our reports related to past pandemics and other infectious disease outbreaks, see https://www.gao.gov/coronavirus/past_pandemic-related_reports.

[10]Disease vectors are living organisms that can transmit infectious pathogens between humans or from animals to humans, according to the World Health Organization.

supported GHS work, including a commitment to the GHSA.[11] Figure 1 shows a timeline of recent key global events and U.S. efforts related to GHS.

[11]In addition, the U.S. GHS Strategy notes that the U.S. government has related, ongoing activities that are not considered core global health security activities but support activities that contribute to strengthening global health security. Such global health activities include those intended to control pandemic influenza, polio, tuberculosis, and malaria, and also include the President's Emergency Plan for AIDS Relief.

Figure 1: Timeline of Recent Key Global Events and U.S. Efforts Related to Global Health Security



Source: GAO analysis of U.S. government, GHSA, and WHO information. | GAO-21-359

[a]The U.S. government subsequently added the Caribbean Community—a grouping of 20 countries comprising 15 member states and five associate members—and Malaysia as partner countries.

GHSA

The GHSA is a multisectoral, multilateral effort launched in 2014 to accelerate progress toward compliance with the World Health Organization's (WHO) International Health Regulations (IHR), among

other relevant international frameworks and agreements.[12] According to a report produced by U.S. agencies, the IHR was adopted by 196 WHO member states and sets requirements for each state to prepare for health emergencies of all types.[13]

As of December 2020, the GHSA had 69 member countries, including the United States. GHSA members also include international and nongovernmental organizations and private sector stakeholders. The United States declared its commitment in 2014 to partner with at least 30 countries and implemented this commitment by supporting GHS activities in 17 GHSA "Phase I" partner countries and 15 "Phase II" partner countries in fiscal years 2015 through 2019 (see fig. 2).[14] Phase I countries were those where the U.S. government committed to provide funding to help build GHS capacity. Phase II countries were those that the U.S. government committed to help develop 5-year road maps to coordinate and guide implementation of GHS activities.[15]

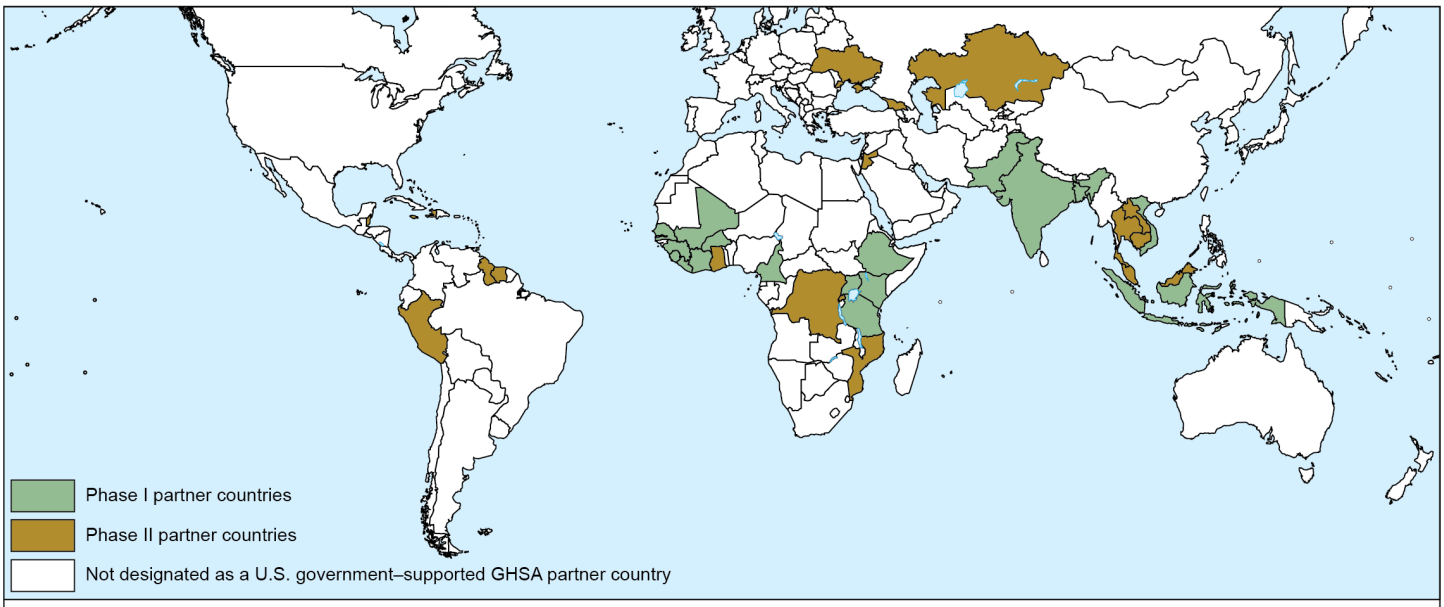
[12]World Health Organization, *International Health Regulations*, 3rd ed. (Geneva: 2005). WHO defines these regulations—also known as "IHR (2005)"—as a legally binding instrument of international law that has its origin in the International Sanitary Conventions of 1851 and was concluded in response to increasing concern about the links between international trade and the spread of disease.

[13]Department of Health and Human Services et al., *Implementing the Global Health Security Agenda: Progress and Impact of U.S. Government Investments* (February 2018).

[14]As of 2016, the U.S. government had identified 14 GHSA member countries and one region, the Caribbean Community, as Phase II GHSA partners. In this report, we present the Caribbean Community as a single country and therefore count the total number of Phase II countries as 15.

[15]In November 2018, the United States renewed its commitment to the GHSA for another 5 years, beginning in 2019. The May 2019 U.S. GHS strategy stated that the United States would use an evidence-, risk-, and feasibility-based process to establish geographic priorities beyond fiscal year 2019. In October 2019, the U.S. GHSA Interagency Review Council, a policy-making entity, established a new term, *U.S. GHSA partner countries*—referring to countries that would receive either intensive or targeted U.S. support—to replace the terms *Phase I partner countries* and *Phase II partner countries*. Beginning in fiscal year 2020, countries receiving intensive support comprised the 17 Phase I countries as well as Nigeria and the Democratic Republic of the Congo. Countries receiving targeted support are those where a U.S. agency is addressing GHS issues; however, the United States has no established list of such countries, according to agency officials. Because we focused our review on funding and activities using funds appropriated in fiscal years 2015 through 2019, we examined GHS work related to Phase I and Phase II countries.

Figure 2: U.S. Government–Supported GHSA Partner Countries, Fiscal Years 2015–2019



Phase I

- Bangladesh
- Burkina Faso
- Cameroon
- Côte d'Ivoire
- Guinea
- Ethiopia
- India
- Indonesia
- Kenya
- Liberia
- Mali
- Pakistan
- Senegal
- Sierra Leone
- Tanzania
- Uganda
- Vietnam

Phase II

- Cambodia
- Caribbean Community[a]
- Democratic Republic of the Congo
- Georgia
- Ghana
- Haiti
- Jordan
- Kazakhstan
- Laos
- Malaysia
- Mozambique
- Peru
- Rwanda
- Thailand
- Ukraine

Sources: U.S. government information on Global Health Security Agenda (data); Map Resources (map). | GAO-21-359

[a]The Caribbean Community is a grouping of 20 countries comprising 15 member states and five associate members. We are showing the Caribbean Community as a single country.

GHSA Joint External Evaluation

The GHSA includes a collaborative assessment process, known as the Joint External Evaluation (JEE), to measure countries' status and progress in building the necessary capacities to prevent and reduce the likelihood of outbreaks, detect threats early, and respond to threats rapidly and effectively.[16]

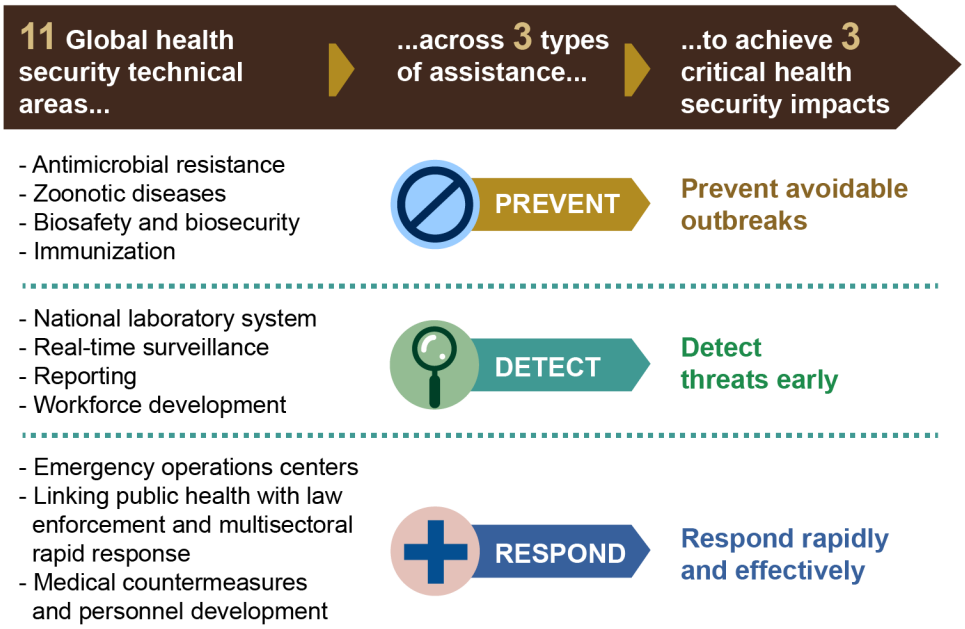
The JEE is completed in two stages: (1) an initial self-evaluation conducted by the host country, using the JEE tool, and (2) an in-country

[16]According to WHO, the JEE process is voluntary.

evaluation conducted by an external team of subject matter experts in close collaboration with the host country. First published by WHO in February 2016, the JEE tool is a data-gathering instrument designed to evaluate countries' capacities to implement the IHR, including all GHSA-relevant capacities across all relevant sectors at a national level. Countries that complete the JEE can use the data and lessons learned from the evaluation process to inform country-level planning and priority setting.

In 2014, GHSA members identified and developed 11 technical areas[17] to facilitate regional and global collaboration to achieve GHSA goals and objectives, according to CDC.[18] These 11 technical areas and associated indicators were included in the JEE tool to assist in measuring and monitoring the status of countries' GHS capacity building (see fig. 3).

Figure 3: Technical Areas of Global Health Security Capacity



Source: GAO, based on Department of Health and Human Services et al., *Strengthening Health Security across the Globe: Progress and Impact of U.S. Government Investments in the Global Health Security Agenda. 2019 Annual Report* (September 2020). | GAO-21-359

[17]The GHSA technical areas are often referred to as action packages.

[18]WHO updated the JEE tool in January 2018. U.S. officials informed us that they began in 2020 to use the updated tool when assessing countries' progress in building GHS capacity. For the purposes of our report, which covers fiscal years 2015 through 2019, we focused on the first edition of the JEE tool, which was published in February 2016.

Text of Figure 3: Technical Areas of Global Health Security Capacity

Global health security technical areas.	Types of assistance	Critical health security impacts
• Antimicrobial resistance • Zoonotic diseases • Biosafety and biosecurity • Immunization	Prevent	Prevent avoidable outbreaks
• National laboratory system • Real-time surveillance • Reporting • Workforce development	Detect	Detect threats early
• Emergency operations centers • Linking public health with law enforcement and multisectoral rapid response • Medical countermeasures and personnel development	Respond	Respond rapidly and effectively

The JEE provides objectives for each of the 11 technical areas, as illustrated in table 1.

