

A group of African school children, mostly girls, are smiling and looking towards the camera. They are wearing blue school uniforms with yellow trim. The image is the top half of a conference poster.

# Ready Together

A Conference on Epidemic Preparedness

## CONFERENCE PROCEEDINGS

**November 13, 2017**

The Joseph B. Martin Conference Center  
Harvard Medical School

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Photo: Warren Zelman

# Ready Together

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# CONFERENCE PROCEEDINGS

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## FOREWORD by MARIAN W. WENTWORTH

### President & CEO, Management Sciences for Health

As President and CEO of Management Sciences for Health (MSH) and on behalf of our partners at No More Epidemics, Harvard Global Health Institute, Harvard Medical School, Georgetown University Center for Global Health Science and Security and the Harvard T.H. Chan School of Public Health and with generous support from the James M. and Cathleen D. Stone Foundation, I'm pleased to present the proceedings of the Ready Together Conference on Epidemic Preparedness held on November 13, 2017 in Boston, Massachusetts.

READY TOGETHER brought together leading voices in health security, the private sector, global health financing, technology, and civil society to discuss the state of the world's readiness to fight the next epidemic or pandemic. We attempted to find answers to the following questions: What are the financial, economic, and other risks to the private sector associated with major disease outbreaks, and what is being done to minimize risk and ensure resilience? What innovations have been developed for pandemic preparedness? How can a whole-of-society approach to collaboration be enhanced to ensure global health security? And how can we overcome barriers to ensure country engagement and leadership and maximize public private partnerships?

Despite tremendous strides under the Global Health Security Agenda (GHSA), the world remains unprepared for the next major disease outbreak. It is clear that to truly be "Ready Together" for the next global pandemic, we must have a multilateral and multisectoral approach to strengthening the global capacity and nations' capacity to prevent, detect, and respond to infectious disease threats and that we must refine and improve health systems—so that they are capable of delivering everything it takes to keep people healthy and safe from infectious disease threats.

Global health security is not the purview of one sector and certainly not the realm of just health care or public health experts. For instance, it is clearly a business imperative to include global health security in enterprise risk management plans. Coming from many years in the private sector, and considering the economic data, I can earnestly say to my business colleagues that failure to include global health security in enterprise risk management is actually an error of stewardship otherwise. Looking back in the other direction, it is equally imperative for ministers of finance to budget for global health security issues. We saw, however, that the fact base needed to help ministers truly understand the relevance is not there, and the key institutions that ministers of finance

look to for guidance are not yet fully on board. We need to do more work to bridge the divide between health-care knowledge and public good.

More innovative partnerships are needed to help boost travel and tourism, telecom, and supply chain industries in vulnerable countries to fight the enormous economic impact that accompanies an outbreak. While no country is immune to an epidemic outbreak, targeted capacity building through unique public-private partnerships in these sectors can mitigate trade disruptions or embargoes. We learned that countries must continue to undergo the Joint External Evaluation (JEE) process and develop national roadmaps, and that there must be a focus on the development of a sustainable funding mechanism, as well as an increase in domestic funding resources to improve country ownership and effect lasting change.

More focus and attention must be paid to developing more and better diagnostic and treatment capabilities in addition to focusing on vaccine development. Diagnostics, together with big data, is changing the way we monitor and respond to outbreaks, enhancing transparency and enabling effective and rapid collaboration in times of crisis. We also heard about the importance of a whole-of-society approach—all sectors have a role to play in behavior change and mitigating measures. But I would add we also heard an example out of Sierra

Leone that was also illustrative of the value of focus: every sector, but not every person, was targeted for the critical messages and the advocacy cascade that would reverse the epidemic. We learned how important it is to involve the community in all National Action Plans for Health Security, effectively empowering communities to become effective disease first responders.

Since 2015, No More Epidemics (NME), an advocacy campaign partnership between MSH, Save the Children, International Medical Corps, and the African Field Epidemiology Network, has played a vital role in raising awareness on the importance of infectious disease preparedness. While the Campaign ended in 2017, MSH's work in global health security is not. MSH is continuing to promote the voice of civil society globally and is engaging communities in increased surveillance and epidemic preparedness planning. Emphasizing the critical importance of leadership and governance to stronger health security, MSH supports national and local partners in enhancing the specific components of the health system that are most important for epidemic prevention and response, including the quality and safety of service delivery, infection prevention and control, a skilled and motivated health workforce, robust health information systems, and an effective supply chain and pharmaceutical management system.

8:00–8:20 am	<b>Welcome</b> Ashley Arabasadi, Management Sciences for Health Dr. Ashish Jha, Harvard University Dr. Michelle A. Williams, Dean, Harvard T.H. Chan School of Public Health Dr. James M. Stone, James M. and Cathleen D. Stone Foundation Marian W. Wentworth, Management Sciences for Health
8:20–8:50 am	<b>Keynote: <i>International Finance Working Group and Introduction to Relevant Efforts in Global Financing of Pandemics</i></b> , Peter Sands, Harvard University
8:50–10:30 am	<b>Panel 1: <i>Risks to the Private Sector and Building Resilient Communities</i></b> <b>Moderator:</b> Dr. Ann Marie Kimball, Chatham House <b>Panelists:</b> Ben Plumley, Chevron Graham Davidson, Rio Tinto Rebecca Fish, Emergent BioSolutions
10:30–10:45 am	<b>Break</b>
10:45 am–12:15 pm	<b>Panel 2: <i>Innovations for Pandemic Preparedness</i></b> <b>Moderator:</b> Dr. Ashish Jha, Harvard University <b>Panelists:</b> Ryan Morhard, World Economic Forum Dr. Kendall Hoyt, Dartmouth Medical School Julie Whipple, Qlik
12:15–1:15 pm	<b>Lunch</b>
1:15–2:45 pm	<b>Panel 3: <i>Whole-of-Society Collaborations to Enhance Global Health Security</i></b> <b>Moderator:</b> Dr. Jonathan D. Quick, Management Sciences for Health <b>Panelists:</b> Dr. Samuel Abu Pratt, FOCUS 1000 Dr. Gagik Karapetyan, World Vision Ashley Arabasadi, Management Sciences for Health
2:45–3:00 pm	<b>Break</b>
3:00–4:30 pm	<b>Panel 4: <i>Overcoming Barriers—Public Private Partnerships, Country Engagement, Financing</i></b> <b>Moderator:</b> Dr. Rebecca Katz, Georgetown University <b>Panelists:</b> Captain Nancy Knight, Centers for Disease Control Allison Neale, Henry Schein Dr. John Paul Clark, World Bank Group Maimuna (Maia) Majumder, HealthMap
4:30–4:45 pm	<b>Concluding Remarks:</b> Marian W. Wentworth, Management Sciences for Health
5:00–7:00 pm	<b>Reception</b> , 2nd Floor Lounge, Rotunda

WiFi: HMS Public. No password required

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## CONFERENCE BACKGROUND

The READY TOGETHER conference brought together the private sector, academia, and other civil society stakeholders to build sustained support, resources, and action to prevent, detect, and respond to biological threats. The goal of the conference was to have evidence-based content that generates and renews engagement from the private sector, governments, and other stakeholders, including media. Private and public sector speakers and panelists came together to discuss their role in pandemic preparedness and response, from continuity of operations for their own businesses, to participation and support of whole-of-society frameworks to reduce pandemic risk.

### THE CONFERENCE FOCUSED ON THE FOLLOWING SET OF QUESTIONS:

1. What are the financial, economic, and other risks to the private sector associated with major disease outbreaks, including pandemics, and what is being done

to minimize risk and ensure industry resilience during public health emergencies?

2. What best practices have been developed for successful public-private cooperation (including relationships with civil society) to strengthen preparedness and response to disease threats nationally and internationally?
3. What innovations or new product lines will benefit industry while also contributing to public safety and population health during emergencies?
4. What are the barriers to whole-of-society cooperation to strengthen global health security, and what is necessary to overcome those challenges and how specifically can the private sector lead or participate in that effort?

The day-long event brought together a cross-sector group of “unusual suspects” to explore these questions and better understand the role of different sectors in supporting global health security.

## SPEAKER SUBMISSIONS

In advance of the READY TOGETHER conference, speakers were asked to prepare a short, written response to be included in these proceedings. Speakers were asked to summarize their written remarks, but also include information about their organization and to address at least one of the conference themes: risks, best practices, innovations, and barriers to better global preparedness.

The entries appear in the same order as the speakers spoke at the conference.

In addition to the invited speakers are essays submitted by Lord Jim O'Neill and Dr. Jeffrey L. Sturchio, who were unable to attend the conference due to scheduling conflicts. We are pleased to include their responses in these proceedings.





## INTRODUCTIONS AND KEYNOTE

The conference was opened by **Dr. Ashish Jha**, director of the Harvard Global Health Institute and K.T. Li Professor of Health Policy at the T.H. Chan School of Public Health. Dr. Jha emphasized that we—as a global community—are underinvesting in pandemics, and that addressing this critical threat requires a multi-sectoral approach.

Dr. Jha was followed by **Dr. Michelle A. Williams**, Dean of the Harvard University T.H. Chan School of Public Health. Dean Williams graciously welcomed the conference participants to Harvard and discussed the importance of collaboration between the public health sector, policymakers, medical professionals, and the private sector in collectively tackling the threat of pandemics.

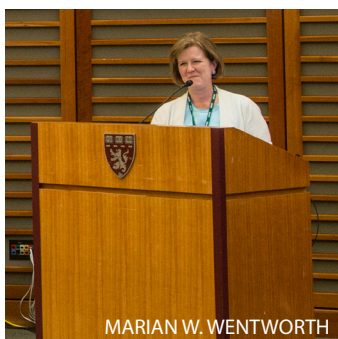


**Dr. James M. Stone**, sponsor of the conference, then highlighted the contrast between spending on defense and spending on pandemic preparedness, despite the certainty of facing a pandemic or epidemic in the near future. The public, he explained, has not been ready to spend the kind of resources that are required to adequately prepare the world for an infectious disease threat.

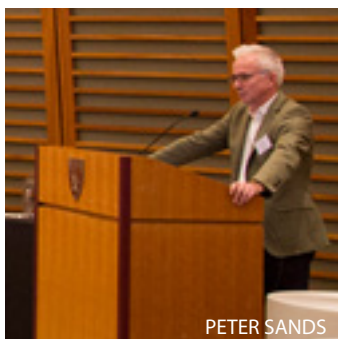
**Marian W. Wentworth**, President & CEO of Management Sciences for Health (MSH), wrapped up the introductions by discussing the role played by the civil society coalition No More Epidemics has had in raising awareness of pandemic risks since its inception in 2015.



