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A PROGRESS REPORT ON THE WEST AFRICA EBOLA EPIDEMIC

HEARING

BEFORE THE

SUBCOMMITTEE ON AFRICA AND GLOBAL HEALTH POLICY

OF THE

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A PROGRESS REPORT ON THE WEST AFRICA EBOLA EPIDEMIC

THURSDAY, APRIL 7, 2016

U.S. SENATE,
SUBCOMMITTEE ON AFRICA AND GLOBAL HEALTH POLICY
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:04 a.m., in Room SD–419, Dirksen Senate Office Building, Hon. Jeff Flake, chairman of the subcommittee, presiding.

Present: Senators Flake [presiding], Isakson, Markey, and Coons.

OPENING STATEMENT OF HON. JEFF FLAKE, U.S. SENATOR FROM ARIZONA

Senator FLAKE. This hearing of the Senate Foreign Relations Committee, Subcommittee on Africa and Global Health, will come to order.

Just last week, the World Health Organization declared the West Africa Ebola epidemic no longer constitutes an international public health emergency. However, this does not mean that the affected countries of Liberia, Sierra Leone, and Guinea have fully recovered from the epidemic.

Today's hearing gives us an opportunity to examine West Africa's road to recovery from the deadly outbreak of Ebola that in—in 2004, that infected more than 28,000 people, took the lives of more than 11,000 individuals before the epidemic was brought under control. The epidemic decimated already weak healthcare systems in the three affected countries. It also has continued to wreak havoc on their economies, complicating recovery for governing institutions and hampering a return to normalcy for the citizens of those countries. There have been a number of so-called flareups of Ebola since the primary outbreak was brought under control, including one ongoing outbreak that has already claimed the lives of at least seven people.

Now, the U.S. Government provided 5.4 billion in emergency appropriations at the end of 2014 to assist affected countries in their response. More than $2.5 billion of this funding falls under the oversight jurisdiction of this committee. Now, more than a million dollars of assistance remains unobligated, with some of it set to expire at the end of the fiscal year, and the remainder to be available until expended. This is a substantial amount of money.

It is incumbent on this committee to examine the successes and the failures of U.S. efforts to assist in the Ebola recovery efforts. This hearing will especially—is especially timing—or timely, given

the news reports that indicate that the White House will ask Congress to reprogram 589 million of existing unobligated balances to address the Zika virus. Some of this will come from funds appropriated to fight Ebola.

At the height of the outbreak, this subcommittee heard testimony that called for the establishment of first-rate healthcare systems in the affected countries. I think we all share that goal, and it is important to remember that simply providing affected countries with the tools they need to stamp out diseases like Ebola is not an economically sustainable model. This kind of health infrastructure necessary to address these outbreaks while providing other health services can only be sustained by the affected countries, themselves.

Is the U.S. helping these countries to put their healthcare systems on a path to self-sufficiency? Have we helped mitigate second-order impacts of the epidemic by focusing assistance in a way that helps facilitate economic recovery and development? The physical accessibility of health services was a problem before the Ebola outbreak, as was the access to clean water for drinking, handwashing, and other activities central to proper hygiene. Are we working to continue the kind—these kind of systemic—or to address these kind of systemic problems that will likely contribute to recovery and certainly contributed to the severity of the outbreak?

We will examine whether our assistance to affected countries is complete enough to consider reprogramming Ebola money for other matters. Will that programming come at the expense of long-term efforts to help economic recovery in the affected countries and to ensure eventual self-sustainability of healthcare systems by the countries, themselves? These are questions that we want to answer.

Lastly, it should be noted that the Ebola recovery funds were appropriated using a supplemental appropriations measure. These funds are not subject to spending caps established by Congress, and they are not part of any long-term strategic planning effort. As Congress prepares to potentially consider appropriation of another tranche of emergency supplemental appropriations, this time to combat the Zika virus here in the U.S., it is worth examining whether this method of appropriating is effective. Does it result in smart investments, or is there pressure to simply get the money out the door before it expires?

I look forward to hearing from the witnesses today. I would like to thank them for taking the time to meet. I have met with each of you before—or three of you in my office before, and I appreciate the time and effort you have put into the testimony that you are going to give us today, and thank you.

We will turn now to the Ranking Member, Senator Markey.

STATEMENT OF HON. EDWARD J. MARKEY,
U.S. SENATOR FROM MASSACHUSETTS

Senator MARKEY. Thank you, Mr. Chairman, very much. And thank you for your leadership and for scheduling this hearing on such an important topic.

The West Africa Ebola epidemic devastated communities in Guinea, Liberia, and Sierra Leone. The virus sickened more than

28,000 people and claimed the lives of more than 11,300. While new cases of Ebola have been dramatically reduced, Ebola is not over, and the conditions that made it an epidemic persist. Last week, a 30-year-old woman died of the disease in Liberia's capital, and her 5-year-old son has been diagnosed with the same disease. Our thoughts and prayers are with them and all the victims of Ebola. But, thoughts and prayers are not enough. We must continue to build up health systems in the most vulnerable places so that we can prevent an even worse epidemic from again rising up to threaten people in Africa and around the world.

Through 2014 and much of 2015, people watched with a sense of helpless horror as the Ebola virus seemed to spread unchecked. Doctors and nurses unable to stem its deadly tide, fell mortally sick themselves. That fear took on a new dimension as Ebola began to spread. In September of 2014, a man checked into a Dallas hospital, sick with the disease, and many began to fear that the U.S. would suffer an outbreak, as well. Of course, the United States did not have an outbreak, neither did countries in Europe. The U.S. and European citizens are fortunate to have capable health systems that virtually eliminated the risk of an epidemic and saved 80 percent of those treated, a survival rate far above what anyone previously thought was possible.

As Dr. Paul Farmer has explained, we in the developed world have the staff, the stuff, the space, and systems to deal with these things. Guinea, Liberia, and Sierra Leone are not so fortunate. Ebola infections there became a rampant, devastating epidemic. More people got the disease than should have, and more sick people died than should have.

Beyond the immediate impact of Ebola, the story became even more tragic as the disease crippled weak healthcare systems and patients had nowhere to seek treatment for routine medical issues. Infant and maternal mortality rates soared, and the economy of each country was hobbled. Agricultural production was disrupted and food and work became increasingly scarce. The scale of Ebola's devastation may never be fully known.

U.S. leadership under President Obama and the Congress was instrumental in stopping the spread of the disease. Thanks to $5.4 billion in emergency funding to combat Ebola, this type of leadership in the face of our severe threats is not only vital for our national security, but also an essential statement about America's commitment to humanity. Just yesterday, the administration once again demonstrated its commitment to protect the American people and strengthen global health security by temporarily redirecting $589 million from existing Ebola funds to combat the Zika virus, a mosquito-borne infection that has broken out in countries of Latin America and threatens to spread north.

In February, the administration asked Congress for an emergency supplemental appropriation of $1.9 billion to fight Zika. We cannot look at a false choice between responding to Zika and continuing to build healthcare systems capable of preventing Ebola from again becoming an epidemic. I applaud the administration for making a good start on Zika. As has often been said, a stitch in time saves nine. But, we cannot stop there on Zika, and we cannot pull out the threads that we and our African partners are using to

stitch together health systems capable of preventing Ebola from again becoming an epidemic threat. Congress must act to fight both of these threats or be prepared to answer for the consequences of inaction.

On Zika, we must invest all of the resources needed to better understand how this disease is transmitted and the suffering which it causes, including babies born with stunted heads and brains. Zika is spreading rapidly in South and Central America, in Puerto Rico and the Pacific islands. And in a small part of Africa, you can see, on this startling map, the World Health Organization estimated the virus will infect up to 4 million people by the end of this year. And health officials have warned of the spread of Zika in the United States, where its mosquito host is already endemic. This next map shows just how much of the U.S. is vulnerable to that mosquito and the diseases which it carries.

While Zika presents a new challenge that America must face, we cannot become complacent about the gains we have achieved against Ebola. We must build upon the investments made during the epidemic and the wake-up call that it provided to the world. The health of the United States is intricately connected with the health of West Africa, Latin America, and other developed regions. As devastating as Ebola was, it is difficult to contract and relatively easy to trace. The next pandemic may not be so forgiving. Having strong health systems in place in vulnerable parts of the world will be crucial to isolate and stamp out the next inevitable threat.

I want to thank each of our distinguished witnesses for being here today. All of your leadership and sacrifice in the face of the Ebola epidemic is nothing short of heroic, and we deeply appreciate your service. I should also note that several of you have connections to Massachusetts. And I am especially grateful that you are representing our great State here today.

Thank you, Mr. Chairman.

Senator FLAKE. Thank you, Senator Markey.

We will now turn to our witnesses. Dr. Alan Knight is General Manager of Corporate Responsibility for ArcelorMittal, and—but, he also served as chairman of the Ebola Private Sector Mobilization effort, which—EPSMG, a group founded in July of 2014 to facilitate a mobilized and coordinated private-sector response to the Ebola virus. Dr. Raj Panjabi is a Co-Founder and CEO of Last Mile Health, a nonprofit organization working to save lives in the world's most remote villages, including in Liberia, where Dr. Panjabi was born. Ms. Amanda Glassman is the Vice President for Programs, Director of Global Health Policy, and Senior Fellow at the Center for Global Development, leading work on priority-setting, resource allocation, and value for money in global health. Lastly, we are joined by Ms. Sophie Delaunay, who serves as Advisor to Doctors Without Borders, an organization that was on the front lines of the Ebola epidemic.

We ask you to keep your comments right around 5 minutes. Your full remarks will be submitted as part of the record. We just want to maximize time for Q&A thereafter.

So, thank you. And, Dr. Knight.

STATEMENT OF ALAN KNIGHT, CHAIRMAN, EBOLA PRIVATE SECTOR MOBILIZATION GROUP, LONDON, ENGLAND

Dr. KNIGHT. Okay. Good morning. And thank you for the honor of speaking here.

You have my paper, so I will just highlight what I think are the most important points in that paper.

As you said, I come here wearing two hats. One, on behalf of ArcelorMittal, who are the largest investor in Liberia, an iron-ore mine; our investment, at the moment, of about 1.7 billion, with an iron-ore mine railway and port facilities, but also as the, sort of, founder, the chairman of the Ebola Private Sector Mobilization Group, which was really, for several months, a hub where the private sector with operations within the whole of West Africa could get together to exchange notes, share information about how the private sector should be responding to this crisis. But, over time, that evolved to where we had a bit of a voice and an opinion on some of these key issues and, more importantly, with in-country groups, a hub where we could exchange resources and assets very quickly to NGOs and government partners who needed them—and so, trucks, medicines, and that sort of stuff.

At the time, it was quite unique for such a large number of private sectors to get together and be actively involved in the operational side of fighting such a big issue. And I think that is why people sort of still remember it and we still talk about it, and many of us are obviously still so active.

I know a lot of this conversation you want to have today is about recovery and "What next?" And so, that is what I really want to focus on.

Firstly, so, what has been the impact on us, as a business? Well, it was hard. We were committed, and we succeeded in keeping our business running, and not forgetting that some businesses just packed up and left the country. We have done that, and we have succeeded. The impacts on us, commercially, was, we lost a scale-up project. Just as Ebola happened was when we had planned to build a lot of infrastructure to significantly grow the size of our operation. Our contractors went home, and we lost that project. Of course, we were distracted with management time, and we had to spend a lot of money on the interventions to prevent Ebola from happening in our concession area. And let us not forget, make a really strong point, we, like most of the private sector, can claim, rightly so, that nobody in our operations actually got Ebola. So, the interventions we did for their own staff clearly worked.

What is been harder for us is the perfect storm that has all happened at the same time as the iron-ore prices collapsed, and probably we spend more time in the office now talking about the consequences of that as much as we talk about the consequences of Ebola. But, despite that, we are working very hard to keep our business functional, and our commitment to staying in Liberia is absolutely clear.

So, I really sort of want to end with just making sort of four points about recovery and what we think we can do, and what we would like to suggest others help us do on this road to recovery.

Firstly, this whole issue of travel. For a group of private-sector people at the time of the crisis, we spent a lot of time talking about

travel restrictions. What happens if somebody from our—America or the U.K. goes over and catches Ebola? Can they come home? And that sort of—it took a lot of time. And it sort of—the observation was, it was not clear, there is no sort of international convention on the movement of people from these areas where this happens. And so, that became very distracting, and we lost a lot of time worrying about that, which we could have been devoted to actually being on the front line. So, I think that there is a space there which we can fill.

There are still—and a lot about the investment—What is the role of the private sector? It is about confidence, giving them the confidence to invest in that country. And another conversation we are having a lot now is about the withdrawal of our mill, where we are—you know, we are nervous about the United Nations security support might actually create tensions in the ore and an inability to sort of fight some security issues. So, that is now—we talk about that as a commercial risk. What will happen when these people work out? What can we do together with other people to fill that space?

I think we need to have an honest conversation about infrastructure. You know, you can build fantastic health services, but if you do not have roads to get them—get people to those health services, it does not actually work. We need roads to keep our business running, and the country needs roads to keep the country working.

I am using roads as a bit of a metaphor, but infrastructure really matters. When our business is running really well, part of our contribution towards these countries is, we actually give money and we help build that—some of the infrastructure. But, at the moment, we are really having to focus on our core business. So, just at the moment when we need more infrastructure is just at the moment that some of the conventional sources of that infrastructure disappear. And I have got some photographs here to show that this is not sort of—issue. You know, the—roads—physical roads, if somebody could—you know, if somebody wants to have a look at them, they are great, but they are just mud tracks. And so, what is the road to recovery? Well, the road to recovery could actually be roads, you know, sort of—that sort of line.

And finally, to save space to discuss this. You know, we have—there are a lot of very big issues—iron mill, Ebola, commodity prices, infrastructure. And I think what EPSMG did when it was just about Ebola was a safe space for different people from different sectors just to get together and discuss with government officials. And I think people are—just underestimate how much can be achieved with collaboration and dialogue.

So, sort of, really, my headline, in my last 30 seconds, is, do not underestimate how important the road to recovery is. And a lot of that road to recovery will be infrastructure, like roads. And the vehicle being dialogue and collaboration. Where can we carry on with our EPSMG-type dialogue on these broader issues, where we can get together and talk to government officials in-country, NGOS, about what we all really need to move this forward? Where is that safe space?

Thank you.

