

CDC Ebola Response Oral History Project

The Reminiscences of

Jordan W. Tappero

David J. Sencer CDC Museum

Centers for Disease Control and Prevention

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Jordan W. Tappero

Interviewed by Samuel Robson
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Interview 4 of 4

CDC Ebola Response Oral History Project

Q: This is Sam Robson here today with Dr. Jordan Tappero. Today's date is July 20th, 2017, and we're in Dr. Tappero's office at CDC's [United States Centers for Disease Control and Prevention] Roybal Campus in Atlanta, Georgia. This is our final interview, I'm saying again, as part of the Ebola Response Oral History Project for the David J. Sencer CDC Museum. Dr. Tappero, thanks so much for agreeing to one more interview. For listeners, we've had some unfortunate technical failures on previous interviews, but Dr. Tappero has been extremely understanding. Because time has passed since the last interviews that we'll have on record, would you mind updating us on your current position with CDC and the US Public Health Service?

Tappero: I'm rear admiral in the US Public Health Service and I'm the senior advisor for global health here at CDC.

Q: Perfect, thank you. I think the first thing that I wanted to ask about is in August you deployed to Liberia. It was as the public health and medical response team lead, looking over not just Liberia but also Guinea and Sierra Leone in conjunction with USAID [United States Agency for International Development] and OFDA [Office of US Foreign Disaster Assistance]. Can you tell me a bit more about interfacing with USAID for the first time that CDC had really done this on a big scale?

Tappero: Sure. It was late in March of 2014 that WHO [World Health Organization] reported that there was an Ebola outbreak in West Africa. In retrospect, it had probably been going on since the end of December, and really been not recognized because there's very poor surveillance and public health infrastructure as well as clinical infrastructure throughout the country. We had teams that were deployed in late March, April, May, and it looked like maybe things were going to get better, but what we didn't know is how much was happening where it wasn't being reported. In late summer there started to be a surge, and it was clear in July when Dr. [Thomas R.] Frieden activated our Emergency Operations Center that things were growing. But we hadn't yet seen evidence of large urban epidemics, or at least high amounts of transmission in urban settings. By the time late July and the first week of August rolled around, it was self-evident that there was widespread transmission, that there weren't enough Ebola treatment units in country to respond to the number of active cases, let alone enough contact tracing teams to do the contact tracing of those who had contact with an active case. The WHO eventually declared in the first week of August of 2014 a public health emergency of international concern. That was the third public health emergency of international concern that had been declared, the first being the H1N1 pandemic, the second being the resurgence of wild polio virus in Nigeria and then, finally, this Ebola epidemic.

The very day that the public health emergency of international concern was declared, Dr. Frieden deployed me to West Africa to lead our teams, as well as to be the first assignee to USAID OFDA, Office of Foreign Disaster Assistance, teams that were also activated

for this public health emergency of international concern. When US ambassadors declare a disaster, OFDA is activated, and under US government structure and laws, OFDA becomes the lead agency. But in times past, it has always been for things like tsunamis, earthquakes, large floods, hurricanes, etcetera, and this was the first time that OFDA had the responsibility for a disaster that was caused by an emerging pathogen. They clearly didn't have the technical expertise to do a big outbreak investigation, and so we agreed that CDC would take the responsibility as the senior technical agency and partner as part of OFDA's DART [Disaster Assistance Response Team] team and I was the first assignee to the DART team as the—[pauses]

Q: Public health and medical response team lead?

Tappero: Yes, that's it. [laughter] Public health and medical response team lead. Upon arrival as that, I also had the dual hat of leading our teams in country. But soon thereafter, the airlines between countries stopped transporting people between countries. Also, at the same time in early August, there was an explosion in the number of cases arising in Monrovia, the capital of Liberia, and we had our first large-scale urban epidemic. Eventually, six to eight weeks thereafter, Freetown would experience the same thing. Fortunately, Conakry in Guinea, although it had large outbreaks in the city, never had an urban epidemic.