**Peter Sands**, visiting fellow at Harvard University, gave the keynote address for the conference. Sands discussed the similarity between the expected annual economic impacts of pandemic influenza (\$570 billion) and climate change (\$890 billion), despite the stark contrast in terms of media and political attention concentrated on each issue. The increasing interconnectedness of the world (physical, financial, media-based) has also increased our vulnerability to infectious disease outbreaks, due to the rapid spread of fear, and the associated economic losses, often not associated with people who are actually at risk of contracting the disease, but with people who fear contracting it.



Sands summarized key messages and vulnerabilities raised in two of the recent reports he was a part of: *The Neglected Dimension of Global Security* and *From Panic and Neglect to Investing in Health Security*. These key takeaways included: The global community needs to strengthen national preparedness as the first line of defense and accelerate research and development. Countries should complete a Joint External Evaluation (JEE), convert results into costed plans, and then prioritize health security in budgets and increase domestic resource mobilization. Most important, national governments should engage the private sector in preparedness and response planning. Insurance can be leveraged to finance response, and the International Monetary Fund (IMF) and the World Bank Group should incentivize national investments. Finance ministers will need to see health risks in the same category as unemployment in order for real financial resources to be devoted to pandemic preparedness. In summary, financing pandemic preparedness is a public-private challenge requiring the following steps: recognize and measure risks; mobilize domestic resources; focus development assistance; and engage private sector more broadly.





*Below is a written response from Sands.*

## FINANCING PANDEMIC PREPAREDNESS

by **PETER SANDS**

**Fellow, Harvard University**

As the former CEO of one of the world's largest international banks, I have spent much of my career analyzing, managing, and responding to risks. Successfully leading Standard Chartered through the global financial crisis taught me powerful lessons: first, when the nightmare scenario happens, it throws the rulebook out, so never assume you know how it will unfold; second, being prepared is everything, since when the storm breaks you have such little time to react; and third, preventing such crises is far more cost-effective than responding to them.

Having recently chaired a commission on pandemics for the National Academy of Medicine, and an international working group on financing pandemic preparedness for the World Bank Group, I am struck by how much these lessons apply to infectious disease outbreaks. Pathogens have a terrifying ability to surprise, be it in their mode of transmission, virulence, or resistance. The speed of containment of an infectious disease outbreak is largely determined by the level of preparedness. The cost of responding to an epidemic or pandemic that has got-

ten out of control is many multiples of what it costs to detect and contain outbreaks when they first occur.

I suspect few public health experts would disagree with these observations, but the reality is that the global community has yet to commit the scale of financial resources required to make us well prepared for a potential pandemic. A truly devastating pandemic could kill millions and wipe trillions of dollars off the global economy. Yet, compared to the money we have invested in preventing a repeat of the global financial crisis, we have invested a tiny fraction in preparing for pandemics. Instead we have been trapped in what Jim Yong Kim of the World Bank Group dubbed "a cycle of panic and neglect"—throwing money at the problem whenever a serious outbreak occurs, but neglecting to sustain investment in preparedness when the panic subsides.

To be better able to prevent, detect, and contain potential epidemics, we need to be stronger in three areas. Our first line of defense is preparedness at a national level, a set of capabilities and infrastructure including veterinary controls, disease surveillance, diagnostic labs, and emergency response. These enable a country to re-

duce the risks of zoonotic transmission, detect outbreaks and respond swiftly. In support of national defenses, we need stronger regional and global capabilities, to ensure coordination, provide technical support, and offer surge capacity, since outbreaks can quickly overwhelm domestic health systems. Finally, we need greater investment in research and development to give us better diagnostics, vaccines, and therapeutics across a range of infectious disease threats.

In the wake of Ebola and Zika, there has been substantial progress in all three areas, but we are still far from ensuring the adequate and sustained financing required to consolidate and build on these advances. To identify what they need to do to reinforce national preparedness, many countries have undertaken a JEE, but very few have translated the results into costed remediation plans, let alone secured the funding to turn these plans into reality. At a global level, the World Health Organization (WHO) has established a Health Emergencies Program and a Contingency Fund, but there remain questions about the scale and sustainability of funding. The launch of the Coalition for Emergency Preparedness Innovations (CEPI) is a considerable step forward on the R&D front, but CEPI alone does not have the resources to bring new vaccines into fruition, let alone new therapeutics or diagnostics.

There is no easy answer to financing pandemic preparedness. Innovative financing tools such as the Pandemic Emergency Financing Facility (PEF) and private sector contributions can play a role, but ultimately health security is a public good that will be largely financed

from public resources. Yet to persuade the international community to commit the funds required, prioritise to assist the poorest countries, fund global capabilities and support accelerated R&D, and to convince local governments to prioritize pandemic preparedness in domestic budgets, we need a far more compelling investment case. Unfortunately, the millions of lives at risk does not appear sufficiently compelling. To obtain the dollars we require demands an investment case measured in dollars. Moreover, ad hoc economic analyses, however rigorous, will not suffice. We need to see the economic risks attaching to health crises incorporated into the kinds of macro-economic analyses that drive policy decisions; to date they have not been.

To escape the cycle of panic and neglect and make the shift to sustained investment in health security requires a big change in the way we think about the risks of infectious disease outbreaks. When the potential impact of an epidemic on jobs, GDP growth, and fiscal resources are a standard part of governments' economic thinking, when businesses routinely factor such risks into investment decisions, and when asset managers regularly incorporate these threats into portfolio allocations, then the dialogue will change. The risks we measure are the risks we manage and invest to mitigate.





## PANEL 1: RISKS TO THE PRIVATE SECTOR AND BUILDING RESILIENT COMMUNITIES

Panel 1 considered the risks that the private sector faces, as well as how the private sector has and can collaborate to help build resilient communities. Dr. Ann Marie Kimball considered how regionalization of embargoes can help mitigate the economic impacts of an outbreak. During this discussion, Dr. Kimball emphasized the importance of public private partnerships in supporting capacity building, which is crucial for regionalization. Graham Davidson highlighted Rio Tinto's work in Guinea during the Ebola outbreak. Davidson discussed Rio Tinto's four pillar response to Ebola, which emphasized the company's strong commitment to safety. He also talked about the challenges that Rio Tinto faced during its work, such as the lack of sufficient information about how the private sector can best help during an outbreak. Subsequently, Ben Plumley described Chevron's work in

Liberia during the Ebola outbreak. He drew attention to Chevron's work with the Liberian government, as well as to the company's current efforts to prepare for future outbreaks. Plumley also discussed the motivations behind Chevron's work in Liberia, including the company's emphasis on protecting future leaders within the region. Afterwards, Rebecca Fish from Emergent BioSolutions considered the need for trust between the public and private sector and the need for effective communication. While discussing the need for more effective communication, she also called for better forecasting of demand and offered a possible solution. Finally, Fish asked that organizations recognize each other's unique capabilities to improve public private partnerships.

## SOME OF THE KEY RECOMMENDATIONS AND TAKEAWAYS FROM THIS PANEL INCLUDED:

- Public private partnerships can help countries build capacity, which is crucial for regionalization. Regionalization, in turn, can help mitigate the economic impacts of a disease outbreak.
- Governments need a strong national strategy to facilitate recovery of the public health sector. This strategy should be locally led and it should be supported by international institutions and the private sector.
- The private sector can and should be more than just a financier.
- Future campaigns need to focus on basic safety, health, and hygiene and best practices in the workplace and at home. The health and success of a community is critical to the health and success of the companies working within that community.
- Scenario planning and strategy planning are important for companies to do as they work to mitigate the impacts of pandemic threats globally. Advice from both internal and external experts is important during this process.
- To improve public private partnerships, we need to improve trust, effectively communicate, and recognize the unique capabilities of partners.
- It is important to have the private sector participate in conversations about public health. To effectively build these partnerships, companies need to think about where they have aligned interests in public health, while being open about business issues.

## RIO TINTO'S FOUR PILLAR RESPONSE TO THE EBOLA OUTBREAK

by **GRAHAM DAVIDSON**

**Managing Director, Simfer, Rio Tinto**



Rio Tinto was founded over 140 years ago and is now the second largest mining company in the world. The company employs approximately 50,000 people, operates in 35 countries, and commits approximately USD 170 million a year

to support community programs. Although we operate across six continents, 85 percent of our assets are in Organization for Economic Cooperation and Development (OECD) countries.

Rio Tinto has a long history of working in Guinea, where the company has operated for over 40 years. Rio Tinto began working in the country as part of the Compagnie des Bauxites de Guinée (CBG), a joint venture with the Government of Guinea and Alcoa that started in 1973. In addition to its work through CBG, Rio Tinto is the

project lead for Simfer, a joint-venture with the Government of Guinea, a consortium of Chinese State-Owned Enterprises, and the International Finance Corporation. The Simfer joint-venture was formed to develop an iron ore mine in the Simandou range, located in the southeast region of the country, close to the border with Sierra Leone, Liberia, and Côte d'Ivoire. Rio Tinto also works in Guinea through the Rio Tinto Foundation, which is a non-profit organization established in 2014 to support economic development in the country. Annually, Rio Tinto provides USD 2 million to support the Foundation's projects. Currently, there are 14 projects under implementation.

As the managing director of Simfer, I was in Guinea during the Ebola outbreak. Ebola highlighted the importance of emphasizing safety, the importance of having a strong national strategy when responding to an outbreak, and the role of accountability in global health security. As we prepare for future outbreaks, it is important for the public and private sector to work together, and for the private sector to know how it can most effectively contribute to health security.



During the Ebola outbreak in Guinea, we had nearly 3,000 employees in the country and not a single Rio Tinto employee, or contractor, contracted the virus. Rio Tinto's emphasis on safety, to both its workers and the community in which it operates, was important to bringing about this outcome. Although Rio Tinto is a private company accountable to its shareholders, we do not work in isolation. Therefore, it is important that we help protect the communities in which we work.

We developed a four-pillar response to Ebola. The first pillar was to keep our staff safe. We did this by providing Ebola prevention training, strengthening our hygiene measures across all sites, imposing rigorous travel controls, and reducing our "footprint." As part of our Ebola prevention training, we regularly disseminated updated information on the virus and had weekly interactions with our employees to confirm that they had not contracted the virus. As part of the travel restrictions we imposed, we screened for risk factors and suspended travel through high-risk red zones, as defined in our in-house developed risk matrix.

