

GLOBAL CHALLENGES EBOLA OUTBREAK



INNOVATIONS FOR SUCCESSFUL SOCIETIES

ALL HANDS ON DECK: THE US RESPONSE TO WEST AFRICA'S EBOLA CRISIS, 2014–2015

Jennifer Widner drafted this case study based on interviews from August 2016 to August 2017. The case is part of a series about the Liberian response to the 2014 Ebola outbreak, available through the Innovations for Successful Societies website. Case published June 2018. IBM's Center for The Business of Government helped finance this case study.

SYNOPSIS

In 2014, an unprecedented outbreak of Ebola virus disease in Liberia, Sierra Leone, and Guinea shined a harsh spotlight on global capacity to deal effectively with a fast-moving epidemic that crossed international borders. By the end of July, the outbreak had started to overwhelm health care systems in all three affected countries. In Liberia, health centers began to close, and President Ellen Sirleaf appealed for help from the United States. President Barack Obama tasked USAID's Office of US Foreign Disaster Assistance (OFDA) to lead an interagency response. From early August 2014 to January 2016, an OFDA Disaster Assistance Response Team, or DART, deployed to Liberia to help coordinate efforts to stop the spread of infection. The DART was the first to involve a large-scale partnership with the US Centers for Disease Control and Prevention (CDC) to combat an infectious disease outbreak. Although the deployment, which scaled up earlier assistance, took place five months after the first reported cases and required extensive adaptation of standard practices, it succeeded in helping bring the epidemic under control: the total number of people infected—28,616—was well below the potential levels predicted by the CDC's models. This US-focused case study highlights the challenges of making an interagency process work in the context of an infectious disease outbreak in areas where health systems are weak.

INTRODUCTION

When suspected cases of Ebola virus disease appeared in a remote part of Liberia in March 2014, Deborah Malac, the US ambassador, asked her government for help. Ebola was previously unknown in the region, but it was usually deadly. It had taken the lives of a child and his family members in neighboring Guinea at the end of the previous year and now there were several cases along the border. Although Liberia had made great strides since a civil war that had ended only a decade earlier, its health system was poorly positioned to respond if the outbreak expanded.

In response to the initial cases in rural Liberia, the Global Health Bureau of the US Agency for International Development helped the World Health Organization deploy 300 technical experts and distribute stockpiles of protective gear to health care workers. The US Centers for Disease Control and Prevention sent a team to assist, and the Defense Threat Reduction Agency set up biosurveillance and lab capacity to test blood samples. Malac worked with Liberia's government to develop a messaging campaign, encouraging people to protect themselves from the disease. By early May, WHO observed no new infections, the outbreak seemed over, and most responders departed.

But the disease caught experts by surprise. In late May new infections appeared, and by the end of June there were 51 Ebola cases and 34 deaths in Liberia—plus 297 additional cases and just over 191 deaths in neighboring Sierra Leone and Guinea.¹ Moreover, while previous outbreaks had occurred in remote parts of Central Africa, in this instance travelers quickly carried the disease to urban areas.

The Switzerland-based NGO Médecins Sans Frontières (MSF, or Doctors Without Borders) pushed the WHO to declare a public health emergency of international concern, an action that would mobilize resources to help contain the epidemic. However, internally divided about what to do and lacking adequate capacity to respond on the scale needed, WHO's leaders demurred.² Liberia's president, Ellen Sirleaf, called for global action, but the response was slow—"like molasses," Malac recalled. Sirleaf turned to US President Barack Obama for help.

For Obama's national security advisers, a crucial initial question was whether the US government should authorize the Office of US Foreign Disaster Assistance (OFDA), part of USAID, to deploy a Disaster Assistance Response Team, or DART, as an interagency platform for coordinating operations to end the outbreak. In the event of a war, earthquake, hurricane, or other disaster outside the United States, OFDA could quickly mobilize such a team to assess humanitarian needs, assemble expertise from many parts of the US government, contract with trusted global partners to provide essential services, and help manage the response, drawing on a pool of flexible funding to finance the activities. The DART worked in concert with a corresponding response management team in Washington, led by the OFDA director, which helped mobilize the resources required and assess strategy. (See text box 1.)

Box 1. The DART Concept

The idea behind the Disaster Assistance Response Team—elite response specialists charged with coordinating the United States’ response to disasters overseas—was the product of a learning process that started in 1964, when the US government realized it needed to increase its effectiveness in dealing with earthquakes, storms, and other types of humanitarian crises outside its borders.

The DART footprint was flexible and could expand or contract based on a situation, sometimes growing to more than 50 team members when necessary. “You look at what the hazards are and choose the kinds of people you need based on that,” said Tim Callaghan, the first Ebola team leader. A typical DART drew members from the US Commissioned Public Health Service, the US military, the US Forest Service, and the Los Angeles and Fairfax County, Virginia, fire departments, as well as from OFDA and its roster of other specialists stationed around the world. It included writers who could document activities, communications specialists, and logisticians as well as people with skills essential to a given situation.

To collaborate effectively, a DART used an incident command system based on a model put in place throughout the United States starting in the 1980s. Designed for speed and effectiveness, the teams had pre-established lines of authority and sharply defined role expectations. Key partners trained together in advance because there was no time to learn the ropes in the middle of a crisis.

In the field, DART workers assessed the situation firsthand, identified urgent needs, determined which NGOs or international organizations had the capacity to assist, and coordinated the overall US response, keeping the effort focused until the job was complete.

One example of an interagency process, the DART and its parent, the Office of Foreign Disaster Assistance, gradually developed a distinctive approach to fostering collaboration across government—an approach that was at the center of the U.S. response to the Ebola crisis.

For more on OFDA’s prior engagement in infectious disease outbreaks, see Office of Inspector General US Agency for International Development, *Lessons from USAID’s Ebola Response Highlight the Need for a Public Health Emergency Policy Framework*, Audit Report 9-000-18-001-P, January 24, 2018, p. 21.

To activate a DART was not a small matter. “It’s a big deal when you create a DART,” said Tim Callaghan, who later helped lead the response. “It sends a signal. It’s a brand name. It is like sending in the SEALs,” the US Navy’s special-operations force.

The National Security Council (the White House’s international security policy forum) and USAID had to make hard decisions about whether enough capacity was available. At the time, OFDA had DARTs in place in South Sudan, Syria, and Iraq, and the office had never managed four large DARTs simultaneously.

There was an additional hurdle. OFDA had seldom deployed a DART to contain an infectious disease outbreak, and the office had never worked closely with large numbers of CDC personnel to do so. If OFDA received the go-ahead from the National Security Council, it would have to revamp some of its

standard practices for managing an interagency effort to address a humanitarian disaster overseas.

THE CHALLENGE

Senior decision makers were cautious. In mid-July, OFDA and the CDC each sent representatives to assess conditions in Liberia. Among them was Justin Pendarvis, who was on OFDA's roster of public health advisers, on-call in case OFDA needed to surge support in an emergency. Pendarvis was no stranger to the locale. For four years, he had managed programs for EQUIP Liberia, a health and social welfare NGO that had long worked with Liberia's health ministry. His CDC partner, Kevin de Cock, who flew in from Kenya, directed the CDC's Nairobi-based Center for Global Health and had helped lead the CDC's epidemiological team in Liberia since March.

Pendarvis said he quickly recognized that operations were in disarray. Liberia's own response personnel and logistical capacity were stretched thin. There were urgent needs for basic supplies such as chlorine and body bags. The Liberian health ministry's newly created National Public Emergency Task Force had set up essential committee functions, but decision-making responsibilities were unclear. The Ministry of Internal Affairs and Sirleaf's office, both of which had important roles to play, were left out of some key meetings of the task force. And because of the number of functions she had to supervise, Chief Medical Officer Dr. Bernice Dahn, head of the Liberia response, was swamped with work. Meanwhile, the number of new cases was increasing at an alarming rate.

In Washington, OFDA Director Jeremy Konyndyk and CDC Director Tom Frieden reviewed the evaluations of the deteriorating situation in West Africa. If the virus continued to spread, it would not only take a terrible toll on the three countries then affected, but it could also cross more borders and go global. Health care workers, who were essential to the frontline defense against the epidemic, were among the early casualties, and clinics had started closing their doors, unable to handle patients safely. Within days, the risk came into sharper focus when two American health workers serving in Liberia with NGOs Samaritan's Purse and SIM USA contracted Ebola. The two flew back to the US on the only airplane in the world that was known to have the equipment needed to conduct safe medical evacuation of Ebola patients.

The National Security Council voiced its preference for using the DART model for interagency coordination. But there were at least seven special challenges that a DART would have to confront to manage an effective interagency collaboration in this situation.

First, integrating new partners into a DART would require that team leaders negotiate differences in procedures and organizational cultures on the fly. OFDA had evolved structures and practices to help different parts of the government work together, but this time a large number of people from the CDC would join the effort without first having trained with other team members. Moreover, the CDC already had people on the ground in West Africa, and it had its own procedures for responding to infectious disease outbreaks.

For example, in its work it employed an incident management system that differed from the incident command model that OFDA's emergency responders used.³ In early July, while contingency planning was under way, the CDC had formed an Ebola emergency center at its Atlanta headquarters.⁴ (See exhibit 1 at the end of the case.)

Konyndyk's second challenge was that the US military, a regular partner, was reluctant to participate. Along with the civilian agencies of the Department of Defense, the armed services often provided logistical support and other assistance in disasters. This time was different. The Joint Chiefs of Staff said the military's medical expertise focused on the health of the armed services' own personnel and had no protocols for aiding in a disease outbreak affecting a foreign country.⁵ If soldiers participated, they could not be involved in patient care, and they could carry out only tasks that demanded their special expertise.⁶

Establishing geographical scope was a third issue. In consultation with the National Security Council and USAID Administrator Raj Shah, Konyndyk decided to focus on Liberia, where the outbreak was most serious, the country's president had reached out for help, and the US government had the deepest relationship. Linked, smaller teams would work in Guinea and Sierra Leone, where planners expected the United Kingdom and France to lead anti-Ebola efforts. If the infection spread, the DART could expand its scope.

Developing a structure for collaboration with host-country officials and humanitarian partners was a fourth challenge. The DART was designed to coordinate US government assistance, but bringing the outbreak under control depended entirely on its ability to work with Liberian authorities, affected communities, and health care providers. Containing the epidemic required both sensitive policy decisions that only the sovereign government could make and deep local knowledge, which health ministry personnel and county governments possessed. At the same time, because Liberia was still rebuilding after a civil war, international organizations and NGOs would be on the front lines supporting the government to carry out essential functions such as helping communicate information, build facilities, care for patients, and bury the dead. Creating a means for coordinating effectively with the Liberian government and with these groups was key.

Though more familiar, because it was part of every OFDA operation, a fifth challenge was to plan not just for the emergency but for exit. In the initial phase of the response, the DART would assess the situation, identify needs, set response priorities, and start bringing in the skills and supplies required. The next phase was to drive the response until the outbreak was under control. In the final phase, the DART would wind down its primary activities and lay the path for subsequent recovery and development assistance, as needed, then transition out of the region.

The sixth challenge was money—how to pay for an unusual mission, which came two months before the end of the US government's budget year, when funding accounts were almost depleted. OFDA received an annual appropriation earmarked specifically for international disaster assistance, and to

fund the Ebola effort fiscal officials at USAID and the White House decided to take exceptional measures, drawing down the office's remaining budget for the year and using part of it to help the CDC cover its related costs. Plans called for the extra spending to be recouped later with a special appropriation by Congress.

Finally, the Ebola crisis differed significantly from other types of natural disasters, in which most deaths occurred immediately and conditions then improved. In an epidemic, the number of infections would continue to increase in the short run, no matter what anyone did. Especially during the turbulent initial period, aid groups would have to grapple not only with a virulent, deadly disease but also with a worsening sense of despair among affected communities.

Ambassador Malac later reflected, "When the DART came in, we weren't at bottom, as things usually are when a team arrives. The problem was getting worse, and we didn't know whether the team's plans would work. It was really hard."

On August 5, Konyndyk gave the go-ahead to deploy a DART, as Liberia's health care centers, hospitals, schools, and other public institutions closed their doors to prevent further transmission. Although the initial focus was on Liberia, the plan was to support all three affected countries if asked to do so. (The heads of the US diplomatic missions in Sierra Leone and Guinea would soon follow Malac in issuing disaster declarations.) The team had to move swiftly. If it did the right things, thousands of lives could be saved and a wider disaster averted.