Table 1: Global Health Security Agenda Technical Areas and Examples of Objectives in Joint External Evaluation Tool

Technical area	Example of objective as stated in Joint External Evaluation Tool
Antimicrobial resistance (AMR)	*Support work being coordinated by the World Health Organization (WHO), the United Nations Food and Agriculture Organization (FAO), and the World Organization for Animal Health (OIE) to develop an integrated global package of activities to combat antimicrobial resistance, spanning human, animal, agricultural, food and environmental aspects.*
Zoonotic disease	*Adopted measured behaviors, policies, or practices that minimize the transmission of zoonotic diseases from animals into human populations.*
Biosafety and biosecurity	*A whole-of-government national biosafety and biosecurity system, ensuring that especially dangerous pathogens are identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach are conducted to promote a shared culture of responsibility, reduce dual use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country-specific biosafety and biosecurity legislation, laboratory licensing, and pathogen control measures are in place as appropriate.*
Immunization	*A functioning national vaccine delivery system—with nationwide reach, effective distributions, access for marginalized populations, adequate cold chain, and ongoing quality control—is able to respond to new disease threats.*
National laboratory system	*Real-time biosurveillance with a national laboratory system and effective modern point-of-care and laboratory-based diagnostics.*
Real-time surveillance	*Strengthened foundational indicator- and event-based surveillance systems that are able to detect events of significance for public health, animal health, and health security; improved communication and collaboration across sectors and between subnational (local and intermediate), national, and international levels of authority regarding surveillance of events of public health significance; improved country and*

	intermediate level/regional capacity to analyze and link data from and between strengthened, real-time surveillance systems, including interoperable, interconnected electronic reporting systems.
Reporting	*Timely and accurate disease reporting according to WHO requirements and consistent coordination with FAO and OIE.*
Workforce development	*State parties should have skilled and competent health personnel for sustainable and functional public health surveillance and response at all levels of the health system and the effective implementation of the International Health Regulations (IHR) (2005).*
Emergency response operations	*Countries have a public health emergency operation center (EOC) functioning according to minimum common standards; maintaining trained, functioning, multisectoral rapid response teams and "real-time" biosurveillance laboratory networks and information systems; and trained EOC staff capable of activating a coordinated emergency response within 120 minutes of the identification of a public health emergency.*
Linking public health and security authorities	*In the event of a biological event of suspected or confirmed deliberate origin, a country will be able to conduct a rapid, multisectoral response, including the capacity to link public health and law enforcement, and to provide and/or request effective and timely international assistance, including to investigate alleged use events.*
Medical countermeasures and personnel deployment	*A national framework for transferring (sending and receiving) medical countermeasures and public health and medical personnel among international partners during public health emergencies.*

Source: World Health Organization, Joint External Evaluation Tool: International Health Regulations (2005) (Geneva: 2016). | GAO-21-359

USAID and CDC Roles, Responsibilities, Organization, and Funding Sources for GHS

According to the U.S. GHS Strategy, USAID and CDC have been the principal implementers of international GHS capacity–building activities for the U.S. government, although many departments and agencies contribute to U.S. GHS-related work.[19] As the strategy outlines, both USAID and CDC are to implement and coordinate their agencies' programs to build capacity relevant to GHS. In addition, both agencies are to lead, in conjunction with relevant departments and agencies, efforts in antimicrobial stewardship and infection prevention and control. Moreover, both agencies manage GHS funding and activities centrally and also maintain staff in some overseas locations to provide support from the field. USAID and CDC staff in some countries participate in U.S. interagency teams in GHSA partner countries.

According to the U.S. GHS Strategy, at the country level, the ambassador convenes an interagency GHSA country team to develop and execute

[19]According to the U.S. GHS Strategy, other U.S. government entities and agencies contributing to GHS-related work include the National Security Council; Office of Management and Budget; Office of Science and Technology Policy; Departments of State, the Treasury, Defense, the Interior, Agriculture, Health and Human Services, Transportation, and Homeland Security; Environmental Protection Agency; Federal Bureau of Investigation; National Institutes of Health; and Food and Drug Administration.

GHSA annual work plans. The ambassador or designate, such as the Department of State (State) economic officer, chairs the team, which consists of staff representing additional agencies such as HHS and the Departments of Defense and Agriculture. GHSA country teams report progress on specific JEE metrics on a semi-annual basis and discuss work plans, priorities, challenges, and successes at least once each year.

USAID

In USAID's Bureau for Global Health in Washington, D.C., the Office of Infectious Disease manages the bureau's activities and engagement related to infectious diseases, including emerging threats and pandemic preparedness and response. The Office of Infectious Disease is responsible for technical direction and leadership and for external engagement on infectious disease issues, including working with external partners, providing technical support to USAID's field missions and programs, and centrally managing infectious disease funding and programs. Additionally, USAID staff serve as GHS advisors in some USAID field missions.

USAID uses two funding sources to support its GHS activities: (1) the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness—which this report refers to as the Ebola appropriation for USAID[20]—and (2) the Global Health Programs appropriations account. The Ebola appropriation for USAID does not expire, and the appropriation to the Global Health Programs account occurs annually, according to USAID officials.[21] USAID officials told us that the Office of Infectious Disease plans for GHS funds to be allocated to various activities worldwide and consults with USAID officials in the field missions during the planning process before obligating funds. In addition, USAID officials informed us that the central management of GHS funds allows for flexibility to address any unexpected, acute, or

[20]Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. No. 113-235, Div. J, title IX, 128 Stat. 2130, 2693 (2014). Beginning in fiscal year 2015, a portion of the Ebola appropriation for USAID was used to fund activities related to GHS, which is one of the four pillars of the 2014 *U.S. Government Strategy for Reducing Transmission of the Ebola Virus Disease in West Africa*. These four pillars are (1) controlling the outbreak, (2) mitigating the second-order impacts of the crisis, (3) building coherent leadership and operations, and (4) strengthening global health security.

[21]The data we present for the Global Health Programs appropriations account do not include any funds from the Ebola appropriation for USAID.

short-term infectious disease that might arise in a country, consistent with the nature of GHS work.

CDC

Four CDC centers collaborate to carry out the agency's global health security work: (1) the Center for Global Health, (2) the National Center for Emerging and Zoonotic Infectious Diseases, (3) the National Center for Immunization and Respiratory Diseases, and (4) the Center for Preparedness and Response. In the Center for Global Health, at CDC headquarters in Atlanta, the Division of Global Health Protection leads CDC's global health security efforts, working with partner countries to help build key public health capacities. Additionally, CDC staff work on GHS in overseas field locations. These staff include Division of Global Health Protection staff who work on GHS full time and staff outside the division who may also work on other global health issues, according to CDC officials.

Through the fiscal year 2015 appropriation to HHS for Ebola response and preparedness—which this report refers to as the Ebola appropriation to HHS—CDC received $597 million to support national public health institutes and GHS. This appropriation expired at the end of fiscal year 2019.[22] According to CDC officials, in the first year of receiving appropriated funds for GHS, CDC developed 5-year funding proposals to allocate GHS funding to the 17 Phase I countries, which the Office of Management and Budget approved. CDC officials noted that CDC adjusted funding levels annually on the basis of various factors, such as a shift in priorities or the inability to hire personnel in the projected time frame, and that the Office of Management Budget approved these adjustments.

USAID and CDC Obligated Over $1.2 Billion and Disbursed About $1 Billion to Build GHS

[22]Pub. L. No. 113-235, Div. G, title VI, 128 Stat. at 2520. According to CDC officials, before fiscal year 2015, CDC did not have an appropriation for GHS.

Capacity in at Least 34 Countries from Fiscal Years 2015–2019 Appropriations

As of March 31, 2020, USAID and CDC had obligated a combined total of more than $1.2 billion for GHS activities and had disbursed about $1 billion using funds appropriated in fiscal years 2015 through 2019.[23] USAID and CDC funding supported GHS activities aimed at building countries' capacity to prevent, detect, and respond to infectious disease threats by bolstering capacity in the 11 technical areas identified by the GHSA in 2014. USAID obligated and disbursed funding from both the Ebola appropriation for USAID and the Global Health Programs appropriations account, while CDC obligated and disbursed funding exclusively from the Ebola appropriation to HHS. Together, the agencies supported GHS activities in at least 34 countries, including 25 GHSA partner countries, through agreements awarded to implementing partners.[24]

USAID and CDC Had Obligated More Than $1.2 Billion and Disbursed About $1 Billion for GHS Activities as of March 2020 from Fiscal Years 2015–2019 Appropriations

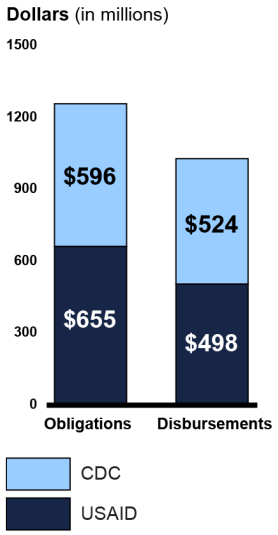
As of March 31, 2020, USAID and CDC had obligated a combined total of more than $1.2 billion and disbursed about $1 billion of this amount for

[23]USAID provided us with two sets of funding and activities data corresponding to the two funding sources that it used to support its GHS activities: (1) the fiscal year 2015 Ebola appropriation for USAID and (2) fiscal years 2015 through 2019 appropriations to the Global Health Programs account. USAID officials explained that the agency reported data for the two funding sources differently because these data sets represent GHS activities with different time frames, appropriations, and reporting requirements. With regard to GHS funding from the Ebola appropriation for USAID, which does not expire, USAID reported obligations and disbursements data categorized by the fiscal year when it obligated these funds to specific award agreements. With regard to GHS funding from the Global Health Programs appropriations account—which, according to agency officials, must be allocated and obligated within 2 years of appropriation—USAID reported obligations and disbursements categorized by the fiscal year of appropriation, regardless of the date of obligation. CDC reported obligations and disbursements for global health security activities implemented in fiscal years 2015 through 2019 from the Ebola appropriation to HHS, which expired at the end of fiscal year 2019. CDC categorized these obligations and disbursements by the fiscal year in which it obligated funds for those activities.

[24]USAID provided funding for GHS activities in at least 33 countries, including 16 of the 17 Phase I countries and eight of the 15 Phase II countries. CDC provided funding for GHS activities in all 17 Phase I countries, including Pakistan; USAID did not provide funding for GHS activities in Pakistan.

GHS activities from funds appropriated in fiscal years 2015 through 2019 (see fig. 4).

Figure 4: USAID's and CDC's Combined Total Obligations and Disbursements for Global Health Security Activities from Fiscal Years 2015–2019 Appropriations, as of March 31, 2020



Source: GAO analysis of U.S. Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC) data. | GAO-21-359

Data table for Figure 4: USAID's and CDC's Combined Total Obligations and Disbursements for Global Health Security Activities from Fiscal Years 2015–2019 Appropriations, as of March 31, 2020 (dollars in millions)

	USAID	CDC
Obligations	$655	$596
Disbursements	$498	$524

Zoonotic Disease Threats

Most global infectious diseases have zoonotic origins, according to officials of the U.S. Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC). The officials said that mitigating zoonotic diseases through efforts such as animal health monitoring and response is an important aspect of building global health security (GHS) capacity. According to USAID officials in Washington, D.C., GHS includes programming focused on the detection of zoonotic pathogens that circulate in wildlife and livestock but also have the potential to affect human populations.

USAID and CDC officials in Ethiopia, Vietnam, and Indonesia told us that advances in GHS for animal health required further investment and that capacities in this area had not grown to the same extent as capacities related to human health. According to USAID officials, longstanding underfunding and relative neglect of animal health capacities by national governments have contributed significantly to this disparity, which is now beginning to be addressed.

USAID Activity to Communicate about Zoonotic Disease Risk

Source: Tegegne Shiferaw, MPH, BSc. | GAO-21-359

USAID and CDC used the majority of the funds they obligated for GHS to award agreements to implementing partners to carry out GHS activities.[25] According to USAID and CDC officials, both agencies' GHS activities aimed at preventing, detecting, and responding to infectious disease threats. Consistent with this aim, USAID and CDC officials noted that USAID's and CDC's GHS activities in fiscal years 2015 through 2019 were intended to help build GHSA countries' capacity to prevent, detect, and respond to infectious diseases in the 11 GHSA technical areas.

Although USAID and CDC cover some of the same technical areas, officials described a number of ways in which the two agencies coordinate to avoid overlapping activities. According to USAID headquarters officials as well as USAID and CDC officials we spoke with in Ethiopia, Indonesia, Senegal, and Vietnam, USAID and CDC collaborate at the headquarters and country levels to ensure that the two agencies avoid duplicative efforts, pursue complementary activities, and prevent gaps in the assistance provided to the countries. For example, USAID headquarters officials explained that if both agencies are working on strengthening laboratory and training techniques, the two agencies may coordinate their efforts, with USAID providing assistance at the laboratory facility and working with the government ministries and CDC providing training for laboratory technicians.

In addition, CDC headquarters officials noted that country-level officials work closely with GHSA country teams, which include USAID officials, to make GHS programming decisions. Moreover, CDC headquarters officials reported regular communication with USAID officials that informs CDC's subsequent programming decisions.[26] Agency officials we interviewed also said that USAID and CDC collaborate to develop interagency work plans at the country level to ensure the two agencies' activities are harmonized.

Figure 5 shows facilities where USAID and CDC supported activities that we observed in Ethiopia and Senegal, which were both Phase I countries.

[25]Both agencies also use some funds that they have allocated for GHS to support their own operating expenses.

[26]USAID and CDC staff in some overseas locations participate in interagency GHSA country teams that may also include staff from State, HHS, and the Departments of Defense and Agriculture.