The second pillar provided practical support for front-line response, including providing donations and running awareness campaigns. Simfer partners contributed more than USD 3.4 million in equipment and financial support. They donated twenty transport vehicles, a jet system for helicopter support, mobile mining camps to increase treatment capacity, and rations and cash assistance to families affected by Ebola. The awareness campaigns that Rio Tinto financed and led had immediate impact on the ground. Not only did Rio Tinto distribute over 250,000 sanitation kits, but we also helped implement other hygiene-related measures. These efforts to keep the community safe also, in turn, helped to keep our staff safe.

The third pillar focused on business resilience and continuity. Simfer is one of the few foreign companies that maintained its presence in Guinea throughout the entirety of the outbreak. We maintained our entire workforce on the ground and did not make any staff cuts. We continued our work in Guinea where it was safe to do so, conducted rigorous risks assessments, and imposed controls to ensure that our work was safe.

Our business reliance teams (BRT) and our work lobbying for Guinea were critical elements of our business resilience during the outbreak. We formed BRTs both inside and outside of Guinea. Our BRTs implemented on the ground response, engaged with the government and agencies, including the WHO, *Médecins Sans Frontières* (MSF), Centers for Disease Control (CDC), and the World Food Programme (WFP), served as a liaison with agencies and private companies, and participated in regular briefings to share best practices. In addition, Rio Tinto leveraged its global relationships to help the Guinean government by working with governments, organizations, and institutions to develop a response to Ebola.

Our focus on business continuity helped promote economic resilience within Guinea during the outbreak. Our ability to continue operating allowed for continued payment of salaries, payment to suppliers, and payment to the government in the form of taxes, which helped to support the economy. In addition, our "salary continuance" policy ensured that all employees stayed on the payroll even when they went home to their respective communities. This enabled employees to act as peer educators and to educate their respective communities about the virus and prevention measures.

The final pillar of our response supported economic recovery. This pillar involved building resilient local health systems, improving business climate for investments, and maintaining the focus of the international community. Rio Tinto engaged the international community by holding high-level meetings and discussions with foreign governments, including France, the U.K., and the U.S., and international organizations, including the United Nations (UN) and the World Economic Forum (WEF).

As we prepare for future outbreaks, the public and the private sector need to work together effectively, and we should start by understanding each other's roles more clearly. A strong national strategy will help the private sector know how it can best contribute, and ultimately, how it can help facilitate recovery of the public health sector. In addition, the private sector must be considered more than just a financier. As private companies, we are accountable to shareholders and it can be difficult when we are serving strictly as the financier, because we are often not sure where or how resources are being

used. Finally, partnering with local health providers will be important to future responses, and future campaigns need to focus on basic safety, health and hygiene, and best practices in the workplace and at home. Although our involvement in the Simandou mine project in Guinea

is ending for commercial reasons, we have learned many lessons from our work in Guinea and these will inform our future projects and our preparation for and response to outbreaks.

## UNIQUE CONTRIBUTIONS FROM THE PRIVATE SECTOR

by **REBECCA FISH**

**Vice President of Marketing and Product Strategy, Emergent BioSolutions**



I have spent my career going back and forth between the private and public sectors, and I have found this experience to be invaluable. I currently serve as the Vice President of Marketing and Product Strategy at Emergent BioSolutions, which

develops medical countermeasures against biological and chemical threats and emerging infectious diseases. Prior to Emergent, I served in the public sector as a Senior Policy Advisor at the U.S. Department of Health and Human Services, where I led development of the U.S. National Adult Immunization Plan. Other roles included Executive Director of Vaccine and Antibiotic Policy at Glaxo SmithKline, Manager of the CDC vaccine business for both Merck and GlaxoSmithKline, and Consultant with Centers for Medicare and Medicaid Services.

### BACKGROUND

The concept of a globally connected world is a common theme in health security efforts. How often have we heard that the next pandemic or infectious disease outbreak is just a plane ride away? Rapid response will require the involvement of many groups, including the private sector. So, how do we leverage the strength of industry in a manner that is both appropriate and impactful? We should look to the past for some lessons on what worked well.

### CREATE MECHANISMS TO BUILD TRUST

Important lessons about innovation and collaboration can be learned from a man named Maurice Ralph Hilleman. Born in 1919 and raised on a chicken farm in Montana, Maurice went on to become a gifted scientist. He worked at the Walter Reed Army Institute of Research and later led vaccine development at Merck & Co., Inc. Dr. Hilleman developed, or contributed to the development, of over 40 vaccines, including ones against measles, mumps, rubella, pertussis, hepatitis A, hepatitis B, pneumonia, and meningitis. When he died in 2005, Dr. Hilleman was credited with saving more lives than any other scientist in the 20th century.

I had the chance to meet Maurice Hilleman as a young employee at Merck. He officially was retired by that time, but he would host luncheons for young employees and tell us about his life and research. Part of Maurice's success came from the relationships that he maintained across military, public health, and industry sectors. There was established trust and respect amongst these individuals, and they could integrate their knowledge. We don't see that same trust across sectors today. People from MSF aren't doing internships at Johnson & Johnson. Amazon personnel aren't routinely brought into discussion at WHO about how to improve supply chain logistics.

### RECOMMENDATION #1

We must create more opportunities for these relationships and networks to flourish. Something as simple as a one-year program that would enable people from different sectors to spend time working in new organizations and different industries would be helpful. There are many executive development programs that could serve as a model for this idea.

## Improve communication

Building trust is necessary, but not sufficient. We also need better communication. I don't mean more meetings and forums where we discuss challenges. I mean sharing precise information about critical gaps. A lack of transparency hinders preparedness efforts. As one example, imagine that you have been tasked with manufacturing cookies for the federal government. Your annual contract states that you should plan to manufacture between 1 and 11 million cookies. The government can order these cookies anytime it chooses, and there is no guaranteed minimum order size. So, the government could order 10 cookies one week and 500,000 the next week. How much flour would you purchase each week to plan for their orders? How many people would you hire to staff your manufacturing facility? How much and what mix of inventory would you carry? This might sound like a silly example, but it actually is analogous to the terms of some medical countermeasure contracts today.

## RECOMMENDATION #2

Share precise information with companies about critical needs.

## Recognize unique capabilities

Another element that will enable a rapid response is understanding that companies have unique skill sets and can't be lumped into a one size fits all category. The strengths of a large pharmaceutical company are clearly

different than the strengths of a smaller organization. The preparedness enterprise needs to have a better sense for who does what well. As one example, Emergent currently operates an Advanced Development and Manufacturing site. This facility is designed to produce 50 million doses of a pandemic flu vaccine in 4 months. I often wonder how many groups outside the U.S. government even know that this capability exists? How else could this facility be used?

## RECOMMENDATION #3

One way to identify what capabilities are needed is to conduct large scale, simulation exercises involving a host of partners. These tabletop exercises help participants understand where bottlenecks exist in the process and where certain resources or support might be needed. It is imperative to include all stakeholders, such as law enforcement, local health care providers, supply chain/distributors, and industry in these events.

There are a host of challenges, but we can overcome them. One only needs to look to the past to see what has been accomplished in times of need.

When asked about the global effort to eradicate smallpox, Bill Foege once said that it was achieved because of the contributions of everyone. Let's recognize the value of true public private sector collaboration and begin to tackle these challenges now.

*The views expressed here are my own, and do not necessarily represent those of Emergent Biosolutions.*



LEFT TO RIGHT:  
DR. ASHISH JHA, RYAN MORHARD, JULIE WHIPPLE, DR. KENDALL HOYT

## PANEL 2: INNOVATIONS IN PANDEMIC PREPAREDNESS

Panel 2 focused on the role of innovation in pandemic preparedness. Ryan Morhard discussed the role of public private partnerships in the WEF's work and highlighted the WEF's Epidemics Readiness Accelerator and the Forum's work to raise business awareness. The panel also highlighted the role of technology companies in helping organizations manage data to make better decisions, focusing on Qlik's work to partner with organizations to improve epidemic and pandemic prevention and response. Julie Whipple emphasized Qlik's partnerships with nongovernmental organizations (NGO) and its work on the JEE dashboard, as part of the Private Sector Roundtable (PSRT). Afterward, Dr. Kendall Hoyt spoke about the Coalition for Epidemic Preparedness Innovations (CEPI). CEPI, from its inception to its current work and plans for the future. Her discussion highlighted CEPI's funding and coordination of vaccine development, which aims to keep the next outbreak from becoming a humanitarian crisis. There is a need for timeliness in vaccine innovation, and Dr. Hoyt discussed how CEPI is investing in approaching the problem of speed in three ways, namely through pipeline development, vaccine platforms, and institutional platforms. Overall, as the moderator Dr. Ashish Jha said, this panel focused on the way in which private sector engagement is fundamental

in global health security and the importance of working to minimize fear surrounding epidemics.

### SOME OF THE KEY RECOMMENDATIONS AND TAKEAWAYS FROM THIS PANEL INCLUDED:

- The global community must do a better job reflecting on the decisions that were made during Ebola and how to operationalize the lessons learned.
- Public private partnerships, such as the WEF's Epidemics Readiness Accelerator and CEPI, can help address problems that are frequently experienced during epidemics.
- The private sector can help develop tools to use data more effectively and deploy these tools to improve pandemic preparedness and response.
- Better institutional platforms are needed to accelerate the vaccine development timeline.
- CEPI's work to have a viable vaccine in the pipeline and to create institutional momentum will help to address the problems often experienced during Phase 3 of vaccine development.
- Because we cannot get rid of people's irrational reactions to epidemics, we need to think about how to minimize fear.



# INTERNATIONAL PUBLIC PRIVATE COOPERATION FOR HEALTH SECURITY

by RYAN MORHARD

**Project Lead, Global Health Security, World Economic Forum**



As the International Institution for Public-Private Cooperation, the WEF is committed to leveraging its partnership platforms toward managing risks associated with emerging infectious diseases of pandemic potential

through innovative, cross-industry, and cross-sectoral public-private cooperation, strengthening national and global health security.

Responses to past outbreaks have featured a range of innovative partnerships among businesses and civil society to complement the official response. However, although there are many instructive success stories relating to public-private cooperation to support outbreak response, efforts in this regard have typically been ad hoc, limited to traditional partners, and largely initiated only after the outbreak has substantially evolved. Cooperation has also generally been challenged by uncertainty relating to communication and coordination, sometimes to the detriment of the response overall. Accordingly, past experience indicates interesting opportunities for optimization in advance of the next outbreak, especially considering that public-private cooperation is essential to an effective global response.