[Dr. Knight's prepared statement follows:]

PREPARED STATEMENT OF ALAN KNIGHT, GENERAL MANAGER, CORPORATE RESPONSIBILITY, ARCELORMITTAL AND CHAIRMAN OF THE EBOLA PRIVATE SECTOR MOBILIZATION GROUP

Mr. Chairman, Ranking Member Markey, members of the subcommittee, thank you for giving me the privilege to testify today on the Ebola outbreak recovery efforts in West Africa and the lessons that we can draw from the response.

It is an honor to represent my company, ArcelorMittal, one of Liberia's largest investors. I am also here in my capacity as a founding member of the Ebola Private Sector Mobilization Group (EPSMG).

My testimony today will focus on two issues:

- Examining the role of the private sector in coordinating an effective, rapid response during a crisis, and
- Looking beyond Ebola and lessons learned and considering the challenges of economic recovery.

As I sit here today, and as you consider my testimony, I would like to suggest that the private sector's largest contribution during the Ebola outbreak was simply to keep business running. This was achieved through rigorous risk-planning and through the development of health-and-safety systems which minimized the risk of employees contracting the virus.

Going forward, I would like to further suggest that the private sector's greatest contribution, post-Ebola, is to keep business going, not in the face of a health emergency, but in an environment of higher costs, higher risks, and low commodity prices.

It is my hope that this hearing will examine not only lessons learned but what steps can be taken to ensure that the region's recovery is driven by a private-sector recovery.

From risk register to company level mobilization

First, by way of background, ArcelorMittal operates an iron ore mine, a railway of 240 kilometers, and a port in Liberia. Our operations stretch from the border of Guinea to the shore of the Atlantic and through three of Liberia's fifteen provinces, Nimba, Bong, and Grand Bassa. We have been operating in the country for ten years. At the height of the Ebola outbreak we had nearly 3,000 direct and indirect employees. While many of our subcontractors declared force majeure because of the health emergency and departed, ArcelorMittal did not. We never left. We never stopped working. We stayed operational throughout the peak of the virus.

As you can imagine, given our footprint and our direct and indirect employees, their families, their extended families, and their communities, ArcelorMittal touches the lives of tens of thousands of people in the region. During Ebola, that meant that our health and safety protocols did as well, and this saved untold lives.

We monitored the Ebola outbreak carefully. We worked hard to understand the virus and make sure that our facilities were prepared to deal with it. We hired experts to advise the company, trained and counselled our staff, and mobilized protective and specialized medical equipment. We also reviewed and refined our emergency response and evacuation procedures, set up a management committee, and enacted the appropriate procedures and systems.

In July 2014, cases of Ebola were reported in Monrovia, Liberia and the risk management triggers were pulled for ArcelorMittal. The company led the way in private sector support to the government with the total value of support to the government and individual counties estimated at US$1.3 million.

Although we hoped that the outbreak would not spread any further and endanger more lives, we were prepared for it. However, we were not the only company operating in the region and knew that we would have to learn from others in order to share what we already knew and to drive a stronger response to the escalating crisis. That is why a call was made to companies we knew, inviting them to join an informal conversation in London to share information about the outbreak, compare best practices, and collaborate to limit impacts across West Africa.

EPSMG is born

The ESPMG started in July 2014 as a one-off gathering of 11 London-based companies who came together to share what they could contribute to help combat the growing threat of Ebola. These companies all had an operational footprint in the affected region.

Awareness of the group spread by word of mouth and more companies asked to be involved. The number of companies dialing in for EPSMG calls quickly grew and we were soon joined by representatives of aid organizations, international institu-

tions, and governments. At the peak there were over 100 companies and almost 50 public bodies and NGOs joining the calls. For one of our December 2014 calls, we believe we had over 400 individuals dialing in.

I call the EPSMG a hub because it was never actually a legal entity with a board, budget or articles of association. Our initial focus was to exchange notes on what we were doing at our operations. We also decided to write to the Director General of the World Health Organization to ask advice on how we could strengthen our response.

Through this all, we found a common voice. Despite the unprecedented nature of the outbreak, group members made a joint commitment to continue operating in those Ebola-affected economies and to carry out business as usual, as far as was possible. This was no easy feat in the face of emerging restrictions on national and international trade as well as travel restrictions. Falling commodity prices bought extra complexity to this operating environment.

Looking after our own people was important but that alone was not going to "bend the curve" of the outbreak. What started as an inter-company information exchange evolved to advocacy for a global response and a hub where the public and NGO sector had direct access to companies for bilateral collaboration.

Although aid organizations had the humanitarian and health response expertise, we had heavy lifting equipment, transport, accommodation, and other needed resources. Perhaps most critically, we already had all of this in the affected countries and were ready to help. The ESPSMG provided a quick and simple hub to learn what needs were and helped facilitate bilateral arrangements between donors and recipients.

Country groups, the real success

From the EPSMG came the EPSMG country groups which were on the ground, mobilizing skills and resources in Guinea, Liberia, Sierra Leone, as well as in the adjacent countries of Mali and Senegal, to increase preparedness and prevent the spread. Most of the EPSMG's success can be linked to these country groups; the umbrella organization created a sense of community and an environment which enabled an efficient exchange of information.

We had a clear responsibility to foster stronger relationships with government and responders, ensuring that we had the information needed to fight the disease, which we could then share within our communities. However, this could only happen at country level and a great success of EPSMG was its ability to help get things done on the ground.

So what did companies do? In some instances assistance meant giving cash, while in others it meant donating vehicles for use as ambulances, providing medical supplies, and providing access to logistics, infrastructure, and communications technology.

People like numbers, but numbers with meaning can be hard to obtain. We believe that, at a minimum, the EPSMG companies gave away least 50,000 liters of chlorine, 4 million latex gloves, and 55 vehicles. More importantly, we trained over 50,000 employees who we estimate reached 350,000 dependents. Another positive outcome was the low infection rates within member companies. Thanks to the rigorous planning and precautions taken by our Liberian colleagues, not one of our employees contracted the virus, a fact that most other companies could also report.

The EPSMG never sought to replace or compete with the governments, donors, other coordination groups, or task forces. It was created to provide a simple access point into the private sector for joint mobilization. The EPSMG was about practical in-field action—not intellectual consensus building.

By January 2015, the Ebola outbreak curve had been bent. While the numbers of new cases reported were still unacceptably high, there were fewer with each passing week. Discussions began on "the road to zero." With the crisis over, we observed that many private sector companies began disengaging from the EPSMG, instead channeling their efforts into the daily operations of running a business in post-Ebola West Africa. By April 2015, EPSMG was no longer as active as was required at the height of the crisis.

Travel restrictions—our biggest distraction

With people dying from a highly contagious disease, it was a shock to many of us that governments around the world had no formal policies or thoughts on what was the right approach to the movement of nationals to and from countries at risk.

For example, if I, as a British national, flew to Liberia to help fight the Ebola outbreak and contracted the disease it was unclear whether I could come back to UK for treatment, or whether I would have to stay in Liberia. If so, what would happen to me? What if I broke my leg or suffered an illness or injury completely

unrelated to Ebola while in an Ebola-affected area—would I be able to return to the UK? It was all unclear. Expatriate employees were concerned about the uncertainties surrounding routine return transport to their home countries and fears grew about the availability of medical evacuation for suspected or confirmed cases of Ebola.

We also realized that blanket travel bans were of significant concern to humanitarian responders struggling to get personnel and supplies to the affected areas. We lobbied hard on this, as there was too much fear driving decisions.

As we look at outcomes from this hearing I would ask that this committee considering asking for an international convention on the movement of nationals to and from countries suffering a pandemic. It is imperative that a protocol be negotiated and agreed before the next pandemic. This is an unnecessary distraction the private and public sectors can ill afford to see repeated.

What did we learn?

1. The EPSMG's greatest contribution was preventative action

The epidemic was rightly seen as a humanitarian disaster, but we observed that it is important not to put Ebola in the same box as event-based disasters like floods and earthquakes, where the worst outcomes occur suddenly, before businesses can intervene, placing the focus on rescue and recovery. While a death toll of 12,000 is a disaster, we should remember that the forecast number of cases exceeded 250,000 in September 2014. Perhaps the forecasts were wrong, or even more likely, the joint effort with NGOs, the public sector, and the private sector were successful. Either way, this success story is about what was prevented.

2. Business has been here before—parallels with HIV

Parallels can be drawn with the long track record many businesses have in managing HIV in their workforces. Whilst the pace of the HIV outbreak was over months and years rather than hours and days, many companies in Africa proved to be highly effective in mobilizing their staff and resources to prevent HIV from spreading. The parallels are noteworthy: the need to change behaviors, the need to have the right medicines, the value of peer-to-peer education, and the issues of stigma are all similar. Perhaps most noteworthy was the need for an employer to engage in conversations with employees about topics that they normally would avoid. For HIV, this was about sexual behavior; for Ebola, it was about attitudes toward funeral rites and traditional care behaviors. Anyone studying the EPSMG contribution should, therefore, also draw lessons from HIV.

3. Risk management works

Business risk processes provide a good framework to plan for pandemic risks. Since SARS, contagious disease has become a theoretical business risk, but late-2013 and early-2014 Ebola cases in West Africa captured the attention of risk managers and their health and safety colleagues. During the worst moments of the outbreak, ArcelorMittal's top management reviewed the status of the outbreak and our actions. This model was replicated across the business network. It works.

4. Businesses will look after their employees, which means they look after citizens

The most significant private-sector contribution was undoubtedly the training and care these companies offered their own employees and those individuals' families and neighbors. Employees are citizens, so a mass outreach by all the employers will reach a significant proportion of the population. I am confident the companies operating in Ebola-affected regions would have done this regardless, but the EPSMG provided value as a hub for sharing best practices on how to approach this most effectively.

5. Business interests are also human interests

To protect a business from such a disease you need to protect your employees. Employees are citizens, so business interventions protect the human, as well as the economic need. The logic extends from the employee to their family and community. What is more, the public sector asked the private sector to stay in-country and remain economically active. The other choice would be to leave the country, which would have made matters worse. By staying in the affected countries the private sector helped keep economies active.

6. Rewiring public-private partnerships

Chairing the EPSMG gave me the rare privilege of getting closer to the workings of the public sector. While I deeply respected the individuals with whom I engaged, I saw that their desire to deliver results quickly and pragmatically was constrained

by bureaucracy, process, and politics. Governance of the public sector is key but it can pay a price in moments of need.

I was proud to see my business colleagues acting nimbly and quickly, but conscious that many public sector players saw business as merely a source of money. The EPSMG was special because it helped to unlock the real contribution from the private sector which was not cash, but skills, assets and awareness. The EPSMG helped the collaboration and coordination of goodwill, skills, and physical assets. It is now clear that the private sector has more to offer than donations and I hope the EPSMG (and the business response to HIV) are proof points. The challenge for the public and NGO sectors is figuring out how to best utilize this in the future.

7. The value of simplicity

It could be argued that the Ebola related events in West Africa were unique. The region simply did not have the means to contain the disease. An Ebola crisis would not happen in the UK, for example. Even airborne Ebola would be contained by measures implemented by the UK government since the SARS epidemic. But while this case was unprecedented, valuable lessons can be taken and applied in future global challenges. Today, for example, there is general recognition that the private sector has a valuable role to play in crisis and humanitarian response.

But perhaps the most important lesson is the value of simplicity. With the EPSMG, a group of businesses saw value in collaborating to protect their people, companies, and entire communities from a terrible disease. Learning and resources were shared when they were needed. Practical action happened when it was needed. When these things were no longer needed the EPSMG was no longer needed and naturally, it fizzled out.

What now?

We get to zero and stay at zero; we build resilient healthcare systems and delivery mechanisms. Beyond on-going collaborations, our group is making two unique contributions in this area. First, some EPSMG members, under Chevron's leadership, have set up the Center of Excellence for Infectious Disease Control at JFK Hospital in Liberia as an on-going platform for training and public-private collaboration. This project is now eligible for a USAID Global Development Alliance grant for Ebola recovery. Secondly, the No More Epidemics Campaign has offered to house lessons learned from Ebola and keep the EPSMG experience relevant.

Recovery in West Africa is vital. At ArcelorMittal, we remain deeply committed to Liberia. While the combination of market conditions and Ebola posed a challenge to our operations, our company is proud that we were able to maintain production and contribute to the Liberian economy at a crucial time in the country's history. We continue supporting the country further, even though low iron ore prices required changes to our operating model. But sustaining a private sector recovery cannot be done by a single company, and in this environment, not just by the host-governments. All of Liberia's stakeholders need to take a look at helping to create conditions for a recovery where jobs are created by a vibrant private sector.

Going forward, the United Nations and other response groups need to look at the private sector as equal partners and not just as donors. The UN Office for the Coordination of Humanitarian Affairs (OCHA) has a role to play here in leveraging new relationships and partnerships.

Again, we need an international convention on the movement of people across borders during a pandemic. We need to address this now, before the next pandemic.

The battle against Ebola is far from over and many obstacles lie ahead, particularly the fight to sustain the economies of the affected countries. The private sector has shown that it can rise to the challenge, working in partnership with other stakeholders to deliver the most effective response to the benefit of employees, their families, and their communities. It is my hope that the hard lessons from this outbreak can be applied to prevent the next.

Senator FLAKE. Thank you, Dr. Knight.

Dr. Panjabi.

STATEMENT OF RAJ PANJABI, CO–FOUNDER AND CHIEF EXECUTIVE OFFICER, LAST MILE HEALTH, BOSTON, MASSACHUSETTS

Dr. PANJABI. Chairman Flake, Ranking Member Markey, distinguished members of the committee, thank you for having me here to testify today.

I just returned from Liberia a couple of weeks ago, and people have not forgotten the leadership that all of you have shown, not only to mobilize resources, but also to actually come to the front lines, as members of this committee did during the height of the epidemic. So, I wanted to express and share that gratitude.

I speak today as CEO of Last Mile Health and as a physician and teacher from Harvard, but also as an American citizen. I was born in Liberia, and fortunatley escaped the country's civil war as a child. Over a decade ago, I went back to Liberia, and, with my colleagues, created Last Mile Health, which, as Chairman Flake noted, partners with governments to create national networks of what we call community health workers. That is,we recruit people from their own villages, give them the equipment, the medicines, the training that they need to bring healthcare to the doorsteps of their neighbors.

And today, I am going to make the case that investing in those community health workers, especially in rural areas, was one of the most effective measures taken by the United States in responding to Ebola. And I also want to make the case that increasing investment in community health workers in rural areas can help stop the next epidemic, build back health systems, and even help support and drive economic recovery.