Figure 5: Examples of Facilities in Ethiopia and Senegal Where USAID and CDC Supported GHS Activities

Left: Public Health Emergency Operations Center in Senegal, which received funding for training and an exercise to evaluate response to outbreaks of infectious disease from the U.S. Agency for International Development; and development of standard operating procedures, and equipment and supplies from the Centers for Disease Control and Prevention (CDC). Center top: Institute for Health Research, Epidemiological Surveillance, and Training in Senegal, which received CDC funding for supplies, equipment, training, and management capacity of antimicrobial resistant reference strains at the national public health laboratory. Center bottom: Room at Public Health Emergency Operations Center in Senegal where officials can monitor reports and outbreaks of infectious disease. Right: Ethiopian Public Health Institute, which received funding from CDC for training, workshops, staff salaries, supplies, and travel.

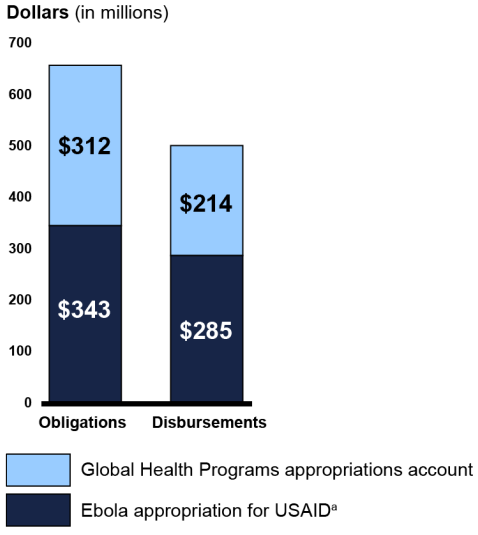
Source: GAO. | GAO-21-359

USAID Had Obligated About $655 Million and Disbursed Nearly $500 Million for GHS Activities as of March 2020 from Fiscal Years 2015-2019 Appropriations

USAID Funding

As of March 31, 2020, USAID reported having obligated about $655 million and disbursed about $500 million for GHS activities from funds appropriated in fiscal years 2015 through 2019. USAID obligated and disbursed this funding from two sources: the Ebola appropriation for USAID and the Global Health Programs appropriations account. Figure 6 shows the amounts that USAID obligated and disbursed from these two sources.

Figure 6: USAID Obligations and Disbursements for Global Health Security Activities from Fiscal Years 2015–2019 Appropriations, as of March 31, 2020



Source: GAO analysis of U.S. Agency for International Development (USAID) data. | GAO-21-359

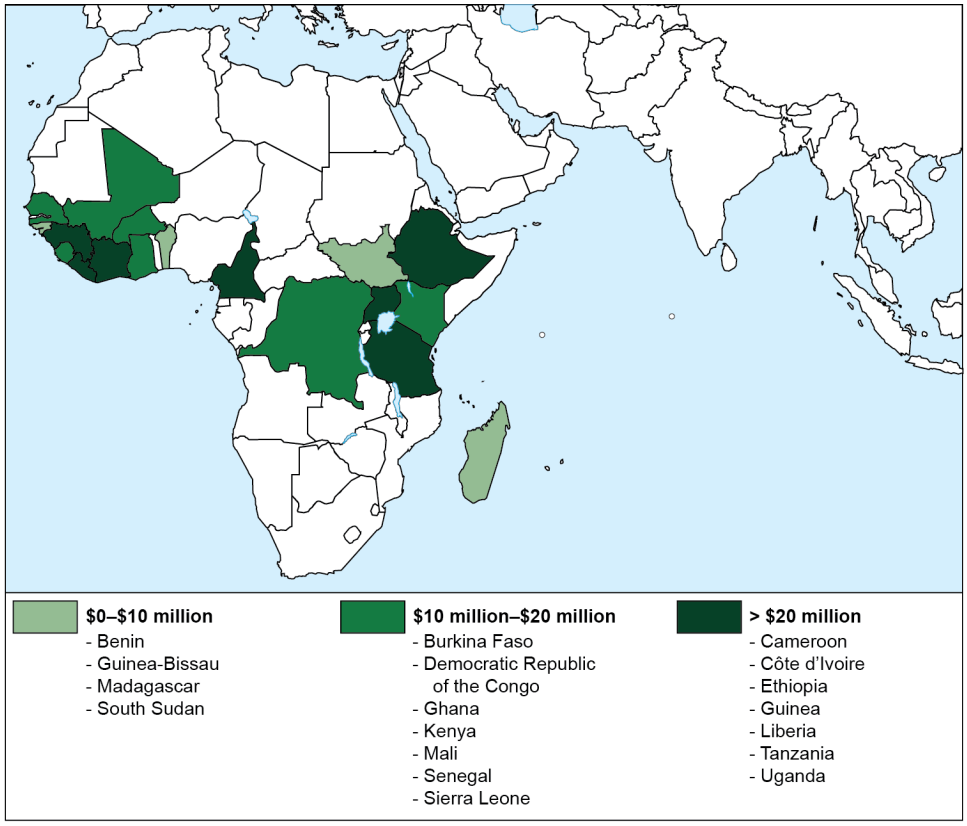
Data table for Figure 6: USAID Obligations and Disbursements for Global Health Security Activities from Fiscal Years 2015–2019 Appropriations, as of March 31, 2020 (dollars in millions)

	Ebola appropriation	Global Health Programs appropriations account
Obligations	$343	$312
Disbursements	$285	$214

[a]"Ebola appropriation for USAID" refers to the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness. Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. No. 113-235, Div. J, title IX, 128 Stat. 2130, 2693 (2014).

Ebola appropriation for USAID. In fiscal years 2015 through 2019, USAID obligated funding from the Ebola appropriation for USAID for activities in 18 countries, according to USAID data (see fig. 7).

Figure 7: USAID Obligations in Fiscal Years 2015-2019 for Countries Where the Agency Supported GHS Activities with Fiscal Year 2015 Ebola Appropriation for USAID, as of March 31, 2020



Sources: GAO analysis of U.S. Agency for International Development (USAID) data (data); Map Resources (map). | GAO-21-359

Note: "Ebola appropriation for USAID" refers to the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness. Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. No. 113-235, Div. J, title IX, 128 Stat. 2130, 2693 (2014). The data shown do not include $33 million in global awards and $13 million in regional awards and do not include funding for USAID's internal operating expenses.

Global Health Programs appropriations account. According to USAID officials, in fiscal year 2019, USAID began to track country-level GHS funding from the Global Health Programs appropriations account, starting with funding for fiscal year 2018, to address congressional reporting

specifications.[27] Officials explained that USAID developed the capability to track country-level funding partly in response to our recommendation in a May 2019 report.[28] Officials also noted that USAID is not able to comprehensively track country-level GHS funding from the Global Health Programs appropriations account for fiscal years 2015 through 2017. However, for the Ebola appropriation for USAID, the agency has country-level GHS funding data for fiscal years 2015 through 2019.

USAID Activities

USAID primarily categorizes its GHS activities according to the three types of GHS assistance—infectious disease prevention, detection, and response—with many activities addressing more than one type. For example, officials stated that surveillance activities address both prevention and detection of infectious diseases. As a result, disaggregating the specific amount of funding used for each type of assistance would be difficult, according to agency officials. However, USAID reporting associates specific funding awards with the relevant types of assistance.

Our analysis of USAID data on funding for GHS activities found the following:[29]

- Of 65 awards identified in USAID data, 29 involved disease prevention, 19 involved disease detection, and 40 involved disease response. Many of the implemented activities involved multiple types of assistance.
- Of 43 implementing partners identified in USAID data, the top three implementing partners (i.e., those that received the largest amounts of

[27]Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Div. K, § 7019(e), 132 Stat. 348, 874.

[28]See GAO, *Emergency Assistance for Zika: USAID Supported Activities Overseas but Could Improve Funds Tracking and Response Planning,* GAO-19-356 (Washington, D.C.: May 13, 2019). We recommended that USAID take steps to ensure that in responding to future public health emergencies of international concern, the agency is able to compile funding information by country. In response, USAID established a requirement and process in July 2019 to track funding obligated for preparedness and response activities supporting a public health emergency of international concern on a by-country basis.

[29]Our analysis of USAID funding for GHS activities focused on obligations as of March 31, 2020, from funds appropriated in fiscal years 2015 through 2019. In addition, our analysis included funding obligated to external USAID implementing partners but excluded funding for internal operating expenses.

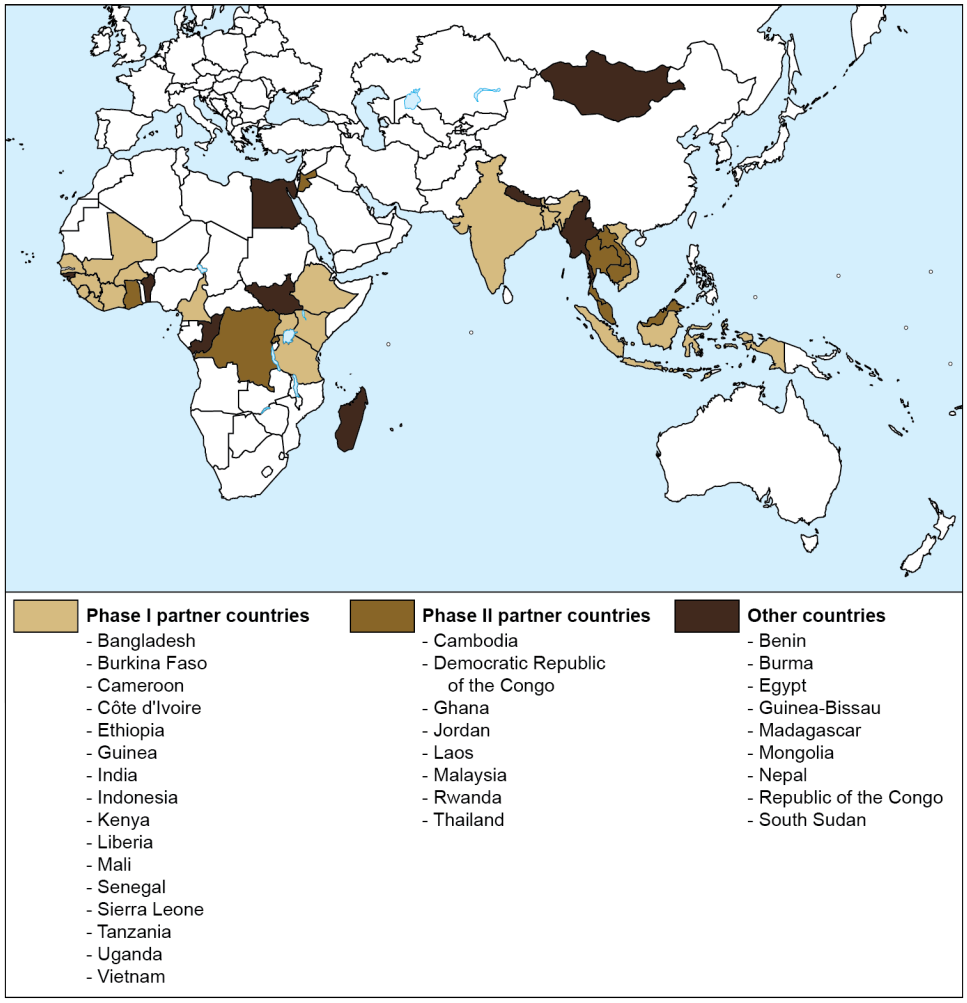
GHS funding) received 59 percent of USAID's total obligations to implementing partners. The top three partners were the United Nations' Food and Agriculture Organization; the University of California, Davis; and the University of Minnesota.

- The 10 implementing partners to which, as of March 31, 2020, USAID had obligated the largest amounts from funds appropriated in fiscal years 2015 through 2019 received 89 percent of USAID's total obligations to implementing partners. See appendix II for a list of these implementing partners and the amounts obligated.

Using funds appropriated in fiscal years 2015 through 2019, USAID supported GHS activities in at least 33 countries, including 24 of the 32 GHSA partner countries. Specifically, USAID provided funding for activities in 16 of 17 Phase I countries, eight of 15 Phase II countries, and nine other countries at high risk for global infectious disease threats, according to information available from USAID. USAID reporting indicates that the agency did not provide funding for GHS activities in one Phase I country (Pakistan) and seven Phase II countries (Georgia, Haiti, Kazakhstan, Mozambique, Peru, Ukraine, and the Caribbean Community).[30] According to USAID officials, USAID focused its GHS funding on countries with the highest risk of zoonotic virus emergence. Figure 8 shows the countries where USAID supported GHS activities using funds appropriated in fiscal years 2015 through 2019.