FRAMING A RESPONSE

OFDA staff often described their work as "building the plane while flying," and the Ebola crisis was an example *in extremis*. Before responding to a disaster, end goals, roles, and protocols had to be clear, but Konyndyk and his colleagues could plan only up to a point. Strategy and tactics had to evolve as circumstances changed and more information became available. Although the DART concept stressed preparation, once in the field the emphasis was on learning and adapting at high speed.

Strong and capable leadership was crucial to success of the DART. Konyndyk needed people who had experience in coordinating novel, complex operations that engaged many partners from the NGO world and the United Nations. Prime candidates included veteran OFDA people who played important roles either at the office's headquarters or as heads of regional field offices. Aware that such high-level people could not be absent from their regular jobs for extended periods, Konyndyk opted for a tag-team approach in which leadership would pass sequentially on a planned schedule.

The lineup included Costa Rica-based Tim Callaghan, head of the Latin America regional office and a veteran of the 2010 Haiti earthquake response and other high-profile recovery efforts; Thailand-based William Berger, who headed the Asia regional office and had led the DART that responded to the 2011 Fukushima Daiichi nuclear disaster in Japan; and Mia Beers, head of the Humanitarian Policy and Global Engagement Division, who was experienced in

leading DARTs in complex crises across several continents. A fourth, Doug Mercado, was on OFDA's call-up roster and had 25 years of experience in humanitarian relief in places ranging from Nicaragua to Bosnia. At the time, he was with the UN's World Food Programme.

Callaghan, the first team leader, had to identify humanitarian needs, set priorities, and coordinate response activities with key stakeholders that included several parts of the US government, the governments of the three most-affected countries, UN agencies, and NGOs that had experience with the kinds of front-line service delivery needed. In Liberia, he worked closely with Malac, who oversaw all US non-military operations in Liberia and was the primary US liaison to Sirleaf.


Before the DART deployed, Konyndyk and his CDC counterpart, Frieden, had agreed that the CDC would oversee medical and health decisions. Because the DART lacked that competence, it was easy to agree to such a division of labor. However, overall management of the response was the purview of the DART leader, who was in charge of the overall effort and reported to the US ambassador in Liberia and to Konyndyk at OFDA's Washington headquarters.

To assist Callaghan and provide a link to CDC operations, Konyndyk and Frieden decided to appoint two deputies, one from each organization. Pendarvis, OFDA's public health adviser, filled one position. Pendarvis had helped carry out the assessment that led the White House to deploy the DART. Because of his past work with NGOs in Liberia, he had personal relationships with people in Liberia's health ministry, and he knew the conditions under which the DART had to operate. The second deputy was Jordan Tappero, director of the CDC Global Health Center's Division of Global Health Protection, where he led CDC's Global Health Security. Tappero would lead the CDC effort as well as serve as second deputy on the DART. To help bring the CDC's expertise to bear, three other CDC people also joined the initial team of 12. Their numbers—and the overall size of the team—would grow quickly.

Communication was crucial to the DART's function. The DART team leader checked in daily with the response management team in Washington, which handled requests for support. A mission tasking matrix, called MITAM, kept track of actions and who was responsible for completing them. (See figure 1.) Konyndyk also consulted regularly with team leaders and initiated a conversation focused on strategy every weekend.

In addition, an interagency conference call—weekly or daily, depending on circumstances—kept senior officials in different parts of government in the loop, including the National Security Council (the White House's voice), the Defense Department, USAID, the Department of Health & Human Services, the CDC, and others as needed. The purpose was to share information, give people a chance to ask questions about rationales behind the decisions, troubleshoot major policy issues, and think ahead. Separately, OFDA's parent agency, USAID, set up its own Ebola "secretariat," which held open meetings, sometimes twice a day, to improve coordination between the different parts of

Figure 1: Mission Tasking Matrix Sample Page



Mission Tasking Matrix: MITAM

USAID/OFDA DoD Mission Tasking Matrix (MiTaM)			
RESPONSE: Super Typhoon Yolanda		Version: Changes from last update	
New Missions identified as of 12-Nov-13 at 2300		Not confirmed / missing info	
Mission #	TY-8	Priority	TY-9
Priority	Urgent	Priority	Priority
WHO WHO is Requesting US Military Assistance?		WHO WHO is Requesting US Military Assistance?	
Name, Pos	John Shah	Name, Pos	John Shah
Org/Office	DSWD	Org/Office	DSWD
email	john.shah@dswd.net	email	john.shah@dswd.net
phone	0916 225 8666	phone	0916 225 8666
WHAT		WHAT	
Describe as clearly as possible what you want the military to do		Describe as clearly as possible what you want the military to do	
Transportation of Department of Social Welfare and Development (DSWD) - Philippines civilian agency		Movement of DSWD 575 food sacks (90,000 lbs)	
WHEN		WHEN	
Date(s) & Time(s)		Date(s) & Time(s)	
12Nov13 1030		12Nov13 1600	
WHERE		WHERE	
If the request is for a static position:		If the request is for a static position:	
START Location		START Location	
Grid		Grid	
POC on-site & contact info		POC on-site & contact info	
If there is Movement involved, info on the START Point:		If there is Movement involved, info on the START Point:	

MITAM - 131120 MITAM - 131119 MITAM - 131118 MITAM - 131117 MITAM - 131116 MITAM - 131115

Standard, field-tested process for validating, prioritizing, and submitting RFA's for DoD support.

(~ MITAM sometimes FRAGOed)

the agency engaged in Ebola-related activities that fell outside the DART's focus, such as recovery planning and innovation.

To strengthen these systems, USAID senior leaders took on additional tasks. Administrator Shah was the interlocutor with the secretary of the Department of Health & Human Services, the White House national security adviser, and the president. At certain times during the crisis, he briefed the president twice a week with information prepared by OFDA teams. Shah "played a huge role," Konyndyk said. "He was very focused on the details—in part because the president was."

Nancy Lindborg, USAID assistant administrator, played an important role by communicating with CDC Director Frieden and helping span the gap between agencies. "The health world and the crisis response world didn't know each other—literally did not know who their health colleagues were," Lindborg said.

Sensitive policy decisions belonged with the president, acting through the National Security Council. Obama became more personally involved than presidents usually did, and he insisted that decisions rest on science and

evidence, which pushed the DART to collect more types of data more frequently than in previous disaster interventions.

In Liberia, Ambassador Malac initiated morning meetings seven days a week with DART leaders and invited her own senior staff so that all were getting the same information. She assigned embassy personnel to follow up on specific issues if the DART needed assistance. Malac considered these meetings vital: “Everyone got the same message, and if someone needed help with the foreign ministry or liaising with the military, we did that.” When the DART had to coordinate response efforts with the Liberian Ministry of Health or Sirleaf, the team leader worked closely with Malac, who could pick up the phone and make the high-level calls required.

GETTING DOWN TO WORK

After arriving in Liberia in August, Callaghan and his deputies quickly learned that an important part of their job was to fit into the situation on the ground. “We had to make decisions about how to be most effective alongside ongoing efforts,” Pendarvis said. “We generally lean on UN-led clusters [of humanitarian agencies] to help outline a plan and to jointly identify needs with the host government. But that option didn’t exist at this stage in the response. So we [the DART members] took greater responsibility for planning and identifying the partners that could help fill needs—and for developing guidance. That was unique for us.” (See text box 2.)

Box 2. Humanitarian Clusters Not Activated

Normally, a DART coordinated its response efforts with the humanitarian cluster system, first established by the United Nations in 1991 and updated in 2005. The clusters were preconfigured groups of agencies and NGOs that specialized in providing certain major elements of disaster relief, such as water, sanitation, and hygiene; logistics; food; telecommunications; and protection. A UN organization such as the World Food Programme or UNICEF led each cluster. The UN Office for the Coordination of Humanitarian Affairs helped put a plan in place, develop and disseminate operational guidance, and organize field support.

In July-August 2014, the West Africa Ebola outbreak presented an unfamiliar, complex emergency. Within the UN system there was no precedent for handling an infectious disease outbreak that was also a humanitarian crisis or disaster, defined by the UN Office for Disaster Risk Reduction defined as a disruption involving “widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope with using its own resources.” The UN secretary-general did not activate the Office for the Coordination of Humanitarian Affairs in its traditional capacity as the UN coordination body. As a result, the DART had to play a greater role than in normally did in helping partners to frame a strategy and work together, aided by a World Health Organization “Road Map,” released at the end of August 2014.

Although the changing situation would surely require midcourse adjustments, the situation required an initial strategy. The team focused on the big picture. The DART's goal was to reduce the number of new infections to zero, flattening the epidemic curve, which graphed the cumulative number of cases. "Bending the curve" or "bending the line" was the lodestar.

To achieve that target, the conventional medical response would be to quarantine or closely monitor all those who had been exposed and quickly isolate the sick. That approach required (1) special facilities with trained staff and management personnel, (2) testing capacity to distinguish between people who had malaria and people who had Ebola (both diseases caused fevers and headaches), (3) ways to help healthy people stay safe, and (4) the cooperation and support of affected communities to investigate each suspect case and rapidly identify those who may have been exposed.

From the outset, however, it was clear that there was no way to build enough treatment and isolation capacity to meet the need during Liberia's intense May-October rainy season. And this delay had serious consequences: A shortage of such facilities would raise questions about safety and likely would hurt the recruitment of medical personnel from other parts of the world.

"You needed Ebola treatment units, but they were hard to build quickly—especially during the rainy season, when roads were washed out," said Callaghan, the first DART leader. "The question was how to isolate those who were ill without those units. This problem was a big source of stress, and we needed the CDC's advice about this."

Callaghan recognized that his team had to take other steps to reduce the spread of infection. He said he decided to focus first on "burials, messaging, and logistics," as well as expanding laboratory capacity.

Because the Ebola virus spread most easily just after death, support for fast but safe and dignified burials became a crucial component of the DART's strategy to stop the spread of infection. That meant working with community leaders and partners such as the Red Cross and the NGO Global Communities to form, train, and deploy burial teams, as well as promote new ways to honor and bury those who died.

Social mobilization—helping people take steps to protect themselves—was essential to support safe burials but also to help people avoid contracting the virus in other ways. UNICEF had launched a messaging campaign on Ebola detection and prevention in April, but the effort had mixed results. Callaghan said he understood the difficulties involved: "My father had just died, and I kissed his forehead. And four months later, I'm telling people you can't kiss your child. Think about what that meant."

Logistics were key to a successful strategy. Burial teams needed training and supplies such as gloves, protective suits, chlorine disinfectant sprayers, and body bags. Quickly moving those items to Liberia was essential—in Monrovia, the capital, bodies lay in the streets, because no one wanted to touch them without special protection. OFDA had some of the items in its stockpiles. "The WHO, the World Food Programme, and private businesses were also beginning to

bring in supplies, so we needed a coherent system for facilitating imports and managing the inventory,” Pendarvis said.

The DART also imported mobile lab facilities to reduce the time required for evaluating an Ebola test from four days to four hours. That step enabled MSF, which had been one of the first responders and continued to work in Liberia throughout the crisis, to sort people more rapidly and reduce the chances of infection. Eventually there were seven mobile labs from the US Defense Department and one from the CDC–National Institutes of Health.⁷

A critical element of the initial strategy—and one that carried through subsequent phases of the intervention—was flexibility. The team had to reassess priorities and make trade-offs constantly. For example, DART leaders saw little alternative to home-based isolation until there were enough community isolation centers and Ebola treatment units. But MSF worried that this approach would spread the disease, because people who were ill might try to go to the fields or markets for food—or a relative would make a mistake and come into contact. Instead, MSF wanted a fast and massive investment in makeshift facilities like those it had built, with floors made of shipping pallets and walls and ceilings made of plastic sheeting.

“It was really difficult, but critical, to do things in parallel,” Pendarvis recalled. “We didn’t want to recommend that people remain in their homes if that was a death sentence for family members. But there were genuine concerns that creating a community isolation center would amplify the disease. There was constant tension between the options. A continuous challenge was to do no harm.”

As the outbreak shifted from rural areas to urban settings or as testing became more available, needs and the opportunities changed. Successive DART leaders faced wholly new challenges and tasks.

Phase One: August–September 2014

In order to implement the goals set in the initial strategy, Callaghan’s team had to coordinate with diverse partners. Doing so required establishing structures and implementing practices that fostered close cooperation and allowed for adaptation as obstacles materialized and the course of the epidemic shifted.