Several recommendations for realizing the private sector's role supporting and augmenting the traditional public-sector led response to outbreaks are outlined in a June 2015 WEF report, *Managing the Risk and Impact of Future Epidemics: Options for Public-Private Cooperation*.<sup>1</sup> These recommendations capture the value that the private sector can bring to emergency response.

To better understand the specific value brought by private companies and how public-private partnerships support response, it is necessary to recognize that the

private sector is not one monolithic entity that contributes in the same way. Instead, as outlined in the report, companies generally play three distinct roles:

- **IN-COUNTRY OPERATORS:** This diverse group includes multinationals and local companies of various sizes. What brings them together is their local presence in the affected countries, and the resulting ties to the community and motivation to act based on business continuity interests.
- **EXPERT CAPABILITY COMPANIES:** These companies are defined by the unique importance of their capabilities to the core of a health response effort. Irrespective of the location or nature of the outbreak, their expert skills or services are required to stem the crisis.
- **GREATER PRIVATE-SECTOR CONTRIBUTORS:** A broad group of both international and domestic private-sector companies often become engaged based on corporate social responsibility or the drive of a leader. This group may vary vastly in terms of when they join the response, how long they stay, and how much they contribute.

It is also important to note that a single company may play multiple roles across these three groups, depending on the scope of its operations or the nature of the outbreak.

## RECOMMENDATIONS

To improve public-private cooperation to strengthen global health security, the WEF is pursuing, among others, the following recommendations:

- Address pressing challenges associated with public-private cooperation relied upon for effective global response to outbreaks. Reliable public-private cooperation is essential for effective global response to outbreaks, particularly in areas of: supply chain and logistics; information technology; telecommunications; travel, tourism, and hospitality; finance; and development and deployment of emergency medical countermeasures (e.g., vaccines, therapeutic



tics, and diagnostics). However, as evidenced by past responses, several recurring and predictable challenges remain in these areas. Accordingly, the WEF has established the Epidemics Readiness Accelerator, which will address challenges associated with public-private cooperation relied upon for effective global response to outbreaks.

- Better understand and address commercial vulnerability to infectious disease risk. A severe pandemic could result in millions of deaths and cost trillions of dollars, and even smaller outbreaks can cost thousands of lives and cause immense economic damage. The most conservative estimates suggest that pandemics destroy 0.1 to 1.0 percent of global GDP, on par with the threat of climate change. Recent analysis suggests that the annual global cost of moderately severe to severe pandemics is roughly \$570 billion, or 0.7 percent of global income.<sup>2</sup>

While predicting where and when the next outbreak will occur is still an evolving science, it is possible to identify factors that make companies more or less vulnerable to suffering financial losses from infectious disease events (e.g., geographic location(s), workforce, customer base, supply chain, structure, etc.).

## PRIVATE SECTOR TECHNOLOGY FOR PANDEMIC PREPAREDNESS

by **JULIE WHIPPLE**  
Global Head of Corporate Social  
Responsibility, QLIK



The Ebola crisis established unprecedented international awareness of global health security. While acknowledging that much more work can and should be done, global health security is an opportunity to drive

coordination and partnership. As a private company and leader in data analytics solutions, we believe the crisis also brought about an opportunity to leverage data and technology in future pandemic preparedness and response.

Accordingly, the WEF, with partners, is developing a first-of-its-kind “dashboard” to enable business leaders to better understand expected costs associated with infectious disease outbreaks, as well as pathways for public-private cooperation to mitigate these costs, thus strengthening health security more broadly.

### References

<sup>1</sup>World Economic Forum. June 2015. *Managing the Risk and Impact of Future Epidemics: Options for Public-Private Cooperation*. <https://www.weforum.org/reports/managing-risk-and-impact-future-epidemics-options-public-private-cooperation>

<sup>2</sup>World Bank. 2017. *From panic and neglect to investing in health security: financing pandemic preparedness at a national level*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/979591495652724770/From-panic-and-neglect-to-investing-in-health-security-financing-pandemic-preparedness-at-a-national-level>

We have many examples showing the combination of data from big data, social data, public data, and all combined with private data to find solutions. All types of data can be leveraged to provide easy access and insights through analysis. In this regard, data and analytical solutions can play an integral part in capacity building to prevent and answer to the next pandemic.

GHSA membership has grown to more than 60 countries since its launch in 2014. The GHSA aims to help countries prevent, detect, and respond to emerging disease threats by implementing WHO's International Health Regulations (IHR). The GHSA also established metrics and indicators to measure pandemic preparedness, as well as a voluntary and collaborative process to assess progress known as JEEs. It is in the analysis of these metrics where we have an opportunity to drive true change.

Global health security is a great example of public private partnership. It's bringing forward what we do best. It is extremely important, on top of goodwill and interest, to engage the private sector. Vaccines, antibiotics, and personal protective equipment are all developed by the private sector and in looking at the supply chain, it is clear we cannot operate without the private sector. The private sector industry is a major public health partner for global health security. Data and technology partners in the private sector can play a vital role as well.

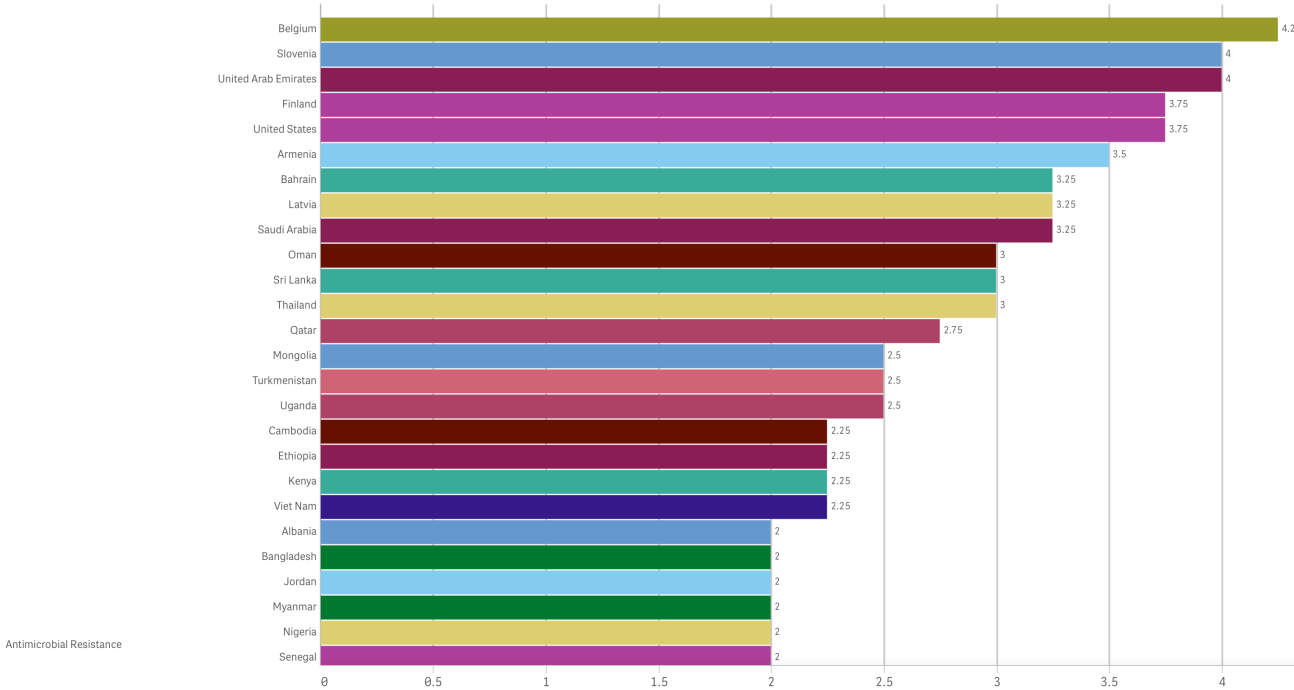
The PSRT was founded in early 2016 to support the GHSA and affirmed the private sector's commitment in combatting disease and epidemics. Led by Johnson & Johnson and the GE Foundation, the PSRT engages industry to help prepare and respond to health-related crises. Our participation in the PSRT led us to developing new and better ways to track and analyze the outcomes of the JEEs. When looking at the online JEE submissions, we quickly realized that much of the most important information is locked away in 40- to 60-page long PDF files.

A publicly available tool enables countries to better understand and track their health security capabilities over time and identify gaps, as well as opportunities for improvement. The goal of the JEE tool is to become a one-stop-shop for governments to view, track, and address global health security capabilities, as well as locate solutions from private sector actors, NGOs, and others on potential answers with costs to addressing GHSA gaps.

We understand the importance and power of data for effective decision-making. It's simple. With better knowledge it is easier to direct health system strengthening efforts and we believe that this tool will be a valuable resource for all GHSA stakeholders. To support the GHSA, we can first assess and understand where the gaps exist, measure and plan ways to address them, and chart progress over time.

Country by capacity: A graph from QLIK's JEE platform

Country by Capacity, Drill for Metric



# MEDICAL COUNTERMEASURES FOR EPIDEMIC PREPAREDNESS

by **DR. KENDALL HOYT**

**Advisor, CEPI**

**Assistant Professor, Dartmouth's Geisel School of Medicine**



The 2014-15 Ebola outbreak revealed new possibilities for epidemic vaccine development. Funders, developers, regulators, and clinicians demonstrated that they can work together to develop vaccines quickly,

even under challenging conditions. But they could do so only because vaccines were already in the pipeline. Moreover, this response relied on a precarious web of ad-hoc partnerships and the goodwill of a handful of companies. Future outbreaks will require a more efficient and sustainable model for epidemic vaccine development.

CEPI was created to fill that need. Founded in 2016 by the governments of India and Norway, the Bill & Melinda Gates Foundation, the Wellcome Trust, and the World Economic Forum, CEPI will fund and coordinate vaccine development for diseases that have epidemic potential in cases where market incentives fail. Other partners include multinational pharmaceutical corporations, the WHO and MSF, and the governments of Germany, Japan, Canada, Australia, and Belgium.

International public private partnerships such as CEPI are an important vehicle for progress against global problems like pandemic preparedness, especially in a climate of austerity and isolationism. CEPI has already demonstrated the power of this model to move forward in the face of political headwinds, raising over \$600 million toward vaccine development, with an overall goal of \$1 billion over the next five years.