The other challenge in that environment was that—there was Médecins Sans Frontières with a large Ebola treatment unit. They started with one called ELWA-2 [Eternal Love

Winning Africa Hospital 2] that became shut down because of transmission between patients and healthcare providers. They developed ELWA-3, which was a large, typical kind of Ebola treatment unit. Started with forty beds, and then they rapidly, because of increasing number of cases, scaled up to 80, 120, 260. But while that was happening, increasing the number of beds available for the number of patients knocking at the door, it was pretty clear that there was exponential growth in cases and that no matter how fast MSF [Médecins Sans Frontières] was trying to scale up, they were being dramatically outpaced by the need. We needed to have more clinical care providers and NGOs [nongovernmental organizations] with expertise in managing Ebola patients working with a Liberian workforce that could be trained in how to safely do this work. No matter how many external experts would come in, you would still need the local workforce to do the work. But they needed training and support and personal protective equipment; and a physical space to work in that was safe; and being taught how to do the triage and separate people with febrile illness that could be Ebola; and do the rapid laboratory testing to identify those who could then be separated and put on contact tracing teams if their fever was due to malaria or something else, rather than stay in an Ebola treatment unit where they would surely get Ebola. That was the first big challenge, was how do we increase our presence, meaning the larger emergency response community, whether they be those who would do laboratory testing or do the contact tracing of persons who were admitted to Ebola treatment units—then all their contacts had to be followed daily, twice daily ideally, to make sure if they did get ill, they would get triaged into isolation and make sure that they didn't have Ebola.

We just didn't have the numbers. It was very clear that the NGO community was frightened and that they were leaving, rather than coming. MSF stayed and tried to scale up as much as they could, but they were outpaced. We had multiple calls with WHO's foreign medical teams asking, where are the responders? Normally in an earthquake or a flood or tsunami or a disaster, there are large numbers of volunteers and responders from foreign medical teams who do this kind of work. But in this case, there was not a single member of rostered foreign medical teams of WHO willing to come.

[break]

Tappero: I think the first thing is OFDA needs to stand up. What OFDA can do is provide—they've got mechanisms for rapidly funding partners to do things. Maybe we should go there.

Q: Yeah, that sounds good. Could you talk more about that role that OFDA had and what took place?

Tappero: Okay. OFDA, typically in an emergency event, they have contracts with preapproved partners for emergency response so that they're not in that situation where their hands are tied until a funding mechanism can be made available. When we needed a contract quickly or a partner to do a specific scope of work, OFDA can take their money that they have and the mechanisms they have with people—not specific to an Ebola epidemic because they wouldn't know, but that they've got nimble mechanisms and that's

why they're such a critical piece. Normally, they're moving food and sandbags and things of that nature. Here, we needed to move personal protective equipment for Ebola and we needed to fund partners to do very draconian kind of work, like pick up the dead bodies at home and get them safely removed from their loved ones and their communities to be buried. I think that the work with OFDA was that they had financial resources and mechanisms. What CDC had was the knowledge of who were the kinds of partners, what skill sets they need, and if they don't have those skill sets, then we can at least train them to do the various pieces.

I would say that while Monrovia was under siege, and we couldn't get volunteers to come to Monrovia to help because they were worried that they would run out of personal protective equipment and other supplies—that they wouldn't have a safe place to work. That if they got sick, they couldn't be stabilized. If they got even stabilized, they wouldn't have a humanitarian waiver to be taken to their home country where they could receive care and they would be abandoned or stranded where they wouldn't get good care.