[30]USAID officials explained that because of funding constraints and security concerns—particularly concerns about the safety of staff drawing samples from animals in the field—USAID did not identify Pakistan as a high-priority country and thus did not provide funding for GHS activities in this Phase I country in fiscal years 2015 through 2019.

Figure 8: Countries Where USAID Supported Global Health Security Activities with Fiscal Years 2015-2019 Appropriations, as of March 31, 2020



Sources: GAO analysis of U.S. Agency for International Development (USAID) data (data); Map Resources (map). | GAO-21-359

Note: USAID also supported some global health security activities through global and regional funding awards, which may have included activities in countries that are not shown.

Examples of USAID's GHS activities in Phase I countries include the following:

- In Senegal, USAID has supported the Infectious Disease Detection and Surveillance project. According to implementing partners, this project has assisted laboratories in Senegal in building capacity for detection surveillance through training sessions and diagnostic support for disease detection and has supported border surveillance efforts.

- In Guinea, USAID provided support to build the central veterinary laboratory's capacity to conduct core tests for diseases such as avian influenza and rabies, according to the GHSA country team. USAID has also coordinated with a reference laboratory at the University of California, Davis, to provide simultaneous analysis of animal samples to Guinea and the United States, ensuring that data and findings are available to inform Guinea's health policy. Additionally, USAID provided 11 solar freezers and 200 coolers to facilitate specimen transport from regional laboratories to national laboratories for advanced diagnostics.
- In Ethiopia, USAID supported the One Health Workforce project, which provided training to current and future One Health workers in the classroom, online, and in the field to create a workforce with technical expertise and practical skills to address emerging infectious disease threats.[31] USAID provided this training in coordination with experts in medicine, nursing, public health, education and development, environmental health, and veterinary medicine, among other disciplines. While supporting the project, USAID officials helped establish the One Health National Steering Committee. According to officials we interviewed in December 2019, although the USAID project had ended, the committee continued to meet regularly to provide high-level government coordination for GHS. Committee members told us that their priority areas included coordinating joint responses to outbreaks and developing the One Health Workforce project.[32]

[31]One Health is a collaborative, multisectoral, and transdisciplinary approach implemented at the local, regional, national, and global levels to achieve optimal health outcomes with respect to the interconnection between people, animals, plants, and their shared environment. USAID's One Health Workforce project supports workforce development in universities in Africa and Southeast Asia.

[32]According to USAID officials, the One Health Workforce–Next Generation project, which launched in October 2019, is a follow-on to the One Health Workforce project and is actively engaged in nine countries in Africa and eight countries in Southeast Asia. USAID officials noted that, as in the original One Health Workforce project, the One Health Workforce–Next Generation project aims to enhance global health security by empowering university networks and their member institutions to develop and deliver sustainable training and programs that address complex One Health challenges, such as infectious disease and antimicrobial resistance threats.

CDC Had Obligated $596 Million and Disbursed Nearly $525 Million for GHS Activities as of March 2020 from Funds Appropriated in Fiscal Year 2015

CDC Funding

As of March 31, 2020, CDC reported having obligated $596 million and disbursed about $524 million for GHS activities from funds appropriated in fiscal year 2015. CDC obligated and disbursed this funding from a single source, the Ebola appropriation to HHS. CDC has the ability to track this funding at the country level, and it categorizes funding for activities that span more than one country as cross cutting.

CDC Activities

CDC officials told us that the agency focused its obligations for GHS support on activities in the following “core 4” areas:

1. disease surveillance and outbreak response—establishing routine surveillance for priority diseases and developing information technology tools and systems;
2. emergency management—providing countries with the knowledge and resources, including emergency operations centers to help mount a fast, coordinated response when outbreaks happen;
3. safe laboratory systems and diagnostics—building the capacity to identify disease threats close to the source and inform decision-making; and
4. development of the workforce—training frontline responders, laboratorians, disease detectives, emergency managers, and other health professionals who are responsible for taking the lead when crisis strikes.

CDC officials noted that, similar to USAID, CDC does not track GHS funding by type of assistance, because many of its activities address

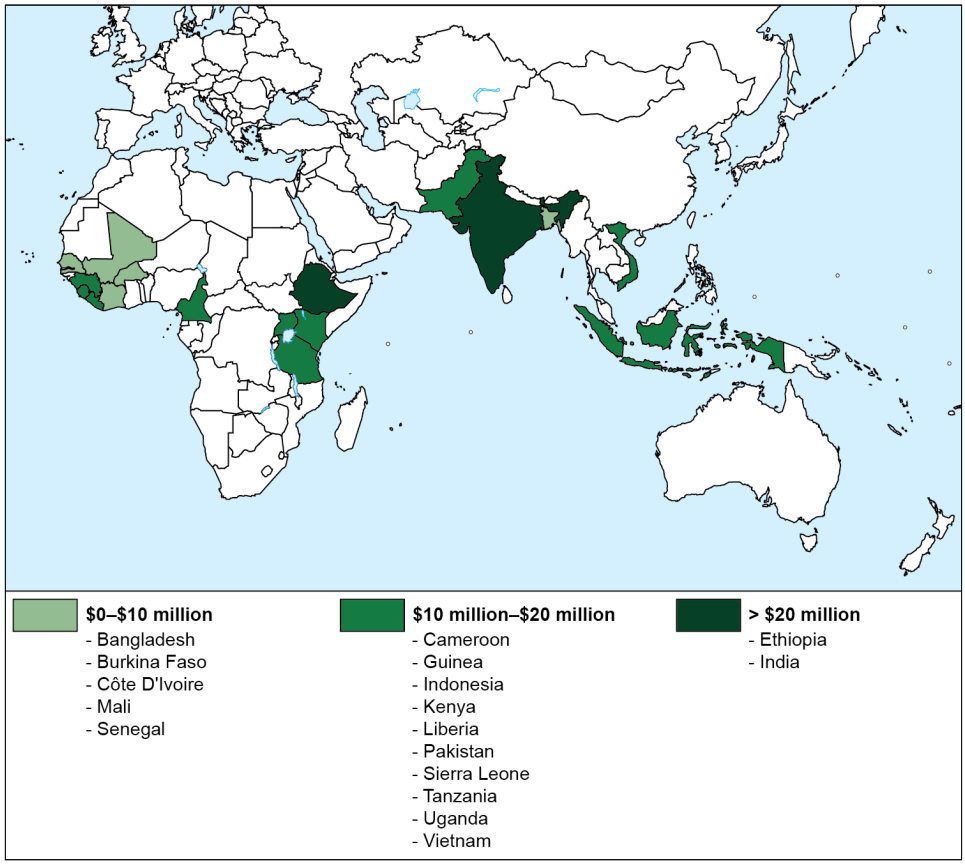
multiple types of assistance or cover multiple technical areas. Our analysis of CDC data on funding for GHS activities found the following:[33]

- Many of CDC's activities involved awarding funds to host governments to implement GHS activities, which comprised about 25 percent of total awards to recipients for GHS-related assistance. Examples shown by CDC data include funding awarded to the Ethiopian Public Health Institute, Pakistan's National Institute of Health, and the Uganda Virus Research Institute.
- Of 105 implementing partners identified in CDC data, the top three implementing partners (i.e., those that received the largest amounts of GHS funding) received 25 percent of CDC's total obligations to implementing partners. These three partners were WHO, the African Field Epidemiology Network, and the Task Force for Global Health.
- The 10 implementing partners to which, as of March 31, 2020, CDC had obligated the largest amounts from funds appropriated in fiscal year 2015 received 46 percent of CDC's total obligations to implementing partners. See appendix II for a list of these implementing partners and obligated funding amounts.

CDC supported GHS activities in all 17 Phase I countries. Figure 9 shows CDC's total obligations for GHS activities in these countries from funds appropriated in fiscal year 2015.

[33]Our analysis of CDC funding for GHS activities focused on obligations as of March 31, 2020, from funding appropriated in fiscal year 2015. In addition, our analysis included funding obligated to external CDC implementing partners but excluded funding for internal operating expenses.

Figure 9: CDC Obligations in Fiscal Years 2015-2019 for Countries Where the Agency Supported GHS Activities from Fiscal Year 2015 Appropriation to HHS, as of March 31, 2020



Sources: GAO analysis of Centers for Disease Control and Prevention (CDC) data (data); Map Resources (map). | GAO-21-359

Note: "Appropriation to HHS" refers to the fiscal year 2015 appropriation to HHS for Ebola response and preparedness. Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. No. 113-235, Div. G, title VI, 128 Stat. 2130, 2520 (2014). The data shown do not include $119 million in cross-cutting awards, which involve work across multiple countries, and do not include funding for CDC's internal operating expenses.

Examples of CDC's GHS activities include the following:

- In Ethiopia and Senegal, participants in the Field Epidemiology Training Program told us about field applications of skills that they had learned in the classroom. Graduates of the program had also participated in regional detection and response efforts, including assisting with the response to an Ebola outbreak in West Africa, according to the participants we spoke with.

- In Ethiopia and Senegal, we observed national emergency operation centers where staff collect data, such as data on reported incidents of suspected infectious diseases, to monitor possible outbreaks. At these centers, CDC has provided software and technical training for staff to build the countries' capacity to monitor and respond to outbreaks.
- In Vietnam, CDC collaborated with WHO Vietnam to conduct a systematic review of sentinel surveillance for influenza-like illness, according to the GHSA country team. CDC previously had provided technical and financial assistance to establish and operate this disease surveillance system and subsequently, in 2016, transferred operations to the government of Vietnam. Findings from the review informed Vietnam's revision and finalization of official national guidelines for such surveillance efforts.

U.S. Assessments Showed Some GHS Capacity in Most Phase I Countries, but Countries Faced Several Challenges

Our analysis of U.S. officials' assessments of the 17 Phase I countries' GHS capacities at the end of fiscal year 2019 found that the majority of the countries had developed some capacity in most of the technical areas developed by the GHSA in 2014. In addition, our analysis of the assessments found that for most of the countries, indicator scores for the majority of the 11 technical areas had remained stable or increased from baseline scores in 2016 and 2017. Our analysis of the assessments also found that the countries faced eight types of challenges to building GHS capacity, including weaknesses in government institutions, constrained resources, and insufficient human capital.[34]

JEEs Assessed GHS Capacity in the 11 Technical Areas Using 31 Indicators

For each of the 11 GHSA technical areas, the JEEs for most Phase I countries in 2016 and 2017 assessed one to four attributes, known as indicators—a possible total of 31 indicators—to assist the countries in

[34]In this public version of our sensitive report (GAO-21-213SU), we have omitted specific details of country scores, examples, and challenges that USAID and CDC deemed sensitive.

building GHS capacity. Table 2 shows the technical areas and indicators assessed in the JEEs.

Table 2: Global Health Security Capacity Indicators Assessed in Joint External Evaluations (JEE) of GHSA Technical Areas in 2016 and 2017

Technical area	Indicators
Antimicrobial resistance (AMR)	• AMR detection • Surveillance of infections caused by AMR pathogens • Health care–associated infection prevention and control programs • Antimicrobial stewardship activities
Zoonotic disease	• Surveillance systems in place for priority zoonotic diseases/pathogens • Veterinary or animal health workforce • Established and functional mechanisms for responding to infectious zoonoses and potential zoonoses
Biosafety and biosecurity	• Whole-of-government biosafety and biosecurity system in place for human, animal, and agriculture facilities • Biosafety and biosecurity training and practices
Immunization	• Vaccine coverage (measles) as part of national program • National vaccine access and delivery
National laboratory system	• Laboratory testing for detection of priority diseases • Specimen referral and transport system • Effective modern point-of-care and laboratory-based diagnostics • Laboratory quality system
Real-time surveillance	• Indicator- and event-based surveillance systems • Interoperable, interconnected, electronic real-time reporting system • Analysis of surveillance data • Syndromic surveillance systems
Reporting	• System for efficient reporting to WHO, FAO, and OIE • Reporting network and protocols in country
Workforce development	• Human resources available to implement IHR core capacity requirements • Applied epidemiology training program in place • Workforce strategy
Emergency response operations	• Capacity to activate emergency operations • Emergency operations center operating procedures and plans • Emergency operations program • Case management procedures implemented for IHR-relevant hazards
Linking public health and security authorities	• Public health and security authorities linked during a suspected or confirmed biological event
Medical countermeasures and personnel deployment	• System in place for sending and receiving medical countermeasures during a public health emergency • System in place for sending and receiving health personnel during a public health emergency

Legend: FAO = Food and Agriculture Organization of the United Nations, IHR = International Health Regulations, OIE = World Organisation for Animal Health, WHO = World Health Organization.