New funding is essential but insufficient to ensure that vaccines will be available in time to reduce the human and economic toll of large-scale outbreaks. Devising new ways to accelerate development times is a key objective. CEPI will pursue this objective with a “just-in-case” proac-

tive approach and an accelerated “just-in-time” development strategy.

CEPI’s “just-in-case” approach makes “bets” on which vaccines to develop in advance, drawing on expert assessments of the outbreak potential of various pathogens and the technical feasibility of vaccine interventions. Much like Biomedical and Research Development Authority (BARDA) in the U.S., CEPI will work with developers and regulators to move this prioritized list of candidate vaccines through the early stages of clinical development so that they can be ready for testing in an outbreak. CEPI’s first round of partnership agreements will develop vaccines for Lassa fever, Nipah virus, and MERS.

CEPI’s “just-in-time” approach invests in platform technologies that can respond to a wider range of known and unknown viruses. These platforms will enable rapid vaccine development, elicit the rapid onset of immunity, and employ production techniques that can be scaled up quickly to respond to outbreaks of new or previously unrecognized infectious diseases. Development and production platforms that meet CEPI’s criteria could significantly accelerate the availability of vaccines during emergencies.

CEPI will support both development strategies by working with partners to develop the policies, procedures, and protocols required to develop, manufacture, and evaluate epidemic vaccines. In short, CEPI will work in advance to reduce the number of details that need to be negotiated in an outbreak. CEPI will also work with partners to identify areas where networks of laboratories, outbreak clinicians, and manufacturing partners can be set up and trained in advance.

Mission-driven investments in new technologies, people, and institutions can have a meaningful impact on global health and a spillover effect for commercial drug development. CEPI’s focus on sustainability and speed in particular will allow it to experiment with solutions to vexing industry issues, including cost transparency, fair pricing, flagging productivity, and reduced rates of innovation.

By sponsoring development in areas where industry does not expect to make a profit, CEPI has an opportunity

to strike a “new deal” between public and private sector partners to deliver a better social return on investments in research and development. CEPI will pursue this objective through working data sharing provisions, cost transparency, and fair pricing into their contracts.

The private sector stands to gain as well. In the short term, CEPI will build partnerships to provide the financial, technical, and regulatory support that companies require to test new technologies and approaches. More broadly, CEPI's strategic focus on rapid vaccine development platforms could transform the landscape for pharmaceutical development. CEPI is looking not just to boost innovation,

but also to improve the timeliness of innovation. Until now, technical platforms that can be rapidly deployed against new and unknown pathogens have received insufficient industry attention because they are a long-term, high-risk investment. CEPI's ability to sustain funding toward this approach will not only save lives in an outbreak but will also improve the efficacy of commercial vaccine development more generally by reducing the time and cost of development.



## PANEL 3: WHOLE-OF-SOCIETY COLLABORATIONS TO ENHANCE GLOBAL HEALTH SECURITY

Panel 3 focused on whole-of-society collaborations in global health security. The speakers discussed the creation of the No More Epidemics (NME) campaign and the work of FOCUS 1000, World Vision, MSH, and the Global Health Security Agenda Consortium (GHSAC). Dr. Jonathan Quick discussed the creation of NME and the work it has done since its inception. Dr. Samuel Abu Pratt, from FOCUS 1000, and Dr. Gagik Karapetyan, from World Vision (WV), discussed their organizations' work responding to the recent Ebola outbreak. Dr. Pratt spoke about FOCUS 1000's work in Sierra Leone collaborating with religious leaders, traditional healers, the media,

women, youth, and civil society to help spread the message about Ebola. Then, Dr. Karapetyan spoke about WV's work as a Christian-based organization consolidating efforts from different faith groups with the goal of helping to support health efforts and build partnerships. Furthermore, Ashley Arabasadi described MSH's work on leadership management, antimicrobial resistance (AMR), and community-level surveillance. Arabasadi also highlighted the role of civil society in global health preparedness through her discussion of GHSAC and she stressed the importance of anthropologists in preparing for and responding to outbreaks.

### SOME OF THE KEY RECOMMENDATIONS AND TAKEAWAYS FROM THIS PANEL INCLUDED:

- Nations must build resilient health systems, robust enough to provide comprehensive primary care services, with sufficiently trained human resources and adequate medical supplies.
- Effective surveillance and health information systems with strong reporting mechanisms, capable of detecting and responding to epidemic needs are essential for global health security.
- We need to develop strong community engagement strategies to trigger community action on prevention, detection and response, and robust national level emergency preparedness and response plans.
- Coordination and collaboration with different sectors of society, and the concept of the whole of society, is about working at the grassroots level with different groups, bringing them together, and helping



them voice what they need to in any response.

- NGOs and foreign partners must empower and continue to use available community structures (religious leaders, traditional healers, market women, media) to help effectively detect and respond to epidemics using their comparative advantages.
- We need to realize that human health is health security, that outbreaks can move a lot faster than many congressional leaders truly understand, and

the NGO community has a platform for global leadership that can be a resource.

- We need to make sure that community organizations are prepared for infectious disease response.
- There must be clear lines of communication from global leadership down to the community level.
- To make interventions more efficient, an anthropological lens is important to epidemic response because each community is different.

## RESILIENT HEALTH SYSTEMS AND WHOLE-OF-SOCIETY APPROACH

### DR. JONATHAN D. QUICK Senior Fellow, Management Sciences for Health



Resilient health systems provide the foundation for effective global health security. From the dramatic decline in childhood illnesses over the last half century due to a rise in effective immunizations, to the rapid halt of SARS

in 2003, to the local containment of each of the 22 Ebola outbreaks that preceded the 2014 West Africa outbreak, success in epidemic control has depended on the strength of the health system. In contrast, the recent epidemics of Ebola in West Africa, cholera in Yemen, and plague in Madagascar are examples of what happens when weak health system are unable to prevent or to rapidly detect and quickly respond to infectious disease outbreaks.

Over nearly five decades, MSH has worked with national and local governments, civil society, the private sector, and communities to build strong, locally-led health systems that are equipped to save lives and improve health by preventing and combatting infectious diseases. Areas of health systems expertise most relevant to global health security include strengthening leadership and governance, building community-level surveillance and preparedness, supporting electronic surveillance and response systems, improving pharmaceutical systems

and supply chains, fighting antimicrobial resistance, and supporting advocacy and social mobilization.

Recently, in Côte d'Ivoire, through the USAID-funded Leadership, Management & Governance (LMG) project, MSH carried out a training program to improve cross-sectoral communication and collaboration for a One Health approach to epidemic surveillance that included regional and district health offices, hospitals, and health centers, as well as the water, sanitation, agriculture, animal, and fishery sectors. In Sierra Leone, as part of USAID-supported post-Ebola recovery, MSH worked with the Directorate of Drugs and Medical Supplies to catalyze a multidisciplinary coalition to raise awareness of the threat of AMR and to implement evidence-based strategies and practices aimed at containing AMR.

### WHOLE-OF-SOCIETY APPROACH

Infectious disease outbreaks impact every segment of society: governments, communities, civil society, the formal private sector, informal private sector, academia, and the faith community. And every segment of society has a contribution to make in preventing, detecting, responding to, and recovering from epidemics.

The WHO first highlighted the importance of a whole-of-society approach to pandemics with its 2009 publication, *Whole-of-Society Pandemic Readiness: WHO guidelines for pandemic preparedness and response in the non-health sector*. This report called out health, defense, law and order, finance, transport, telecom, energy, food, and water as critical sectors. The UNWTO's Towards

a Safer World initiative took the concept farther in its 2011 publication, *Beyond Pandemics: A Whole-Of-Society Approach to Disaster Preparedness*.

The 4th GHSA High Level Ministerial held 25-27 October 2017 in Uganda took a similar perspective with its theme, “Health Security for all: Engaging Communities, Non-Governmental Organizations and the Private Sector.” This theme aptly reflects the increasing recognition of the need for whole-of-society engagement. An indication of the importance of cross-sectorial involvement, in addition to participants from ministries of health, some countries also sent officials from foreign affairs, finance, defense, agriculture, tourism, trade, environment, or the office of the president or prime minister.

## THE EXPANDING GLOBAL HEALTH SECURITY COMMUNITY

The combination of the February 2014 launch of the GHSA, worldwide attention to the West Africa Ebola outbreak in late 2014, and concerns raised by the Western Hemisphere Zika outbreak have together contributed to a notably rapid expansion of global health security-related initiatives and collaborations—most of which did not exist just four years before the GHSA was launched.

More than 60 countries are officially engaged in the GHSA. The rotating the leadership of the GHSA multi-lateral Steering Group and the venues for the high level ministerial meetings among countries in different regions of the world, as well as the cross-regional composition of working groups, has helped create widely shared ownership. The 4th High Level Ministerial endorsed extending the GHSA to at least 2024. The WHO Strategic Partnership Portal maps over \$10 billion of GHS-related support for countries from more than 20 donor governments, international agencies, and foundations. In addition, the GHSA has led to the formation of GH-SAC, the GHSA PSRT, Next Generation Global Health Security Network, multi-stakeholder JEE Alliance, WHO Health Emergencies Program, CEPI, International Working Group on Financing Preparedness, the World Bank Group’s PEF, Global Health Council’s Global Health Security Roundtable, regional efforts such as the Indo-Pacific Centre for Health Security, and numerous individual

government, university, think tank, nonprofit, and private sector efforts.

These achievements reflect remarkable momentum in the global health security community. Yet, the experience with global epidemic prevention and preparedness over the last 60 years history suggests caution. It was 15 years between 1951 when smallpox eradication was first proposed by the WHO director general and 1966 when the world’s governments committed themselves to the task. After the 1995 World Health Assembly endorsed stronger IHRs—following perceived complacency in the handling of India’s 1993 plague outbreak—little progress was made until the 2003 SARS outbreak shook the world. Within two years, the considerably fortified 2005 IHRs had been adopted. When Ebola struck West Africa nearly a decade later, however, only one-in-three countries worldwide and none in Africa met the new IHR standards. And today, global health security initiatives such as CEPI and PEF, noted above, regularly face challenges in securing the required leadership support or funding.

Looking from a whole-of-society perspective, a similar dynamic appears to play out in the private sector. After the combination of avian influenza concerns in the mid-2000s and 2009 H1N1 swine flu epidemic, there was a flurry of pandemic preparedness activity across a wide range of sectors from travel and tourism, to shipping and public safety. During the Ebola crisis, there was a heartening response by the Ebola Private Sector Mobilization Group, other private sector coalitions, and many individual international and local companies. However, beyond the steadfast commitment the PSRT members, the global health security work of the World Economic Forum, and the work of a few individual business sectors, such as travel and tourism, there appears to be limited on-going, senior level attention to epidemic and pandemic threats.