Working with the Liberian government

It was essential to devise a way to collaborate effectively with Liberia’s president, cabinet, and health ministry as well as with any medical providers still operating in the country. “A lot of our effort usually goes into building a government’s capacity to deal with its own situation,” Callaghan said. Liberia was still recovering from a civil war that had ended 10 years earlier. Although ministries were functioning better, they still struggled to get things done quickly and efficiently.

The DART helped Liberia organize operations to create a workable decision structure that could respond to the dynamic demands of the Ebola

situation. CDC personnel proposed an incident management system (IMS)—which had a direct line to Sirleaf—to replace the ineffectual National Public Emergency Task Force within the Ministry of Health. The assistant minister of health oversaw six IMS committees, each of which covered a function essential for containing an infectious disease outbreak: epidemiological surveillance, contact tracing, laboratory, social mobilization, case management, and logistics/support. A nongovernmental partner—a UN organization in most instances—co-chaired each committee with a Liberian official. Other ministries and organizations provided services and expertise to the committees, under the direction of the committee chairs. Soon there were daily IMS meetings—always attended by a DART member and a CDC representative as well as others with active roles in the response.

The Liberia IMS sent issues that required policy decisions, or high-level political clout, to a new President's Advisory Council on Ebola, which consisted of Sirleaf, the US ambassador, and several ministers. The advisory council helped the president and the cabinet track progress and solve problems without getting bogged down in administrative matters.

Getting the system up and running turned out to be a slower, rockier process than anticipated, because the various participants had to learn their specific roles. “The time to create an incident management system is not in an emergency,” Callaghan reflected. “You need to do the capacity building in advance.”

Berger, who later became the second DART leader, said. “Typically, the incident management system is more focused on a management process. In Liberia, the IMS was more focused on information sharing.”

“It would have been unfair to export a US domestic model of incident management,” Pendarvis added. “We needed something between a command-and-control approach and a consensus-based coordination system, such as the humanitarian cluster system that the UN Office for the Coordination of Humanitarian Affairs usually set up. We needed a bit of both. We had to have some ability to forge agreements and coordinate.”

Recruiting partners

Attracting external implementation partners to manage burial teams, staff Ebola treatment units, organize last-mile delivery of supplies, and handle other functions proved more challenging than in other DART interventions. Usually, those kinds of partners—both within government and outside government—were quick to make themselves available. But after Samaritan's Purse and SIM USA staff members contracted Ebola at the end of July, rumors circulated that commercial airlines were going to shut down service. Already, people had started leaving Liberia—“the kinds of people we would need,” Callaghan said. “At one point, someone said the only way to get out would be to take a boat.”

OFDA reached out aggressively but was unable to mobilize the NGO capacity that it needed. Most organization had abandoned their operations, having no way to protect their employees and lacking reliable means to move

people into and out of Liberia. Nonetheless, MSF continued its work, and a few organizations, such as International Medical Corps and Global Communities, agreed to join the response, as did parts of the UN and the Switzerland-based International Organization for Migration (an intergovernmental organization that later became part of the UN).

OFDA press officer Carol Han, who was among the first to deploy on the DART, remembered, “We couldn’t stand up the response more quickly because we didn’t have many partners on the ground to handle the enormous, growing needs.” It was even hard to find people to staff the DART itself.

Callaghan ascribed much of the fear to a shortage of accurate information and an abundance of uncertainty: “We were asking NGOs to come manage Ebola treatment units, when they’d never done that before.” On the one hand, contracting the virus was not as easy as many thought, if people had adequate protection. The virus was not airborne; it was transmitted only through direct contact with bodily fluids. On the other hand, at the time there was no vaccine to protect people against the disease it caused; there were only a few doses of an experimental-treatment drug; and, there was only one plane, anywhere in the world, with the capacity to evacuate volunteers who fell ill.

Another source of uncertainty arose from speculation about whether countries would start to close their borders to travelers from the region, which would make it difficult or impossible for volunteers to return home. By the middle of August, the number of airlines serving Liberia had dwindled to two—Brussels Airlines and Royal Air Maroc, the Moroccan national carrier. Some countries had tightened border restrictions, and discussion of quarantine had exploded as a political issue.

US politicians, too, were embroiled in the debate over what to do. Fear that the disease would spread globally had skyrocketed in the United States just as the DART was set to deploy. Blocking people traveling from the region from entering the US or requiring mandatory quarantine in a third country would make it much harder to staff the DART and recruit NGO partners. In addition, such steps would make it even more difficult to find airlines and ships willing to carry cargo to Ebola-affected countries. To avert these problems, the CDC, the National Institutes of Health, the Department of Health & Human Services, and the Department of Homeland Security raced to introduce airport screenings and kits for self-monitoring at home.

Building a relationship with the CDC

The CDC was vital to the response. The agency deployed its people to remote areas and worked directly with those affected by the disease, setting up systems to trace personal contacts with infected people, managing cases, and testing therapies and vaccines.

The scale of its effort would eventually make the outbreak the largest emergency response in the CDC’s history.⁸ But the agency had little experience in mounting such a large operation in a region where infrastructure was poor and governments had limited capacities. Moreover, the CDC had its own

processes and procedures, and its people were accustomed to reporting to their headquarters in Atlanta, which had activated its own Ebola emergency operations center on July 9.

Despite the pre-deployment agreement that the CDC would oversee medical and health decisions while the DART leader had overall management responsibilities, the two differed in ways that complicated the partnership. As anticipated, some of the practical challenges of making the new interagency relationship work became clear only after the DART was in Liberia.

One significant difference was structural. In OFDA's incident command system model, Konyndyk shaped strategy and pacing but delegated most of the operational decision making to field personnel. He reported to the USAID administrator and Lindborg, and through them to the White House.

The CDC was more centralized. Director Frieden had a direct hand in the day-to-day decision making of his agency's field operations. CDC employees, including CDC representatives on the DART, consulted each evening with the CDC's Atlanta Ebola emergency center. Issues that DARTs would normally handle at the field level—matters delegated by OFDA's director—tended to be elevated to Frieden within the CDC. That meant that the CDC director often would weigh in on issues the DART would have dealt with at the country level. Gradually the CDC's personnel in the field gained greater independence as US domestic issues took more and more of senior CDC officials' time.

Further complicating the relationship was a difference in the status of the protagonists. Both Frieden and Konyndyk were presidential appointees. Although the two were counterparts in the Ebola response, Frieden had a higher public and political profile than Konyndyk did and had direct access to the White House. USAID Administrator Shah sometimes stepped in to help iron out disagreements and other wrinkles that resulted from the unusual structure.

Differences also affected lower levels of the combined operation. Because CDC workers had not received OFDA's disaster-response training, misunderstandings sometimes arose about what they could expect other partners to do. From time to time, CDC personnel working in remote areas instructed NGO partners to carry out specific tasks, forgetting that DART was in the lead and had contractual relationships with these organizations. The CDC and OFDA had to work out those differences on the fly and then make sure everyone on the ground understood. Mandatory predeployment briefings for all new personnel helped ease the problem.

Pendarvis, OFDA's public health adviser, said the differences had another important dimension: "The CDC was organizationally different. They are scientists, and they try to get the data right and target action accordingly. There was tension at points where we didn't have the data, but we had to act."

Integrating the military into the response

In late August, just as the DART began to implement its priority activities and Liberia's new Incident Management System began to function, the number of new Ebola cases began to rise rapidly—especially in poor, crowded

neighborhoods of the capital city, Monrovia. For the first time, the international public health community had to deal with rapidly spreading urban Ebola, instead of an outbreak in a remote rural area. Callaghan faced questions from all sides, as doubts arose about whether the DART's approach would work.

Konyndyk and CDC director Frieden flew to Monrovia at the end of the month, just as the WHO released a prediction that 20,000 people would likely die from Ebola.⁹ Both were worried.

"I came back fervently convinced that the epidemic was outpacing the US government response and the international response," Konyndyk recalled. "We were responding linearly, but the disease was growing exponentially."

Frieden met with Sirleaf and other Liberian officials and said much more needed to be done. On his return to the United States, he pressed the White House for stronger action. Others also rang alarm bells. At a meeting in New York on September 1, MSF President Joanna Liu lamented the response's slowness. She accused world leaders of "failing to come to grips with this transnational threat" and said they had "essentially joined a global coalition of inaction."¹⁰ She called for US military involvement, an appeal the European Commission's health adviser also voiced.¹¹

Obama received a letter from Sirleaf on September 9 appealing for additional help. "Mr. President, at the current rate of infections, only governments like yours have the resources and assets to deploy at the pace required to arrest the spread," Sirleaf wrote. "Branches of your military and civilian institutions already have the expertise in dealing with biohazard, infectious disease and chemical agents. They already understand appropriate infection control protocols . . ."¹²

On September 16, as the number of cases in Liberia topped 2,400 and approached 5,000 in the region as a whole, Obama issued an executive order to deploy the military.¹³ (See exhibit 2 at end of case.) The Defense Department authorized the Africa Command to deploy almost 3,000 troops under a mission dubbed Operation United Assistance.¹⁴ Major General Darryl Williams, commander of US Army Africa, arrived in Liberia with the first contingent of military personnel two days later.

The mission had specific objectives: to help train volunteers arriving from other organizations, design and build a field hospital—the Monrovia Medical Unit—that would enable US Public Health Service personnel to care for health workers who became ill, construct Ebola treatment units, and assist with logistics. Williams quickly brought in a navy engineering and construction team, a port-opening team to bolster cargo-handling capacity in Senegal and Liberia, communications and planning support, and pilots and aircraft that could deliver supplies to sites unreachable during the rainy season. "Overnight there was a real change in the atmosphere," Malac said.

However, the Joint Chiefs of Staff also imposed strict limits on the military's role. The Defense Department did not want to handle tasks that civilians could do just as well, and it barred military participation in activities that might put soldiers at risk of infection.

Moreover, the military's participation came with procedural entanglements. All task requests required approval by the Joint Staff in Washington. The stipulation represented an exception to the usual procedure during a disaster response, in which USAID identified needs and requirements and the Defense Department identified how to fulfill them. In past interventions, this process played out almost entirely at the field level, with the DART in the lead.

The need to get Washington's approval generated uncertainties and caused delays. Because each decision had to go back up through several layers in the military chain of command, the DART could not get fast answers in response to pressing questions about the scope of military involvement. "We would ask them at the field level to do things, and they wouldn't know whether they could," Konyndyk said. "They had to run it to the top. It took us a long time to realize that no one in the field or at combatant command could commit. We couldn't just go work something out."

Assuming that the Defense Department would decline a request, or that its clearances would arrive too late to be useful, OFDA and the DART leaders sometimes bypassed the process and sought alternatives to meet task needs. Doing so led to new problems. "The White House would ask the military, 'Why aren't you doing X and Y?', and [the Defense Department] would say, 'Because OFDA hasn't asked us to,' which put us in a real bind," said Konyndyk. Finally, USAID Administrator Shah told OFDA to task the military formally with all requests it wanted to make, even though the response likely would be "no."

The Defense Department eventually tapped Michael Lumpkin, assistant secretary of special operations and low-intensity conflict, to help manage the military's various roles in the crisis. Lumpkin had handled the earlier deployment of the Defense Threat Reduction Agency and the mobile labs.

Strengthening diplomatic reach

Although Ambassador Malac had overall responsibility for US government actions in Liberia, neither she nor others at the State Department were formally part of the interagency emergency response to the outbreak—in the sense that they were not included on the daily and weekly telephone coordination calls. Still, diplomacy rapidly became an essential element of the intervention.

Medical evacuation was one of the traditional responsibilities of the State Department, along with tasks more often associated with diplomacy, such as international negotiation and the issuance of visas. In that respect, the department had played a role in the Liberia response since July, when the two American citizens who worked with Samaritan's Purse and SIM USA had contracted Ebola. Although a private doctor had located the plane used to fly the two citizens back to Atlanta, it was the department's job to negotiate passage and to plan ahead to accommodate similar needs that might arise in coming weeks or months.

The need for greater attention and capacity within the State Department grew as OFDA conveyed a rising number of requests to negotiate with governments and international organizations, including the WHO. During the

third week of September, just after Obama announced Operation United Assistance, Secretary of State John Kerry created an Ebola coordination unit headed by Nancy Powell, a former US ambassador to India.