In West Africa, we lost over 500 of my fellow health workers. Many of them were community health workers. This kind of loss would be great for any country. It was especially so for mine, Liberia. We had very few health workers, to begin with. When I first returned to Liberia in 2005 after the war, we were left with just 51 doctors to serve a country of nearly 4 million people. Now, to put that in perspective, just imagine for a moment all of Washington, D.C., the entire city, being cared for by only eight doctors. And you can imagine if you were sick in a city back then, you might stand a chance, but if you were sick way out in the remote villages, where there were no doctors, you could die anonymously.

And I bring this up because it has something to do with Ebola. The massive shortage of health workers in remote villages has a lot to do with outbreaks of zoonotic origin, infectious diseases that move from animals to humans. Ebola has revealed that illness is universal but access to care is not in these places, and that fact places all of us—all of us from, Liberia's rainforests to American cities—at greater risk. Paradoxically, it is exactly in these hard-to-reach areas where defeating diseases like Ebola is most difficult. The problem is that remote communities, not unlike I imagine some very rural stretches of your own States, face what we call a triple bias. That is, that the public sector is unable to prioritize remote communities. The private sector often does not see the market potential. And even the nonprofit social sector thinks it is too expensive to serve them. Now, that set of conditions brewed a perfect storm to help escalate what was—could have been—a local outbreak into a global epidemic.

And you only have to think of patient zero, little 2-year-old Emile in the borderlands of rural Guinea, Sierra Leone, and Liberia, who fell sick with Ebola in December of 2013. A lot has been made of what happened from March 2014 and thereafter, what was too slow of an initial response. But, between December 2013 and March

2014, not only did Emile die, but dozens of people in nearby villages also died. Partly because of a lack of well-supported health workers in those remote communities, we lost time. When minutes counted, we lost months. It took us months before we recognized the outbreak in March 2014. What more could have been stopped, in terms of loss of lives, in terms of billions of dollars lost, had we had those health workers in place? And so, Ebola and other emerging infectious diseases that start in regions that are in remote communities reminds us that the cost of inaction is greater than the cost of action.

You know, the good news is, is that when the U.S. does invest in rural community health workers, their achievements can be dramatic. I have seen it firsthand. Over a year ago, I was sitting in a mud-walled hut, working with local rural community health workers, helping them respond to an outbreak. A woman, 42 years old, had come into the community, died of Ebola, and over a dozen people there had also died who had attended her funeral. Now, this community, deep in the rain forest, in an area called Rivercess, was cut off. It was cut off from electricity, from roads, from phones, and days away from the nearest hospital

We were told back then, as you know, that we could see as many as 1.4 million cases of Ebola, that outbreaks like this would spread all across the region, and that many of those people could die. But, together, we fought back. And that was a major credit to the Liberian government, to the U.S. Government and other partners. With other NGOs and a coalition of U.S. agencies, including USAID and the CDC, we rallied behind the government to train several hundred front-line health workers. That included people like David, a 24-year-old who drove a motorbike 6 hours over mud tracks in the rain forest to go door-to-door to collect blood samples from people who had been exposed. And it included community health nurses, like Alice Johnson, who distributed thermometers, masks, gowns, and gloves to clinics to help put in place infection control measures. And they also included community health workers, like Zarkpa, who, while the health system was collapsing all around her, managed to keep all kids who had malaria on treatment and never miss a single date. These community health workers risked their lives to hunt down the virus, stop it in its tracks, and protect all of us.

And, as you said, the fight is not over. We have seen flare-ups in Liberia and rural Guinea last week. There are other outbreaks of HIV/AIDS, malaria, tuberculosis. We have seen a spike in child and maternal deaths, in malnutrition. You know, Ebola has taught us that what works best in an emergency system is not actually an emergency system; it is an everyday system that reaches all people, that is robust, resilient, and can respond before these threats even emerge. If that is our goal, to build such a system, in partnership with our Liberian counterparts, to make a sustainable system, we must continue to invest in people, we must continue to invest in Liberia's health workforce.

At this hearing, we heard that call echoed 15 months ago in this very chamber by Liberia's leader, President Ellen Johnson Sirleaf. Members of this committee asked her, What is one of your top priorities? She said—I quote—"At the time, we want to build capacity

at all levels, especially at the lower levels of community healthcare workers." Her government has followed through on that vision. She is now launching a revolutionary health workforce program that, once fully financed, will train, equip, and pay over 4,000 community health workers, and train hundreds of Liberian nurses and doctors across the country. This community health workforce has the potential to be a front-line defense that can stop the next local outbreak from becoming the next global epidemic. It is also going to extend healthcare to all people. And it is going to be great for jobs, because it is going to create employment opportunities for young, unemployed, rural people.

In closing, I will say that it is a single program that can save lives, create jobs, and stop the next outbreak. Investing in these kinds of programs, alongside labs, supply chains, and hospitals, can generate great returns, not only for Liberians, but the safety of Americans. A lot of U.S. Government agencies, including USAID, CDC, HHS, the Peace Corps, as well as international partners, are already mobilizing support for Liberia's health workforce program.

And I would say, in the face of other global threats, U.S. funding towards programs like this must be preserved and sustained over the long term if we are going to have a healthcare system led by Liberians.

Mr. Chairman, as Liberians and Americans have shown, those who fought Ebola taught us that we are not defined by the crises that strike our lives. We are defined by how we respond. Our response is not over. We must demand a health worker for everyone, everywhere. That is the only effective response, I believe, to the Ebola crisis and to the everyday crisis of premature death.

Thank you.

[Dr. Panjabi's prepared statement follows:]

PREPARED STATEMENT OF DR. RAJ PANJABI, CEO, LAST MILE HEALTH

Chairman Flake, Ranking Member Markey and other distinguished members of the committee, thank you for inviting me to testify. We are grateful to members of this Committee not only for the resources you've mobilized in the fight against Ebola in West Africa, but also for your personal leadership. I just returned from caring for patients alongside community health workers and nurses in rural Liberia and my colleagues there have not forgotten that members of this Committee visited them on the frontlines of the Ebola epidemic while it was still very active.

Today, I want to speak about the power of those local health workers. As you know, over 11,000 people and over 500 of my fellow health workers—nearly all West African—have lost their lives in this fight. I want to dedicate my testimony in honor of their sacrifices and the Americans who stood by their side. I will make the case that investing in Liberian health workers—especially in remote rural areas—was one of the most effective measures taken by the United States in responding to Ebola. And I will present the case that long-term investments in rural health workers are more important now than ever to respond to public health threats and build resilient, sustainable health systems.

Liberian health workers have shaped my life. As CEO of Last Mile Health and a physician and teacher from Harvard, I've had the privilege of working with my colleagues on the ground in Liberia for a decade to train and employ hundreds of community health workers to serve Liberia's most remote communities. But their mark on my life runs deeper than that. Today, I am a proud American citizen and I was fortunate to be born in Liberia where Liberian midwives helped my mother bring me into this world.

I know first-hand how dire conditions can get in the absence of health workers. When I was 9 years old, Liberia erupted in civil war. I was one of the lucky few. My family was evacuated and eventually resettled in America. Here in America, I went from having my hopes crushed in a war to pursuing my dream of attending

medical school. But I could not forget where I came from. So in 2005, I returned to Liberia as a medical student, to help serve the people I had left behind. What I found was utter destruction. After 14 years of civil war, Liberia was left with just 51 doctors to serve a country of over 4 million people. To put that in perspective, imagine the entire city of Washington, DC, having only 8 doctors available to care for it. If you fell sick in the city you might stand a chance, but if you fell sick in remote villages you could die anonymously. It was in response to this massive shortage of rural health workers that my colleagues and I began our work at Last Mile Health.

What does this lack of health workers in remote areas have to do with the Ebola outbreak? While Ebola infections transmit primarily from person to person, Ebola and 75% of emerging infectious diseases first enter human populations from animals—that is they have a "zoonotic origin'. Ebola and other epidemics with a zoonotic origin—like HIV/AIDS—often first emerge in the world's most remote communities. We all know that "patient zero', two-year old Emile from rural Guinea likely first fell sick in this way with Ebola and died in remote communities in the rainforest borderlands connecting Guinea, Sierra Leone and Liberia. In large part due to the lack of trained and equipped health workers in rural areas, it took three months before an Ebola outbreak was identified. This time lapse allowed the epidemic to spread and as we know, it eventually reached 10 countries, including this one.

Paradoxically, the hardest-to-reach communities are also where zoonotic infections—amongst other diseases—are the hardest to defeat. The problem is that remote communities, not unlike the most rural reaches of your own states, face a triple bias. The public sector, which favors areas that are easier to reach to maximize limited resources, is often unable to prioritize remote populations. The private sector, which favors areas with high concentrations of customers, doesn't see market potential. The social sector, which favors reaching more people in fewer areas at less cost, deems it too expensive to serve them.

The good news is U.S. investments in local health workers in remote communities can have dramatic results. A little over a year ago, I stood in a mud-walled building in one of these isolated, hard-to-reach rainforest communities. I was there to help train a group of Liberian health workers in an area called Rivercess. Nearby, an outbreak had erupted in a village days from the nearest hospital and cut-off from roads, electricity and phones. A young woman there had just died of Ebola, and so had over a dozen people who attended her funeral. We partnered with a coalition of U.S. agencies, other NGOs, to support the Liberian Government to train and equip brave local health workers to respond.

Investments like these, complemented investments in Ebola Treatment Units, and were made across Liberia, with the support of the USAID, NIH, CDC, HHS, the DOD and other agencies. With that and other international support, the Government of Liberia and its partners trained and equipped thousands of Liberian health workers in remote areas. They included lab technicians like David Sumo, a 24-year-old who drove a motorbike more than six hours over mud tracks in the rainforest to collect blood samples from the hundreds of people at risk. Nurses like Alice Johnson distributed digital thermometers, masks, gloves and gowns to clinics to ensure infection prevention and control measures were in place. And community health workers like Zarkpa Yeoh ensured no child with malaria in her village missed a day of treatment even as the rest of the country's health system was collapsing. It's these rural health workers—alongside American health workers—who have helped hunt down Ebola, who are best positioned to help prevent flare-ups, and who can help rebuild a health system led by Liberians themselves.

Last week, the World Health Organization declared the West Africa Ebola epidemic no longer an international public health emergency. But, let U.S. make no mistake. The response is not over. The Ebola threat remains real and it has been persistent. Counter to conventional wisdom, this epidemic isn't West Africa's first encounter with Ebola. Medical studies document antibodies to Ebola in the region as far back the late 1970s—suggesting the virus has been present and has gone undetected in remote villages in West Africa at least since then. Infectious diseases can also act with speed. We have seen already seen flare-ups of Ebola and other outbreaks. In the last week alone, new Ebola cases and deaths occurred in both Liberia and rural Guinea. Ebola shut down other health services and we've seen an increase in other infectious diseases like measles, malaria and pertussis, as well as child and maternal deaths. We must sustain a defense that exceeds the persistence and speed of these threats. We must help West Africa maintain a high level of capacity to rapidly prevent, detect and respond to flare-ups of Ebola and other public health crises.

Ebola has taught U.S. what works best in an emergency is not an emergency system—it is an everyday system that is robust, resilient, and functioning before the crisis begins. If our collective goal, looking forward, is to work with Liberians and other affected countries to build such health systems—then we must continue to make smart investments. We must continue to invest in people. We must invest in Liberia's rural health workforce. We've heard this call echoed by Liberia's leaders. Mr. Chairman, at another hearing on Ebola hosted by this committee only 15 months ago in December 2014 in this very room Committee members asked Liberia's President Ellen Johnson Sirleaf about her priorities. She responded clearly, "we seek to build capacity at all levels, especially at the lower levels of community health care workers."

Her Excellency's Government has followed through on this vision. The Government is working to launch a revolutionary National Health Workforce Program. This program, once fully financed, will train hundreds of Liberian doctors and nurses in line with President Sirleaf's priorities, employ and equip over 4,000 community health workers nationally. This rural community health workforce will bring disease surveillance for Ebola and other threats each and every at-risk remote corner of Liberia. They are a frontline defense that can stop the next outbreak from becoming an epidemic. It will also build health systems by extending health care to the over 1 million rural Liberians who've never had health care before. President Sirleaf has already called for 2000 rural community health workers to be deployed by the end of next year.

Investing in training, equipping and paying rural community health workers not only saves lives in remote areas, but they are also a great economic bet. Recent reports show that by creating jobs, providing "insurance"for countries against catastrophes like Ebola, and by extending productive life, rural community health workforce investments in can yield an economic return of up to $10 for every $1 spent.

Of course, rural community health workers are not a panacea. Investments in these workers must be complemented with broader investments in publicly financed health systems that include well equipped clinics and hospitals, robust laboratories and supply chain systems. We must target these investments not just in cities, but also in rural areas. And these investments must align with and reinforce government-led plans. One example includes the recent re-signing of the results-based five-year Fixed Amount Reimbursement Agreement (FARA) between USAID and the Liberian Government that invests directly in the Government's National Health Plan.17 Such mechanisms should be expanded because they directly build country capacity and help improve the effectiveness and sustainability of U.S. foreign assistance to Liberia.

As we look forward, we must not forget that illness is universal but access to care is not, and as Ebola has taught us, this places all of U.S. at greater risk. The cost of inaction on closing this access gap is greater than the cost of action. Mr. Chairman, as Liberians and Americans have shown, we are not defined by the crises that strike our lives. We are defined by how we respond. Our response is not over. We must demand a health worker for everyone, everywhere. That is the only effective response to the Ebola crisis—and the everyday crisis of premature death.

ANNEX

NEW REPORT SHOWS THAT INVESTING IN COMMUNITY HEALTH WORKERS IS ESSENTIAL FOR IMPROVING HEALTH, STRENGTHENING ECONOMY, AND PREVENTING THE NEXT EBOLA

by Jeffrey Walker and Rajesh Panjabi

> CHWs play the most important and effective role in our fight against disease; it is they who have reached the most vulnerable, they who have been able to be the contract tracer, they who have been able without much training to take the risk to go out into the community and bring care. We need to urgently invest in the training and building of capacity of healthcare workers at the community level.—*President Ellen Johnson Sirleaf of Liberia at the Third International Financing for Development Conference in Addis Ababa on July 13, 2015*

In May, the World Health Organization declared Liberia "Ebola free"after forty-two days without new cases. While thiswas a remarkable milestone, none of U.S. can forget that Ebola killed 4,800 people in Liberia and has already left more than 11,000 dead across West Africa. While the fight against Ebola continues in Liberia and neighboring Sierra Leone and Guinea, one vital measure for epidemic prepared-

ness has emerged: a robust community health system. As President Ellen Johnson Sirleaf stated on Monday at the UN's Third International Financing for Development Conference: "We need to urgently invest in healthcare workers at the community level."