The underlying challenge across most segments of society and most sectors of the economy is that for most political, health, business, and civil society leaders, as well as for the public, epidemics threats such as SARS, avian influenza, Ebola, and Zika are far away in time, space, and perceived risk.

## RECOMMENDATIONS

- Building resilient health systems, supported by the overarching goal of universal health coverage (UHC), should continue to be an underlying objective of all work in global health security. This should include integration of outbreak prevention, early detection, and rapid response into each level of the health system.
- Global health security organizations and initiatives should recognize they are part of an expanding global health security movement, and each seek to ensure shared objectives, communication, synergies, and accountability measures.
- The global health security community is producing rigorous evidence and persuasive real-life examples of the risks, impact, unmet needs, and achievements in combating infectious disease outbreaks. This evidence and these examples must continuously be widely shared with political leaders, health officials, and other stakeholders, including the general public.
- Advocacy goals, messages, and skills for sustaining the current momentum in global health security must be vigorously pursued at the international, national, and local levels. Key topics include risk, required actions, needed investments, and expected benefits.

## ORGANIZING COMMUNITIES FOR SUSTAINABLE DEVELOPMENT

by **DR. SAMUEL ABU PRATT**

**Director of Programmes, FOCUS 1000**



Facilitating and Organising communities to Unite for Sustainable Development (FOCUS 1000) is a nonprofit, national development agency in Sierra Leone that is committed to making the best investment in the most crucial

time in a child's life: the first 1000 days—the number of days from conception and pregnancy until the child reaches age two. During this period, the child is fragile and susceptible to many illnesses and environmental conditions, such as malaria, acute respiratory infections, diarrheal diseases, malnutrition, and lack of access to safe drinking water and sanitation. We work to ensure that children achieve their full potential by enhancing their livelihood and quality of life through sustainable initiatives, with full participation and ownership of communities.

FOCUS 1000 partners with the government, UN agencies, and other local and international organizations to promote simple, evidence-based, cost-effective and high impact interventions that can help build a solid foundation for children to survive, thrive, and develop to become productive citizens.

We focus on three areas of intervention: the promotion of maternal and child nutrition; reduction of teenage pregnancy; and the improvement of the quality and utilization of basic services. We employ four key strategies for program implementation: evidence generation; advocacy; community engagement; and capacity development. We adjusted these programme areas to include emergency preparedness and response during the Ebola epidemic (2014-2015).

### **WHOLE-OF-SOCIETY COLLABORATIONS TO ENHANCE GLOBAL SECURITY—THE FOCUS 1000/PARTNERSHIP EXPERIENCE DURING THE EBOLA VIRUS DISEASE CRISIS 2014-2015**

To mitigate the risks associated with disease outbreaks and epidemics, it is important to have a thorough understanding of the social and cultural contexts under which they thrive. This includes those contexts that have a direct relationship to their modes of transmission, management, misconceptions, and anticipated control measures. It is also absolutely essential to gain insight into local partnerships that can add value to proposed interventions.

There is no doubt that Ebola imposed a major setback on an already devastated and weak health system. Apart

from infecting almost 14,000 people and directly causing almost 4,000 deaths, it further exposed a non-functional health surveillance system, health staff that were not adequately trained, and health facilities that were logistically non-functional to effectively respond to epidemics.

Like the SARS crisis, which created a total breakdown in normal societal activities in great cities such as Singapore and Beijing, the Ebola crisis completely devastated the Sierra Leonean population with rampant loss of lives. Education was brought to a halt, schools, colleges, and public places were closed down, and people lost confidence in the country's health system. Moreover, people became stressed, stigma intensified, labor diminished, supplies became scarce, and prices of commodities escalated.

The economic costs associated with the above in relation to households on the one hand and investors on the other cannot, therefore, be overemphasized, since households wanted to safeguard themselves and investors wanted to take actions in response to the household decisions, a phenomenon tagged as “aversion behavior.” In the process, further significant financial, economic, and societal burdens were imposed on an already embattled health system, and the country as a whole. Consequently, by the end of 2014, the expected economic growth declined drastically from an estimated 11.3 percent to a meager 4.0 percent.

The situation, as described above, demanded accurate actions and information that were capable of quickly igniting the adoption of positive behaviors and habits that could positively impact the course of the epidemic. Cognizant of the above, FOCUS 1000 engaged in the following activities:

## ACTIONS TAKEN BY FOCUS 1000

FOCUS 1000 and its team of experts lead an existing dynamic civil society organization partnership network consisting of religious leaders (RL), traditional leaders, community-based organization (CBOs), market women (MW) and media practitioners (Kombra Media Network (KMN)) to facilitate better national response to the Ebola epidemic. Because of the confusion emanating from poor knowledge of the disease's mode of transmission, detection, prevention and treatment, the organization embarked on the following:

## EVIDENCE GENERATION

FOCUS 1000 and partners conducted four knowledge, attitude and practice (KAP) surveys in August 2014, October 2014, December 2014, and July 2015, and used preliminary cross-sectional findings to inform immediate control efforts. Also to inform future epidemic prevention and control efforts, FOCUS 1000 and partners analyzed trends across the four KAP surveys. The results, which addressed a range of issues including Comprehensive knowledge of Ebola, prevention practices including safe burial, acceptance of Ebola survivors, stigma and misconceptions, were used to inform response measures including tailoring of messages.

## COMMUNITY ENGAGEMENT

Our community engagement strategy is tailored around the DRAFT Approach, which is described below:

### D – Dialogue

Discuss: Why do people still go to traditional healers (TH)? Why do THs continue to practice?

### R – Reflection

Reflect on the dangers or consequences of the THs continued practice to people, themselves, and communities.

### A – Action planning

#### Adopt and enforce SKIN framework

**STOP** Treating patients (patients with Ebola or non-Ebola symptoms)

**KEEP & IMPROVE** Adhere to by-laws set by the Sierra Leone Traditional Healer's Union (SLTHU); refer sick people to health facility; monitor defaulters

**NEW** Promote key messages that support “Getting to Zero”

### F – Facilitation

Give needed support to facilitate actions: logistics, communication, transportation, etc.

### T – Track changes

Keep track of the number of THs referring sick people to health facilities; keep track of the number of THs documented to have treated a patient

## **EACH PARTNER IN THE ENGAGEMENT PROCESS HAD ITS OWN COMPARATIVE ADVANTAGE WHICH WAS USED IN THE RESPONSE**

### **RELIGIOUS LEADERS (RLs):**

Six thousand (6000) registered imams and pastors from several mosques and churches across the country, were supported to come up with relevant verses from the Quran and the Bible to support already designed public health messages, which were then disseminated country-wide. The religious leaders thus became trusted sources to disseminate the public messages from the pulpits to every corner of the country.

### **TRADITIONAL HEALERS (THs):**

THs are the first port of call for treatment within the communities and for conditions that people believe cannot be treated by Western medicine. With a registered membership of about 10,000, THs are custodians of deep-rooted cultural practices and, therefore, have a very large following in the country. Their treatment methods always have to do with the use of their hands, as they normally have to rub and massage their patients with traditional medicines. This absolutely confirms that they can be instrumental in transmitting EVD. Targeting them helped in minimizing transmission of the disease. Engaging THs shifted their role to become part of the solution rather than the problem.

### **MARKET WOMEN (MW) ASSOCIATION:**

The Market Women Association with a membership of over 4,000 and a strong voice in the day-to-day running of communities was no doubt a potential source for sensitizing women about EVD. They mounted public education campaigns in their market places and promoted handwashing and food hygiene critical for the control of the epidemic.

### **COMMUNITY-BASED ORGANISATIONS (CBOs):**

These are strategically located between the communities and the health system, and were, therefore, used in advocacy and mobilization in their various communities. There are about 180 CBOs across the country.

### **KOMBRA MEDIA NETWORK (KMN):**

The network, consisting of 50 journalists from different media houses (print and electronic media), has the capacity of reaching almost all communities countrywide, and was used in promoting messages on Ebola detection and prevention. The KAP studies showed that over 90 percent of the population received their messages from the radio.

### **CAPACITY DEVELOPMENT:**

All partners in the response (RLs, THs, MW, CBOs, and KMN) received appropriate training on disease transmission, prevention, and control. This helped them to tailor strategies based on their comparative advantages. The platform trained 12,000 members, drawn from the above partners from all sections of country, to fight against Ebola. It succeeded in reaching all communities, particularly in the remotest villages.

### **ADVOCACY:**

Evidence generated in all the Knowledge, Attitude, and Practice (KAP) studies was used as a basis for advocacy at all levels. As a result, religious leaders (both Muslim and Christian) embarked on a nation-wide campaign, reaching almost every village in the country through their churches and mosques, with sermons on prevention and control of Ebola, which included organized, safe, and dignified burials. Traditional Healers demolished their shrines, banned their entire membership from even touching sick and dead people, and established committees for monitoring the activities of their members. The Kombra Media Network (KMN) used their various radio stations to provide information on the disease and to update communities on the response. Similarly, market women sensitized their colleagues and customers on Ebola transmission and prevention and encouraged them to educate other members of their various communities. The combined efforts of partners and the strategies deployed contributed to a significant reduction in Ebola transmission, leading to the attainment of zero cases, which has been sustained until now.

## **RECOMMENDATIONS**

The FOCUS 1000 experience confirms that countries with the minimum capacity to detect and handle ep-



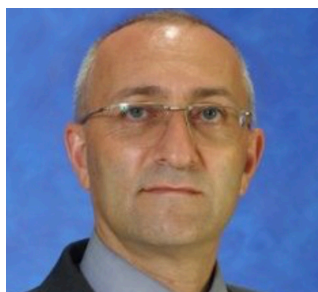
idemics leaves enough room for mismanaged emergency responses. All the same available local resources, structures and opportunities must be utilized wherever possible, whilst awaiting intervention of international stakeholders. It is therefore recommended:

- Build resilient health systems, robust enough to cater for comprehensive primary care services, with adequate and sufficiently trained human resources and adequate drugs and medical supplies.
- Develop robust resource mobilization mechanisms that enable government to deliver equitable and high-quality services to all its citizens.
- Develop effective surveillance and health information systems with strong reporting mechanisms, capable of detecting and responding to epidemic needs.