Powell played an important role in ensuring that the DART and non-US aid partners could move people into and out of the affected region. Some countries had already closed their borders to all flights from the region and refused to allow doctors, nurses, and others who offered their help to return unless they underwent three weeks of quarantine elsewhere. Powell's office had to negotiate to keep borders open.

Maintaining air transportation was also essential to accessibility for aid workers. Just two carriers still served the area, and maintaining their commitment was crucial. Brussels Airlines had agreed to continue its service, and with stepped-up airport screening aided by the CDC, Royal Air Maroc agreed to "touch-down, take-off" service that entailed no layovers or contact between the crews and local services. Powell enlisted Kerry, her French counterparts, and the UN to negotiate the use of air facilities in Senegal in order to warehouse supplies.

Powell's office also worked to ensure the availability of transport for Ebola patients who had to leave the region. With only one plane in the world outfitted with the necessary containment equipment at the onset of the crisis, options remained few despite the involvement of the Defense Department and other countries' militaries. Later, the State Department partnered with Microsoft cofounder Paul G. Allen to commission a containment unit that could be rolled on and off a cargo plane,¹⁵ and the United Kingdom and Germany crafted facilities to expand medical evacuation capacity.

Although the DART's purview extended to all three of the countries most affected by Ebola, the National Security Council considered Britain and France to be in better positions to work with the governments of Sierra Leone and Guinea, respectively. Sierra Leone was a former British colony, and France had once governed Guinea. The US embassies in the two countries were not fully staffed at the time, so it made sense to divide the responsibilities. It was up to Powell to coordinate with Britain and France as they stepped up their involvement in the two West African countries.

Managing bad news

Responding quickly and effectively to citizens' concerns was a critical and continuing task in a public-health crisis where troubling developments were common.

An especially challenging instance arose during the third week of September, when Callaghan, who was about to hand off his responsibilities as DART leader to William Berger, received word that the CDC planned to publish an epidemic model and predictions of the number of people likely to become infected with the Ebola virus and the number likely to die if no interventions curtailed the epidemic and if citizens failed to alter their behavior. The estimated range had an upper bound of 1.4 million cases and roughly 500,000 deaths.

Although few expected the worst-case scenario to pan out, the release of the model had the potential to spark a public panic that could hobble efforts to contain the crisis.

Callaghan persuaded the CDC to share the results ahead of publication with Malac and Sirleaf, before the CDC presented its findings at a meeting of the new UN Mission for Emergency Ebola Response in Accra, Ghana. The numbers came out publicly in the CDC's *Morbidity and Mortality Weekly Report* on September 26.¹⁶

The media and public response was immediate. DART and CDC press officers worked to explain the numbers and respond to an onslaught of questions that came from all directions. “The fear factor was huge,” Callaghan said. Berger added, “We were trying to do the job on the ground, and these new numbers created more pressure for us.”

Focusing Liberians on what they could do to protect themselves was essential both to reduce the number of new infections and to ward off panic. The Liberia IMS ratcheted up its communications campaign, which engaged traditional leaders and communities in getting the word out about how to stay safe from the disease.

Four days after the CDC predictions went public, more bad news, this time in the United States, underscored the need for quick and effective responses to public concerns. On September 30, health officials in Texas reported that a Liberian man was ill with Ebola in a Dallas hospital, having flown, while asymptomatic, from Monrovia through Brussels to Washington's Dulles airport and then to Texas. The disclosure raised additional concern among the US public and sparked calls for visa restrictions or quarantines that would limit travel from affected parts of West Africa—similar to those several countries had imposed earlier.¹⁷

Obama enlisted the CDC director and other high-ranking officials to push back against proposals for more-extreme measures. The Department of Homeland Security worked with Powell's office at the State Department to persuade the states to agree on a policy that would protect US citizens without undermining the international Ebola response. The negotiated arrangement allowed travelers from West Africa to enter through five US airports. There they would go through heightened, CDC-designed screening and receive proper follow-up as needed. “It would have been almost impossible to recruit and retain medical and relief personnel without assurances that they could return to the United States when their tours were completed” or that they could get emergency evacuation if needed, Powell said.

Phase Two: Bending the Curve

At the end of September, nearly two difficult months after the DART had deployed, Callaghan handed off to William Berger, the second DART team leader. Like his predecessor, Berger was an experienced professional. He was senior regional adviser for South Asia, and he had led the US disaster response in Japan when a tsunami triggered the Fukushima Daiichi nuclear meltdown—

another atypical DART deployment. Pendarvis stayed on to work with Berger, who shared Callaghan's high respect for his deputy's ability to get things done. "He was the guru," Berger said. "Justin knew all the people in the government, the personalities, how they worked, how they interacted, how to weave through the whole matrix."

"Tim [Callaghan] had set up a robust system," Berger said. The overarching mission goal remained unchanged—doing whatever was needed to bend the curve—and Berger's job was to make the system run effectively in order to reduce the number of new infections.

One central focus was to get more Ebola treatment units, called ETUs, up and running in order to segregate sick people from healthy people. Another was to create a rapid-response system to serve remote areas of Liberia. Hot spots were popping up in the countryside as the rainy season tapered and people were once again mobile. Berger wanted to create a sentinel system to detect new cases and a flexible response capacity to quell new outbreaks before they expanded. This initiative, known as RITE for Rapid Isolation and Treatment of Ebola, created on-call teams to investigate and respond to news of an outbreak in a remote area. It also provided pre-packaged kits of essentials—rehydration fluids, infection prevention materials—and a new testing capability that reduced the time for a diagnosis from roughly one day to a mere fifteen minutes. One study found that this approach reduced the time between a new case and notification of health authorities by half, increased the proportion of new cases properly isolated to 81% from 25%, and increased survival rates to 50% from 13%.¹⁸

Some of the previous challenges began to ease too. The West African rainy season began to end and supplies were starting to flow more easily to the locations where they were needed. Conditions had started to improve, increasing the probability of success, but there were still stiff challenges to address. For example, staffing remained a persistent problem. "We were still struggling to get key partners in place," Berger said. "Not every NGO, understandably, wanted to be part of the effort, and those that came out were taking risks. They did not know whether they could get their volunteers back home safely." With more visa restrictions still under discussion, limited transportation access and the Monrovia Medical Unit still unfinished, many valuable people with much-needed skills had to remain far from the action.

To address these issues and achieve interim goals, Berger also had to help the agencies represented on the DART work more effectively with each other and with host country governments.

Partnering with the Liberian government

"For me, a central aim was to help the Liberian government work effectively with the CDC and international organizations or NGOs," Berger said. But achieving that goal required changes on several fronts: As more and more people arrived to assist, the Incident Management System had to adapt. "There were too many people at the meetings—especially once our military

arrived,” Berger said. “Everyone wanted to be there, but we didn’t really need that many people at the table.”

In response, DART helped introduce a daily meeting for six top decision makers—including Tolbert Nyenswah, assistant minister of health and the head of the IMS—to address key questions and decisions. When Nyenswah and the IMS’s international partners encountered coordination problems they could not resolve easily, the DART stepped in to assist.

“Sometimes, navigating the bureaucracy was a challenge,” Berger said. “When someone shut something down, I had to work that back.” One example was the tendency of some Liberian government employees to maintain a business-as-usual approach to their work while the rest of the country was in crisis mode. That kind of problem was especially common when NGOs tried to import supplies for treatment centers but ran afoul of customs agents who would not release shipments unless the NGO paid customs duties. Occasionally officials would not allow NGOs to unload supplies that did not appear on a central list of medical equipment permitted to enter the country.

Berger said he met with Sirleaf three or four times a week to secure her help in clearing bottlenecks. Sirleaf herself had to walk a thin line, DART leaders acknowledged. On the one hand, to enable a speedy response she sometimes had to use the powers of her office to lift import restrictions or streamline clearance procedures. Members of the public and aid donors both wanted to know their supplies were reaching the front lines of the fight against Ebola quickly. On the other hand, Sirleaf had to deal with how her own government workers might perceive selective suspension of the rules for things like customs charges on relief supplies, a practice they had been warned against, as a form of corruption, in normal times.

Strengthening interagency relationships

Berger had to continue building an effective working relationship with the CDC and the US military in order to ensure the effort achieved its goals. CDC personnel were still learning how the DART worked and what its capacities were. Berger said he told his CDC deputy, Frank Mahoney (who had arrived at the end of September as Tappero rotated out), “If you’ve got a problem, let me know and we can try to fix it.” For example, he said: “We had procurement people on our team. When ETU construction plans in Monrovia ground to a halt because of the mud, we purchased 20 tons of gravel to solve the problem when others didn’t have that capacity.” OFDA’s standard operating procedure was to solve problems quickly instead of referring these decisions back to headquarters.

The need to finesse differences in organizational culture also extended to the DART’s relationship with the military. On October 20, Major General Gary Volesky, who commanded the 101st Airborne Division, arrived to take over from Williams, bringing roughly 1,400 soldiers with him. Under Williams’s month-long command, the military had focused on designing ETUs, importing lab capacity, and strengthening logistics. Volesky’s mission was to build the

Monrovia Medical Unit and other treatment facilities, help train health care workers, assist with data management, continue providing logistics support at the airport, and _____ helicopter access to hard-to-reach areas. As specified by the Joint Chiefs, the soldiers would neither treat patients nor come into contact with suspected cases.

Although the military participated regularly in joint training with OFDA, being a part of the DART team was an unaccustomed role for Volesky's division, which had served in Afghanistan and expected to go back there. "It was the first time in my career we [the 101st] deployed in support of another federal agency," Volesky said. He added, "it was also the first time in 30 years we had talked to MSF," a frequent critic of US military operations.

Building ETUs to help contain the epidemic was a central objective, but it required medical experts to work with logisticians and military engineers, and its success depended on very careful planning and project management. "Detailing that out was a huge piece of work," said Berger. "You have to identify all of the steps required and how to sequence them, so that at the end of the day, you have enough ETUs, enough trained people to staff the ETUs, and enough equipment and supplies to sustain operations. It was incredibly complex, and we had to avoid any missteps, or everything would be delayed or, in the worst case, fall apart." The DART also had to negotiate which agencies would take responsibility for the facilities after Operation United Assistance completed them.

The 101st's operational planning teams wrote a campaign plan that included measures of performance and effectiveness, and they met with Berger and other members of the DART to make sure everyone was in agreement. They then refined the plans and built them into OFDA's mission tasking matrix, the MITAM, while also joining the nightly phone call with the Washington response management team.

Action items continued to go to the Africa Command and then to the Defense Department for review, as they had under Williams, however. On good days, the Joint Staff sent clear answers, and approvals came quickly. But Lumpkin, the assistant secretary of defense for special operations who helped troubleshoot in Washington, said he sometimes got different answers from different offices. The delays Williams had experienced during September and early October persisted, and in some instances, decisions took weeks.¹⁹

Two innovations helped ease the problem created by the requirement for Joint Staff approvals. First, the Africa Command granted Volesky broader authority to approve a wide range of activities without having to submit each for clearance. Second, the military set up a separate task-monitoring system that enabled the DART to keep tabs on progress on specific tasks, such as the number of beds in a treatment unit that would become available on a specific date.

As the DART leaders had anticipated from the start, other partners remained frustrated with the limits placed on the military. The CDC wanted the 101st to transport blood samples on its helicopters and fly personnel directly to

communities, but Volesky had to respect the red-line restrictions the Joint Chiefs had set. One CDC representative told a military after-action team: “[Department of Defense] helicopters will take us to remote locations, but will not transport us out of ‘hot zones.’ We had people who had to walk out of the jungle, which took days and risked injury. It didn’t make medical sense. The people who walked out could turn around and get back on a DoD helicopter to fly somewhere else the next day. Even if we had been exposed to the disease, we wouldn’t be symptomatic at that point, so there wasn’t any risk to the crew of the helicopter.”²⁰

Communications systems also presented a persistent challenge. The military’s heavy reliance on classified computer networks made it difficult to share epidemic-related information until Volesky’s team offered to post information on the US Africa Command’s Ebola website, where everyone could reach it. Lack of interoperability between different software packages used by different parts of the military also hampered collaboration—even within the Defense Department. And in an environment in which both electricity and internet connectivity were limited, communication sometimes required hand delivery of printed material.

Less-obvious factors also occasionally hindered interagency collaboration in a group effort in which flexibility was a prime consideration. Once focused on a task, the military locked onto its goal, and difficulties sometimes arose when the shifting situation required adaptation. For example, it was hard to alter engineering plans and construction schedules, as the dimensions and location of the outbreak shifted.