I think that the first five things that were critical were one, protecting the workforce for clinical care and insuring them and the public health workforce doing contact tracing that we could provide for them. That begins first with widespread infection prevention control. Before the public health emergency was declared, our focus was on screening people getting on airplanes at the capital cities and going off somewhere else. We wanted to make sure that someone with febrile illness wouldn't board an international flight and that they would get screened and evaluated and treated—hopefully, it would be

something else—before they could go elsewhere. We had to take that concept and expand it widely throughout the country. The harbinger of an Ebola outbreak is a cluster of deaths among healthcare workers. Because those surveillance and reporting systems and the communication networks with rural areas were so poor in these three countries, we couldn't assume that media and other sources of education were reaching these facilities. Even then, they didn't have a system for triaging people in health facilities that see many people per day for febrile illness that is typically malaria or some diarrheal disease or respiratory infection, as well as those coming for care for a laceration or a broken leg or whatever other non-febrile illness people would seek care for. We worked very hard to get soap and water—many of these facilities don't have piped water or any soap—into these rural health centers, and to train the healthcare providers on how to triage or separate people with febrile illness from those without febrile illness. In the early days, we didn't have enough full personal protective equipment that you give to people caring for Ebola patients to give to everywhere, let alone train people how to use the more complex personal protective equipment. But we could leave latex gloves and barrier aprons and masks and some things that would in a triage environment be appropriate, and also give them some protection if they actually did stumble into an Ebola patient while waiting for laboratory test results to come back and tell them they actually do have an Ebola patient and they need to be transported for care in an Ebola treatment unit. That was a big piece, was to make sure that we give some protection to the local healthcare providers in the district health centers.

A second piece would be we needed to improve our communication messaging. The reason that that was so critical is that these three countries had been under civil war and they really had lost a lot of faith or trust in their government. Here their government is saying don't bury your dead through traditional practices because you could get infected, and they were suspicious of that.

But they were also suspicious because of point three, which were burial teams. We knew with this urban epidemic, with the number of dead that were being called in to the call centers, that we were outstripped by the number of burial teams that could go pick up the dead. A typical burial team is made up of six to eight people. You need a dedicated driver, you need four people that don all the personal protective equipment and pick up the body and take it out of the house. Someone needs to be responsible to be in personal protective equipment with a chlorine sprayer and spraying down any spilled fluids or leaked fluids or any breach in that personal protective equipment that the transporters might have had and give them as much protection as possible. Then one or two people need to also stay behind in the environment and do their best to clean up the contaminated environment where people live because they're going to go back into those households. A typical burial team working a twelve-to-fourteen-hour day could probably do no more than six to ten burials, depending on how far away and etcetera they were from where they would be taken to be buried. We estimated, based on the number of reports from call centers and number of bodies piling up in the communities, that we needed to have thirty-two burial teams in Monrovia and sixty-four throughout the country. But we only had four in Monrovia. That was one of the first things that we did

with OFDA, was to release funds to purchase vehicles, use the CDC Foundation to bring vehicles, but also to provide the personal protective equipment and the salaries for training people to be responsible to these burial teams.

Q: Does a call just go out to the general populace in Liberia?

Tappero: The International Committee for the Red Cross, ICRC, was responsible for those four burial teams, and so we scaled up that. There was another partner that was more local, a local, indigenous partner that had been doing the work up in rural areas, and we were able to contract with them and expand relatively quickly. It took weeks to expand the capacity to pick up the dead, and in that interval, when there's only four and you need thirty-two and there's no Ebola treatment units to accept patients beyond the outstripped MSF facility, you have increasing numbers of people getting sick at home, being taken care of at home, dying at home, etcetera. These burial teams got to the point where they couldn't dig a gravesite for each individual person. Even if they could convince their loved ones that they should allow the body to be taken away, that they couldn't do a traditional burial with hands-on dressing and preparing the body for the ancestors, that it just wasn't safe. They resorted to using a crematorium, which is not a traditional form of burial in Liberia. The crematorium was outside the city limits in Monrovia, but soon you had these large plumes of smoke in the air and the population not understanding that their loved ones were being commonly cremated with many others just because the sheer numbers were outstripping the capacity of the burial teams to provide individual burials. That also resulted in a lot of fear, and people that would get

sick would then run to their home village instead of staying at home where they might assume that they would end up being cremated if they died. It wasn't that no effort was meant to communicate about these things. It was just so much: not enough responders, not enough skill with communication. The response was scaling up in an environment that people were fearful to even come and respond, let alone if you had adequate numbers, it still takes time to get these systems in place. When you're overwhelmed, when you're really overrun. It's like having an army overrun a small outpost. You can't do everything in a crisis. We had to really work hard on getting people that are skilled in risk communication to work with local community leaders and religious leaders to be the voice for communicating with their populations to ensure that they understood why there was cremation; why we were going to get ahead of that with more burial teams; that loved ones would increasingly be able to see where their loved one would be buried and hopefully, even observe the burial, but from a distance, from a safe distance.