For the past year, we have been asking ourselves how the Ebola outbreak spread so quickly and what steps should be taken to prevent such future disasters. A year after the epidemic took hold, we know that stronger, integrated community-based delivery systems are necessary to help prevent such outbreaks and support progress against the top killers of women and children—especially malaria, pneumonia, and diarrhea. At the core of such delivery systems are highly-trained, supervised, equipped and paid professional Community Health Workers (CHWs), who work in teams with other primary health workers (e.g. nurses) to extend care to the most vulnerable.

Unfortunately, financing for community health systems is relatively low compared to other health system areas and to priority diseases. Consequently, countries struggle to raise the funding necessary to train, supervise, and pay CHWs. Today, there is an estimated shortage of more than 700,000 community health workers across sub-Saharan Africa and it will require at least $3 billion each year to address this gap. In Ebola's deadly wake, a number of leaders from African countries and the global health community came together to explore how to address this funding problem. We released our initial thinking on Monday at the Financing for Development Conference in Addis Ababa through a report titled, "Strengthening Primary Health Care through Community Health Workers: Investment Case and Financing Recommendations."The report calls for urgent action by all global stakeholders, including African governments, major funders, and our partners to address funding challenges of CHWs, and provides the following key findings:

- *Supporting Community Health Workers is a game-changing investment:* CHWs are critical for increasing access to health care and, if scaled up, could save up to 3 million more lives each year. They are also a great economic bet, returning up to $10 for every $1 spent through productivity gains from a healthier population, from the "insurance" they provide against catastrophes like Ebola, and from expanding employment opportunities.
- *Not all Community Health Worker systems are created equal:* What we need are highly trained and skilled community health workers integrated into the primary health system. While each national context will be different, when building CHW programs policy makers should focus on core factors such as measurement and management of community health program performance, integration with the rest of the primary health system, leadership from within Ministries of Health, and community engagement in program design. It's also important that CHWs not be construed as "stand-alone" agents of change, but instead are effectively linked to broader teams of clinic-based health workers.
- *Countries need to be proactive in developing a financing pathway:* When developing a CHW program, countries need to take the initiative to determine program scale, cost the plan, set funding targets and identify specific financing mechanisms to reach targets. Countries are used to doing this for other disease areas and should apply the same methodology to community health. Support from international donors through mechanisms like the World Bank's recently launched Global Financing Facility, will create new avenues for long-term country-led investments for CHW programs, but additional start-up funding remains vital.

In addition to these findings, we went on to make a set of recommendations to national goverments, donors, and the broader community.

- First, we encouraged governments in sub-Saharan Africa to prioritize CHW programs for investment and to create teams to focus on community health financing;
- Second, we asked international donors and funders to make more grants and low-cost financing available to countries wishing to build CHW programs;
- Next, we urged funders that currently support specific diseases to make more of that funding available to support CHW programs, since CHWs are absolutely essential for diagnosing and treating diseases like malaria, HIV, and TB and preventing epidemics;
- Finally, we encouraged the broader health community to consider establishing teams to work alongside existing initiatives to assess available financing options and develop metrics and scorecards to track progress in community health.

On the last day of June, when the body of a dead seventeen year old boy tested positive for Ebola, Liberia reported its first new case since it was declared "Ebola-free" in May. While the country now has much stronger health capabilities than it did at the start of the Ebola epidemic, this sad death is a clear reminder that we must remain vigilant and move urgently to make much larger investments in community health systems. Such investments will not only help prevent the resurgence of Ebola and achieve our global health goals, but may also help prevent the next epidemic. This is crucial as the World Bank estimates that a severe pandemic flu is "virtually inevitable" and could cost the global economy up to $3 trillion. The time for action is now.

Senator FLAKE. Thank you.

Ms. Glassman.

STATEMENT OF AMANDA GLASSMAN, DIRECTOR OF GLOBAL HEALTH POLICY, CENTER FOR GLOBAL DEVELOPMENT, WASHINGTON, D.C.

Ms. GLASSMAN. Chairman Flake, Ranking Member Markey, members of the subcommittee, thank you very much for the opportunity to testify today.

My comments will focus on three U.S. actions that might accelerate progress in the Ebola response: first, a recommitment to recovery; second, an enhancement of efforts to promote global health security; and, third, a call to track the money better.

First, on recommitment to recovery. The Ebola outbreak took a serious toll on the affected countries' economies. Businesses suffered, jobs disappeared. A fifth of Monrovia businesses closed as a result of the outbreak. And almost half of jobs were lost.

Economic recovery is gradual and at risk, due to commodity price drops that affect Liberia's biggest employers, like those of my colleague on this panel. And estimates suggest it could take until after 2020 for Liberia to achieve the rate of GDP growth that it experienced prior to the epidemic.

Ebola was also a shock to the health system. Overwhelmed health facilities were unable to provide services. Delayed immunization campaigns led to Liberia's worst measles outbreak in years. And, as we have seen, days after the WHO declared the end of Ebola last week, new cases were confirmed.

After being out for months, from mid 2015, families did send their kids back to school and increased use of basic services, but two-thirds of households are food insecure in Sierra Leone, and almost 70 percent of the Liberian population lives on less than $1.90 a day.

To counteract these effects and ensure continued protection against health threats, the U.S. should recommit to recovery in ways that will make a measurable difference for firms and economic growth, health system effectiveness, and family well-being.

In support of firms and economic growth, the U.S. should continue to work to improve the investment climate, address infrastructure deficits, and encourage business support services as well as regional investments. These steps are critical to maintaining foreign investments and reviving local firms needed to ensure recovery and sustainability.

The U.S. must continue its work to strengthen health systems, but our efforts have to go beyond capacity-building. More training and numbers of people trained are not, themselves, signs of health system preparedness. Instead, the U.S. should ensure that coun-

tries structure their healthcare funding to reward improved performance. Increases in children fully vaccinated, reductions in hospital infections, and improvements in child survival are what we must seek to achieve with our investments. And to aid families, keep kids in school, reduce food insecurity, and get markets working again, USAID should extend its support to cash transfer programs in Ebola-affected, ultra-poor populations. Evidence shows that cash is the most efficient way to help families and can counteract the widespread distrust in government that actually contributed to the epidemic's spread.

Second, on the issues related to global health security. The next outbreak is a matter of when, and not if. Our health and the health of our economies depend on modern and flexible response. And to get to that kind of response, the U.S. must ensure that the WHO is fit for purpose. We should incentivize our partner countries to step up their own global health security, and we should invest permanently in disease outbreak preparedness and response.

The WHO has been rightly criticized for its response to Ebola, but its role remains critical. With the change in WHO leadership later this year, the U.S. must ensure that the next Director-General has the full confidence of our Congress and the credibility, financing, and support needed to implement much-needed reforms and execute its mission. The U.S. should develop stronger incentives for countries to adopt best practices in outbreak preparedness. Perhaps financial and reputational incentives to low-income countries that make measurable progress in strengthening their disease surveillance should be rewarded.

Finally, we need to ditch the ad hoc interagency task forces and emergency budget requests. To understand the full range of alternatives, Congress should ask the Government Accountability Office to explore potential budget instruments that would ensure the availability of contingency funding and risk management in the event of a major outbreak.

Finally, we need to track the money better. No existing platforms are up to this task. USAID's regular factsheets offer only snapshots of the work underway. Quarterly progress reports from the Offices of the Inspectors General only hint at what we might expect as results from our program. And a search on ForeignAssistance.gov yields an incomplete record. And, worst of all, there is no way—no easy way—to match the reported expenditures across these documents and platforms.

More than a year ago, the Center for Global Development hosted Liberia's Minister of Public Works, Gyude Moore. We were greatly honored to have you, as well, Chairman Flake. At that time, Moore asked that the organizations responding to Ebola provide an account of money received and report on how it was spent in the public domain. Our response to his very sensible request has fallen short. I believe it is appropriate to hold this off-budget emergency supplemental funding to a higher standard. That means not only reporting on spending, but linking it to performance. In the absence of such reporting, we lose the opportunity to know what we have accomplished and where our next dollar is going to have the biggest impact. And we should start now by improving our accounting for any remaining unobligated funds.

Thank you. And I look forward to your questions.
[Ms. Glassman's prepared statement follows:]

PREPARED STATEMENT AMANDA GLASSMAN, VICE PRESIDENT FOR PROGRAMS AND DIRECTOR OF GLOBAL HEALTH POLICY, CENTER FOR GLOBAL DEVELOPMENT

Chairman Flake, Ranking Member Markey, and members of the Subcommittee, thank you for the opportunity to testify on West Africa's recovery from a devastating Ebola outbreak and the lessons we can learn from the U.S. response to the crisis.

My name is Amanda Glassman and I am the vice president for programs and director of global health policy at the Center for Global Development, an independent, non-partisan think tank headquartered in Washington, DC. CGD conducts policy research aimed at improving the policies and actions of rich countries, including the United States, that affect developing countries.

Along with my colleagues at the Center, I have been watching the Ebola epidemic unfold in West Africa and keeping a close eye on the world's response. As you know, this outbreak was unprecedented in scale and impact. Liberia, Sierra Leone, and Guinea endured a total of more than 28,600 cases of the virus and 11,300 deaths.[1] The disease took a heavy toll not only on families, but also on the health systems and economies of the afflicted countries.

By the time the World Health Organization (WHO) declared Ebola a public health emergency in August 2014, it was clear additional resources were urgently needed to help West Africa contain the disease. Congress stepped up to the plate, appropriating $5.4 billion in emergency funding, including nearly $2.5 billion to the U.S. Agency for International Development (USAID) for international response, recovery, and preparedness.[2]

My testimony will focus on three areas, providing specific recommendations to Congress to help West Africa heal and regain lost ground, and to ensure that the United States is better protected and prepared to face future global health threats.

1. Remain committed to recovery with an approach that addresses the needs of households, health systems, and firms.
2. Enhance efforts to promote global health security by improving coordination, developing clearer incentives, and exploring new ways to manage risk.
3. Track money and progress to ensure accountability and learn what works.

First, the United States must remain committed to West Africa's recovery from Ebola, addressing the needs of households, health systems, and firms.

The Ebola virus and the fear it generated took a serious toll on the affected countries' economies, which lost an estimated $2.2 billion in 2015.[3] During the crisis, borders and markets were closed and plans to invest in West Africa were put on hold. Economic recovery has been gradual. Estimates suggest it could take until after 2020 for Liberia to achieve the rate of GDP growth it experienced prior to the epidemic.[4]

Further, Ebola was a shock to already fragile health systems in West Africa. During the epidemic, overwhelmed health facilities were unable to provide services, while the fear of contracting Ebola prevented residents from seeking care. Delayed immunization campaigns led to Liberia's worst measles outbreak in years.[5] The system also lost healthcare workers, which may have long-term effects on health and service delivery. Analysts predict that maternal mortality rates could increase by 74 percent in Sierra Leone and by a staggering 111 percent in Liberia relative to pre-Ebola rates.[6]

To counteract these effects and ensure sustained protection against existing and new disease threats, the United States should invest in ways that will make a

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[1] World Health Organization. (2016). Ebola Situation Report—30 March 2016. Retrieved from http://apps.who.int/ebola/current-situation/ebola-situation-report-30-march-2016

[2] P.L. 113–235

[3] World Bank Group. (2016). World Bank Group Ebola Response Fact Sheet. Retrieved from http://www.worldbank.org/en/topic/health/brief/world-bank-group-ebola-fact-sheet

[4] International Monetary Fund. (2016). IMF Country Report No. 16/8: Liberia. Retrieved from http://www.imf.org/external/pubs/ft/scr/2016/cr1608.pdf

[5] World Health Organization. (2015). Liberia tackles measles as the Ebola epidemic comes to end. Retrieved from http://www.who.int/features/2015/measles-vaccination-liberia/en/

[6] Evans, D. K., Goldstein, M., & Popova, A. (2015). The Next Wave of Deaths from Ebola? The Impact of Health Care Worker Mortality. World Bank Group. Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/06/26/090224b082f92f94/2—0/Rendered/PDF/The0next0wave00are0worker0mortality.pdf

measurable difference for household well-being, health system effectiveness, and economic growth.

When it comes to aiding households, USAID should extend cash transfer programs in Ebola-affected communities to help the poorest families pay for food, medical costs, and school fees. Evidence shows that cash is often a better way to help people meet their basic needs, can counteract the damage to young children's nutrition, get kids back to school, and stimulate local markets.[7] USAID supports small-scale cash transfer programs in Liberia and Sierra Leone, and these should be scaled up.[8]

On health systems, U.S. efforts must go beyond capacity building. More training and number of people trained are not sufficient indicators of health system readiness or performance. Instead, the United States must ensure that countries structure their healthcare financing and payments so that they reward improved performance in health facilities and on health itself. Increases in children who are fully vaccinated, reductions in maternal mortality and morbidity, improvements in child survival are what the United States must seek to achieve with its investments. More money should be tied to improved results instead of specific inputs or staffing models.

In support of economic growth, the U.S. government, in coordination with other donors, should work to improve investment climates, address infrastructure deficits, encourage business support services, and look for opportunities to strengthen regional ties. These steps are critical to attracting foreign investment and reviving local firms. A new Millennium Challenge Corporation compact to address roads and electricity in Liberia and a threshold program in Sierra Leone to improve water and electricity service delivery are complementary steps in the right direction.[9] [10]

Next, we must enhance our efforts to promote global health security by improving coordination, developing clearer incentives, and managing risk.

The next outbreak is a matter of when, not if. Our health and our economies increasingly depend on modern, flexible responses to these imminent threats. The U.S. government must take steps to (1) ensure the WHO is fit for purpose; (2) incentivize countries around the world to step up their health security; and (3) invest permanently in disease outbreak preparedness and response.

The WHO has been rightly criticized for its slow response to the Ebola outbreak. But the role of the WHO remains critical. It is in a unique position to set standards, initiate and coordinate incidence and pathogen tracking, and strengthen health-system responses. With a change in WHO leadership later this year, it is incumbent upon the United States and the global community to ensure the next leader of the institution has the credibility, support, and respect needed to govern effectively and implement much-needed reforms.

The U.S. government, through USAID or the Centers for Disease Control and Prevention, should develop incentives for countries to adopt best practices in disease response and preparedness. By rewarding countries on the basis of progress toward strengthening disease surveillance and preparedness, the United States could more effectively leverage limited resources and ensure results.