Enhancing cooperation with the host government was part of the challenge of interagency collaboration too. Throughout, Volesky aimed to build relationships with Liberia’s military. He supported Liberian government partners, helping them see the challenges firsthand, set priorities, and organize themselves to respond effectively. “We could fly anywhere, and every time I went, I tried to take a Liberian leader with me,” he said. “That enabled us to reach a common understanding of the problem so we could work together more closely on the ground.”

Tracking progress: Data

The DART’s goal was to bend the line, but it was hard to know the line’s shape at any particular time, never mind how it would change. “Bending the line was a data-driven result in a world where data were ridiculously terrible or fuzzy and unreliable,” Lindborg recalled.

Although it was relatively easy to measure outputs—new patient beds created or numbers of communities reached through social mobilization, for example—assessing impact on the epidemic itself was much harder in the fast-shifting situation.

“Data was missing or went uncollected—including the names of some of the people cremated—and it was important to correct that problem,” Pendarvis said. But sometimes there would be multiple entries for the same person under

slightly different spellings of the person's name, collected at different times or by different means, so double-counting was also common. And if data filing was delayed for some reason, the later input of the accumulated information could produce a sharp change in trends that confounded evaluation and analysis.

Swedish health statistician Hans Rosling, internationally known for his work on data visualization, came to Liberia in mid-October—with no formal invitation—to support the IMS data management committee. Rosling, a professor of international health at Sweden's prestigious Karolinska Institute, had devoted much of his career to studying disease outbreaks across Africa, and he believed he could help solve the Ebola data conundrum. Luke Bawo, Liberia's head of Ebola surveillance, recalled, "He just walked into the office and introduced himself."²¹

Rosling wanted to cut through the thicket of information the IMS received from the field. The first step, he said, was to create an epidemic curve based only on positive lab results. Then it would be possible to build an algorithm capable of recognizing duplicate entries. To address the problems caused by delayed data-entry, he suggested using a 21-day moving average to chart the epidemic's path. His ideas required the work of people adept at using spreadsheet software Excel, and Volesky's 101st had people with such skills.

When Rosling's group finished its work at the end of October, it was clear that the curve of new infections had indeed started to flatten—and had actually begun to do so at the end of September and early October, just after the CDC's worst-case prediction had made headlines and Callaghan handed DART leadership to Berger.

The findings were unexpected and heartening, and they fueled optimism that the fight against Ebola was producing tangible gains. Pendarvis praised Rosling's success in producing an accurate picture of what was happening: "He was able to show data in a compelling way for people who didn't understand how much error there might be in the big forecasts."

Rosling's new graphs helped power a subtle but tangible shift in tactics as the goal turned to halting all new infections rather than curbing their growth. "At this point, the response could become more technical and focus on identifying events that might trigger hotspots, stopping the spread of the disease before it happened," Berger said. Scientific expertise was more useful than it had been earlier—and there was more of it available, now that other systems were beginning to work effectively.

Phase Three: Getting to Zero

In November, Mia Beers took over as DART leader, and Berger returned to his regular work in South Asia. Beers was a veteran of the Haiti earthquake DART as well as the 2004 Indonesia tsunami, the 2006 crisis in Lebanon, and the conflict in Somalia. At the time, she was director of OFDA's Humanitarian Policy and Global Engagement Division.

Although Rosling's charts showed the number of new infections had declined, Beers worried that unreported cases could be wild cards, and that the

crisis could erupt anew. “We didn’t know where this would go,” she said. If the outbreak rekindled, international responders said, there would not be enough beds. And if it ended, there would be unused capacity.

Beers cast a watchful eye on the data as the situation unfolded. As part of Operation United Assistance, the United States planned to support a total of 17 ETUs, each of them with 100 beds.²² The Monrovia Medical Unit, a 25-bed clinic staffed by the US Public Health Service, would care only for health care workers who fell ill—a measure initially considered essential for attracting and retaining people with medical skills to help respond to the outbreak. The Monrovia facility opened in November, along with one ETU, and three additional centers were scheduled to come on line in December.

As the situation began to improve in Liberia, new challenges arose. It was clear that the epidemic was behaving differently in each of the three countries involved. Infection rates had come down in Liberia, but rates were spiking in neighboring Sierra Leone. In Guinea there were fewer reported cases overall than in Liberia or Sierra Leone, but the disease kept popping up. In a region with porous borders, an outbreak in a neighboring country could easily reignite the spread of the virus in Liberia. OFDA sought new ways to assist nearby countries, including sending a small DART to help contain an outbreak in Mali. (See exhibit 3 at end of case.)

In Sierra Leone, the DART had only a modest presence, and the United Kingdom had stepped up its activity in cooperation with the United States. The UK effort there began incorporating elements of the Liberian approach and had established a similar incident management system but with a more pronounced role for Sierra Leone’s military.

Guinea was another story. France had started to assist, but relations between the two countries were strained. Guinea’s government was less open and less engaged. Sirleaf and Liberian disaster management officials had thrown themselves into the effort to contain the epidemic in Liberia, but Guinean leadership emerged only slowly.

While working to hone a regional strategy, Beers also attempted, with limited success, to clarify roles with a new partner, the UN Mission for Ebola Emergency Response, or UNMEER, which was based in Accra, Ghana. Although formally established in the middle of September with the goal of coordinating the UN’s agencies, UNMEER was still struggling to become operational. In a disaster, the UN’s real expertise lay with its Office for the Coordination of Humanitarian Affairs, which the UN system had declined to activate. The DART had already engaged some of the UN agencies that led key humanitarian clusters normally involved in disaster response. At this stage, UNMEER was another player on a crowded field, and the UN’s corporate culture and structure sometimes got in the way. For example, requests for frequent meetings—usually outside the affected countries—hindered the effectiveness of joint efforts even though the organization brought some highly talented and experienced people to assist.

From mid-November, the number of reported new infections continued to decline, although small outbreaks occasionally popped up. The Christmas holiday—when people traveled to see their families and there were more social gatherings than usual—portended an uptick in new infections. However, the disease surveillance and social mobilization campaigns appeared to work well. By year end, the number of new infections had fallen to fewer than 100 per week. Small outbreaks could always ignite, but it looked increasingly possible to extinguish the epidemic.

Phase Four: Transitioning Out

At the end of December, Beers had to resume her roles at OFDA headquarters in Washington, and she handed off the DART leadership role to Doug Mercado, another DART veteran. Mercado had helped lead refugee protection in conflict zones around the globe. He arrived on January 2 and stayed through July 2015.

“My challenge was to think about how to shift the orientation and think about rightsizing to match the epidemiological profile of the disease,” Mercado said. Revising goals and making new plans required a joint effort. Beginning in early 2015, representatives of USAID, the CDC, the DART, and the State Department met weekly to determine what they needed in order to assist with recovery and unwind the response effort.

The border had become a source of increasing concern because Liberia would remain at risk of a new wave of infection as long as Sierra Leone or Guinea still had active epidemics and vice-versa. The DART had worked with the International Organization for Migration to set up temperature screening for vehicle passengers at official checkpoints along the boundaries between countries. But satellite images revealed people were dodging the screeners by crossing over through the bush—sometimes within yards of the border posts.

While working to contain the epidemics in Sierra Leone and Guinea, Mercado helped the Liberian IMS to set up community-based surveillance systems that trained villagers to recognize people who might have contracted Ebola and take steps to keep themselves safe. The Red Cross facilitated the process and engaged traditional healers and communities, provided instruction, and managed screening centers.²³

Mercado also concentrated on building Liberia’s own health capacity and helping wind down the emergency phase of the US response. High on the list was what to do with the Ebola treatment units that the US had completed after the number of new infections had started to decline. Mercado said, “I saw the ETUs and realized we were past the point where we needed all these beds.” But adjusting plans for treatment units required difficult choices. The ETUs cost money to maintain as well as to build, and the DART could reduce costs by stopping construction, but what would happen if Ebola returned?

“We were between a rock and a hard place,” Mercado recalled. “The Liberian government was still nervous. It took a lot of discussion to decide what to do.” He negotiated to reduce the number of treatment units the military built

in Liberia to 11 from the 17 originally planned (the DART also funded construction of several additional ETUs by other partners bringing the total number funded by the US to 15).

Mercado worked with Volesky to send home the military, which had completed a list of tasks assigned by the DART. Original plans had called for three 6-month deployments, but the engagement mostly ended in late February, when all but 30 of Volesky's soldiers left Liberia. (Operation United Assistance officially ended June 30.) The DART found other partners to replace soldiers who had provided services that required continuing work. An OFDA contractor, for instance, replaced Volesky's people at the Monrovia Medical Unit.

For Mercado, the next question was whether—and how—any of the emergency Ebola infrastructure that the US government had helped build could be adapted and left behind to strengthen future health capacity in Liberia. “In an emergency response, we try to do things to save lives. If we can leave something behind, that's great but it's not the key goal,” he said. Most of the ETUs were like giant tents, with roofs and walls made of plastic sheeting that would deteriorate over time. A few were semi-permanent bamboo structures, and the DART could turn those over to local communities. Most of the warehouses and much of the lab capacity—though not all of it—were only temporary, too, and the DART would have to close them down. In addition, the DART had supported the purchase of vehicles and a cemetery through the NGO Global Communities, and it lacked a way to transfer such assets to the Liberian government or to other parties.²⁴ The DART had to come up with a plan.

Mercado was also part of early conversations about how to transition to recovery and development activities. There were no established procedures for navigating that phase. Some of the debates were about Liberian needs and the appropriate sequencing of new types of aid. But others centered on whether the DART's NGO partners—some of which had deep knowledge of communities, people, and the issues—ought to be part of recovery and development or whether these partners should hand over those responsibilities to the organizations that typically worked on health system strengthening and related matters.

Highlighting one of the challenges, Ambassador Malac said: “It's hard to move from disaster response to development. The color of money is one issue. People don't want to give up resources. We were helped by the fact that there was a big USAID presence in Liberia already, and we had a lot of activity in health. That helped the glide path a little. But it took hard work.”

OVERCOMING OBSTACLES

Two especially stubborn problems confounded the response throughout the crisis. The first was the staff rotation of partner personnel. For example, the US Public Health Service replaced the commander of the Monrovia Medical Unit three times within a period of about three months. Other key government partners, such as the CDC, pulled their people back to their headquarters every

30 days. DART members switched out every five to eight weeks. And the DART leaders stayed roughly six weeks each—except for Mercado, who remained on post for about six months.

In a situation in which people worked seven days a week, often for long hours, such rotations were important not only because of the stress of working under dangerous conditions but also because of the likelihood of burnout. But personnel churn hampered efficiency by causing losses of experience and know-how and by disrupting crucial personal and professional relationships.

“The Ebola response was a complicated operation with many stakeholders, and it took most people a month to learn their way around,” Mercado said. “We really wanted people on their posts for a minimum of three months.”

Personnel policies drove much of the staff turnover. State Department-mandated medical-clearance requirements and other training required for duty overseas lasting more than 29 days took a long time to complete, and that made it hard to get people into the region. Some CDC and Public Health Service Commissioned Corps personnel lacked not only the clearances but also passports because they hadn’t planned on being deployed overseas.²⁵ Eventually, the State Department made accommodations on a one-time basis. The CDC also began to send some of the same people back, which helped, DART team leaders said.

There was little else that the DART could do to ease the problem—except to support frequent briefings and orientations, which helped smooth handovers but also consumed valuable time.

A second unanticipated issue was interaction with US domestic policy. Unlike most of the disasters that DARTs handled, American citizens—and many of their political leaders—felt vulnerable to the dangers posed by the Ebola outbreak thousands of miles away. The Ebola death of a Liberian man in Dallas and infection of nursing personnel exposed the failure of hospital personnel and other workers to follow guidelines and requirements set by the CDC and other federal agencies regarding aspects such as exposure, waste, and transportation. The incident also heightened public anxiety, which escalated after a doctor in New York, who had returned from volunteer service in West Africa, came down with the disease.

Across the United States, hospitals began buying protective gear, exhausting the supply of materials needed to fight the epidemic in West Africa, where they were most needed. State-imposed quarantine rules made it harder for Ebola workers to return home, and political pressure to cut off all travel to and from the region grew. When Konyndyk traveled to Liberia with US ambassador to the United Nations Samantha Power during the third week of October 2014, the debate was at fever pitch. He recalled that the White House “wanted to focus on evidence, not politics,” but with midterm elections just a week or so away, Ebola protection became a campaign issue in some areas. Konyndyk recalled that he did not know what would happen when they flew home a week later.