Those three pieces, infection prevention control out in the rural areas to protect healthcare workers and patients without fever in those healthcare facilities; scaling up the number of burial teams that could pick up the dead when the community would use the call-in facilities for picking up the deceased; and the burial teams in adequate numbers with adequate training so that they weren't exhausted and putting themselves at risk picking up bodies, but also being able to do the job quickly and in a way that the community would trust them.

Then two other pieces were critically important. The contact tracing teams and the data from doing our contact tracing needed to be collected, and we also needed to be able to rapidly mobilize to newly identified hotspots where all of a sudden there's a cluster of cases in a neighborhood where there hadn't been any the day or so before, or communities even outside of Monrovia where people would go to because they were fearful of dying and being cremated or whatever. Scaling up our surveillance data for new neighborhoods, new villages, new communities that had Ebola cases, because it's much harder to control an outbreak in a community if there's twenty to forty to a hundred cases than it is to go into a community with a team when there's only three or four and you can do the contact tracing around them and, hopefully, stop that outbreak in that local setting in two to three generations of transmission. When you've got literally hundreds of people in a community with Ebola, that means you have many generations of transmission, and there's many more people that are going to get sick in the weeks to come.

Lastly was the emergency response coordination. When I first arrived, the leader for the Liberian response, Tolbert Nyenswah, was reporting to multiple members of the cabinet and the president. There was not a coordinated way in which he could lead the government's response, let alone work with the partners and provide direction so that everyone was paddling with the same rhythm and in the same direction. That changed. We had to get out of a small, little, Ministry of Health conference room that could hold comfortably maybe ten people and it was trying to hold thirty or forty, and into a place where there could be team rooms for various partners to address things like contact tracing

or burials or surveillance or laboratory testing, and then come together at least once daily, if not twice daily, to get some direction from the incident manager to lead that response. We found the Liberian telecommunications that had a large building, and because of the epidemic, they weren't using but half of it and they—at least for the first several months—volunteered the space. Of course, we had to use our resources to buy the equipment and fit it for an emergency response, but then we finally had an adequate place a few weeks in that was physically sufficient for a robust emergency response with enough ample space for all the partners to come together and for a task force to be developed for the various components of an emergency response and start getting ahead of this thing.

I would say those five things were the critical elements to begin—at least instead of having exponential growth, having sort of leveled-off, steady replacement of the dead with new cases. What later changed the curve to actually go from level outbreak to a declining or decelerating outbreak was the bringing in of responders that could provide primary care in Ebola treatment units with the confidence that they could provide care and if they got ill, they could get medevacked. That's why the Monrovia Medical Unit facility provided by the Department of Defense, but manned by the US Public Health Service, created a lot of confidence in the healthcare providers that if they got sick, they would have a place to go to be stabilized and to get a humanitarian waiver and go home and get healthcare. Or if you were Liberian and a healthcare provider, to know that you would get the highest level of care possible because you took on the greatest risk. Those were the key pieces in September and October that were finally being put in place that we

planned in August after the PHEIC [public health emergency of international concern], but that took several weeks to really become actionable. Working with the DART teams, making the physical supplies of personal protective equipment, funding partners, ensuring their salaries, ensuring that we had soap and chlorine, that we had the materials that could be purchased to begin building the Ebola treatment units—the stand-alone tented structures that provide care—equipping burial teams, buying vehicles so that more burial teams could go out into the field, all of that was essential.