## MOBILIZING COMMUNITIES

by **DR. GAGIK KARAPETYAN**

**Senior Technical Advisor, Infectious Diseases,  
World Vision**



Established in 1950, World Vision (WV) is a Christian humanitarian organization dedicated to working with children, families, and their communities worldwide to reach their full potential by tackling the causes of poverty and injustice. The

World Vision partnerships' more than 40,000 staff serve all people, regardless of religion, race, ethnicity, or gender in nearly 100 countries, responding to needs in health care, HIV and AIDS prevention, education and vocational training, food security, agricultural production, and economic and micro-enterprise development. We work in partnership with local civic actors and government to foster accountability and develop and strengthen participatory decision-making and ownership of the communities we serve.

### THE WEST AFRICAN EBOLA VIRUS EPIDEMIC

The West African Ebola virus epidemic (2013–2016) was the most widespread outbreak of the Ebola Virus

- Develop strong community engagement strategies that trigger community action on prevention, detection, and response.
- Develop robust, annual country emergency preparedness and response plans.
- Facilitate timely, effective, and supportive supervision and monitoring at all levels of the health delivery system.
- Empower and continue to use available community structures to help effectively detect and respond to epidemics using their comparative advantages.
- Explore the possibilities of accessing new predictive models, financing mechanisms, and leadership for the preparedness and response of future outbreaks.

Disease (EVD) in history—causing major loss of life and socioeconomic disruption in the region, mainly in Guinea, Liberia, and Sierra Leone.

This unprecedented epidemic in West Africa was first reported in Sierra Leone in March 2014 and rapidly spread, revealing the failures of the region's chronically fractured and under-resourced health care system. In August 2014, the WHO declared the outbreak a “public health emergency of international concern.” Due to a lack of early warning systems, Ebola spread rapidly and the country's health system lacked the capacity to address the overwhelming number of cases, mainly due to the challenges that countries face in promptly detecting and responding to public health emergencies. By March 2016, the WHO had documented a total of 14,124 cases of Ebola, including 3,955 deaths, in Sierra Leone.

It is widely accepted that the response to the 2014 Ebola crisis failed due to the state of health care systems in West Africa, which are often described as fragile and dysfunctional. Interventions targeting the complex nature of the Ebola outbreak had varying successes. For instance, while it is critical to isolate Ebola patients and conduct safe burials in controlling spread of the disease, top down approaches, particularly quarantine and body collection, were ineffective. Designed and implemented

without buy-in and input from community leaders, they failed to address key infrastructure constraints and were culturally insensitive. This resulted in general distrust among community members, and, ultimately, underutilization, and underuse of these interventions.

However, with the help of community health care workers (CHWs), social mobilization campaigns brought about awareness and led to buy-in from the community, which then increased the use and effectiveness of these interventions. In addition to the critical need to strengthen existing health care systems and integrate cultural beliefs and practices into all facets of the response, the evidence demonstrates that community-based approaches to prevention and care can notably reduce Ebola transmission.

NGOs that had secured the trust of communities emerged as critical players in terms of changing knowledge, attitudes, and behaviors around Ebola and, ultimately, accepting/adopting the lifesaving interventions required to control the outbreak. Having gained access to communities, NGOs were posed to deliver a wide range of health services, including identifying new infections in Ebola-affected communities, providing clinical care to the critically ill in Ebola Treatment Units (ETUs), advocating for and employing survivors to assist with the response, and reopening district hospitals and health centers.

World Vision was one of such NGOs that made a difference during the Ebola outbreak, with World Vision in Sierra Leone's (WVSL) contribution to helping change the beliefs about Sierra Leone's health system.

From the very onset of Ebola outbreak in Sierra Leone, World Vision was actively engaged in implementing preventive activities and EVD case management in 25 of its area development programs (ADPs), which included 25 chiefdoms in Bo, Bonthe, Pujehun, and Kono districts of Sierra Leone.

World Vision's Ebola response strategy was designed to work in close collaboration with the government of Sierra Leone to reach a population of 1.6 million. This was possible through mobilization of WorldVision's extensive network of community service providers (CHWs, traditional healers, teachers, paramount chiefs, and faith leaders) that it has established over the past 20 years.

## RECOMMENDATIONS

- Multilateral and multi-sectoral approach for strengthening both the global and national capacity to prevent, detect, and respond to infectious diseases threats is essential. In the overall ability to improve outbreak and epidemic preparedness, community engagement and social mobilization must be considered as an integral and critical success factor. Some of the recommendations presented below are meant to improve coordination and promote a whole-of-society principle aimed toward our collective national and global health security.
- Make frequent visits at the community level. The encounters with WorldVision staff and CHWs were instrumental in accessing critical information and service utilization for suspected Ebola cases, and subsequent psychosocial and developmental support.
- Invest in trusted local community members (CHWs, religious, and village leaders) to build community engagement and trust.
- Design effective strategies for early authentic communication to provide key messages, mitigate false assumptions, and provide key actions to be undertaken at the household and community level.
- Explore and build capacity of existing community resources to establish context-specific community systems to address emergencies.
- Create effective, user-friendly, community-based monitoring systems for surveillance, ensuring equity and quality.
- Ensure integration of services (health, education, food security, and livelihoods) for effective community participation.
- Capacity building, learning, and organizational strengthening must be included as an ongoing process for health systems to ensure they are prepared for responding to future emergencies.
- Effective engagement in the response from the onset of an outbreak is critical to gaining trust of people.

## READY TOGETHER RECOMMENDATIONS

by **ASHLEY ARABASADI**

**Policy Advisor, Management Sciences for Health**



Civil society plays a vital, necessary role in the development and implementation of global initiatives such as the GHSA. The GHSA is an open collective of nongovernmental entities dedicated to promoting collabora-

tion, excellence, innovation, and commitment in implementing the GHSA, adherence to the IHR, the World Organization for Animal Health (OIE) Performance of Veterinary Services (PVS) Pathways, the Alliance for Country Assessments for Global Health Security and IHR Implementation, and the Biological Weapons Convention and United Nations Security Council Resolution 1540. The GHSA is comprised of over 50 organizations and companies operating in 100 countries and dedicated to achieving a world safe from the threat of infectious diseases either natural or manmade.

The GHSA is a platform for providing strategic input to USG and international leadership on how best to accelerate progress on the continuation of the GHSA through 2024 working in partnership with civil society and the private sector. Recent recommendations shared with the GHSA Steering Group at the Kampala ministerial include tracking political and financial commitments; urging countries to cost, complete, and fully finance Joint External Evaluations and National Action Plans in at least 75 countries by 2019; increased transparency in monitoring progress of GHSA goals and a more inclusive, One Health collaborative approach, to health security. As the voice of civil society, the multisectoral membership base of the GHSA is truly reflective of a One Health and whole-of-society effort and thus are uniquely positioned to help in efforts to strengthen health security through advocacy, education and outreach.

In addition to serving as the current Chair and member of the GHSA Steering Committee, MSH, through its work in countries is empowering communities to become effective disease first responders through a comprehensive epidemic preparedness and readiness model. We know that making the world safer from infectious disease outbreaks begins in the community. However, too often programming is community-based rather than community-led. Community-led programming—those programs that involve community leaders and members in the decisionmaking process, investment, implementation, and maintaining projects that meet the most pressing needs of the community—are more effective. Involving community members early and continuously not only contributes to more thoughtful and effective programming but in the case of an epidemic, can be a turning point in stopping an outbreak.

Beyond community engagement, I believe that designing programming through an anthropological lens can lead to better and more culturally sensitive programming. For epidemics, it can stop an outbreak quickly since cultural influences like mortuary and burial practices often contribute to the spread of disease. An understanding of the underlying reasons why people behave in the manner in which they do leads to the development of more appropriate risk communications to ensure that appropriate messaging is being used to the greatest effect. Using cultural and medical anthropologists in emergency response, as well as other longer term programming, is a timely concept considering the plague outbreak in Madagascar. Anthropologists have warned that a burial custom “famadihana,” or dancing with the dead, can be a potential cause for disease spread and are actively engaged in how best to mitigate this risk while honoring this sacred tradition.

There's much to be learned from engaging social scientists and civil society in the fight against infectious disease outbreaks, epidemics and pandemics.

To ensure a true One Health approach, I recommend the following:

- Civil society, both international and domestic stakeholders must be involved early and continuously in the drafting, reviewing and finalization of international agendas such as the GHSA.
- Create and contribute to a global-to-local feedback loop to raise important issues at the country level to global leadership and vice versa. This will ensure not only ensure that challenges and issues are raised to the highest levels, but also that information is transmitted to implementers in a timely fashion and can be integrated into appropriate quickly and efficiently.
- Considerations for appropriate program interventions must not only be community-based but also community-led, culturally relevant, and locally appropriate.
- Similar to emergency rosters of trained medical personnel able to deploy in the immediate aftermath of a disaster, a roster of cultural and medical anthropologists should be created.
- Organizations should consider having anthropologists as technical experts to assist in program design.





LEFT TO RIGHT:  
REBECCA KATZ, CAPT. DR. NANCY KNIGHT, DR. JOHN PAUL CLARK, ALLISON NEALE, MAIMUNA (MAIA) MAJUMDER

## PANEL 4: OVERCOMING BARRIERS—INCLUDING BARRIERS TO PUBLIC PRIVATE PARTNERSHIPS, BARRIERS TO COUNTRY ENGAGEMENT, AND BARRIERS TO FINANCING

The final panel of the day focused on overcoming barriers to global health preparedness, including barriers to public private partnerships, barriers to country engagement, and barriers to financing. Capt. Dr. Nancy Knight from the CDC's Division of Global Health Protection (DGHP) considered some of the barriers to global preparedness and response, including insufficient support, lack of timely and accurate information and sharing of data, poor assessment of risks and vulnerabilities to all sectors, partial accountability and transparency among countries, and unpredictable and insufficient funding and resources. Dr. Knight also discussed funding challenges moving forward and how we can make progress so that countries can continue their work when there is uncertainty about funding from the U.S. Dr. John Paul Clark from the World Bank described the Regional Disease Surveillance Systems Enhancement (REDISSE) Program, which is an interdependent series of projects (iSOP) that work to address systemic weaknesses within the animal and human health sectors that hinder effective disease surveillance and response. These interdependent projects aim to help countries fulfill their obligations under

the IHR and the OIE Terrestrial Animal Health Code. Dr. Clark highlighted some of the key challenges that the World Bank Group faces. These challenges include overcoming the complacency that occurs after an outbreak, the difficulty of coordinating to avoid duplication and fragmentation of projects and program financing gaps, challenges presented by working across sectors and the One Health approach, and the complexities associated with taking a regional approach, a multi-systems approach, and a multi-sector approach. Allison Neale discussed Henry Schein, Inc.'s work to improve supply chain management in preparation for the next pandemic. Neale focused on Henry Schein's work as part of the Private Sector Roundtable (PSRT) and, more specifically, on Henry Schein's role as the private sector lead for the Pandemic Supply Chain Network, which has worked to identify products that are necessary during an outbreak. Furthermore, Maimuna (Maia) Majumder described the work of HealthMap, a computational epidemiology group. HealthMap's platform uses nontraditional data sources, including social media, to monitor, visualize, and disseminate digital information on approximately 250

different diseases in 15 languages. Majumder emphasized how HealthMap's Epi Curves can help epidemiologists and other groups working in global health, especially when traditional sources of information are not available.