Lastly, we need to ditch the ad hoc interagency task forces and emergency budget requests. To understand the full range of alternatives, Congress should ask the Government Accountability Office to explore potential budget instruments for ensuring permanent preparedness and protection in a way that manages risk. One option is to contribute to the World Bank's Pandemic Emergency Financing Facility. Another, complementary option would be to develop our own global health emergency fund that would allow for faster release of financing to assist countries in need and provide coordinated funding at each stage of pandemic preparedness, response, and recovery.

Finally, Congress should require U.S. agencies to report data on Ebola spending and progress to a consistent, integrated and publicly available platform.

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[7] Center for Global Development & Overseas Development Institute. (2015). Doing Cash Differently: How Cash Transfers Can Transform Humanitarian Aid. Report of the High Level Panel on Humanitarian Cash Transfers. Retrieved from http://www.cgdev.org/sites/default/files/HLP-Humanitarian-Cash-Transfers-Report.pdf

[8] USAID & HHS Offices of Inspectors General. (2015). Quarterly Progress Report on U.S. Government International Ebola Response and Preparedness Activities: Fiscal Year 2016, First Quarter. Retrieved from https://oig.usaid.gov/sites/default/files/other-reports/oig—ebola—quarterly—fy16—021720126.pdf

[9] MCC. (2015). Liberia Compact. Retrieved from https://www.mcc.gov/where-we-work/program/liberia-compact

[10] MCC. (2015). Sierra Leone Threshold Program. Retrieved from https://www.mcc.gov/where-we-work/program/sierra-leone-threshold-program

No existing platforms are currently up to the task. USAID's regular fact sheets offer snapshots of the work underway, but lack the detail to determine how most money is being used. Quarterly progress reports from the Offices of the Inspectors General provide a more comprehensive outline of the U.S. response, but program descriptions only hint at expected outputs and outcomes. A search of the term Ebola on ForeignAssistance.gov yields some results, but it is unclear how much of this incomplete record is related to the supplemental funding. Worst of all, there is no easy way to match the reported expenditures across these documents and platforms.

More than a year ago, the Center for Global Development hosted Liberia's Minister of Public Works Gyude Moore. At the time, Moore stressed the need for accountability when it came to the money being provided to fight Ebola in Liberia. He asked that the organizations responding to Ebola provide an account of the money they received and how it was spent. Our response to this sensible request has fallen short.

While all U.S. assistance should strive for greater transparency, I believe it is appropriate to hold this off-budget, emergency, supplemental funding to a higher standard. Crises of this scale and novelty complicate procurement and data collection, especially when there are multiple agencies involved in the response. This makes it all the more critical that we are vigilant when it comes to recording how much has been spent and where, and what we are getting for our dollars. That means not only reporting on spending but linking it to performance indicators and targets. In the absence of such reporting we lose the opportunity to determine what we have accomplished and where our next dollar would have the greatest impact. We should start now by improving our accounting for the remaining unobligated funds.

The WHO's recent declaration of the end to the public health emergency in West Africa was good news, but there is more to be done to address flare-ups and realize full recovery in Liberia, Sierra Leone, and Guinea.

The devastating epidemic should serve as a wake-up call. Congress can ensure a stronger U.S. response to health threats and guard against future ones by supporting recovery focused on households, health systems, and firms; promoting global health security through coordination, incentives, and risk management; and encouraging improved aid transparency in crisis response.

Senator FLAKE. Ms. Delaunay.

STATEMENT OF SOPHIE DELAUNAY, ADVISOR, MEDECINS SANS FRONTIERES, NEW YORK, NEW YORK

Ms. DELAUNAY. Thank you, Chairman Flake, Ranking Member Markey, and members of the subcommittee, for providing me the opportunity to address you today.

This outbreak prompted one of MSF's biggest emergency ever, and valuable lessons were learned from this strategy, and it is vital that they be acted upon. Needless to say, we also learned our own lessons in this process.

But, today I am going to share with you MSF's perspective regarding one specific issue, the state of biomedical research and development, R&D, because Ebola not only revealed existing challenges in the current R&D system, but teaches us lessons that are also applicable to other public health emergencies priorities, from tuberculosis to antibiotic resistance to Zika.

So, today, where do we stand when it comes to preventing, diagnosing, or treating Ebola? As we speak, we are still lacking an accurate and rapid point-of-care Ebola test that caregivers could use in the triage area to find out immediately whether a patient has Ebola or not. The few therapeutic options identified as effective, such as ZMapp, also present severe limitations in terms of availability and cost. On the vaccine side, there is one promising candidate, but, again, its use will be made more complex by cold-chain requirements or its perceived side effects. So, this is to say that

current solutions are not ideal. And a number of key questions remain about the disease, and more research is needed on it.

But, based on our lessons learned, MSF would like to see changes in the way biomedical R&D is conducted, and would like emphasize four priorities. One is to invest in needs-driven R&D before the next epidemic. The second is to start clinical trials as early as possible once an outbreak is identified. The third priority is really to maximize existing knowledge about the disease by sharing data and biomaterial among scientists. And the fourth priority should be to ensure that, once research is done, the products are indeed available and affordable to the population it needs.

So, let me go back to my first point about investing in research before the next outbreak. We know that R&D takes time and that we cannot wait for another outbreak before initiating research on lethal disease. So, we need to continue investing in research on Ebola, for Zika, and other neglected disease. And incentives for innovations are essential, but they need to work as intended and for the patients they claim to support.

And, to this point, in 2007, Congress created an incentive program for research on neglected diseased called the FDA Priority Review Voucher Program, the PRV. This program rewards a research institution which successfully registers a product for neglected disease with a voucher allowing this institution to actually fast-track any other project in its portfolio through the FDA regulatory process.

So, this is a very valuable programs, but two changes must be made to it. First, it should include a novelty requirement to ensure it actually induces new investments in R&D and is not awarded to already-existing drugs or vaccines. Second, the PRV should also require an access strategy to ensure that patients which the PRV intends to benefit will have affordable and appropriate access to the products.

These recommendations are not just rhetorical. They result from our own experience in dealing with leishmaniasis, tuberculosis, and malaria, where PRVs were granted for drugs that had been available in other countries for years, and also from our persistent struggle to access affordable medicine and medical innovations.

So, my second point is about implementing trials early in the emergency response. The lesson is that we started the trials much too late, and, as a result, the trials could not be deemed conclusive. So, we recommend that product calls and ethical guidelines for clinical trials during emergency be predefined in the interepidemic period.

My third priority is maximizing access to available knowledge, because collaborative research involving a timely sharing of data and specimen is being increasingly recognized by the scientific community as an essential means to incentivize research. MSF, which has cared for more patients with Ebola than any other organization, in terms of treatment, has collected valuable data that we would like to share, and we would like to see it used ethically for research priorities by the scientific community. The CDC, itself, certainly holds the largest collection of EVD-specimen library from this experience. Nevertheless, our attempt to support the WHO in establishing networks of biobanks and data-sharing platform is

very poorly supported by actors, including the U.S. counterparts. And there is still a very significant gap between the rhetoric and action.

I would like to go to my fourth and final point, ensuring that the final products when research is done are available and affordable to population in need, because innovation without access is actually meaningless. And we hope that, you know, improvements to the Priority Review Voucher Program to ensure medical products are available would be an important step, but there is still an urgent need also to address the global crisis on raising drugs and vaccine prices.

So, in conclusion, I would like to say that significant scientific advances are still required against Ebola and other deadly neglected disease. Ebola shocked and shook the world, giving us another opportunity to reflect on how we approach R&D. And as Zika has most recently demonstrated, it is in the interest in—of all countries, including the United States, to guarantee that appropriate mechanisms are in place to maximize the benefit of research and improve our response to future outbreaks.

Thank you.

[Ms. Delaunay's prepared statement follows:]

PREPARED STATEMENT OF SOPHIE DELAUNAY, ADVISOR, DOCTORS WITHOUT BORDERS/MÉDECINS SANS FRONTIÈRES (MSF) USA

Thank you Chairman Jeff Flake, Ranking Member Edward Markey, and members of the subcommittee for providing Doctors Without Borders/Médecins Sans Frontières—also known as MSF—the opportunity to share our perspective regarding the Ebola outbreak in West Africa, and some of the lessons MSF has garnered in its wake.

The Ebola Virus Disease (EVD) outbreak in West Africa was the most significant global medical challenge MSF faced between 2014 and 2015. As we speak, recent cases declared in Guinea and Liberia attest to the continued challenges posed by the virus.MSF's response to this outbreak has been unprecedented, and prompted one of our biggest emergency interventions in the 40 years MSF has been operational internationally. MSF responded across the region in Guinea, Sierra Leone and Liberia, but also in Mali, Senegal, and in Nigeria, and cared for one third of all infected patients throughout this outbreak. From March 2014 to December 2015—MSF set up and managed 15 Ebola management centers, with 40 to 250 beds in each facility, and also provided Ebola management training to national governments, international responding agencies—including the CDC, U.S. Public Health Service and the 101st Airborne Division—and other non-governmental organizations.

Across many sectors, valuable lessons were learned in the past two years, and it is vital that these lessons be acted upon. Needless to say, we also learned many of our own lessons in this process. Today, I am going to share with you MSF's perspective regarding one specific issue: the state of biomedical research and development (R&D). Notably, Ebola not only revealed existing challenges in the current R&D system; but allowed us to learn lessons that we think are also applicable to a large number of other public health priorities, from tuberculosis, to antibiotic resistance to Zika.

Ebola starkly illustrated how critically important it is to develop tools for infectious diseases before an outbreak occurs, as well as how challenging it can be to respond when adequate tools aren't available. This was not just an Ebola problem, though; it's an R&D problem, a systemic problem. And the consequences should really come as no surprise. Ebola was discovered nearly 40 years ago, but only after the outbreak devastated thousands of lives across West Africa and reached the U.S. and Europe, were significant R&D efforts launched to deliver tools to prevent and treat the disease.

Historically, Ebola has primarily affected rural populations in sub-Saharan Africa, and therefore the development of tools to prevent, diagnose, or treat the disease has not been a priority. Almost no R&D efforts were focused on Ebola until the mid-

2000s, when the virus was identified as a potential bioterrorism threat in several countries. Thereafter, the U.S., Canada, and a few other governments began supporting some basic research projects for Ebola.

However, the primary objective was to protect citizens of the countries sponsoring the research, not necessarily to address the needs of people affected by the disease where it occurs, in Africa. Therefore, crucial characteristics, such as product affordability or user-friendliness in resource-poor settings, were not really taken into consideration. Moreover, some of the public funding for this research dried up due to national level budget cuts, and several potentially promising treatments and vaccines stalled in the early stages of development without a sponsor to take them forward.

When the current outbreak started, research was incomplete and products had not been developed, despite the earlier public investments. Following the introduction of Ebola cases on U.S. and European soil, a number of trials for new vaccines and treatments were initiated. The beginning of these trials, however, also coincided with decreasing numbers of new cases.

Today, where do we stand when it comes to preventing, diagnosing or treating Ebola? Should there be another Ebola outbreak tomorrow, or an outbreak of another deadly and neglected pathogen, will we be better equipped to provide relief and treatment to the people affected by the disease? How can the R&D efforts be improved upon?

I would like to address a few of these questions now:

Firstly, in the area of diagnostics: the traditional Lab-based polymerase chain reaction (PCR) test used to diagnose EVD is very accurate, but the time taken between obtaining a blood sample and getting a result can be considerable,[1] and can take several days in some cases when samples need to be shipped from remote areas, as we have seen in West Africa. By using other types of accurate tests that can be positioned in more peripheral settings (such as the GeneXpert assay), our teams were able to reduce the time needed between sampling and result notification by 50%. Considering that the earlier a patient is treated, the more likely they are to survive, this is significant progress. The diagnostic process, however, is still time consuming and labor intensive. What is still lacking today is an accurate and rapid point of care Ebola diagnostic test that caregivers could use in the triage area to find out immediately whether a patient has Ebola or not.

Secondly, regarding therapeutics, three main types of products were tested or used in the treatment of patients: antibody-based products (i.e. ZMapp, convalescent serum), antiviral products (i.e. favipiravir, brincidofovir), and to a lesser extent, commercially available drugs repurposed for Ebola due to demonstrated in vitro activity (i.e. amodiaquine). None of the trials have been fully conclusive. In many cases, due to the decreasing numbers of infected individuals available to participate in trials, the sample size was just too small to lead to definitive conclusions.

The most promising results were found with ZMapp (licensed to Mapp Biopharmaceutical). There are on-going discussions in the United States to offer ZMapp under an "expanded access protocol" until it reaches licensure. However, other limitations for its use remain—including the potential high price of ZMapp and the limited production capacity. MIL77, a biosimilar of ZMapp which is produced in China is more likely to be available in large quantities and potentially at a lower cost. We are also now seeing many second generation drugs in the pipeline, but these products are unlikely to pass through the necessary trials before the next outbreak. One question, in this case, is whether it could be possible to rely exclusively on data in animals and in healthy volunteers to approve new treatments for Ebola.

Regarding vaccines, the good news is that there are now many more vaccine candidates in the pipeline. One of them—rVSV-ZEBOV acquired by Merck—is currently the most advanced candidate. Yet, even if scientists are able to confirm its efficacy and safety, it still will not be the perfect vaccine for Ebola due to several significant limitations. The vaccine currently needs to be stored at -80 °C (-112 Fahrenheit); it protects only against Zaire Ebola virus and not for other Ebola species or other filoviruses such as Marburg; the duration of its immunity is unknown; and the management of recorded side-effects—such as post-vaccination fever—will constitute a challenge during an epidemic.

As you can see, and despite a remarkable mobilization in accelerating Ebola research and development, current solutions are not a panacea. From my preceding assessments, we can conclude that, if there were another outbreak of EVD tomor-

[1] Van den Bergh R, Chaillet P, Sow MS, Amand M, van Vyve C, Jonckheere S, et al. Feasibility of Xpert Ebola Assay in Médecins Sans Frontières Ebola Program, Guinea. Emerg Infect Dis. 2016;22(2):210-2106

row, the tools will surely help but we cannot ascertain that we will contain the virus or save the lives of most patients.

Lastly, there are still a number of crucial questions related to the course of the disease itself. For example, how long does the virus linger in body fluids? This question leads to complications in a significant number of survivors and to the potential risk of sexual transmission several months after a patient could be otherwise confirmed as Ebola-free. More research is needed. There are other sequelae for Ebola survivors that require further research, including post-traumatic stress disorder.

MSF would like to see changes in the way biomedical R&D is conducted, including by pursuing the following:

1. Invest in patient and needs-driven R&D before the next epidemic;
2. Test these candidates and start clinical trials as early as possible once the outbreak is identified;
3. Maximize existing data and knowledge about the disease—by sharing it among scientists;
4. Ensure final products are available and affordable to populations in need.