Q: The last point of refining the incident management system into a well-oiled machine—correct me if I'm wrong, but my previous understanding was that we worked with the Liberians to find Tolbert, who became the incident management head, and once that was done, it was smooth. But what I thought I was hearing from you was that actually it was a longer process because even after he was named the incident manager, he was still having to report to multiple different cabinet agencies. That creating the incident management system wasn't just a snap-your-fingers-and-it's-done thing, but there were maybe weeks, I don't know, of work that needed to go in to make it actually work. Does that make sense?

Tappero: Sure, I think that's accurate. I think if I could break it down, one, there was no physical place. So we established a physical place. The second was learning about incident management takes time. For example, when I first said I was interested in emergency response work, and we have our Emergency Operations Center, there were a number of training modules and a number of training courses that you take to understand

how an incident management system works. We were going to have to build that system while we were flying the response. But Tolbert was a sharp guy and was willing to take some technical advice from us on how incident management should work, and what we had to do was convince his leadership that this was the way that it was going to go. So it went from Tolbert reporting to his minister of health and many other cabinet members to during Dr. Frieden's visit where we actually had access to President [Ellen Johnson] Sirleaf, where we could make sure that Tolbert reported directly to the president and that he had the ability to make decisions. And if those decisions weren't effective, he wouldn't be punished for them, but he would work with all the partners and all this robust increasing technical assistance being provided to come up on an agreed-upon plan for making those adjustments. And being supported and further adjusting when things weren't working, or focusing on an area if this was clearly the right direction but something was wrong with the risk communication or something wrong with just not having enough vehicles for the trained burial teams that we now had, but had nothing to drive to go pick up the bodies. I could go on and on with many other such examples. The incident management system was something that with technical assistance, he learned well by doing. But having the political cover and support to be able to not have to report to multiple people and be able to go out of his normal chain of command and identify, who is my supervisor for this response, and having it be President Sirleaf, allowed him and the partners to have a more coordinated response. And increasingly more financial resources as well as human resources coming into the country because we had established that we could provide personal protective equipment for first responders, that we could ensure them a safe place to be taken care of if they were suspected or found to have

Ebola, and that they could get a humanitarian waiver to go home or survive if a local healthcare provider. Being able to also when we made the argument to President [Barack H.] Obama and the Department of Defense was deployed, even though the Department of Defense did no direct patient care, they didn't transport any biologic specimens like blood samples for testing. They did not take on those kinds of risks. That was CDC, WHO, the direct NGOs that came to provide patient care. That was our responsibility, but what they did do is they brought the infrastructure of telecommunications. They could transport people, as long as they weren't patients or suspect patients, where they needed to go if there was a new hotspot identified and drop us off. If we needed some kind of special equipment that we couldn't lug over by land, it could be delivered to us. They just brought back confidence to the international community that hey, if you get stranded, there's going to be a communications network that's going to function and there will be with the Department of Defense deploying and their ability to return to the United States with a humanitarian waiver should they get sick, and that would be applied to at least all the US citizens that deployed. And with the UN ramp-up as well, then the network of countries in Europe developed similar support and confidence for European NGOs that would be needed to join this response.

Q: I want to get to the Global Health Security Agenda work that you've been doing. We're helping shepherd that here at CDC. Just to very briefly summarize, so you come back to Atlanta at the end of August, is that right? And then become at some point the deputy incident manager here in Atlanta.

Tappero: Late September, yeah, and I become the deputy incident manager with the idea that I would be here for a few weeks to get through the first Global Health Security Agenda ministerial being hosted by the White House and President Obama and then return back to lead our teams in Liberia. Unfortunately, we had an introduction of a Liberian with Ebola that required that we had to develop an entire, robust, domestic response to ensure that people coming back from providing support in Liberia, Guinea, Sierra Leone and other African nations, that they could be followed and have contact tracing. We had to set up a system to funnel what became about two hundred fifty people per day coming to the US with linked itineraries to those three countries—would have to be funneled to one of five US international airports and then be handed off to public health authority in their own states and only be allowed to travel onwards if, of course, they were afebrile. Then [they] received the instructions about who they would contact when they got to their final destination. With all of that, as a reason why I ended up being a deputy incident manager for the next four or five months for that domestic response, the intent was to return.