There was no clear place to bring the domestic and international responses together in order to reduce the problems they created for each other. The

National Security Council's agenda was crowded, and no other high-level forum was available to help work out differences.

To fill the gap, Obama appointed Ron Klain to the new position of Ebola response coordinator, dubbed "Ebola czar." A lawyer who had served as the vice president's chief of staff, Klain set to work immediately after his October appointment. Although DART leaders had little direct contact with Klain, his actions helped ease some of the problems the team confronted. Klain had political stature and the ear of the president, as well as a sense of humor that enabled him to defuse some of tensions over domestic policy and negotiate effectively on matters that otherwise might have complicated the epidemic response.

ASSESSING RESULTS

The World Health Organization declared Liberia free of Ebola on May 9, 2015. The disease reappeared in June and July, with six cases, but the country was again declared Ebola free in early September.²⁶ Sierra Leone and Guinea were declared Ebola-free in December 2015, and USAID deactivated the DART on January 4, 2016.

In March 2016, the WHO declared that the outbreak in West Africa was no longer a public health emergency of international concern, though there was still a risk that isolated cases could appear. All told, 28,616 cases were reported (suspected, probable, and confirmed) in the three countries, with 11,310 deaths.²⁷ In Liberia, there were 10,678 suspected, probable, or confirmed cases and 4,810 deaths.²⁸ The numbers of cases and deaths fell far below the CDC model's upper estimates

The DART was one of many factors that contributed to ending the epidemic—not least of them the actions the citizens of Liberia, Sierra Leone, Guinea, and other countries in the region had taken on their own to protect themselves. But without the actions taken by the DART, it was likely that the epidemic would have spread more widely and taken a much higher toll.

The decision to deploy the DART was undeniably late. OFDA Director Konyndyk told a Joint Coalition Operational Analysis after-action interviewer, "If something like this [the disease] were airborne, we could not have remotely afforded the month to month-and-a-half that we spent running around ourselves, trying to figure out who was going to do what. That would just kill us—literally."²⁹

A USAID-commissioned after-action report questioned the DART's effectiveness and relevance in the opening two months, when there were delays in starting key functions partly as a result of lags in amending OFDA contracts and moving funds and partly because the strategy, focused on Ebola treatment units, did not meet the demands of the situation. However, the report credited the DART with greater impact after October 2014, "when funding and activities increased and intensified."³⁰

Although defining an effective strategy was central to bringing the epidemic under control (see text box 3), so were coordination and operational

Box 3. Right Strategy?

Both the US military and a 2018 inspector general report faulted USAID for not having a clear strategy up front. The DART had to begin its work without either a formal US government strategy, which appeared only in September 2014, or the UN's road map, published at the end of August.

DART leaders generally agreed that four things were essential from the start: social mobilization to encourage behavior change, effective isolation, contact tracing, and safe and dignified burials.

Expressing a view that the DART leaders all shared, Berger said: "If people had not changed their behavior, we could have built hundreds of ETUs and it would never have been enough. We had to keep people from catching Ebola in the first place." Fortunately, it proved easier than anticipated to surmount social mobilization challenges in urban areas. "We had never confronted 'urban Ebola' before, so there was a fear of the unknown," Berger said. "But what was so ironic was that it was easier to deal with than 'jungle Ebola.' Because we could use all of the existing community networks in urban settings to communicate messages so quickly, behavioral change was easier to accomplish in the city than in rural areas, where networks weren't as strong."

A USAID inspector general report later questioned why USAID and OFDA had not launched social mobilization campaigns sooner—before deploying the DART—and why the DART had not moved faster to expand that effort. Part of the problem lay in finding the right way to reach people. From April to the end of July, a public service campaign featuring the message "Ebola Kills"—borrowed from experiences in rural Uganda and other countries—appeared to generate a sense of resignation among Liberians instead of sparking public action on safety issues. Later slogans and participatory, community-based strategies proved more successful.

Strategy, too, lay at the center of the debate about whether treatment centers could have come on line sooner, when they could have saved more lives, and whether there were too many of them constructed after the number of new infections had started to decline. A USAID-commissioned after-action report noted that the CDC epidemic model, which estimated it was possible to control the epidemic "if 70% of the cases were isolated in health facilities" underlay the September 2014 decision to engage the military in building treatment units, a decision that was "forward-looking to accommodate a worst-case scenario..."¹

As MSF showed, it was possible to set up a simple treatment center of wood pallets and plastic sheeting without the labor, materials, and time the US military invested. The NGO-built Ebola treatment units OFDA supported were available earlier than the units the Department of Defense constructed and had greater impact. "We tried to build to the gold standard, and next time around we might not do that," Doug Mercado, the fourth DART team leader, concluded. More simply built ETUs might have accelerated availability and saved lives.

Some also questioned why the DART did not terminate construction of Liberia ETUs earlier, when it was known that some of the beds were going unused. One *New York Times* article called the construction of the treatment centers a "misstep." Critics pointed to the empty beds as evidence of faulty calculations. But the people leading the response viewed the unused facilities as a hedge against a risk that the epidemic might explode again before it wound down. Until late October, no one knew what path the epidemic was likely to take, and acting conservatively—by building more capacity—made sense, DART leaders reasoned.

(See Norimitsu Onishi, "Empty Ebola Clinics in Liberia Are Seen as Misstep in U.S. Relief Effort," *New York Times*, April 11, 2015; the multi-volume assessment produced for USAID by International Business and Technical Consultants, Inc., *Evaluation of the USAID/OFDA Ebola Virus Disease Outbreak Response in West Africa 2014-2016*, US Agency for International Development, January 2018; Unclassified Joint and Coalition Operational Analysis, "Operation United Assistance Study," August 20, 2015; and Office of Inspector General US Agency for International Development, *Lessons from USAID's Ebola Response Highlight the Need for a Public Health Emergency Policy Framework*, Audit Report 9-000-18-001-P, January 24, 2018.)

effectiveness. The question was how well OFDA's approach to managing interagency collaboration worked under the circumstances of an infectious disease outbreak.

The quality of interagency collaboration hinged on answers to three questions: Was the internal governance process as effective and efficient as it could have been? Were the right people involved in sufficient numbers? Were team members able to operate safely and effectively?

"It looked chaotic from the outside, but ultimately, we had a pretty good internal-governance process in a very complex response, with groups not used to working together," Konyndyk said. Still, there were undeniable challenges.

- The authority systems within the CDC and the limitations established by the Joint Chiefs together constrained DART leaders in Liberia from making rapid decisions and pushed more operational decision making into Konyndyk's Washington office. A USAID after-action report said the relationship with the CDC was slow and stilted at first but that "the coordination between CDC and OFDA became close, intensive, and extensive."³¹
- On the ground, the incident management system (IMS) functioned differently from OFDA's conventional model by emphasizing information sharing and consultation more than management. The IMS also had a technical and scientific orientation and did not emphasize field operations and joint planning functions. In future responses, it would be important to strengthen the command and management dimensions.
- Although several participants said there were too many people on the interagency calls with Washington, the decision not to include the ambassador and the State Department created some awkward gaps in knowledge. Malac said, "We fed stuff in but didn't get a lot back. A lot of the time we were surprised [by decisions]. In terms of shaping the response, the Washington interagency [consultations] *imagined* what was needed and *didn't listen* to what those of us in the field were saying."

Preparation was centrally important for harmonizing practices and building relationships, both of which were hard to do in the middle of a crisis. Earlier OFDA had organized a special disaster-response orientation program for its interagency partners and senior managers of specific NGOs. Incorporating the CDC into its activities was essential for improving performance in the future. The USAID-commissioned after-action report also recommended embedding OFDA staff with the CDC at CDC headquarters in Atlanta, Georgia.

Were the right people engaged—and in the right numbers? Callaghan said that in the first two months, "We just needed more of everything on the ground: more military liaison officers and more writers and more program officers." Those problems eased over time, but frequent rotations meant it was harder to make efficient and effective use of the staffing available. Quickly rebuilding relationships and getting know-how up to speed were difficult to achieve.

The answer to the last question—safety—was the easiest. The intensity of responding to this unprecedented outbreak was evident in the number of people

who said the Ebola response set a new standard for tough deployments. Carol Han, the DART press officer, said, “My barometer for DART deployments became, ‘This is not as bad as Ebola was.’” But the precautions put in place worked. No one in the military or at the US diplomatic mission contracted Ebola, thanks to pre-deployment briefings and continuous training and monitoring.³² No local staff at the embassy got sick despite the fact that the embassy had about 600 employees, and some lived in neighborhoods where Ebola was rampant.

During a roughly 10-month period, this interagency effort provided more than 435 metric tons of essential supplies,³³ constructed 15 Ebola treatment units in Liberia addition to the Monrovia Medical Unit (and supported additional Ebola treatment units in other affected countries), trained thousands of health care workers, and helped finance and prepare nearly 200 safe-burial teams in Liberia, Guinea, and Sierra Leone (including 70 in Liberia). Across the three countries, it also delivered food and other relief to over 3 million people whose livelihoods were affected by the epidemic.³⁴

The DART launched social mobilization campaigns, created lab capacity, provided extensive logistics support, and helped coordinate the response. It aided Sierra Leone and Guinea when outbreaks there challenged the operations the United Kingdom and France were assisting, backing up the UK Department for International Development and French aid workers as needed. It also deployed a small DART to Mali for a month or so to combat an outbreak there, and it sent personnel to Guinea Bissau on an exploratory mission. USAID further provided \$73.9 million for the WHO to cover the costs of that organization’s response to the crisis, including medical personnel mobilized to assist.³⁵ (See exhibits 4 and 5 at end of case for summary financial data.)

In December 2014, a little over four months after the DART’s work began, the US Congress provided \$5.4 billion in emergency funding for Ebola preparedness and response, of which about \$2 billion supported work by the departments of Defense and Health & Human Services.³⁶ In the end, USAID and the State Department together used about \$1.5 billion of the \$2.5 billion allocated to them for their activities in the response and redeployed a substantial part of what remained to respond to an outbreak of the mosquito-borne Zika virus in Latin America and the Caribbean in 2015. For comparison purposes, \$1.5 billion was about 37% of the \$4.1 billion the international community pledged in the wake of the 2015 Nepal earthquake and less than 1% of the \$120.5 billion the US government spent on the Gulf Coast recovery from Hurricane Katrina, which struck in 2005.³⁷ (See text box 4.)

USAID’s decision to reallocate funding planned for other emergencies and priorities while the request for Ebola funding made its way through Congress worked, though there were complications. The Ebola appropriation passed in December 2014 was intended to reimburse USAID for costs incurred and fund the remainder of the response going forward. However, a Government Accountability Office report found that of 271 reimbursements that USAID made for funds obligated before Congress acted in December 2014, 21—or a

total of about \$60 million out of about \$1.5 billion spent—did not meet the requirements under the funding bill and corrective actions had to be taken.³⁸

Box 4. Following the Money

One of the DART's responsibilities was to ensure US government funds went where they were supposed to go. It was hard to determine whether the financial leakage exceeded levels normally encountered in similar situations. The International Federation of Red Cross and Red Crescent Societies reported it had lost to fraud about \$5 million of \$124 million in Ebola funds—about 4% of the total Ebola budget it managed—during 2014–16, mainly because of overpriced supplies, payroll discrepancies, and forged customs declarations. IFRC said that some of that money had come from OFDA. The magnitude of losses among other partners was unclear, though there were no reports of similar magnitude.

Tracking whether all payments were used exactly as planned during a worsening emergency would have produced delays that jeopardized the response. For example, partners had to pay community mobilizers and Liberian health-care workers, some of whom lacked identity cards. It was unlikely that all of the dollars allocated for payroll went only to the people who assisted, but trying to establish tighter controls would have limited ability to reach far-flung communities. As it was, some of the Liberian government officials and NGOs complained about strict rules that made it hard to shift supplies to locations where there were new outbreaks or across boundaries from one affected country to another.

Limiting over-purchasing was also a challenge. Especially in the early part of the crisis, uncertainties about the growth and extent of the epidemic created a quandary for those who had to purchase supplies and materials, because accurately anticipating needs was impossible. Even after it became apparent that new cases were diminishing, no one could say for sure that the epidemic would not flare up again.