Source: World Health Organization, Joint External Evaluation Tool. International Health Regulations (2005), 1st ed. (Geneva: 2016). | GAO-21-359

Note: In 2014, the United States and other nations launched the Global Health Security Agenda (GHSA) to accelerate progress toward a world safe and secure from infectious disease threats. In 2014, GHSA members identified and developed 11 technical areas to facilitate regional and global collaboration in achieving GHSA goals and objectives, according to Centers for Disease Control and Prevention officials. JEEs conducted in 16 countries in fiscal years 2016 and 2017 assessed one to four indicators for each technical area as attributes to assist countries in building capacity.

USAID and CDC Officials Use GHSA Progress Reports and JEE Scores to Assess Countries' Progress and Plan Future Assistance

USAID and CDC headquarters officials review reports on Phase I countries' progress in building GHS capacity, which GHSA country teams have submitted twice each year since fiscal year 2017. In completing these GHSA progress reports, the teams use the indicator scores from the 2016 and 2017 JEEs as baseline measurements of each country's capacities to respond to infectious disease threats, and they use these baselines to assess the effectiveness of U.S. efforts to help the countries build GHS capacities.[35] In 2016 and 2017, 16 of the 17 Phase I countries that received U.S. GHS assistance participated in a JEE with an external evaluation team.[36]

Guidance for completing the GHSA progress reports indicates that officials should develop their reporting using the capacity levels identified in the JEE tool. According to the guidance, the reports should provide scores for indicators in each technical area and should include examples of U.S. efforts to support capacity building for each area. Table 3 shows the five capacity levels and the attributes associated with each level, with examples from the technical area national laboratory system.

[35]According to WHO, the JEE is a voluntary, collaborative evaluation process that is completed in two stages: (1) an initial self-evaluation conducted by the host country, using the JEE tool, and (2) an in-country evaluation conducted by an external evaluation team of subject matter experts in close collaboration with the host country. First published by WHO in February 2016, the JEE tool is a data-gathering instrument designed to evaluate IHR capacities for health security, including all GHSA-relevant capacities across all relevant sectors at a national level. According to WHO, countries can use the data and lessons learned from the evaluation process to inform country-level planning and priority setting.

[36]A JEE had not been conducted for the one remaining Phase I country as of May 2020.

Table 3: Capacity Levels for GHSA Indicators Identified in Joint External Evaluation (JEE) Tool

Capacity levels	Description	Examples from *national laboratory system* technical area
Level 1: No capacity	Attributes of a capacity are not in place	National laboratory system is not capable of conducting any core tests. No system is in place to transport specimens. No diagnostic testing strategies are documented. There are no national quality standards for health laboratories.
Level 2: Limited capacity	Attributes of a capacity are in the development stage (some are achieved and some are being implemented).	National laboratory system is capable of conducting one to two core tests. System is in place to transport specimen from less than 50% of country for advance diagnostics. Minimal diagnostic capacity exists. National quality standards have been developed, but there is no system for verifying their implementation.
Level 3: Developed capacity	Attributes of a capacity are in place; however, the capacity's sustainability in country may be uncertain, as indicated by its lack of inclusion in the operational plan in the National Health Sector Planning or lack of secure funding.	National laboratory system is capable of conducting three to four core tests. System is in place to transport specimens from 50% to 80% of country for advance diagnostics. Diagnostic testing strategies are documented but not fully implemented. Licensing system for health laboratories, including conformity with national quality standards, exists but is not required for all laboratories.
Level 4: Demonstrated capacity	Attributes of a capacity are in place, are sustainable for a few more years, and can be measured by the inclusion of the attributes or International Health Regulations (2005) core capacities in the national health sector plan.	National laboratory system is capable of conducting five or more core tests. System is in place to transport specimens from at least 80% of country. Diagnostic testing strategies are documented and fully implemented. Mandatory licensing of all health laboratories is in place, and conformity to national quality standards is required.
Level 5: Sustainable capacity	Attributes of a capacity are functional and sustainable, and the country is supporting other countries in implementing the capacity.	Country has national system for procurement and quality assurance. Specimen transport system is in place for all of country and funded from country budget. Country has sustainable capacity for performing diagnostic testing, with no more than 20% dependence on donor funding. Mandatory licensing of all health laboratories is in place, and conformity to an international quality standard is required.

Source: World Health Organization, Joint External Evaluation Tool, 1st ed. (Geneva: 2016). | GAO-21-359

Note: The JEE tool, developed by the World Health Organization, is an evaluation process that U.S. officials use to monitor progress in building capacity to prevent, detect, and respond to infectious disease threats in countries receiving assistance from the United States as part of the Global Health Security Agenda (GHSA). In 2014, the United States and other nations launched the GHSA to accelerate progress toward a world safe and secure from infectious disease threats. To assist countries in building capacity, JEEs conducted in 16 countries in 2016 and 2017 assessed one to four capacity indicators for each of 11 technical areas, assigning a score for each indicator. The JEE tool provides contextual questions and examples to help evaluators assign the scores.

Officials at USAID headquarters stated that at least annually, they review the GHSA progress reports submitted by the GHSA country teams.[37] According to the officials, they use the reports to track the countries' progress in building GHS capacity, identify successes and areas for improvement, determine follow-up actions, and develop future programming for each country and technical area. Officials at USAID headquarters said that they discuss follow-up actions during calls with GHSA country teams, who may incorporate the actions in the interagency annual GHS work plans that they develop for the countries. According to USAID officials, the GHSA progress reports, in combination with other information related to topics such as security concerns and country governance, assist them in making programming and resource decisions.

In addition to using the GHSA progress reports to monitor each country's progress in building capacity, officials at USAID headquarters use the reports to review countries' collective progress, by country and across the technical areas. The officials explained that some technical area activities benefit from collaborative regional efforts, such as ensuring quality standards for laboratories. During our visit to Senegal, U.S. officials stated that technical experts in laboratory standards and testing in that country have shared their expertise with other countries in the region, using knowledge gained from U.S.-funded training (see fig. 10 for an example of equipment used in such training).

[37]GHSA country teams comprise staff from USAID, CDC, State, and the Departments of Defense and Agriculture.

Figure 10: Equipment Used in Senegal's Institute for Health Research Epidemiology Surveillance Training

Equipment for calibrating biosafety cabinets. The Centers for Disease Control and Prevention funded training in quality control, such as calibration and maintenance of laboratory equipment.

Source: GAO. | GAO-21-359

CDC officials at headquarters stated that they use the GHSA progress reports to inform discussions of technical support for GHS development and to plan future activities. According to these officials, they review changes in average indicator scores in technical areas to identify indicators needing additional support and indicators showing capacity increases. Officials also stated that they conduct country-specific analysis of indicator score changes over time and analyze ranges of JEE country scores across various geographic regions to obtain regional project updates and inform future planning. Further, CDC headquarters officials said that they review contributions made by CDC officials on GHSA country teams to the draft GHSA progress reports. According to the officials, they use the final reports submitted by the teams to track progress and articulate the effects of U.S. GHSA activities.

CDC officials also discuss the GHSA progress reports with other agencies' officials. CDC officials on the country teams told us that they work closely with officials of the other represented agencies, including USAID, State, and the Department of Defense, to make programming decisions. CDC headquarters officials stated that they discuss the progress reports with interagency colleagues during interagency GHS calls.

U.S. Progress Reports Submitted before COVID-19 Onset Showed Some GHS Capacity in Most Technical Areas and Countries

Analysis of Indicator Scores by Technical Area

Our analysis of the GHSA progress reports for fiscal year 2019 for the 17 Phase I countries found that the indicator scores for most of the 11 technical areas showed some GHS capacity.[38] As seen in table 4, for seven of the 11 technical areas—*zoonotic diseases*, *immunization*, *national laboratory system*, *real-time surveillance*, *reporting*, *workforce development,* and *emergency response operations*—the largest numbers of indicator scores were at level 3, which the JEE tool defines as "developed capacity." For three of the 11 technical areas—*antimicrobial resistance*, *biosafety and biosecurity*, and *medical countermeasures and personnel deployment*—the largest numbers of indicator scores were at level 2, which the JEE tool defines as "limited capacity." For the remaining technical area, *linking public health and security authorities*, the largest number of indicator scores was at level 2 and level 3, which each had five scores.

Table 4: Numbers of Indicator Scores at Each Capacity Level for All Phase I Countries, by GHSA Technical Area, at the End of Fiscal Year 2019

Technical area	Level 1: No capacity	Level 2: Limited capacity	Level 3: Developed capacity	Level 4: Demonstrated capacity	Level 5: Sustained capacity	Total number of scores
Antimicrobial resistance	5	26	25	6	0	**62**
Zoonotic diseases	0	9	32	9	0	**50**
Biosafety and biosecurity	1	16	13	1	0	**31**
Immunization	0	2	13	11	1	**27**
National laboratory system	4	15	34	13	0	**66**
Real-time surveillance	0	9	29	25	0	**63**
Reporting	0	4	18	1	0	**23**
Workforce development	0	8	22	18	0	**48**
Emergency response operations	4	9	30	12	4	**59**

[38]Although GHSA country teams assess countries' progress in building GHS capacity at the midpoint and end of each fiscal year, we focused our analysis on the assessments at the end of the fiscal year.

Technical area	Level 1: No capacity	Level 2: Limited capacity	Level 3: Developed capacity	Level 4: Demonstrated capacity	Level 5: Sustained capacity	Total number of scores
Linking public health and security authorities	0	5	5	2	0	**12**
Medical countermeasures and personnel deployment	3	9	4	5	1	**22**
Total	**17**	**112**	**225**	**103**	**6**	**463**

Source: GAO analysis of U.S. agencies' Global Health Security Agenda (GHSA) capacity gains progress reporting. | GAO-21-359

Note: In 2014, GHSA members identified and developed 11 technical areas to facilitate regional and global collaboration in achieving GHSA goals and objectives, according to Centers for Disease Control and Prevention officials. The Joint External Evaluation (JEE) tool, which is used to assess countries' capacities in the technical areas, includes one to four indicators for each technical area—a total of 31 indicators—as attributes to assist a country in building capacity. U.S. officials submitted indicator scores related to existing U.S. government–supported programs in 17 Phase I countries for fiscal year 2019. If no U.S.-supported programs related to a given indicator, U.S. officials did not submit an indicator score for that indicator. When scores were recorded for both human health and animal health capacities, our analysis used the lower of the two scores.

According to the JEE tool, a level 3 indicator score means that attributes of a capacity are in place but the capacity's sustainability may be uncertain, as indicated by a lack of secure funding, among other factors. For example, according to the GHSA progress report for one country for fiscal year 2019, the score for one of the indicators for the technical area *emergency response operations* moved from level 2 to level 3 because of new documented procedures for transferring suspected Ebola outbreak patients from the airport to a treatment unit.

Emergency response operations was one of three technical areas that had the highest number of level 3 indicator scores; the other two technical areas were *national laboratory system and zoonotic diseases. Emergency response operations* also had the highest number of indicators with level 5 scores. According to the JEE tool, a level 5 indicator score means that attributes of a capacity are functional and sustainable and the country is supporting other countries in its implementation.

In contrast, *antimicrobial resistance* had the highest number of indicators with level 1 scores. According to the JEE tool, a level 1 indicator score means that attributes of a capacity are not in place. USAID and CDC have built programs to address these gaps in the *antimicrobial resistance* technical area.

Analysis of Indicator Scores by Country

Our analysis of the GHSA progress reports for fiscal year 2019 for the 17 Phase I countries found that most of the countries had some GHS capacity. For 13 of the countries, the largest numbers of indicator scores were at level 3. For one country, the largest number of scores was at level 4, and for three countries, the largest numbers of scores were at level 2.

For one country, U.S. officials gave a level 1 score to the indicator "System in place for sending and receiving health personnel during a public health emergency" for the technical area *medical countermeasures and personnel deployment*. According to the fiscal year 2019 GHSA progress report, the government of this country had incorporated the concept of a public health corps and management of personnel only as an element of the organizational structure of the emergency operations center. According to the JEE tool, a country would demonstrate level 2 capacity in this technical area if it had drafted plans for sending and receiving health personnel during a public health emergency. A country would demonstrate level 3 capacity if it had conducted tabletop exercises to demonstrate decision making and protocols for sending or receiving health personnel from another country during a public health emergency.

For another country, U.S. officials assessed the indicator "Capacity to activate emergency operations" for *emergency response operations* at level 5, because staff at the emergency operations center had received numerous trainings and participated in tabletop exercises and had been activated for Ebola preparedness activities.