The Global Health Security Agenda, however, and the second ministerial—perhaps that needs a little bit of background. Global health security had an initiative that was launched on February 13th of 2014. No one knew it at the time, but Ebola was spreading throughout Guinea, Liberia, and Sierra Leone's rural, forested areas. But because there was no surveillance system and reporting, it wasn't recognized and reported by WHO until six weeks later. When it was launched, it was joined by twenty-nine other countries or ministries of health, WHO, the two animal health organizations, FAO [Food and

Agriculture Organization] and OIE [World Organization for Animal Health], and a handful of other partners. The impetus behind the Global Health Security Agenda was that we had first seen SARS in 2003, severe acute respiratory syndrome epidemic that resulted in eight thousand cases, nearly eight hundred deaths over four continents over a period of four months, and a forty billion dollar economic price tag on the global economy. Tragedy in loss of life, tragedy in terms of the economy and disruption and rational decisions about border control that were made by many, many countries across several continents. The International Health Regulations that have been in place since the late sixties were revised to try and ensure that something like SARS, if it did happen, would have a better chance of being stopped at its source instead of spreading around the globe. That revision of the International Health Regulations was adopted in 2005, and it became actionable, or put into effect, with a five-year time clock in June of 2007. Five years later in 2012, even by self-report, only twenty percent of one hundred ninety-six nations that were signed by treaty to this World Health Assembly declaration committed to trying to attain International Health Regulation plans had reached or attained even by self-report compliance. If you fast-forward to two two-year periods in 2012 and again in 2014, the number by self-report had only increased another ten percent. Now you had less than thirty-three percent of the countries around the world saying that they were meeting International Health Regulations compliance. If you go from SARS to our experience with H1 pandemic spreading around the world—and fortunately, it wasn't such a severe, pathogenic strain of flu [influenza] that we didn't have a Spanish flu-like epidemic, but it still was a pandemic that went around the world—we could see that countries were not able to be compliant with the goals set in place by the International Health Regulations

largely around the world. Then we had Middle East respiratory syndrome, coronavirus, and other examples of how countries weren't able to stop these outbreaks at their source. We believed that implementing the Global Health Security Agenda, that the world was only as safe as the International Health Regulations compliance capacity in the weakest country in the chain. One of the challenges of the International Health Regulations is that it says what you need to do, but it doesn't provide any rational explanation for what are the activities you have to do to be able to be compliant across nineteen core capacities. The International Health Regulations were a great tool for saying what countries needed, but not what you need to do to be able to get there.

The Global Health Security Agenda defined eleven technical areas, also known as action packages, that were spread out across a framework of prevention, detection, and response. You had roughly three or four of these action packages in each of those three lanes of prevent, detect, and respond. And that had metrics that were fallible. For example, one of them in detection would be, is there one epidemiologist per two hundred thousand population, so that you have people who can count cases and report cases accurately? Do you have a surveillance system that can report on agreed-upon reportable disease conditions in the country? Do you have a national laboratory with the capacity to perform all six core tests under the World Health Organization regulations? That would be things like serology or smear microscopy or [polymerase] chain reaction, also known as PCR, or use of rapid tests or use of culture. Basically, I could walk down all the elements of the Global Health Security Agenda, but it provides specifics of things that countries could actually begin doing by practicing public health and practicing

emergency response during outbreaks, which are really common, and making sure that this is practiced and that the infrastructure is in place. That was the beauty of the Global Health Security Agenda. It used the framework of where countries needed to get under the International Health Regulations, but it gave countries, what are the activities you need to do to be able to reach compliance?