1. Investing in research before the next outbreak

Research and development can be a lengthy and laborious process and years can pass before it delivers the right drug or vaccine. We should not wait for another outbreak before initiating research on lethal diseases. Due to biosafety considerations, Ebola benefited from public research in the past decade, but this early stage research was never translated into biomedical breakthroughs for at-risk populations. Despite representing more than 10% of the global disease burden, only 4% of new drugs and vaccines approved across the world were indicated for neglected diseases between 2000 and 2011. It takes vision and needs-driven priority setting to invest in R&D for neglected diseases, and such vision could save lives when outbreaks like Ebola occur. We need to continue investing in research for Ebola, Zika, and other neglected diseases or epidemic-prone emerging pathogens.

When incentives for innovation exist, especially if paid with public funding, they should benefit those most in need. For example, in 2007, Congress created an incentive program for research on neglected diseases called the FDA PRV program. The program works as follows: if a company, research institution or organization successfully registers a product with the FDA from a list of eligible neglected diseases, it is rewarded with a voucher, known as an FDA priority review voucher (PRV), allowing it to fast-track any other product in its portfolio through the FDA regulatory process. The voucher can also be sold to another company. The PRV program was recently improved, by lifting limits on transfers of the PRV for neglected diseases, increasing the potential appeal and value to prospective PRV recipients. The latest PRV has been sold for US$350 Million—a considerable amount of funding for R&D in the field of neglected diseases.

However, two changes must be made to ensure the FDA PRV program works as intended and for the patients it claims to support. First, the PRV program should have a novelty requirement to ensure it induces new investments in R&D and is not awarded to already existing drugs or vaccines. Secondly, the PRV should require an access strategy to ensure that patients and treatment providers which the PRV intends to benefit will have affordable and appropriate access to products. These recommendations are a direct result from our experience in dealing with leishmaniasis, tuberculosis and malaria, where PRVs were granted for drugs that had been available in other countries for years, or from our persistent struggle to access affordable medical innovations.

2. Implementing clinical trials early in the emergency response

Prior to the EVD outbreak, MSF had never been involved in clinical trials in the midst of an emergency intervention. Yet, even though the trials were fast-tracked, relative to traditional timeframes, they started too late. When the number of Ebola-infected cases started to dwindle, as a result, trials could not be deemed conclusive.

Clinical trials pose formidable logistical, technical and ethical challenges in an emergency situation. Yet, they are feasible and accepted by local communities when all information is shared openly. With adapted and transparent trial designs in place, medical organizations could promptly experiment candidates and augment the chances of expeditiously finding new medical solutions. MSF recommends that protocols and ethical guidelines for clinical trials during emergencies be pre-defined and agreed upon during the inter-epidemic period so when the next emergency occurs, trials can commence much sooner. The United States has, and continues to invest millions in the response and containment of epidemics. It is well placed to

ensure that such mechanisms are in place to improve the response to future outbreaks

3. Maximizing access to available knowledge

Outbreaks, be they of Zika, Ebola or influenza, are always contained through a combination of community, national and international efforts. Science is no exception to this rule; there, unity is also strength.

Collaborative research, involving timely sharing of data and specimens is being increasingly recognized as an essential means to incentivize research and leverage our understanding of diseases. Despite having learned a great deal about Ebola, many unanswered questions remain which will continue to hamper our ability to fight against the disease.

More than two years after the first case was confirmed in Guinea, responding country agencies, international organizations and NGOs involved in the response are still unable to draw a complete picture of the data, nor of the biological samples collected during the outbreak. Each of us holds a piece of the puzzle.

MSF, which has cared for more patients with Ebola than any other organization,[2] has collected valuable data that we would like to share and see used ethically for research priorities by the scientific community. The CDC certainly holds the largest EVD specimen library ever collected. Nevertheless, our attempt to support the WHO in establishing networks of biobanks and data sharing platforms for EVD and emerging pathogens is poorly supported by the many actors involved—starting with the U.S. counterparts. A significant gap remains between rhetoric and action. Knowledge sharing and collaborative research are often acknowledged in principle but they face tremendous resistance when it comes to implementing them. And too often, they come too late, once the outbreak has begun.

Collaborative science should be an integral part of the culture and the response to outbreaks, with clear standards and frameworks in place beforehand to optimize the limited knowledge available. I regret to say that should another outbreak hit tomorrow, there is no ethical or organizational framework in place to ensure the collection and sharing of biospecimens or the standardization of accurately collecting routine data.

As Zika has most recently demonstrated, it is in the interest of all countries, including the United States, to guarantee a culture of knowledge and data sharing in biomedical research.

4. Ensure final products are available and affordable to populations in need

Innovation without access is meaningless. Improvements to the FDA PRV program to ensure medical products are made available to patients and treatment providers will be one important step toward broader changes that are urgently needed to ensure the R&D system delivers appropriate and affordable health technologies. There is an urgent need to address the global crisis of pharmaceutical companies raising drug and vaccine prices. MSF is advocating for changes in the way biomedical R&D is financed by separating cost of research and development from the price of final products.

Likewise, global quantities of available products may not be sufficient to meet all needs. There may be a need to ration them at the global level. Member States of the World Health Organization should agree on a code of conduct on stockpiling of strategic drugs and vaccines. In order to make the best and most equitable use of those products, a collective stockpiling mechanism needs to be discussed under the auspices of the WHO.

CONCLUSION:

Significant scientific advances are still required against Ebola and other deadly neglected diseases. Once a disease is known and starts being documented, the lack of adapted and affordable medicine is rarely unavoidable. This is often caused by our inability or unwillingness to implement lessons learned and a needs-driven approach. Ebola shocked and shook the world. It gave us another opportunity to reflect on how we approach R&D.

The multiple health crises that patients are facing, including those treated by MSF, must be addressed. Every day, patients go without access to critical medical tools because such products are either not affordable, not suited to the conditions in which patients live, or simply do not exist because patients suffer from a disease not seen as a commercially attractive market.

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[2] MSF Ebola Treatment Centers admitted over 5,200 confirmed Ebola cases, of which almost 2,500 have survived

These are challenges we have faced for decades but in 2016 several government-driven processes will take place that seek to address different aspects of the failures of the R&D system and to create global norms and efforts to deliver appropriate and affordable medical tools, including negotiations at the World Health Organization, the United Nations General Assembly and the G7/G20. This a critical and historic opportunity to make a political choice to sustain improved medical outcomes.

Being a major contributor to both the responses to global health emergencies and to research and development, the United States government can and should lead by example by boosting collaborative and open research, including but not limited to neglected diseases and emerging pathogens, ensure global investments in R&D are coordinated, target priority health needs and deliver medical tools that are available and affordable to patients and medical treatment providers by de-linking the price of drugs from their R&D cost.

Senator FLAKE. Thank you, Ms. Delaunay.

Start with a round of questions now.

Dr. Knight, can you give some assessment of U.S. programs in our aid, our 5.4 billions, most of which was used initially, some left over. But, how could we have better utilized the private sector in Liberia? In what ways did we fully leverage the resources that were there, and what could we have done better to utilize those resources?

Dr. KNIGHT. I think it boils down to a very simple sort of attitude, which is historically—and we saw it in the beginning of the Ebola outbreak—that the private sector was often sort of seen as just remote, "Just give us a check and let us get on with it." And they underestimated just how much physical resource we had in the way of assets, expertise, way around the country. And sometimes the really basic stuff, which sometimes gets in the way, like just somewhere to sleep that night, access to a Land Rover, access to a bulldozer, and somebody to drive it. And so it sort of goes to that sort of almost closing remark I made in my more formal entry about just dialogue and collaboration.

And so, treat the private sector as an operational tactical partner, and start the dialogue with them as quickly as possible.

I mean, we were lucky with the EPSMG, because we had the idea, and people came to it. What if we had not had the idea? Yes. Who else could have that idea. And just make it a prerequisite, when you go into these types of operational places, fields, Who are the big private sector? Who is having a conversation with their big boss in their big corporate office? And who is going to have a conversation with them in the country? And I think you will be shocked. If you take the conversation away from the check to, "How can you physically help us with assets, skills, and expertise?"—people want to help. So, very simple answer. Treat them as an operational partner.

Senator FLAKE. Right. I have seen the pictures that you have——

Dr. KNIGHT. Yes.

Senator FLAKE.—of the roads around Liberia. Give—can you give some outline of how much of the country is inaccessible during much of the year? Just—you have operations in various parts of the country. How difficult is it, in terms of infrastructure that would relate to healthcare centers as well as businesses?

Dr. KNIGHT. Well, I will give you an example which I am familiar with. You know, to go from Monrovia to our mine, when everything is right—you know, the sun is shining, the road is dry—it can take 3 hours. When we get to these conditions, it can take 10–12 hours.

So, imagine trying to run a business, just getting assets, let alone people, to and from that site. We used to have a helicopter, but we have now grounded that as part of our cost-cutting messages. So, imagine if somebody gets hurt. Imagine if we break a leg and we need to get somebody to Monrovia. We have got to move them on those types of roads. You know, who would want to work in that environment? You know, I mean, sort of saying things such as, "We want to create confidence and incentives for people to invest in these countries." You know, these really basic things get in the way. So, a muddy, destroyed road really makes businesses suffer.

You asked me what percentage. I do not actually know the number, but it is a lot, and it is making a noticeable difference.

Senator FLAKE. All right. Thank you. In Arizona, we dream of muddy roads like that. But—[Laughter.]

Senator FLAKE. Dr. Panjabi, it was touch-and-go for a while during the height of the outbreak, when—there was a case here in the U.S., someone who had traveled from West Africa. And there was a real push for a travel ban that would have affected those countries and cut off airline service. Fortunately, we avoided that. What would that have done, in your view? How would that affected—have affected your operations and others?

Dr. PANJABI. Thank you, Mr. Chairman.

You know, I was in Liberia at the moment that traveler was here, and, you know, to be very honest with you, it would have felt like an infected wound was being cut off. But, besides the moral dilemma there, and leaving people behind, it would not have been very strategic. The most important thing that the U.S. did was to keep those doors open to allow health workers to go there and help stop the infection at its source. So, from a strategic perspective, it was wise to keep the doors of this country open.

Senator FLAKE. Thank you. As far as lessons learned, I think that is one that we have to learn again and again, not to overreact on some of these epidemics that make the matters worse. And, frankly, that would have been a big blunder on our part, I think, had we pushed through and allowed that to happen.

Give us an idea what these local health centers—President Sirleaf has talked about, in the next—before she leaves office, to have, I think, 2,000 or so in rural areas. Is that achievable? And how can we help? And are we helping in that effort?

Dr. PANJABI. Well, the good—what President Sirleaf—amongst her priorities in the health system, in addition to labs and clinics and hospitals that need to be refurbished and equipped, she has focused in on the health workers. The number you mention is around the community health workers. In one effort, she has seen that you can extend healthcare to the most remote communities, there are about 1.2 million people out of 4 and a half [million] in the country—that do not have any physical access to healthcare. So, this will bring healthcare to those regions. Those are exactly the places where Ebola is likely to reemerge. And it also is going to create jobs. We know that rural unemployed people, men and women, is not—is a big issue for the country. It always has been, from all perspectives, economically and securitywise. This is a chance to give employment to 4,000 people out there.

She [President Sirleaf] has asked for 2,000 of these workers to be deployed for the sake of healthcare and jobs by the time she transitions office at the end of the next calendar year. The U.S. is already stepping up to mobilize this kind of support, and a number of agencies I mentioned in my testimony have been designing this program, along with the Liberian government. It will be government-led. Private groups will also be involved in helping roll it out. Speed is of the essence, I think, to help stop the next Ebola, but also to make sure we take advantage of the fact that there is phenomenal leadership from the country itself that is being asked to push forward.

So, I think what can be done, from the Congress's perspective in the U.S., is to make sure that that momentum is preserved, the funding is preserved for that kind of initiative that is so important as a priority to her, and that it is amplified and there are commitments made to the long term. This is something that is not going to be built back in a year or even in the next 18 months. It will give us a big headstart, but it took years to start to rebuild the health system after our war, and it is going to take years to put this in place. But, it will have a high return on investment.

Senator FLAKE. All right.

Before I turn it to Senator Markey, let me just say—dealing with Liberia with an epidemic like this, I cannot imagine having done that with the prior administration or others that did not work directly with us. And also, on the back end, to have the President of Liberia come back and thank us, and thank the American people for the resources and the taxpayer monies that were spent is something that perhaps is not heard often enough by the taxpayers out there who fund these kind of efforts. But, there was genuine gratitude and a willingness to work with us to make sure that we can prevent this kind of outbreak in the future.

So, with that, turn it over to Senator Markey.

Senator MARKEY. Thank you, Mr. Chairman, very much.

Without the United States and international community moving in to help and build the structures and help the healthcare system, how capable would these countries have been to deal with this issue? How indispensable is the United States, in other words, in dealing with this issue?

Ms. GLASSMAN. The U.S. has obviously had an indispensable role. And, most importantly, is helping with the logistical response, funding the many nongovernmental organizations who deployed healthcare workers to meet the need. But, even more importantly, as a signal of commitment to the rest of the nations of the world that this was an important problem that needed to be solved, because we cannot go it alone. This is obviously something that affects the world community.

Senator MARKEY. So, if there are, which there will be, additional Ebola flareups, Lassa fever flareups, what is the capacity for these countries to deal with it in the absence of the United States being there to provide assistance?

Ms. GLASSMAN. Well, I mean, you have seen how poor the West African countries are. Other countries have more resources to be able to mobilize on their own. But, unless we, as the United States Government, are creating better incentives for governments to put

their own money towards basic public health programs, disease surveillance, healthcare workers, infection control, results in health, I do not think we will get to sustainability anytime soon. So, I think that is something that we need to think about, going forward.

Senator MARKEY. So, we will have to be there in order to ensure that, when these flareups occur, that the problem is contained quickly. Is that what you are saying?

Ms. GLASSMAN. So far, the United States seems to have been the first responder in many cases——

Senator MARKEY. And that will have to continue, in your opinion?

Ms. GLASSMAN. In low-income countries, I think that will have to continue.

Senator MARKEY. Yes, thank you.

And what about the survivors? They are particularly vulnerable. What kind of additional assistance will they need in order to be able to deal with the aftermath of their families being afflicted with this disease?

Dr. PANJABI. I can take that.