Most Indicator Scores in 2019 Had Remained Stable or Risen, by Technical Area and Country, Relative to Scores in 2016 and 2017

Analysis of Indicator Scores by Technical Area

Our analysis found that the majority of indicator scores for each of the 11 technical areas in GHSA progress reports submitted to USAID and CDC for fiscal year 2019 had either remained stable or increased relative to the

baseline scores in 2016 and 2017.[39] For example, for *antimicrobial resistance*, 60 of 62 scores had either remained stable or increased, while two scores had decreased. Table 5 shows the number of indicator scores that remained stable, increased, or decreased for each technical area.

Table 5: Numbers of Indicator Scores for Phase I Countries That Remained Stable, Increased, or Decreased, by GHSA Technical Area, from 2016/2017 to 2019

Technical area	Remained stable	Increased	Decreased	Total number of scores
Antimicrobial resistance	25	35	2	**62**
Zoonotic diseases	24	25	1	**50**
Biosafety and biosecurity	16	12	3	**31**
Immunization	20	3	4	**27**
National laboratory system	30	24	12	**66**
Real-time surveillance	41	16	6	**63**
Reporting	10	13	0	**23**
Workforce development	21	21	6	**48**
Emergency response operations	24	32	3	**59**
Linking public health and security authorities	5	6	1	**12**
Medical countermeasures and personnel deployment	14	8	0	**22**
Total	**230**	**195**	**38**	**463**

Source: GAO analysis of U.S. agencies' Global Health Security Agenda (GHSA) capacity gains progress reporting. | GAO-21-359

Notes: In 2014, GHSA members identified and developed 11 technical areas to facilitate regional and global collaboration in achieving GHSA goals and objectives, according to Centers for Disease Control and Prevention officials. The Joint External Evaluation (JEE) tool, which is used to assess countries' capacities in the technical areas, includes one to four indicators for each technical area—a total of 31 indicators—as attributes to assist countries in building capacity. We analyzed indicator scores for the 17 Phase I countries that received U.S. GHS assistance in fiscal years 2015 through 2019. Our analysis included only those indicators with (1) baseline scores produced by countries and external evaluators in 2016 and 2017 and (2) scores submitted by U.S. officials in GHSA progress reports for fiscal year 2019. In some cases, a country may have had fewer than 31 indicator scores because no baseline score was provided for the indicator or no score was submitted for fiscal year 2019. Specifically, if no U.S. government–supported program relating to an indicator existed for a technical area at the end of fiscal year 2019, no score was recorded for that area. Thus, the total

[39]Our analysis compared scores for a total of 31 indicators in 11 technical areas from JEEs conducted in 2016 and 2017 for 16 of the 17 Phase I countries with scores for those indicators in GHSA progress reports submitted for fiscal year 2019 for the 16 countries. The JEE scores were produced by countries' self-evaluations and by external experts from WHO, and the scores in GHSA progress reports were produced by U.S. officials in GHSA country teams using the evaluation tools that were used for the JEEs. For the one remaining Phase I country where a JEE had not yet been conducted, we used baseline scores from this country's GHSA self-assessment tool, which U.S. officials provided in their fiscal year 2017 GHSA progress report for that country. We counted only indicators for which both a baseline score and score from the end of fiscal year 2019 were available. For more information about our methodology, see appendix I.

number of indicators recorded for each technical area may vary by country. When scores were recorded for both human health and animal health capacities, our analysis used the lower of the two scores.

Antimicrobial resistance, with one to four indicators reported per country, had the largest number of increased indicator scores. The score for at least one indicator for this technical area increased for 13 of the 17 Phase I countries, and the scores for all four indicators increased for five countries. For example, one country's 2016 JEE found that the country had many of the components needed for surveillance related to antimicrobial resistance. However, additional work was required to develop a national antimicrobial resistance detection and surveillance system capable of generating high-quality data for evidence-informed national policies, strategies, and plans and for timely operational and tactical response for mitigation and control. According to the GHSA progress reports for fiscal years 2018 and 2019, the U.S. government provided technical assistance to develop and implement national antimicrobial resistance plans, conducted training, and provided funding to support quality-assurance practices in laboratories.

Reporting, with one or two indicators reported per country, had the highest percentage of increased indicator scores of any of the technical areas. For example, the 2016 JEE report for one country stated that the country had some reporting capacities but had limitations in its capacity for information sharing between human and animal health organizations. According to GHSA progress reports from fiscal years 2018 and 2019, U.S. government efforts in this country contributed to developing processes for coordination between the human and animal health sectors and assisted in international simulation exercises to demonstrate these capacities. The country subsequently used these developed capacities to enhance coordination between the two sectors during a yellow fever outbreak in August 2019.

National laboratory system, with one to four indicators reported per country, had the largest number and highest percentage of decreased indicator scores of any technical area. Our analysis found that at least one indicator score for *national laboratory system* decreased in six countries. For example, for two of the four indicators, scores in one country's GHSA progress report for fiscal year 2019 were lower than the scores in the country's JEE report for 2017. In fiscal year 2019, U.S. officials assessed separate scores for animal health and human health

capacities[40] for these indicators and gave lower scores for animal health capacities than for human health capacities.[41] In contrast, the 2017 JEE reported a single score for each indicator rather than separate scores for animal health and human health.[42] Figure 11 shows examples of USAID's and CDC's activities to support the national laboratory systems in Ethiopia and Senegal.

[40]Some GHSA progress reports submitted for fiscal year 2019 include two sets of scores—for animal health capacities and for human health capacities—for certain indicators. USAID officials told us that State and other agencies had encouraged embassies to estimate both sets of scores where feasible and that reviewing both scores had helped them track progress in the two sectors. USAID officials also noted that underfunding and relative neglect of animal health capacities by national governments had been a major contributor to disparities between animal health and human health capacities and that such disparities were beginning to be addressed.

[41]When scores were recorded for both human health capacities and animal health capacities, our analysis used the lower of the two scores. For more information about our methodology, see appendix I.

[42]USAID officials told us that beginning with GHSA progress reports for fiscal year 2020, U.S. officials started to use the second edition of the JEE tool, published in 2018, which provides greater clarity about the animal health component of GHS. The second edition of the JEE tool clarifies differences between national capacities for human and animal health and recommends separate indicator scores for human health capacities and animal health capacities.

Figure 11: Examples of USAID's and CDC's Activities to Support Ethiopia's and Senegal's National Laboratory Systems

From left to right: Locked-model scientific refrigerator used for safe storage of thermosensitive biological products at Senegal's national bacterial meningitis reference laboratory; funding provided by the Centers for Disease Control and Prevention (CDC) for the device. Machine used to identify bacterial samples at the Ethiopian Public Health Institute; funding provided by CDC for training and laboratory supplies for the device. Microscopes at the Amhara Public Health Institute Laboratory; funding provided by the U.S. Agency for International Development (USAID) and CDC. Liquid nitrogen storage container used to transport biological samples and viral specimens for priority zoonotic diseases at the National Animal Health Diagnostic and Investigation Center; funding provided by USAID.

Source: GAO. | GAO-21-359

USAID's PREDICT-2 Project

While in Senegal, we met with implementing partners of the U.S. Agency for International Development (USAID) who worked on PREDICT-2, an activity that involved the surveillance of zoonotic diseases. Before the project was implemented, Senegal had no capacity for zoonotic disease surveillance, according to these officials.

This activity was implemented by the following partners in Senegal: the Interstate School of Veterinary Science and Medicine of Dakar, the Senegalese Institute of Agricultural Research, and the Cheikh Anta Diop University, in coordination with district veterinary and public health professionals.

Monkey from Bandia Reserve in Senegal, Studied during Surveillance Activities for USAID's PREDICT-2 Project

Source: GAO. | GAO-21-359

Across all 31 indicators, increased scores were most common for one of the *zoonotic diseases* indicators, "Mechanisms for responding to infectious and potential zoonotic disease are established and functional," and one of the *emergency response operations* indicators, "Capacity to activate emergency operations under the emergency response systems." Scores for both indicators increased in 11 countries. For example, the 2016 JEE for one country found that the country needed to develop an integrated national surveillance plan that brought together human and animal health capacities. The GHSA progress reports for this country for fiscal years 2018 and 2019 show that the U.S. government contributed to developing mechanisms for intersectoral collaboration and for timely and systematic information exchange between the animal and human health sectors. The reports for those fiscal years also show that the U.S. government contributed to developing training activities in the country to increase skills and capacity for managing zoonotic diseases.

Among the 31 indicators, decreased scores were most common for a *national laboratory system* indicator, "Specimen referral and transport system." The score for this indicator decreased for six countries. For example, the 2016 JEE for Ethiopia identified as challenges the lack of linkage between public health and animal health diagnostic laboratory systems and the absence of mechanisms for sharing specimens between public health and animal health laboratories. The fiscal year 2018 GHSA progress report stated that the U.S. government was contributing to efforts to establish specimen referral guidelines for Ethiopia and provide Ethiopian officials with technical assistance and training in specimen transport. (See fig. 12 for examples of specimens in a laboratory at the Ethiopian Public Health Institute.)

Figure 12: Specimen Samples in Laboratory at Ethiopian Public Health Institute

The Centers for Disease Control and Prevention provided funding and technical assistance to the institute for surveillance and laboratories.

Source: GAO. | GAO-21-359

Analysis of Indicator Scores by Country

Our analysis comparing indicator scores in GHSA progress reports for fiscal year 2019 with the baseline scores in 2016 and 2017 found that the majority of scores for each Phase I country remained stable or increased. For example, 14 of 24 indicator scores for one country had either remained stable or increased and eight scores had decreased.

For the country with the largest number of increased indicator scores, 25 of 31 scores increased (about 81 percent). All of this country's indicator scores increased for five technical areas: *antimicrobial resistance*, *zoonotic disease*, *emergency response operations*, *linking public health and security authorities,* and *medical countermeasures and personnel deployment*.

Regarding the fifth technical area, *medical countermeasures and personnel deployment*, the JEE conducted in 2017 for the country found that it did not have a national plan for the transfer of medical and deployment resources. The GHSA progress reports for fiscal years 2018 and 2019 indicate that the U.S. government provided assistance to build the country's capacities in this technical area by conducting simulation and tabletop exercises, developing and adopting emergency supply chain management tools, facilitating training in inventory management, and

supporting the government's efforts to develop and implement a national plan and policies for medical countermeasures. According to the reports, this U.S. assistance built capacity for the country to respond to monkey pox and cholera outbreaks in 2018.

For the country with the highest percentage of increased indicator scores, 23 of 26 scores increased (about 89 percent). At least one score increased in eight of the 11 technical areas. For example, the scores for all four indicators for the technical area *real-time surveillance* increased from the baseline scores in 2017. According to the GHSA progress report for fiscal year 2019, U.S. government efforts supported the establishment of a hospital-associated infections surveillance network specifically for bloodstream and urinary tract infections. The success of the program led the government to consider implementing a national surveillance network for all major hospital-associated infections.

For the country with the largest number and highest percentage of decreased indicator scores, eight of 24 scores decreased (about 33 percent).[43] USAID headquarters officials stated that this country's challenging security environments, as well as other challenges it faces, made building health security difficult.

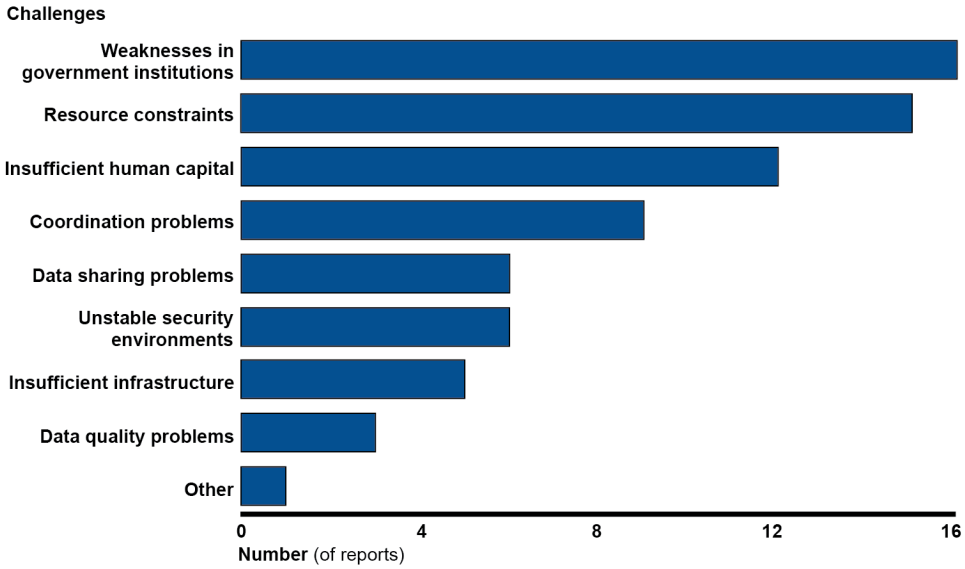
Common Challenges to Building GHS Capacity in Fiscal Year 2019 Included Weaknesses in Government Institutions, Resource Constraints, and Insufficient Human Capital

The GHSA progress reports submitted by the interagency GHSA country teams for fiscal year 2019 for 16 of the 17 Phase I countries identified challenges affecting the countries' efforts to develop GHS capacity.[44] Our analysis of these 16 reports found eight distinct types of challenges. Figure 13 shows the eight types of challenges and the numbers of progress reports identifying at least one instance of each type.