Another critical piece of the Global Health Security Agenda was instead of relying on countries by self-report that they had achieved IHR compliance or had achieved full capacity with these eleven action packages, it required an external and independent evaluation. Rapid, yet external and independently assessed capacities of the country. We started with countries need to do their tools for self-report. Instead of countries doing by self-report and only self-report, we still wanted countries to utilize the designed activities in the Global Health Security Agenda and report by self-report, but then have it externally validated. We know from the preparedness assessments we did across West Africa to neighboring countries of Guinea, Liberia, and Sierra Leone, that their IHR, their International Health Regulation capacities were highly inflated. Where they said they were ready, they weren't. I think because the Global Health Security Agenda would come with let's do your self-reporting, then we're going to externally validate it, a lot more honest answers. Because there was also a framework for how you move from no capacity—over a color-coded visual picture of full capacity, over five steps from red, orange, yellow, to green, that gave countries the ability to say okay, let's start here—baby steps—start making some progress. This is where we think we are. Largely, the external validation would support their findings or give them critical feedback about how they

were over or underestimating their current capacity across those lanes. WHO after the Ebola epidemic was able to go back to their member states with the argument that we know that self-report isn't sufficient, we know that's what you're comfortable with, but now we have an experience with this Ebola epidemic that tells us we need to move towards independent assessment after your self-assessment of your capacities. That was remarkably well received because the Global Health Security Agenda had already in six countries done external independent evaluation across the eleven action packages and showed that it was well accepted and that countries would put their results on a publicly available website and show their, if you will, findings in hopes to receive support, technical support or financial support or both, from other members of the Global Health Security Agenda to say okay, now that we know where you are in these things, here's how we're going to help you with some technical assistance for several months or financial resources so that you can hire the people you need or buy the equipment that's required, etcetera. That was the beauty of the Global Health Security Agenda. The external evaluation assessment tool for GHSA was then taken and brought together to make complementary with the International Health Regulations self-reporting tool and turned into one that is now called the Joint External Evaluation. And that Joint External Evaluation is now a tool where countries begin with self-assessment. They have an external team of subject-matter experts, usually ten to fifteen—usually fifteen is a very large team for a very large country with many, many millions of people, but still a reasonably sized team for the size of the population, to visit the country, look at their self-assessment, make visits, talk with many of the experts that participate in the activities that made that self-report, and give an honest assessment of their capacities. And bringing in

through all the donors to the Global Health Security Agenda the resources to begin to address their shortfalls.

Q: It is so interesting to hear about how the experience with Ebola had that effect of really helping make the case that an external evaluation also is important. Financially, just in terms of funding for the Global Health Security Agenda, did Ebola have a big effect on that?

Tappero: Certainly. I think the reason that CDC struggled in the first few months of the Ebola epidemic is that we had to turn in many ways to the CDC Foundation to bring us resources because we didn't have a specific appropriation for an emergency response of this size and scale. We were able to use our people, but we didn't have mechanisms or dollars to put into place. OFDA could only do so much with their partners, and the need for resources and technical assistance far outweighed what OFDA had available. In mid-December of 2014, where Liberia and Sierra Leone were in over their heads with the first two urban epidemics of Ebola that had ever been really described and experienced, the US Congress generously gave six billion dollars for ending the epidemic of Ebola in West Africa and launching the Global Health Security Agenda.

Those monies came essentially in three pieces: domestic Ebola preparedness—and I talked about how we were in the peak of the response seeing two hundred fifty healthcare workers or administrators returning from Guinea, Liberia, or Sierra Leone on a daily basis that needed to be screened at one of five airports and then followed by contact

tracing up to twice daily depending on the jobs that they had in their home state and in their own locality by public health authority. And that's just one piece.

We also needed to ensure that we had a network of triage facilities to see anyone who responded and was out in one of our fifty states and territories, as well as set up a network of fifty-four hospitals that had training and equipment for providing care for Ebola patients so that we didn't see transmission in one of our local hospitals as we saw in Dallas where two nurses were infected by that first traveler from Liberia. That took a lot of resources to scale up and increase our infrastructure, which is now in place for other things besides Ebola. That took one-third of CDC's resource envelope. There was \$6 billion across all of US government. CDC received \$1.8 billion of that \$6 billion. One-third of it, \$600 million, went to our domestic response. Another one-third of it went to just stopping the epidemic in West Africa—in other words, the work in Guinea, Liberia, Sierra Leone, and some preparedness work in neighboring countries in West Africa. Because there was some spillover, fortunately it stopped quickly in Nigeria and in Mali—I think one case in Senegal. We needed to make sure that those frontline responses in neighboring countries could stop the introduction at their source.