You know, Senator Markey, I—what is needed is good healthcare. I mean, you brought up, in your opening remarks, that the survival rate for people with Ebola in West Africa was dramatically lower than it was for people that were brought here. They had the same disease, but they had different healthcare systems. So, what we need for Ebola survivors is ongoing care. A number of them have ophthalmological/eye problems. Of course, there is the potential for the disease to be retransmitted through sexual transmission. So, focusing there [on strengthening healthcare] will also help care for those people and help, from a public health perspective——

Senator MARKEY. How high is the threat for reinfection?

Dr. PANJABI. Well, you know, I am not an expert in reinfection, itself, but we do know, for instance, that our initial estimates of how long the Ebola virus exists in semen was an underestimate; it is actually much longer. And we are still learning exactly how long it can last. But, certainly beyond the 90 days we initially thought, and several more months after that. So, you know, continued monitoring is also going to need to happen. And that is not going to come from anything but actually providing healthcare to these Ebola survivors.

Senator MARKEY. Okay. What are the lessons that you think we can take from Ebola and now apply to Zika, in terms of protecting those countries that are already infected and the United States as we head into the warm-weather months? And——

Dr. PANJABI. Yes.

Senator MARKEY.—at least 200 million people are potentially in areas that could have Zika outbreaks before the end of this year. What are the lessons that you would have us take from that? And what kind of actions should the United States take in order to deal with that potential threat?

Dr. PANJABI. Yes. Well, I think that the effort to bring in capacity to detect early, respond quickly, and then prevent these things from coming back is critical. So, health workforces are important.

The training is important. You know, the lab systems are important. Vaccine delivery and creation is important.

We need to also remember that 75 percent of emerging human infections are of zoonotic origin. That means that they are coming from animals to humans. They may spread human-to-human in some cases, as Ebola does primarily, but they are happening in remote parts of the world. Zika itself was discovered initially in a forest in Uganda in the '50s. So, you know, can we detect these earlier in those remote parts of the world to identify the next threat that we do not even know about yet? I mean, that——

Senator MARKEY. Just going back to what you said earlier about how we had to move in minutes and we were moving in months and years.

Dr. PANJABI. Yes.

Senator MARKEY. Do you feel that there is a sense of urgency here?

Dr. Knight, could you talk about that, in terms of the lessons of Ebola, given the fact that Zika is on our border.

Dr. KNIGHT. I think, you know, the lesson is, How would you work with the private sector? I mean, this sort of reducing the response time from months to minutes. The private sector is already established in those places. You know, it is an email. It is a phone call. And it is a request. And we can mobilize, because we have got systems and logistics there.

You know, what can the private sector do? It can talk to everybody who works for them. It can talk to everybody who supplies them. It can talk to their neighbors. And if every single big-, medium-sized company in those infected countries was doing that, it makes a big difference. You know, you have a very special relationship in an employer-employee relationship.

Senator MARKEY. Well, how do you feel about this transfer of funding out of Ebola and over to Zika at this time, Dr. Knight?

Dr. KNIGHT. It is hard, because, as you sort of said, it is sort—it is a big of a moral maze. But, if the question is, Have we done enough to stop Ebola happening in Liberia? Have we done enough to create the right momentum towards economic recovery in Liberia?—the answer is no.

Senator MARKEY. Have we done enough to put in place the protections that we need against Zika, from that perspective?

Dr. KNIGHT. Well, I—I am not close to Zika, so it is not fair to——

Senator MARKEY. Dr. Delaunay, how do you feel about that?

Ms. DELAUNAY. MSF is not working in the countries where—affected by Zika either, so I am not really able to answer your question. But, I can just say that, indeed, there is still a lot to be done for Ebola, both in terms of system strengthening and research to understand this disease. And if it is about shifting from one priority to another, then it is worrying, because this is one of the lessons that we learned from Ebola, that we need to be prepared. It is going to come back, and science needs to goes on.

Senator MARKEY. Yes. So, your basic message is to fund Zika at the levels that it should be funded, but do not underfund Ebola as a result of making that choice—almost a "Sophie's choice" between the two diseases and the impact it can have on families?

Ms. DELAUNAY. Absolutely. Absolutely, yes. There is still a lot to be done on Ebola. And our big concern is that, when the cameras have left these countries and the—there are still lots of lessons can—that can be implemented, especially in terms of—because it is not just about funding, it is also, as Amanda was saying, you know, trying to be more effective with the funding that we do. And in the field of science, it is clear that one big lesson is being prepared and being organized to gather that data, to share knowledge, is going to improve the scientific advances.

Senator MARKEY. Okay.

Thank you so much.

Senator FLAKE. Thank you.

Senator Isakson.

Senator ISAKSON. Thank you, Chairman Flake.

Being a Senator from the State of Georgia, I am very proud of what the CDC and Emory University did in the contribution toward the terrible Ebola outbreak. And I have a few questions regarding the CDC on that line.

And, Dr. Panjabi, I would really like to ask you, if I could for just a minute. We have—in our supplemental appropriation, we talked about a goal of establishing many CDCs around the world, maybe as many as 20 of them. And Bill and Melinda Gates and International Association of Public Institutes and others are working on that goal. Would it be helpful to disperse that type of delivery system around the world? And would there be enough countries who would be willing to make the financial contribution to help make that happen?

Dr. PANJABI. Thank you, Senator Isakson.

A short answer is yes, that it would make a big difference. In the middle of this crisis, at the beginning of it, the Liberian government and Ministry of Health, we were sitting in these rooms. There was—it is not that there were not any actions taken at that level. There were 30–40 people meeting every day, including the Minister of Health, trying to respond to the initial outbreak. One of the most effective things the CDC helped with was putting in an emergency operations center and helping—organized even the decisionmaking around that, called an incident management system. So, whether it is the field epidemiology training programs that the CDC wants to put in place or an initiative like that, I think the—efforts like that will be critical. As long as we are trying to transfer and support the skills of local health workers, we need to build that capacity in those countries.

A question of whether other groups will be behind this, I know that the African Union and others are looking to try to focus on that. The idea of an African CDC or a CDC based in Africa, is something that I know a lot of groups, both specific governments, but also as a community of African states, for instance, and I imagine other parts of the world will be interested in.

Senator ISAKSON. I was interested in Dr. Knight's comments about engaging the private sector early on in the effort, and what you did, yourself, to recognize what needed to be done to protect your people and your assets. Is there a catalyst anywhere in Africa to take best practices and lessons learned from this Ebola outbreak

and try and train countries so they are better able to respond on their own? Is anybody synthesizing that?

Dr. KNIGHT. The World Economic Forum took a lot of interest in Ebola, and they took a lot of interest in, obviously, what we did as the private sector, being the World Economic Forum. So, they have codified and written down everything we did. And in Turkey, U.N. are hosting the humanitarian sort of big convention. And again, it is clear that they have now sort of—they are beginning to look at the private sector in a different way.

The tough thing about what we did was that it was in—it worked because it was quite informal, and it was not wrapped up in process and governance. So, it is actually quite hard to sort of codify something which works when it is quite informal. So—but, my message to people at World Economic Forum, the United Nations—it goes back to the earlier comment. It is—the moment you need to mobilize on any humanitarian crisis, one of the questions in that, sort of, first page should be, "Who are the private-sector players out there? Let us get them together and talk to them."

Senator ISAKSON. Right.

Dr. KNIGHT. And if you start to overinstitutionalize something, people sort of—the private sector sort of go, "Oh, this is going to be membership fees. This is going to be governance. I am going to have to commit something politically. I am not quite sure." But, the moment there is a crisis, they are eager and keenly enthusiastic help. So, it is just how quickly you engage, the moment you need players on the ground with equipment and assets.

Senator ISAKSON. Yes, do not overbureaucratize the response, or it will take entirely too long. I think that is what I hear you saying.

Dr. KNIGHT. Yes. Yes.

Senator ISAKSON. Because time——

Dr. KNIGHT. Do not overbureaucratize, but jump on the opportunity as soon as you need it. And—you know, and all of us are saying what the big lessons from Ebola was: We all could done more, quicker. And that is the other thing, you know. And I think what worked for the private sector, as well, was the fact that we had a risk-management system. You know, it is very textbook, it is very business school. But, when it works, it really works. You know, we were testing what would happen if Ebola became serious back in about February.

Senator ISAKSON. Right.

Dr. KNIGHT. We had everything in place. All our staff were trying to—when we had the big outbreak in Monrovia, the first deaths in Monrovia, we literally just turned on a switch and we were there. We were testing people. We were communicating with people. Because we had planned it. We had rehearsed it. And we were ready.

Senator ISAKSON. Yes, I was really proud of Dr. Frieden, at the CDC, and also our military. A lot of people have forgotten, we deployed military assets in West Africa to build some of the temporary facilities so we could isolate those that had the infection, keep them from spreading it to others. So, it takes a multiple set of efforts.

Dr. KNIGHT. Yes.

Senator ISAKSON. And a private-sector partnership with governments that are prepared to respond and have a best-practices plan, if we have another one, God forbid, will be an improvement on the lessons we learned from this one.

Dr. KNIGHT. And to go back to the private-sector contribution, many of the foundations and the ground-clearing for that was actually done by our equipment and our bulldozer drivers. You know, you cannot build a medical center without foundations. And we just turned up and did it. So, all that extra bit of complication for real mobilization, we just did. You know, and it is just very—it is very—we underestimate the power of these very simple, straightforward support. Very easy for us to drive bulldozers——

Senator ISAKSON. And we are also—we have some——

Dr. KNIGHT. But, we just got to it quicker.

Senator ISAKSON. We had a lot of private sector, like Samaritan's Purse and religious-based organizations did a tremendous—deliver healthcare services. In fact, one of the people who was transferred from West Africa to the United States at Emory University was a Samaritan's Purse physician who was infected in Africa. And that was the first big controversial issue about bringing somebody into the country. But, because we did that, I think it was a—it was a good thing, obviously, for the patient, but it was a good thing for the entire epidemic and the——

Dr. KNIGHT. Yes.

Senator ISAKSON. Thank you very much for your efforts.

Senator FLAKE. Thank you.

Senator Coons.

Senator COONS. Thank you, Chairman Flake, Ranking Member Markey, to Senator Isakson, my good friend, to all of you for your remarkable work in this field and for your testimony today.

The principal point you are making is that Ebola is not over and that the significant amount of resources that the United States has appropriated to try and address Ebola should not be redirected elsewhere, that, frankly, we should also be investing, simultaneously, in a response to Zika, and that all the conditions that led Ebola to go from largely unknown to a significant challenge to a global concern are still there.

When you say, Dr. Panjabi, it is a zoonotic illness, there is an animal reservoir of Ebola that has probably been active in West Africa 40 years, that we have now discovered. There have probably been a whole series of small outbreaks in remote villages that the rest of the world never knew about. And there is, of course, the possibility, that this virus will mutate and become more lethal.

What we see on the ground in Liberia, in Guinea, in Sierra Leone, economies that have not yet fully recovered, may not recover for a number of years. Grassroots healthcare systems that need to be fully built out. And, of course, we commend President Sirleaf for her terrific work in leading the effort the deploy community health workers across the country. But, there is so much more to be done. Porous borders and a lack of any sort of a modern healthcare infrastructure in the remote places in these three affected countries led to the outbreak.

One lesson, I think, that was most poignant at the time was that, at the moment when Ebola broke out into Nigeria, in the Port

Harcourt area, I think there was a global collective gasp at the real prospect that Ebola would get loose into major metropolitan areas into the international travel community and metastasize globally. And it did not. It was contained, quickly and well, and in no small part because of, of course, the brave public health workers in Nigeria, volunteers, and the infrastructure. Investments made by the United States through our PEPFAR program, and through our efforts against polio built some of the labs and the communications and the infrastructure and the public health systems used to prevent an outbreak.

So, if I hear you right, your central message to us across many concerns is this: To the U.S.—do not stop investing in making sure that we have addressed all the things that, because they were not addressed, led Ebola to be so lethal so quickly, so broadly. Have a clear path forward on vaccine testing and development. Have a clearly developed ethical structure and incentive structures. Medecins San Frontieres, you have shared with us that concern, and, I think, a very powerful and important one. We need to have a framework for data-sharing and for vaccine development that is proactive, not reactive. It is very hard to do effective field trials in the middle of disaster response. As Dr. Panjabi has said, continue to build out grassroots community health worker networks across the region in the country. And, as Dr. Knight has said, we have private-sector partners all over the continent and the world who can and should be proactively engaged in planning for the next pandemic.

Zika, which is a challenge, is not what I think we are most concerned about as a group, which is a truly lethal global pandemic. Ron Klain, who I think served admirably as the President's Ebola coordinator, has recently published a piece in which he raises the specter of a truly global pandemic that would be faster-moving, more lethal, and more readily shared than Ebola was. And he makes a number of suggestions. So, let me move to asking what you see about both lessons learned, the need for our continued investment, and the suggestions that you and he have made.

And let me not close my opening without saying that it was the people of Liberia, in my experience there in December of 2014, volunteers from around the world, who were really on the front lines in making the lifesaving difference, and, in 500 cases, giving their lives as health workers. But it was, as Senator Markey said, the United States that was the indispensable nation that brought to bear, at a critical moment, in the rainy season, when there was a near collapse of the nation of Liberia, absolutely essential logistical supplies, resources, funding, trained personnel that helped Liberians turn the corner. This was, I think, a moment of great partnership and of great leadership by the United States, the international community, and by thousands of volunteers from around the world.

But, there are critical lessons learned about how to reform the WHO, about how to reform the accountability and transparency of data, about how to improve the grassroots healthcare networks of fragile nations, and about how to plan for the next outbreak.

So, let me turn, if I might, to the issues raised by Ron Klain. He has suggested that, within the United States, we should have a—

an identified National Security Council coordinator to manage interagency responses. He suggested investment in just the sort of CDC that Senator Isakson was asking about, regional CDCs—Africa first, but in other geographies—that have the capacity to mobilize cutting-edge analytical capabilities, field tests, and to coordinate field trials. He suggests that the global health security agenda, Global Health Security Act and the agenda that it would authorize, needs to move forward, that we need to continue, as a country, to invest at the grassroots. And he suggests a parallel to FEMA that would be essentially a public health emergency management agency.

As was mentioned in passing, one of the things that most impressed me about the response I was able to see in December of 2014 was its coordination. There were dozens and dozens of nonprofits, of government ministries, of U.N. agencies, of U.S. entities, and there was a regular, clear, weekly meeting, with a public agenda, with everybody in the same room at the same place at the same time, using the National Incident Management System that has been built out in the United States by FEMA to coordinate response, to identify and prioritize investment. That was truly encouraging. And a number of the folks from the DART team at USAID, who I met with, said, across a half-dozen other disasters, they had never seen that work so well. That was partly due to private-sector engagement and leadership, in terms of skills and capability. It was partly the U.S. But, it also was a reflection of the very strong Liberian-American community. There were dozens and dozens of Liberian-Americans who had returned to help lead the government and ministry responses.