[43]According to the GHSA progress report for this country for fiscal year 2018, some scores that the GHSA country team reported were lower than the JEE scores produced by external evaluators in 2017. According to the GHSA progress report, the country team lowered the score on the basis of its understanding of the country's capacity in each technical area.

[44]One GHSA country team did not complete the challenges section of the GHSA progress report for fiscal year 2019.

Figure 13: Types of Challenges Identified in GHSA Progress Reports and Number of Reports Identifying Each Type, Fiscal Year 2019



Source: GAO analysis of U.S. agencies' Global Health Security Agenda (GHSA) capacity gains progress reporting (GHSA progress reports). | GAO-21-359

Data table for Figure 13: Types of Challenges Identified in GHSA Progress Reports and Number of Reports Identifying Each Type, Fiscal Year 2019

Challenges	Number of reports
Weaknesses in government institutions	16
Resource constraints	15
Insufficient human capital	12
Coordination problems	9
Data sharing problems	6
Unstable security environments	6
Insufficient infrastructure	5
Data quality problems	3
Other	1

The three most common types of challenges identified were weaknesses in government institutions, resource constraints, and insufficient human capital. All 16 GHSA progress reports that identified challenges in fiscal year 2019 cited weaknesses in government institutions, while 15 reports cited resource constraints and 12 reports cited insufficient human capital. Weaknesses in government institutions ranged from administrative hurdles and procedural delays to a lack of planning and political will on

the part of a host government. Resource constraints involved funding deficiencies stemming from competing government priorities or broader fiscal concerns. Challenges related to human capital included inadequate staffing, limited competence, and insufficient training to carry out GHS activities. The following are examples of these three types of challenges that the GHSA progress reports identified in fiscal year 2019:

- **Weaknesses in government institutions (16 countries).** The report for one country stated that the government was slow to prepare and sign a decree establishing a national epidemiologic surveillance network for veterinarians.
- **Resource constraints (15 countries).** The report for another country stated that the national budgetary allocation for sustaining surveillance and laboratory activities was insufficient, particularly for animal health.
- **Insufficient human capital (12 countries).** The report for a third country stated that fewer than 10 veterinarians were trained in field epidemiology despite a country-wide need for an estimated 100 trained veterinarians.

We observed resource constraints in Ethiopia, where local public health employees showed us damaged facilities at a regional veterinary lab (see fig. 14). U.S. officials noted that available U.S. funding went to training staff at the lab rather than making improvements to the facilities. U.S. officials in Ethiopia also described infrastructure challenges, noting that a lack of transportation infrastructure and challenging terrain sometimes made it difficult to transport specimens in remote areas.

Figure 14: Damaged Exterior Door and Exposed Wiring at Bahir Dar Veterinary Lab in Ethiopia

Source: GAO. | GAO-21-359

Several of the reported challenges also involved U.S. government actions related to funding and personnel. For example, the GHSA progress report for one country stated that an in-country CDC staffing shortage had limited CDC staff's ability to provide technical assistance and engage with health leaders, policy makers, and physician trainees. Officials at USAID headquarters in Washington, D.C., and at CDC headquarters in Atlanta indicated that some challenges can be overcome with additional U.S. government funding, specialized support, or diplomatic efforts. In addition, USAID headquarters officials noted that they work with overseas field missions to advocate for changes to policies and practices that adversely affect USAID's programs. However, USAID and CDC officials stated that many other challenges, such as security issues and institutional delays, remain outside the U.S. government's control.

For additional examples of the eight types of challenges identified in GHSA progress reports for fiscal year 2019, see table 6.

Table 6: Examples of Challenges Identified in 16 GHSA Progress Reports for Fiscal Year 2019

Challenge type	Selected examples	Number of reports[a]
Weaknesses in government institutions	• Implementation of One Health at the decentralized level was weak.[b] • Leadership vacancies led to delays in activities, including those related to surveillance, laboratory systems, and workforce development.	16
Resource constraints	• Resources were lacking for training in regional veterinary laboratories. • Economic contraction and government fiscal problems crippled public health institutions.	15
Insufficient human capital	• Staff in national antimicrobial resistance reference laboratory faced difficulties in meeting testing standards. • Animal health surveillance and laboratory human resources faced shortages.	12
Coordination problems	• Synergy was lacking between GHSA technical partners implementing similar projects. • Intersectoral coordination was lacking.	9
Data sharing problems	• Absence of data sharing on animal disease outbreaks hampered multisectoral collaboration. • Because of a strike by the main public health union, no data would be reported from service delivery points.	6
Unstable security environments	• Political conflict at regional level limited on-site support. • Government response was slow in areas targeted by a militant group.	6
Insufficient infrastructure	• Unstable electricity had the potential to impede proper functioning of laboratory equipment. • Persistent lack of internet connection prevented rapid remote support from experts.	5
Data quality problems	• Variation in data quality made use of the data difficult. • Reporting on disease events was limited, not timely, and not accurate.	3
Other	• Physical relocation of government ministries hindered access to country officials.	1

Source: GAO analysis of U.S. agencies' Global Health Security Agenda (GHSA) capacity gains progress reporting (GHSA progress reports). | GAO-21-359

[a]For fiscal year 2019, the GHSA progress reports for 16 of the 17 Phase I countries included a section on challenges. The remaining country's GHSA progress report did not include this section, so we omitted that progress report from our analysis of the challenges.

[b]One Health is a collaborative, multisectoral, and transdisciplinary approach implemented at the local, regional, national, and global levels to achieve optimal health outcomes with respect to the interconnection between people, animals, plants, and their shared environment. USAID's One Health Workforce project supports workforce development in universities in Africa and Southeast Asia.

Agency Comments

We provided a draft of the sensitive report to USAID, HHS, State, and DOD for review. USAID's comments on the sensitive report are reprinted in appendix III. HHS, State, and DOD provided technical comments, which we incorporated as appropriate.

In its comments, USAID concurred with our findings and conclusions. In particular, USAID highlighted that U.S. agencies' assessments of Phase I countries' capacities, as detailed in our report, identified GHS capacities that USAID and CDC helped to upgrade. USAID also commented that our report recognized its collaboration with CDC and others to prevent, detect, and respond to threats of infectious disease at home and abroad. In addition, USAID noted that its programs support the U.S. GHS Strategy and include investments in One Health approaches that recognize that the future well-being of humans, animals, and the environment are inextricably linked.

We are sending copies of this report to the appropriate congressional committees and the Administrator of USAID; the Director of CDC; and the Secretaries of State, Health and Human Services, and Defense. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact David Gootnick at (202) 512-3149 or gootnickd@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 IV.

David Gootnick
Director, International Affairs and Trade

Appendix I: Objectives, Scope, and Methodology

House Report 114-693 contained a provision for us to review the use of funds provided to promote global health security (GHS) and to address emerging health threats overseas. This report examines, for the 5 fiscal years before the onset of the Coronavirus Disease 2019 (COVID-19) pandemic in December 2019, (1) the status of the U.S. Agency for International Development's (USAID) and the Centers for Disease Control and Prevention's (CDC) GHS funding and activities and (2) U.S. agencies' assessments, at the end of fiscal year 2019, of Global Health Security Agenda (GHSA) partner countries' capacities to address infectious disease threats and of any challenges these countries faced in building capacity.[1] The scope of our work begins with fiscal year 2015 because it was the first year that both USAID and CDC provided funding for GHS activities.[2]

This report is a public version of a sensitive report that we issued in February 2021.[3] USAID and CDC deemed some of the information in our February report to be sensitive, which must be protected from public disclosure. Therefore, this report omits sensitive information about

[1]According to agency officials, U.S. agencies' activities to strengthen global health security and their activities to address the GHSA are complementary and constitute a comprehensive approach to addressing threats from infectious diseases. USAID and CDC used appropriated funding for GHS to support their internal operating expenses, but the agencies used the funding primarily to award contracts, grants, or cooperative agreements to implementing partners to carry out GHS activities overseas. In this report, *implementing partners* refers to entities such as nongovernmental organizations and host-country governments that are awarded U.S. government contracts, grants, or cooperative agreements to carry out GHS activities overseas. Nongovernmental organizations include international humanitarian aid organizations, international and local private voluntary organizations, and other entities. In this report, *GHS activities* refers to activities or projects that USAID and CDC officials identified as being related to GHS and the GHSA, including those funded by USAID and CDC through awards made to implementing partners.

[2]USAID used appropriated funding for various GHS-related activities to address infectious disease threats before fiscal year 2015, according to USAID officials. CDC did not receive an appropriation for GHS until fiscal year 2015, according to CDC officials.

[3]GAO, *Global Health Security: USAID and CDC Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset*, GAO 21-213SU (Washington, D.C.: Feb. 4, 2021).

capacity scores assigned to specific countries, certain country-specific examples, names of countries associated with certain other examples, and some challenges that countries faced. Although the information in this report is more limited than that in the sensitive report, this report addresses the same objectives and uses the same methodology.

To examine the status of USAID's and CDC's funding and activities, we analyzed USAID's and CDC's data on funding that they had obligated and disbursed as of March 31, 2020, for GHS activities from funds appropriated in fiscal years 2015 through 2019—the most recent data at the time of our analysis. We used data on awards to the organizations that implemented these activities—known as implementing partners—to determine the distribution of funding among USAID and CDC implementing partners as well as among countries.[4] We also conducted data testing to check for missing or anomalous data and obvious errors, reviewed related documentation, and discussed the accuracy and completeness of USAID's and CDC's data with agency officials. We found the data to be sufficiently reliable for the purpose of describing the status of GHS funding and activities.

USAID provided us with two sets of funding and activities data, corresponding to the two funding sources that it used to support GHS activities: (1) the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness (Ebola appropriation for USAID) and (2) fiscal years 2015 through 2019 appropriations to the Global Health Programs account. USAID officials explained that USAID reported data for the Ebola appropriation for the two funding sources differently because these data sets represent GHS activities with different time frames, appropriations, and reporting requirements. With regard to GHS funding from the Ebola appropriation for USAID, which does not expire, USAID reported obligations and disbursements categorized by the fiscal year when it obligated these funds to specific award agreements. With regard to GHS funding from the Global Health Programs appropriations account—which, according to agency officials, must be allocated and obligated within 2 years of appropriation—USAID reported obligations and disbursements categorized by the fiscal year of appropriation, regardless of the date of obligation.

[4]Our analysis of the distribution of funding among USAID and CDC implementing partners and across countries does not include USAID's and CDC's internal operating expenses.

CDC reported obligations and disbursements for global health security activities implemented in fiscal years 2015 through 2019 from the fiscal year 2015 appropriation to the Department Health and Human Services for Ebola response and preparedness, which expired at the end of fiscal year 2019. CDC categorized these obligations and disbursements by the fiscal year in which it obligated funds for those activities.

To examine U.S. agencies' assessments of GHSA partner countries' capacities to address infectious disease threats, we reviewed (1) assessments of scores for capacity indicators in 11 technical areas in reports on GHSA partner country's progress in building GHS capacity—which we refer to as GHSA progress reports—in fiscal year 2019, that interagency teams of U.S. officials in the countries submitted to USAID and CDC on November 1, 2019, and (2) scores recorded for the same capacity indicators in the Joint External Evaluations (JEE) completed for 16 of the 17 Phase I countries in calendar years 2016 and 2017. According to USAID officials, when they began GHSA reporting, there was only one phase I country without a JEE. Because a JEE had not yet been conducted for this country as of May 2020, we used baseline scores from its GHSA self-assessment tool, which U.S. officials provided in their fiscal year 2017 GHSA progress report for the country. In some cases, baseline scores may have changed over time on the basis of U.S. officials' assessments; however, because of difficulties associated with identifying the full universe of such changes, we used the original JEE scores or GHSA self-assessment, as recommended by USAID officials.