Then the third piece was launching the Global Health Security Agenda. When we planned it in February of 2014, the goal for the US government was we are going to work in thirty countries with a population of four billion people. We roughly said we're going to work in thirty of the most populous countries in the world, and we were going to implement these action packages, these eleven action packages, in those countries. To be

honest with you, because it was a dual metric of people and thirty countries, most of them were not countries in West Africa that have small populations. We had to rethink how we launched the Global Health Security Agenda and get rid of the “four billion people” and say we're going to work predominantly in thirty countries around the world, and many of those countries became West African countries like Guinea, Liberia, and Sierra Leone. None of those three countries were originally on our thoughtful list of countries where we would implement the Global Health Security Agenda if we had the resources when it was launched in February of 2014.

What came out of it, because so many countries were in West Africa, was that we would work in the US government with its many, many other country partners. But the US government said, we are going to work in thirty countries, and here's how we're going to do it. We're going to work in seventeen phase-one countries where we will provide technical assistance for these Joint External Evaluation assessments—or back then in the early days they were called “GHSA assessments.” But by February 2016, it became the agreed-upon common framework with WHO of the “Joint External Evaluation.”

Seventeen countries to ensure that the technical expertise and the dollars needed to bring in subject matter experts to do these independent assessments would be provided. And to then, based on the results, develop a five-year action plan for health security in the country and develop a one-year implementation plan for starting to do those activities in those countries and provide financial resources through cooperative agreements to begin implementing those activities. In seventeen countries, we did all four things.

Then in fifteen other countries, plus CARICOM—a Caribbean community has an acronym known as CARICOM, it is a membership of fifteen Caribbean small island nations. Thirty-one countries and CARICOM—we went above the thirty countries, but seventeen where we would do everything as part of the Global Health Security, another fifteen countries where we would do the Joint External Evaluation assessments to see where they were—to help them with their five-year national action plans for health security, to help them with their one-year implementation plan, and then make those results available to other Global Health Security Agenda partners with resources like countries in the G20, countries in the G7, some philanthropists and others that were willing to invest their dollars in this phase to do the funding with groundwork of the assessment, the five-year strategy and the one-year implementation plan so they, too, could get going. We would, in many of those countries, have staff on the ground to be technical assistants over months to years to help them implement. But the dollars that would be available for the actual equipment and salaries, etcetera, would come from other countries that were investing in Global Health Security.

Q: Wow. That was a beautifully succinct description of Global Health Security. Thank you for that. I know we had someone knock on your door. I think you have things to go do. But unless there's a final reflection that you'd want to give, I just have to thank you so much.

Tappero: Sure. My final reflection is that this was the most harrowing experience of my twenty-five-year career. It was hard on these communities more than anything, and it was

really hard on the healthcare-providing community in these countries, and it was also hard even on our families and loved ones here at home for all of us who responded, as well as in the communities throughout the United States that were willing to receive responders and welcome them back into their communities with the reassurances that the system we had set up and put in place could ensure their own health security. My reflections are that the importance of the Global Health Security Agenda cannot be overstated. In a sense, because Ebola is transmitted by direct contact rather than through aerosol respiratory transmission, we got lucky. Even in a situation where it got completely out of hand, over a couple year period we were able to completely stamp out this Ebola epidemic in West Africa. The next time, we might not be so lucky and we might be even more challenged to call on the international community to not do irrational things about their borders so that we can stop these things, and therefore it's paramount, critical importance that health security be a number one priority not only of the United States but of every nation around the world, that our best chance to protect each other is through compliance with the International Health Regulations and practicing public health preparedness and response as a routine.

Q: Perfect. Thank you so much, Dr. Tappero.

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