The DART leaders insisted on buying local whenever possible. For example, when international organizations or NGOs wanted to import ambulances or other heavy equipment, the DART pushed back. It was faster and much more cost-effective to convert a pickup truck into an ambulance than to bring in vehicles that took up scarce time and equipment to unload when they arrived via cargo plane at the airport and were unsuited to the terrain.

(Relevant reports by the USAID Inspector General are accessible at <https://oig.usaid.gov/category/programs/ebola-oversight>. See also BBC, "Red Cross apologises for losing \$5m of Ebola funds to fraud," November 3, 2017 <http://www.bbc.com/news/world-africa-41861552>.)

REFLECTIONS

Because of the importance of containing global pandemics, the response to the 2014 West Africa Ebola outbreak became the focus of many reviews both official and unofficial. Within the US government, the DART was the subject of several reports by the agencies that participated and their inspectors general (accountability officers). These highlighted a number of ways to improve, from expanding the use of pre-negotiated indefinite quantity contracts with trusted

partners and enhancing the military's awareness of conditions that affected logistics, to new systems for supply chain management.³⁹

However, leaders of the Office of US Foreign Disaster Assistance (OFDA) Disaster Assistance Response Team (DART) were the first to caution against relying too heavily on lessons from the Ebola crisis as a blueprint for future disaster responses. "You don't want to be fighting the last war," declared William Berger, second of four successive DART leaders. "Always go in with an open mind and a sense of humility, and understand there are things you don't understand. Pay attention to what's happening on the ground. It's about context and what people are thinking in the country, and those things will be different everywhere."

Deborah Malac, US ambassador to Liberia during the response, stressed that the dynamic character of the Ebola crisis demanded a flexible strategy that allowed for adaptation: "Everything was moving so fast . . . what was needed by [the] end of August was not what was needed by mid-September. In just two weeks, the needs changed."⁴⁰ To act quickly, future DARTs needed new and different contracting mechanisms that would allow them to shift away from some projects and programs and emphasize others as circumstances required.

Better data and feedback, throughout, were also crucial in order to adapt strategy and actions to the patterns of disease.⁴¹ The push for evidence-based decision making created pressure to collect many types of information. "Everyone was fixated on the numbers," said Carol Han, an OFDA press officer who was among the first to deploy on the DART. "We had a team of information officers who gathered response figures, such as number of available beds and Ebola specimens tested."

However, "better data" was not necessarily synonymous with greater detail. On the contact tracing forms collected in the field, epidemiologists wanted complete assessments that included specific circumstances of individual cases, and they wanted to collect data at each point along a patient's journey. But entering large amounts of data into spreadsheets took time, and it was often impossible to synchronize information collected from patients, ambulance teams, treatment centers, and cremation or burial sites. As a public health specialist himself, deputy DART leader Justin Pendarvis understood why the epidemiologists wanted the detail, but he tried to focus colleagues on priorities: "The key was to make it as simple as possible and aim data collection and management toward what we needed."

Pendarvis added that any strategy or plan had to take into account the high level of uncertainty that persisted during the crisis despite improvements in information collection and data analysis. In a blog posting, he emphasized that uncertainty was no excuse for hesitation in a situation where time was the enemy: "No single factor explains how the disease was brought under control in Liberia. . . . But here is one thing we do know: the effectiveness of the response depended not on limiting action to what was known at the time, but taking action in spite of the unknown."⁴² The Ebola episode drove home a further

lesson, he wrote: “A challenge for us is how to make decisions when 70% of the information is not good and you have different technical estimates.”

Managing in the context of uncertainty reversed the common business axiom that managers should focus on solutions rather than problems. The first DART leader, Tim Callaghan, said the key to dealing with the Ebola crisis was first to identify the problems and needs, and only then to consider possible solutions. “People always tend to talk about tools or solutions,” he said. “But it’s essential to first ask what the priorities are. Tell me what the issue is, and I’ll figure out how to resolve it. As a DART leader, that’s my job. Sometimes people offered solutions that didn’t reflect the reality of the problems we faced. We have to find local ways to do things; for example, people wanted to use smartboards in the IMS, but there wasn’t local capacity.”

DART leaders offered other maxims for managers of infectious disease and disaster responses. Callaghan summed up a shared view: “What I would convey is: get the right people, stay for a while, and get out to the field so you can see what’s happening. A lot is based on personalities. You need people who are committed to getting the job done. We had the right people there—people who knew how to be flexible.”

Others who were centrally involved emphasized that last point: the importance of having people with the right knowledge and aptitudes on the team. Many of the senior team members and some of their international counterparts had worked together before. Some had known one another at the NGO Mercy Corps earlier in their careers, and others had met during earlier disasters or epidemic outbreaks.

Having advance understanding of conditions, cultures, and people also was vital. “That’s why having Justin was the most brilliant thing,” said Berger. “He knew the names of people, and they were all friends.” To help build that kind of knowledge, OFDA had disaster experts working in five regional offices and 22 field offices, dedicated to helping countries develop their own disaster response capabilities. Although these offices aimed to build capacity, they also forged relationships with people who had the local knowledge essential for navigating a crisis.

OFDA Director Jeremy Konyndyk said: “US government credibility is critically important in a situation like this. It was the US government’s saying it saw this situation as important that led others to get involved. The point when we saw the international community perk up was after Obama’s announcement in mid-September [that the US military would assist], when the UN high-level meetings took place. The UN General Assembly then called on the rest of the world to act, and that carried a lot of weight.”

“The situation showed the importance of credibility—the personal credibility of a president and his press people and spokespeople,” Konyndyk added, “and part of that credibility came from focusing on the science.”