We reviewed the indicator scores submitted in the GHSA progress reports for fiscal year 2019 to assess the GHS capacity of the 17 countries prior to the onset of the COVID-19 pandemic. We also compared the scores at the end of fiscal year 2019 with the scores in JEEs and GHSA self-assessment tool from 2016 and 2017 to determine whether the scores, by both country and technical area, had remained stable, increased, or decreased. Where scores were recorded for both animal health and human health capacities, we used the lower of the two scores in our analysis. When no score was recorded for an indicator either in 2016 and 2017 or in 2019, we omitted that indicator from our analysis for the country.

To examine U.S. agencies' assessments of challenges that partner countries faced in building capacity, we reviewed challenges identified by U.S. officials in fiscal year 2019 GHSA progress reports and categorized the challenges to determine the types that occurred most frequently

across countries.[5] Furthermore, we met with USAID and CDC headquarters officials to discuss both agencies' processes for analyzing the assessed indicator scores and how, if at all, the agencies use the scores to make decisions on funding and activities.

To address both of our objectives, we analyzed documents related to USAID's and CDC's GHS activities in four countries—Ethiopia, Senegal, Indonesia, and Vietnam—and interviewed officials in the United States and those four countries. We selected the four countries, on the basis of our review of agency-provided GHS funding and activities data and documents, to reflect activities that accounted for a significant amount of total GHS funding; the presence of staff from multiple U.S. agencies; and geographic diversity in and among countries in Africa and Asia, where USAID and CDC provided GHS assistance. We interviewed USAID and CDC officials in Washington, D.C., and Atlanta, Georgia, respectively. In addition, in December 2019, we met with U.S. agency officials, implementing partner organizations, international organizations, and government officials in Addis Ababa, Ethiopia, and in Dakar, Senegal. In Ethiopia and Senegal, we also visited offices, toured facilities, and observed operations of GHS activities supported by USAID and CDC. In March 2020, we conducted teleconferences with U.S. agency officials in Jakarta, Indonesia, and in Hanoi, Vietnam.

The performance audit on which this report is based was conducted from February 2019 to February 2021 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. We subsequently worked with USAID and CDC from November 2020 to April 2021 to prepare this version of the original sensitive report for public release. This public version was also prepared in accordance with generally accepted government auditing standards.

[5]Our analysis included challenges identified by U.S. officials in 16 of the 17 Phase I countries in fiscal years 2015 through 2019. We were unable to include one country in our analysis, because the GHSA country team did not complete the challenges section of the GHSA progress report for that country for fiscal year 2019.

Appendix II: Implementing Partners That Received Largest Amounts of Obligated Funds for GHS

Table 7 shows the 10 implementing partners to which the U.S. Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC) had each obligated the largest amounts of funding for global health security (GHS) activities as of March 31, 2020, from funds appropriated in fiscal years 2015 through 2019.[1]

[1]USAID provided us with two sets of funding and activities data corresponding to the two funding sources that it used to support GHS activities: (1) the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness (Ebola appropriation for USAID) and (2) fiscal years 2015 through 2019 appropriations to the Global Health Programs account. USAID officials explained that USAID reported data for the two funding sources differently because these data sets represent GHS activities with different time frames, appropriations, and reporting requirements. With regard to GHS funding from the Ebola appropriation for USAID, which does not expire, USAID reported obligations and disbursements categorized by the fiscal year when these funds were obligated to specific award agreements. With regard to GHS funding from the Global Health Programs appropriations account—which, according to agency officials, must be allocated and obligated within 2 years of appropriation—USAID reported obligations and disbursements categorized by the fiscal year of appropriation, regardless of the date of obligation. CDC reported obligations and disbursements for global health security activities implemented in fiscal years 2015 through 2019 from the fiscal year 2015 appropriation to the Department of Health and Human Services for Ebola response and preparedness, which expired at the end of fiscal year 2019. CDC categorized these obligations and disbursements by the fiscal year in which it obligated funds for those activities.

Table 7: USAID and CDC Implementing Partners That Received Largest Amounts of Obligated Funds for Global Health Security from Fiscal Years 2015-2019 Appropriations, by Total Amount Obligated as of March 31, 2020

	Implementing partner	Amount obligated, in dollars
USAID	Food and Agriculture Organization of the United Nations	168,980,370
	University of California, Davis	131,351,316
	University of Minnesota	52,202,482
	Development Alternatives, Inc.	36,572,512
	World Health Organization	30,464,077
	Management Sciences for Health, Inc.	28,575,000
	ICF Incorporated, LLC	26,290,000
	Gavi Alliance	20,000,000
	International Federation of Red Cross and Red Crescent Societies	19,014,120
	The Johns Hopkins University	18,724,598
CDC	World Health Organization	34,123,072
	African Field Epidemiology Network	22,364,910
	Task Force for Global Health, Inc.	21,535,767
	Association of Public Health Laboratories	13,653,059
	Emory University	10,110,069
	PATH	9,720,764
	Ethiopian Public Health Institute	9,585,017
	Infectious Diseases Institute	8,684,322
	International Medical Corps	7,653,216
	American Society for Microbiology	7,611,439

Source: GAO analysis of U.S. Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC) funding data. | GAO-21-359

Notes: The 10 implementing partners shown for each agency are those to which, respectively, (1) USAID obligated the largest total amounts from the fiscal year 2015 Global Health Programs appropriation for Ebola response and preparedness and fiscal years 2015 through 2019 appropriations to the Global Health Programs and (2) CDC obligated the largest total amounts from appropriations in fiscal year 2015 for global health security activities in fiscal years 2015 through 2019. USAID and CDC officials informed us that global health security funding awarded to United Nations organizations, including the Food and Agriculture Organization and World Health Organization, was separate from the U.S. government's annual contributions to these organizations.

Appendix III: Comments from the U.S. Agency for International Development

David Gootnick
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20226

Re: *GLOBAL HEALTH SECURITY: USAID and CDC Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset,* GAO-21-213SU (Engagement Code 103285)

Dear Mr. Gootnick:

I am pleased to provide the formal response of the U.S. Agency for International Development (USAID) to the draft report produced by the U.S. Government Accountability Office (GAO) titled, *GLOBAL HEALTH SECURITY: USAID and [the Centers for Disease Control and Prevention (CDC)] Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset,* GAO-21-213SU (Engagement Code 103285).

The International Health Regulations (IHRs), adopted by the World Health Assembly in 2005, define a "Public Health Emergency of International Concern" (PHEIC) as "an extraordinary event which is determined…to constitute a public health risk to other States through the international spread of disease and to potentially require a coordinated international response." Directors-General of the World Health Organization (WHO) only have declared six PHEICs since the IHRs entered into force on June 15, 2007. USAID has learned an extraordinary amount as a result of the unprecedented battles to contain H1N1 Influenza, poliomyelitis, Ebola (in both West Africa and the Democratic Republic of Congo), Zika, and COVID-19, and is committed to strengthening all aspects of our programming, reporting, and coordination.

As noted in the *Global Health Security Strategy*, investments that focus on prevention and preparedness are far more cost-effective than responding after epidemics of infectious disease have begun. USAID is committed to continuing to defend our Homeland by helping to prevent outbreaks from reaching our shores. We will continue to take all measures to sharpen our policies and programs to prepare for, respond to, and learn from public health crises around the globe, including PHEICs.

I am transmitting this letter and the enclosed comments from USAID for inclusion in the GAO's final report. Thank you for the opportunity to respond to GAO-21-213SU, and for the courtesies extended by your staff while conducting this engagement. We appreciate the opportunity to participate in the complete and thorough evaluation of our Global Health Security programs and the strength of our interagency coordination and collaboration with the CDC within the U.S. Department of Health and Human Services. As an Agency, we believe the

GAO's engagements provide a valuable opportunity to assess and improve upon our policies, procedures, and programs.

Sincerely,

Frederick M. Nutt Jan. 8, 2021
Frederick M. Nutt
Assistant Administrator
Bureau for Management

Enclosure: a/s

COMMENTS BY THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT ON THE DRAFT REPORT PRODUCED BY THE U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO) TITLED, *GLOBAL HEALTH SECURITY: USAID and CDC Funding, Activities, and Assessments of Countries' Capacities to Address Infectious Disease Threats before COVID-19 Onset,* GAO-21-213SU (Engagement Code 103285)

The U.S. Agency for International Development (USAID) would like to thank the U.S. Government Accountability Office (GAO) for the opportunity to respond to draft report GAO-21-213SU. We appreciate the extensive work of the GAO's engagement team, and the specific findings that will help USAID achieve greater effectiveness in the current and future public health emergencies.

For more than half a century, the United States has been the largest contributor to global health security and humanitarian assistance. Investments in global health security substantially advance U.S. foreign-policy interests by protecting Americans at home and abroad and supporting the rise of capable partners better able to solve regional and global problems. In an increasingly interconnected world in which diseases recognize no borders, USAID will continue to combat infectious diseases that threaten the lives of millions each year. Infectious diseases can present significant threats to health, livelihoods, and governance, as well as regional and international health security. Public health diagnostic, surveillance, workforce, and response institutions and networks are critical to reducing mortality and morbidity and ensuring health security by minimizing the impact of both endemic and epidemic-prone infectious diseases.

USAID's programs support the implementation of the U.S. Government's *Global Health Security Strategy*, released in May 2019. The *Strategy* outlines our approach to strengthen global health security—including by accelerating the capabilities of governments and other partners in targeted countries to prevent, detect, and respond to outbreaks of infectious disease. USAID works closely with the U.S. Departments of State, Defense, and Health and Human Services (HHS, including the Centers for Disease Control and Prevention [CDC]), and other Federal Departments and Agencies to implement the Global Health Security Agenda (GHSA), an international initiative to advance health-security priorities multilaterally, bilaterally, and domestically. The GHSA brings together governments, international and non-governmental organizations, academia, and the private sector to work toward common goals to make the world safer.

USAID notes that draft report GAO-21-213SU recognizes the close cooperation and strong collaboration we have with HHS/CDC and our other partners to prevent, detect, and respond to threats of infectious disease at home and abroad. USAID plays a critical role in coordinating the U.S. Government's efforts in health security among other Departments and Agencies, with donors and multilateral organizations, and through our long-standing partnerships in developing countries.

Since 2009, USAID has invested more than $1 billion to strengthen capacities in our partner countries to reduce the risk and impact of emerging infectious-disease threats and outbreaks. To achieve this objective, USAID works to ensure the necessary systems and knowledge are in

place to prevent avoidable outbreaks, detect threats early, and respond rapidly and effectively when outbreaks occur.

USAID's Global Health Security Program invests in "One-Health" approaches that recognize that the future well-being of humans, animals, and the environment are inextricably linked. These projects include the following:

- Strengthening the capacities of governments, academic institutions, and the private sector to understand and address the risks posed by zoonotic diseases that spill over from animals to humans and cause epidemics;
- Improving national laboratory and disease-surveillance systems;
- Training the next generation of health workers in "One-Health" capacities;
- Improving risk-communications to inform the public and health workers on preventing and controlling infections in health facilities;
- Addressing the rising threat of antimicrobial resistance;
- Promoting innovation in the development of vaccines; and
- Conducting research into new and emerging viruses.

As noted in the draft report, USAID's assistance strengthens networks, institutions, and capacities across animal and human health to identify and address zoonotic diseases at the national, regional, and community levels; strengthen laboratory and surveillance capabilities to detect and characterize the threats of infectious disease; improve risk-communication programs; help prevent, detect, and control antimicrobial-resistant pathogens; and develop partnerships with international consortia for research and development.

USAID is pleased that GAO-21-213SU highlights the GHSA's monitoring framework, which is based on the Joint External Evaluation monitoring tool. In addition, the report detailed country-level results (capacity scores improved), which reflects well on the design and implementation of the GHSA. The report also identifies the country capacities that USAID and HHS/CDC together helped to upgrade under the GHSA. All countries that are participating in the GHSA demonstrated improvement in multiple technical areas during the 2015–2019 time period under review.

As noted in the *Global Health Security Strategy*, investments that focus on prevention and preparedness are far more cost-effective than responding to epidemics of infectious disease after they have begun. USAID is committed to continuing to defend our Homeland by helping to prevent outbreaks from reaching our shores.

Text of Appendix III: Comments from the U.S. Agency for International Development

Page 1

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Page 3

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Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

David Gootnick, (202) 512-3149 or GootnickD@gao.gov

Staff Acknowledgments

In addition to the contact named above, Joyee Dasgupta (Assistant Director), Claudia Rodriguez (Analyst-in-Charge), Victoria Lin, Alexander Webb, Neil Doherty, Reid Lowe, and Grace Lui made key contributions to this report. The team benefited from the expert advice and assistance of Robert Copeland, Alexandra Edwards, and Justin Fisher.

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