So, please, if you would, respond to a number of those proposals. I know that was a long survey of the different issues. Each of you have spoken to them in your testimony, but if you would focus and sharpen. What are we missing? What do we most need to do next? And I assume you agree that Ebola is not over, the conditions that create it have not gone away, and, if anything, we need to double down on the investments we are making, and make them count.

If you would, in order. Dr. Knight, please.

Dr. KNIGHT. I agree with everything you said. You know, Ebola is not over. But, I might put a slightly different context in it, that, in such a globalized world, the risks of pandemics is more severe. You know, and that might help some of this conversation about, How much do we appropriate funds? It is actually—this is an emerging and growing problem. Very mobile world, et cetera.

The other question, What do I think of the recommendations? They all seem—I support them all, obviously, but the missing one, I think—and I mentioned it in my opening comment—is, in a world where there was a serious pandemic and an infectious pandemic, what are the conventions, protocols of people traveling from one country another? You know, if I was to send 10 people to a country to help fight a pandemic, what do I do with them if one of them gets the disease? Can I fly them home to treat them in my hospital in my country? Or they then have—they have to stay in that country? Because it changes who I ask and what I ask of them. It—if it is clear somewhere, it was not clear at the time. And it almost feels like—I do not understand how international systems work,

but it almost feels like there should be an international convention on the movement of people across borders during the time of a pandemic. And maybe with different trigger levels. When it is beginning to happen, it is more accessible. When it is really severe, borders might have to shut. I do not know. But, do not let us work it out during the next one. Let us have it written whilst we enjoy not having one.

Senator COONS. I do think, Dr. Knight, the establishment by the U.S. Public Health Service, which has been sort of an unsung hero of this, of the treatment facility out at Robertson Airport, was especially critical, because it allowed international volunteers, public health professionals to have some confidence that, when they contracted Ebola, they would get world-class care without having to be repatriated. I met with a number of the Liberians and foreign nationals who had survived Ebola because of their treatment there. We have no plan or convention around that——

Dr. KNIGHT. Let us, Yes, codify, write it, and say that is how we will deal with that scenario.

Senator COONS. Excellent.

Dr. KNIGHT. Otherwise, it interferes with decisions sometimes.

Senator COONS. Dr. Panjabi?

Dr. PANJABI. Thank you, Senator Coons.

You are right, Ebola is not over. The conditions, as you said so eloquently, that created it are still there. And it is true that the medical literature reports that we were warned about this. We just did not see it. As late as—as far back as the 1970s, there was literature from West Africa that reported antibodies—meaning that people were exposed to Ebola. It just was not caught. And so, there are these blindspots—and that is what I would say is missing—in global health. We ask, in making investments in global health, what disease to focus on. Is it HIV and AIDS? Is it Ebola? We have started to ask more of the question of how to do it. Amanda brought up great suggestions about focusing on performance, focusing on the health workforce. We have not asked enough about who and where the distribution of those resources have gone.

Take the State of Alaska, for instance—a homegrown example—600,000 square miles, 600,000 people. Instead of deciding to allocate resources just on a dollar-per-capita basis, which would have left every small remote community out of that calculus, they asked the question, How far are people from healthcare? If there are 50 people in a village or a community, if there are 100 people, how far are they from a C-section? If they are 60 minutes or more from a C-section, regardless of population size, you are going to be designated a "frontier community," which means you are going to get a higher earmark in the budget. This is the Office of Rural Health Policy here at HHS.

Those kinds of policies and financing innovations need to come to global health if we are going to focus on the blindspots that lead to the hotspots of disease. And to get there, that first has to start with tracking conditions in those areas. So, we need to be asking about distribution. Who and where? If it is medicines, is it getting to the last mile, is it getting to all people? And can we prove that? Can you hold people accountable to cover each and every person? Great agendas are already been put forward. The Global Health

Security Agenda, you mentioned one of them. There is no way you can stop emerging infectious diseases if they are zoonotic if you do not go to places where they first emerge. But, there is also broader agendas and synergies with the investments you all have already made in HIV and AIDS, in tuberculosis and malaria, in strengthening health systems. There is a grand agenda to get universal health coverage out to all parts of the world that do not have it. These are synergistic.

And I think that is just the second point I would make that is more subtle, perhaps, is, we cannot pit different diseases against each other, but we also cannot pit different strategies against each other. Last week, a bunch of community health workers who were delivering care for mothers and children discovered a pertussis, a whooping cough, outbreak in that region. You know, you could have said, "Well, those community health workers are not disease responders, they are not focusing on disease surveillance, so let us not fund primary healthcare." When, in fact, now they are the front lines of a disease response.

So, these are synergies. It is not either/or. And I think there is a lot of leverage yet to be had in linking these agendas together. But, the goal, I think, again, the big blindspot, is, we are not reaching the last mile. There are 400 million to one billion people on the planet who live out of complete reach of healthcare, even in the 21st century. And if we do not reckon with that, we are not going to, I think, be able to stop these outbreaks from happening.

Senator COONS. Well, thank you, Doctor. And thank you for your particularly brave and persistent and powerful work, along with Paul Farmer and the Partners in Health. The model that you have been advancing is a huge "aha" moment, I think, for all of us.

If you could, briefly, Amanda and Sophie.

Ms. GLASSMAN. Yes. Thank you, Senator.

I agree totally, there should be a global health czar that has power over the interagency and the budgetary tools needed to assure that all the agencies are moving in the same direction. But, that said, I think we also need to structure our financing of response to infectious disease, whether they are outbreaks or whether they are protracted issues, in a way that avoids repeat disease earmarks and repeat emergency funding. As we have said, it is not if, it is when.

So, you know, can we change? We have been doing this since the time of PEPFAR. And we seem to like disease-specific earmarks. It is great to know you can talk more specifically about what is happening, but we can still have that accountability and, you know, the impact on people's lives without having to name money by disease-specific intervention.

And finally, the Global Health Security Agenda, very important. We have been doing a lot of training, meeting, and capacity-building. I worry that we are not creating enough incentives for outcomes on disease preparedness. So, we know what a good disease surveillance system looks like, but did we know whether Brazil's disease surveillance system was working well? Did it have complete coverage? Were they able to respond? Brazil is a big federal country like our own. They face a lot of the same issues. How do we get subnational entities to be prepared for public-health outbreaks?

Are they really recording all the deaths? Do they have the capacity to do that?

And I will end there. Thank you very much.

Senator COONS. Sophie?

Ms. DELAUNAY. Thank you, Senator, for your eloquent summary of our recommendations.

I would like to make a comment about the Global Health Security Agenda and the CDC.

On the Global Health Security Agenda, of course we see a lot of value in the U.S. taking a leading role in trying to address the response to outbreak. And one of the value is actually that you have been able to get onboard a number of countries. And the response to an outbreak never takes only one actor; it takes a whole range of actors. So, that is a very valuable issue.

Our only concern with the Global Health Security Agenda is that—is hoping that the agenda is not just driven by security concerns, because what we have learned, and what we learn repeatedly in humanitarian and medical situations, is that the best way to actually address health issue is to be patient-driven, is to try to respond to the needs of the patients first, and not necessarily when we feel a threat. There were some research about Ebola in the beginning of the 2000, when there was a fear of bioterrorism, and then it was abandoned. And so, the—you see the risk of actually attaching an agenda to security issue, as opposed to health consideration and needs of the population.

Regarding the CDC, I would just like to share a very recent experience. We are—first, we have been working very, very well with the U.S. CDC in Liberia, as you may know, hand-in-hand during several—during 2 years. We also recognize that there is a major need for better surveillance. And we have engaged in talked with WAHO, the West African Health Organization, on data-sharing. And it was interesting to see that actually they wanted every discussion were going back to the African CDC. So, they want the African CDC. They want this to happen. And provided that the United States is able to actually help them set this up and help them develop the ownership and the capacity to run such a initiative, it will definitely be a game-changer in the region.

Senator COONS. Well, thank you.

Thank you all. Thank you for your service.

And thank you, Chairman Flake and Ranking Member Markey, for convening this important hearing and for staying engaged and being such leaders on this important issue.

Thank you.

Senator FLAKE. You bet. And thank you, Senator Coons, for actually traveling to Liberia in the height of the epidemic. That was a gesture that was much appreciated by all, and certainly courageous on your part.

Let me just say, in the form of kind of a question, but a statement—Ms. Glassman, you talked about the perils of supplemental funding. I think a lot of the discussion today is around—you know, we have disease-specific funding that we appropriate. It is, frankly, far easier to appropriate, from a standpoint of an elected official, when there is an issue like Ebola or like—or HIV/AIDS in Africa. With an epidemic level, it is just—it is easier to move money. That

is why we do it. But, it does not serve us very well in the long term.

And if I look at our global health budget, the request for 2017 is $8.5 billion; enacted, 8.1 billion for last year. When are we going to actually bite the bullet and say, "All right. We need to increase that, and decrease the likelihood of a supplemental needed later?" Or do we go another direction?

Ms. Glassman, do you have any thoughts on that? You have shared some in your testimony, certainly, but I would like to have you detail that a little more.

Ms. GLASSMAN. Thank you, Senator Flake.

Well, it is a very difficult political task to do, but I think the idea of trying to increase funding and still hold ourselves accountable for results in specific disease areas is a good combination. That way, we can use our funding rationally, but we are still accountable for the outcomes in the diseases that we care about, the infectious diseases, and the preparedness that we care about. So, I think maybe that is a compromise that would be politically feasible.

Thanks.

Senator FLAKE. Well, certainly from our point of providing oversight, and a lot of the funding is through this committee, if we have a regular appropriation cycle that includes this money, it gives us opportunities through the hearing process, budget committee hearing processes, to actually scrutinize and scrub and see, you know, what worked and what did not. So, I hope that we can move more in that direction.

Senator Markey, did you have any followup——

Senator MARKEY. Yes, if I may, please. Thank you, Mr. Chairman, very much.

I would like to, again, come back to this Zika question. I think it is very important, because there is clearly a dynamic tension now that is opening up, in terms of the willingness of Congress to appropriate the monies that are going to be needed to deal with both of these diseases. And maybe you—Dr. Panjabi, maybe you could talk about this issue again, in terms of the need to ensure that there is funding for the Zika epidemic as it moves throughout that region and towards the United States at an ever-accelerating pace. What would you recommend that we put in place, given the lessons that we have learned from Ebola? And would you recommend to Congress that they replenish the money that they are taking, that we could reprogram out of Ebola, and ensure that there is, at the same time, full funding for Zika so that we do not, unfortunately, lose the lessons of the Ebola crisis, lose all of the—you know, the basic hard-won human tragedy that had to be suffered through because we did not act quickly enough, because the world did not respond quickly enough, because the WHO did not respond quickly enough? What would you recommend to us, as an institution, in terms of the funding and how we should proceed?

Dr. PANJABI. Well, you know, the way I think about this is, these are not separate battles in a single war. You cannot win one or the other and win the war. These are two different wars to fight. And we have to be able to maintain our defenses in—on both fronts, whether it is in West Africa or in Latin and South America now,

in the Americas. So, I do think whatever can be done, from the Congress perspective, to both provide the support that is needed to respond to Zika and, where needed, replenish, if that is what is needed, the funds that are being moved away from Ebola, but also actually—and again, tie that to performance. I mean, there are clear targets here of what is needed to be done. These are—you know, the—we need to get kids vaccinated in West Africa. We need to make sure that community health workers are paid and supported. Lab systems need to be strengthened. Health-worker readiness needs to be there. They need to have protective gear, gloves, and gowns. If we continue to do that in West Africa, we will help stop the next threat there.

Some of those same lessons and interventions are what is needed in Zika, whether it is training health workers, equipping them appropriately. And, you know, I think that the Global Health Security Agenda, what the CDC has put forward, is very straightforward: prevent, detect, respond. That kind of agenda, of investing in that, will be very helpful.

You know, we also know that Zika has been present—as I mentioned earlier, the first cases were in West Africa and Nigeria, of human infections. Right? So, by investing now, post-Ebola—or while we are trying to fight Ebola, still, and also recover, but also set it up to be resilient against Ebola in West Africa, we are also setting it up to be resilient against other kinds of diseases, if we do it the right way, whether that be Zika, if it reemerges there, or whether it is other infections. So——

Senator MARKEY. So, as you look at WHO and what just happened with Ebola, have they learned the lessons, in your opinion, Doctor, of what just occurred in West Africa?

Dr. PANJABI. I do think the WHO—a well-supported, fit-for-purpose WHO—is going to be important to helping stop and respond to these outbreaks. I think they play an essential role. Have the lessons been learned? I think they are still being learned. I think that——

Senator MARKEY. What do you think the big problem was, Doctor? Why did they not see it? Why was it not—why was the alarm bell not ringing so loudly that they did not respond? And why, in your opinion, should we have any confidence that any reforms are going to change that attitude?

Dr. PANJABI. I think the central primary reason is that this went undetected? Right? As I mentioned in the testimony, you have an Ebola infection that moves from an animal reservoir into a human reservoir—a human population, initially, in really remote areas. Health workers are not supported there. They are unpaid or they are underpaid, they are unequipped or underequipped. And if you do not have a health system in these remote areas, you are going to miss—it took 3 months; when minutes counted—every minute counted, we lost months. So, by the time March rolled around, of 2014, to catch up with that response was—we were already behind several steps from the epidemic. So, I think that still is the central issue, is making sure surveillance in primary healthcare services in the most remote areas are there. That includes good data and monitoring. Had those pieces been in place earlier on, any institution, whether it was the governments in those three countries, the

WHO, the U.S. Government, they all would have been better prepared to respond. And again, I think that is the focus now that needs to be there for all of us, is to make sure, where we know there are disease hotspots likely to happen, and there are blindspots in healthcare reaching those areas, we need to double down on investments in those places.

Senator MARKEY. Thank you, Doctor.

Thank you, Mr. Chairman.

Senator FLAKE. Well, thank you.

Thank you all for sharing your time and your experience and your expertise. This has been very enlightening to all of us. Appreciate the preparation that went into this.

The hearing record will remain open through Friday. And so, as you receive questions, if you could respond promptly, then your responses will be part of the record.

So, with the thanks of the committee, this hearing is adjourned.

[Whereupon, at 11:31 a.m., the hearing was adjourned.]

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