Exhibit 1: Organizational Relationships

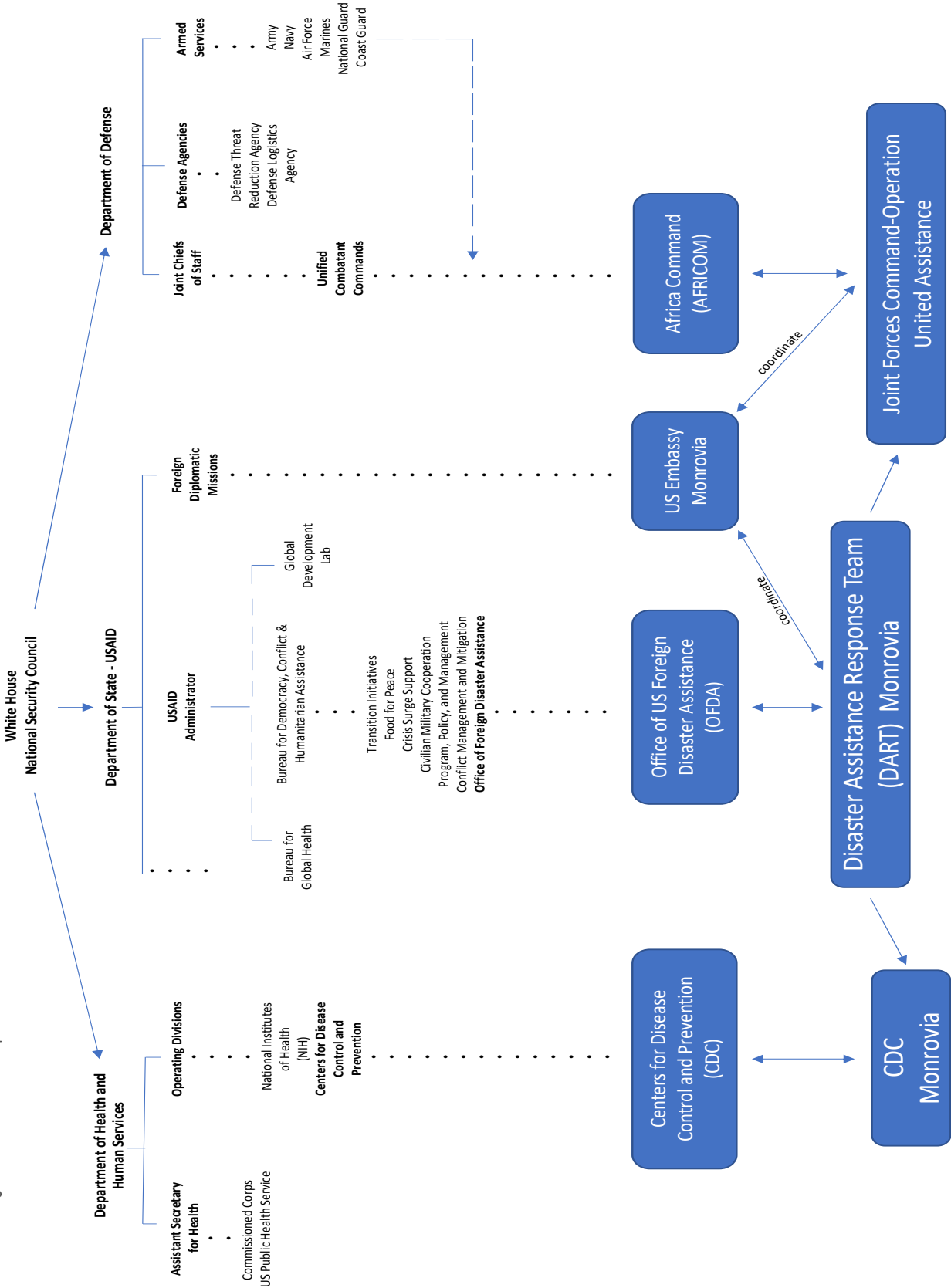


Exhibit 2: DART Timeline and Epidemic Curve, Liberia

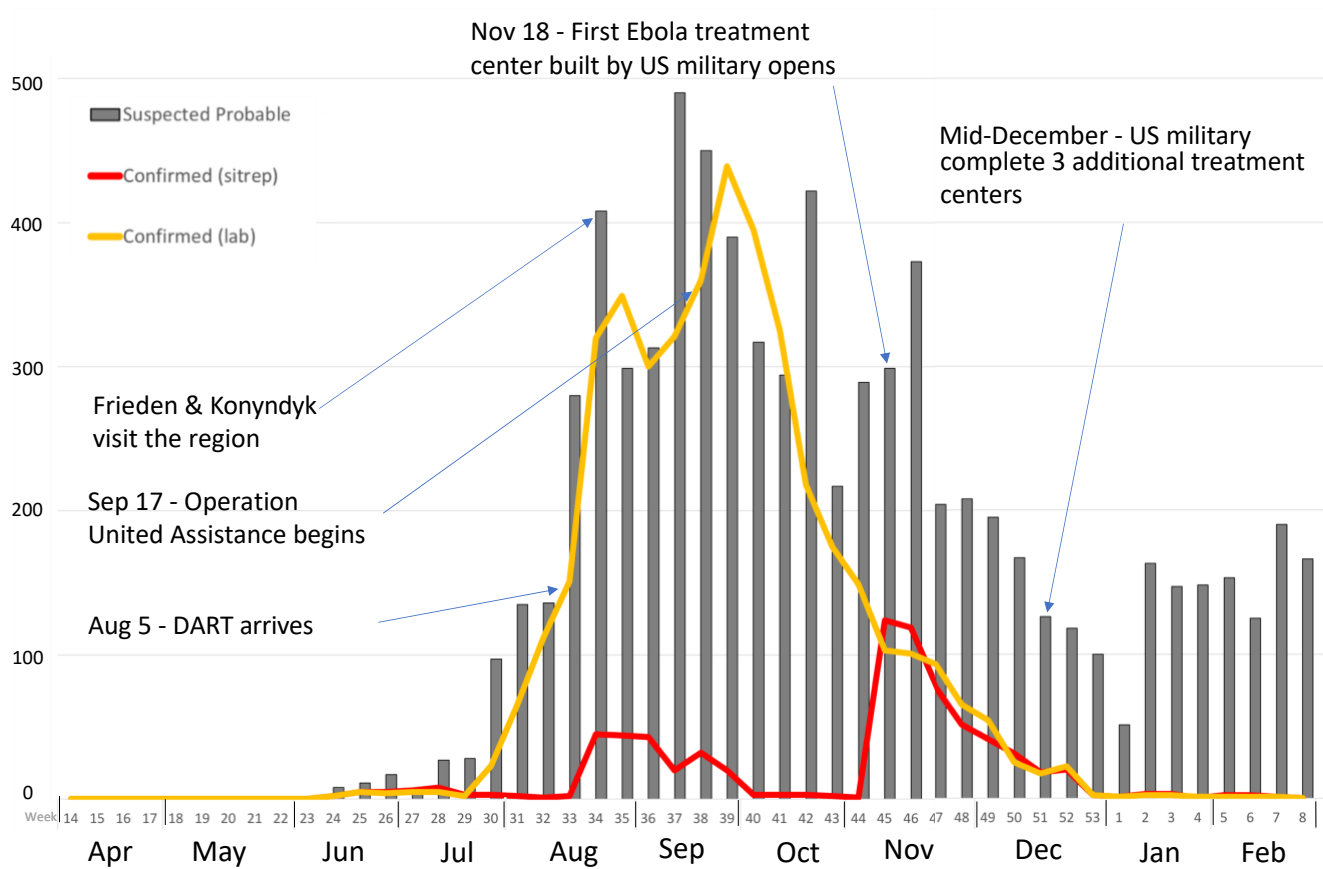
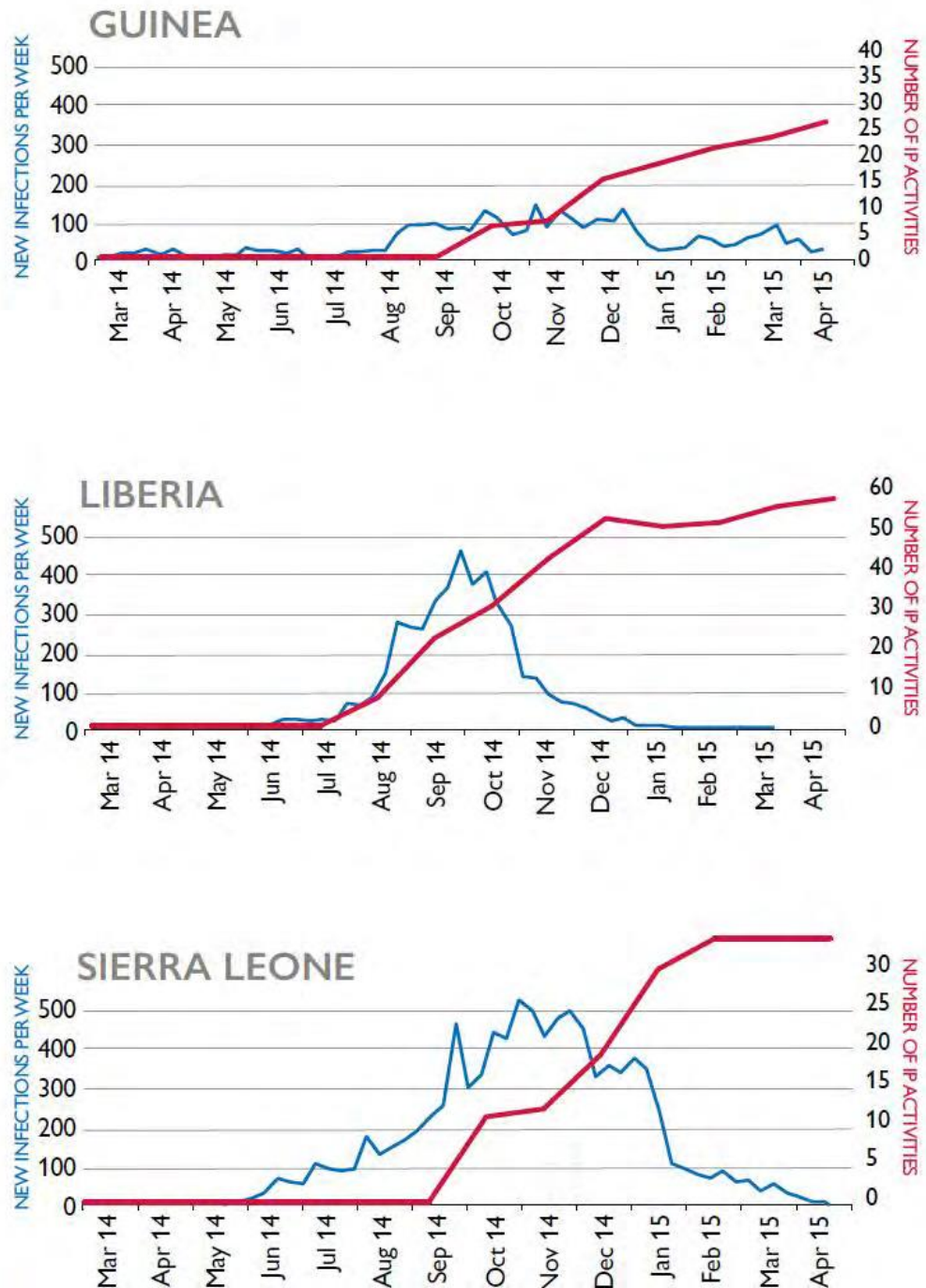


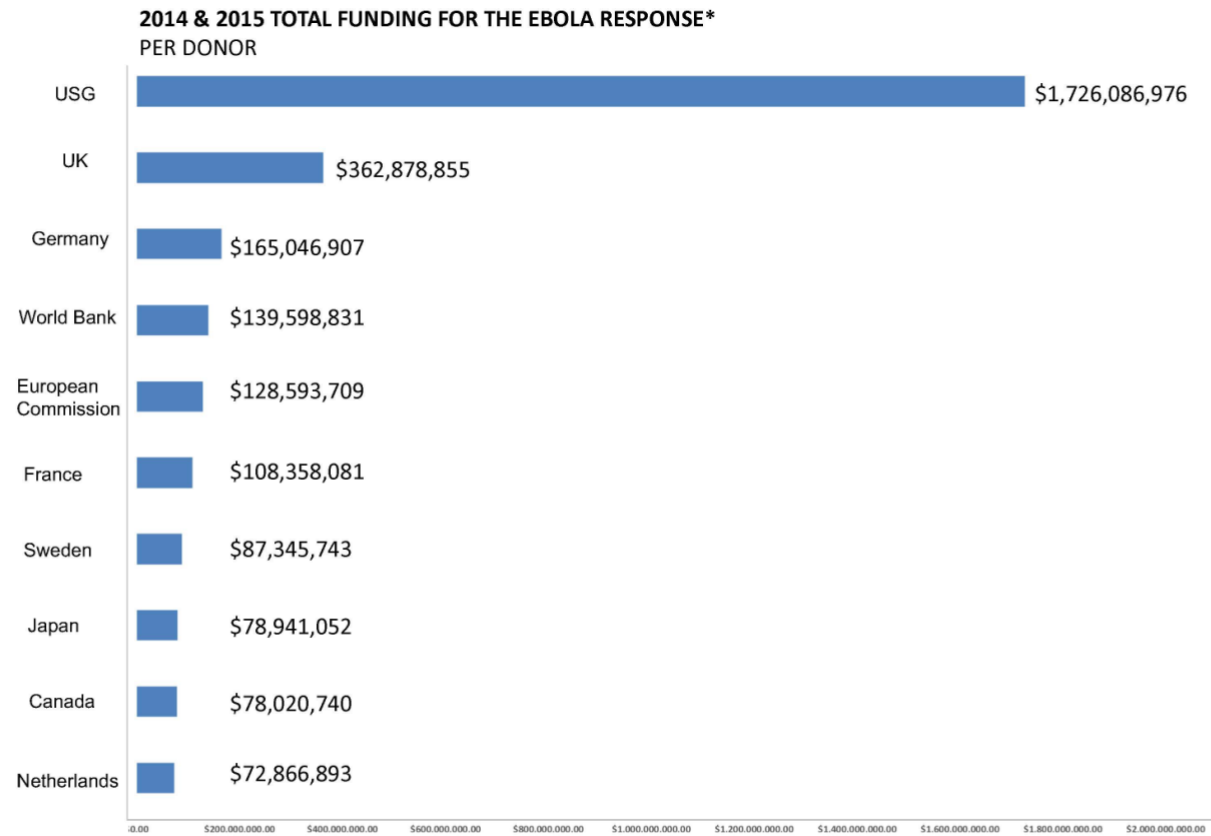
Exhibit 3: Number of New Infections by Week Across Three Countries

New EVD infections reported vs. timeline of OFDA-supported IP grant agreements, by country



Source: Reproduced from International Business and Technical Consultants, Inc. *Evaluation of the USAID/OFDA Ebola Virus Disease Outbreak Response in West Africa 2014-2016*, section on effectiveness, p. 13, US Agency for International Development, January 2018. Accessed at https://pdf.usaid.gov/pdf_docs/PA00SSBX.pdf.

Exhibit 4: Funding for Ebola Response 2014-2015

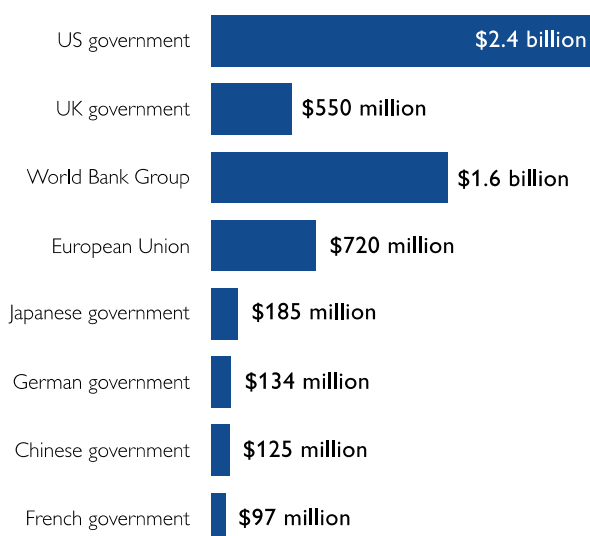


* Funding figures are as of June 16, 2015. All international figures are according to the UN Office for the Coordination of Humanitarian Affairs (OCHA) Financial Tracking Service and based on international commitments during 2014 and to date in 2015, while USG figures are according to the USG and reflect USG commitments from FY 2014 and FY 2015, which began on October 1, 2013, and October 1, 2014, respectively.

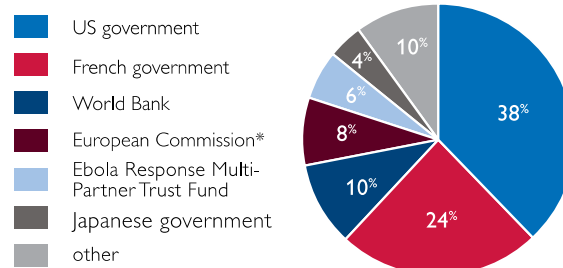
Source: Adapted from US Agency for International Development and US Centers for Disease Control and Prevention. West Africa—Ebola Outbreak Fact Sheet #35, June 16, 2015, p. 5. Accessed at https://www.usaid.gov/sites/default/files/documents/1866/west_africa_fs35_06-16-2015.pdf.

Exhibit 5: Funding for Ebola Response 2014-2016 and breakdown by affected country

Funding for the EVD outbreak response, 2014–2016



Percentage funding distribution by donor in Guinea



*European Commission's Humanitarian Aid and Civil Protection Department

Figure E3. Percentage funding distribution by donor in Sierra Leone

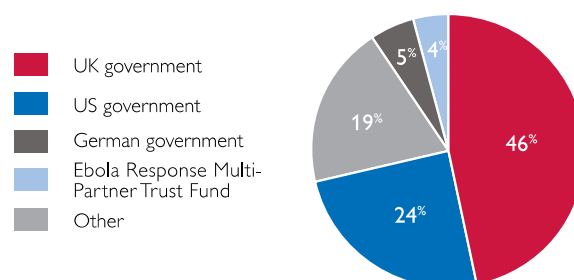
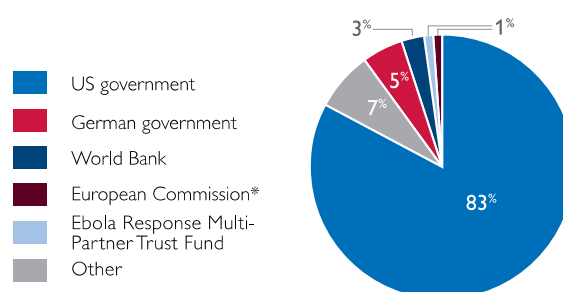


Figure E4. Percentage funding distribution by donor in Liberia



*European Commission's Humanitarian Aid and Civil Protection Department

Source: Reproduced from International Business and Technical Consultants, Inc. *Evaluation of the USAID/OFDA Ebola Virus Disease Outbreak Response in West Africa 2014-2016*, section on effectiveness, US Agency for International Development, January 2018, p. E-10, accessed at https://pdf.usaid.gov/pdf_docs/PA00SSBX.pdf.

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