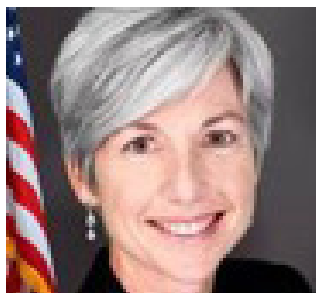
### **SOME OF THE KEY RECOMMENDATIONS AND TAKEAWAYS FROM THIS PANEL INCLUDED:**

- Collectively, we need to demonstrate successes in global health security, which is difficult because the desired outcome is for a pandemic to not happen.
- Countries should create publicly available, costed action plans, which will enable donors to identify gaps they can support. This will become increasingly important as some of the funders, including the U.S. Government, will have to reduce resources devoted to health security.
- To avoid duplication of programs within countries, we need to focus on the dialogue of the country level implementers of the program.
- We need to work to address the risks that apply to the global supply chain, work to make the supply chain as strong as possible, and make sure that the lines of communication are open and effective in getting resources where they need to be.
- The private sector should seek data privacy and bioethics counsel; individually or in tandem.
- The private sector should consider creating a formal requisition pathway where partners can go to a company directly, and request data that might be available.

## **US GOVERNMENT ENGAGEMENT FOR HEALTH SECURITY**

by **CAPTAIN DR. NANCY KNIGHT**

**Director of the Division of Global Health Protection, Centers for Disease Control and Prevention**



CDC's Division of Global Health Protection (DGHP) helps countries strengthen global health security and meet the requirements of the IHR. Because an outbreak anywhere in the world can

reach major cities on six continents in under 36 hours, our mission is to control disease outbreaks at the source in order to reduce the social and economic impact of public health threats.

Due to the nature of infectious diseases, we will all remain vulnerable until every country in the world can rapidly identify and contain public health threats; even a single gap in a remote area leaves everyone at risk. CDC closes the gaps by working across sectors to build core public health capacities for surveillance, laboratory, workforce development, and emergency management. Strengthening public health capacities results in systems

that can, and do, stop outbreaks from becoming world endangering epidemics.

For example, in Uganda, CDC support for rapid response teams and an emergency operations center decreased response time to deadly hemorrhagic fever from 40 days to under 8 hours. In Liberia, post-Ebola investments in core public health systems led to immediate response to a deadly outbreak of meningococcal disease, with CDC-trained disease detectives on the scene within 24 hours. In Cameroon, investments in CDC-led emergency management training have improved response times from eight weeks to one week to as little as a single hour. In Vietnam, CDC-supported efforts to involve community members in event-based surveillance have resulted in 100+ large outbreak clusters detected. And in DRC, teams of CDC-trained disease detectives and rapid responders recently contained a potentially devastating outbreak of Ebola. The results of our collaborative efforts have been exciting to witness as together we create faster, smarter outbreak response capabilities across the globe.

But more is needed. Strengthening core systems demands sustained, directed, and cooperative efforts from both public and private stakeholders—from heads of governments to village leaders. The barriers we face in

achieving this goal include a sense of complacency; a lack of accurate and transparent information; and a need for resources, including technical expertise.

Support wavers when people, from citizens to business executives to policymakers, fail to accurately assess the risk or lack clear understanding of what must be done to close health security gaps. This leads to fewer resources and hinders whole-of-society participation in global health security implementation. We must escape the cycle of panic and neglect and instead commit to a policy of sustained progress. Preparation must continue even in the absence of a crisis, because the next emergency is always nipping at our heels.

Furthermore, panic is costly in both lives and dollars. As we saw with the West Africa Ebola epidemic, racing to build needed systems in the face of an outbreak can result in large-scale human and economic devastation. CDC recognizes the need to have strong, scalable systems in place before an outbreak strikes. Building upon the success of our disease-specific work, our programs seek to strengthen countries' capacity to stand up to any public health threat.

Flagship CDC initiatives to strengthen capacity include the Field Epidemiology Training Program, which has trained more than 10,000 disease detectives in 70 countries, the CDC Global Rapid Response Team of 400+ experts that can rapidly deploy to the scene of a crisis, and 10 Global Disease Detection Centers that provide critical surveillance and research data as a foundation for a sustainable global protection strategy. Multisectoral support for these and other efforts that enable rapid outbreak detection and response is vital to maintaining and expanding health security.

The IHR and the GHSA have set a common destination for public health. In charting our course, we must clarify where we are starting from, decide how we will reach our goals, and set checkpoints along the way to track our progress and hold ourselves accountable.

An effective way to do this is through a JEE, in which a team of international experts is sent to independently evaluate a country's emergency response capabilities. The WHO, working with CDC and GHSA partner countries, adopted the JEE tool in February 2016 to harmonize independent monitoring for both GHSA targets and IHR compliance efforts. In contrast to previous self-reporting

mechanisms, the JEE standardizes assessment across all 19 IHR core preparedness capacities, and results are shared openly. JEEs are designed to establish a baseline measurement for a country's capacity, inform national policy, target resources, track progress, and highlight priority areas for improvement. The JEE helps us overcome hurdles that have plagued us since the signing of the IHR by enabling better assessment, accountability, and transparency.

CDC experts have participated in over 70 percent of the JEEs that have been conducted to date. JEE results help countries develop costed action plans, which can open the door for partnership through matching needs with resources. As an example, after Ghana's needs were identified through their JEE assessment, The Korea International Cooperation Agency (KOICA) dedicated over \$7M USD, working alongside CDC to strengthen Ghana's capabilities in the areas of laboratory, workforce development, and emergency response.

Recent experiences prove that global health security efforts are both sound and necessary. Through its global health protection platform, CDC is working with many partners to overcome the barriers and fill the gaps. We do this through forging trusted relationships across sectors; offering proven solutions and the expertise to implement them; and leading efforts to help partner countries meet GHSA goals.

The October 2017 GHSA Ministerial Meeting in Kampala, Uganda reaffirmed the commitment of the U.S. and more than 60 other countries to a world safe and secure from threats posed by infectious diseases, but also acknowledged there is much more work to be done.

There is no greater investment than that which will protect our physical, social, and economic wellbeing. Now is the time for each of us to look at what we can offer the global community, whether we are technical experts who help guide policy and grow capacity; partner organizations who can offer support, supplies, or resources; or community members who can communicate important health information and help report outbreaks early. CDC stands ready to support these investments and continue working toward a world safe and secure from emerging and re-emerging health threats. Disease won't wait, and neither can we.



# WEST AFRICA REGIONAL DISEASE SURVEILLANCE SYSTEMS ENHANCEMENT PROGRAM

by DR. JOHN PAUL CLARK

REDISSE Program Coordinator, The World Bank Group



The member states of the Economic Community of West African States (ECOWAS) are at high-risk for infectious disease outbreaks, including those of animal origins (zoonotic diseases). West Africa is both a hotspot for emerg-

ing infectious diseases and a region where the burden of zoonotic diseases is particularly high. In this region, emerging and re-emerging diseases at the human-animal-ecosystems interface are occurring with increased frequency. These include highly contagious diseases that cross borders easily and have the potential to rapidly evolve into pandemics.

The impacts of infectious disease outbreaks can be devastating to the fragile social and economic situation of countries in West Africa. The 2014 EVD outbreak had severe consequences for the entire region. It clearly eroded hard won gains in the fight against poverty and in the fight to promote human development and economic growth in Guinea, Liberia, and Sierra Leone.

The expeditious spread of transmissible diseases in West Africa is accelerated by individual country health systems' limited capacities for efficient surveillance, early detection, and rapid response to infectious disease outbreaks that result in significant reversals in human development progress in the region including increased cases of morbidity and mortality, threats to both health and food security, and substantial economic losses. Despite this, there are presently no significant sources of funding for disease surveillance and response in West Africa, and

although there has recently been a sharp focus on this issue in the three countries most affected by Ebola, the emphasis has been on the response to the immediate EVD crisis rather than the systematic development of capacity to detect and respond to infectious disease outbreaks more broadly.

Given the transboundary nature of contagious diseases and the fact that a significant share of them can be transmitted between animals and humans (more than 60 percent), there is a critical need for coordination and exchange of knowledge and information among countries and between sectors. West Africa's EVD epidemic could not be contained due to the absence of systematic collection, reporting, and exchange of infectious disease information across country-borders in a timely manner. The EVD epidemic dramatically illustrates the need for a more harmonized approach to disease surveillance and response, and highly underscores the importance of regional cooperation among West African countries for the prevention and control of potential cross-border disease outbreaks, as a key component of the post-Ebola health systems recovery strategy, and overall health systems strengthening efforts in the region.<sup>1</sup>

In response to this situation, the World Bank Group has initiated the Regional Disease Surveillance Systems Enhancement (REDISSE) Program to strengthen cross-sectoral and regional capacity for integrated disease surveillance and response in West Africa.<sup>2</sup> The Program is in line with the World Bank Group's mission to end extreme poverty and promote shared prosperity. The Program is being developed jointly by the Health, Nutrition and Population (GHNDR) and Agriculture (GFADR) Global Practices to ensure that the human-animal-environment interface is addressed and the One Health approach is respected.

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- <sup>1</sup> There are three primary rationales for a regional approach to disease control and financing a RDSR network in West Africa: 1) disease outbreaks and epidemics have far reaching economic consequences, contributing to disease burden and curtailing the flow of goods, services and labor; 2) the control and prevention of cross-border spread of communicable diseases is a global public good, and 3) efficiency can be enhanced through resource sharing and collective action.
- <sup>2</sup> ECOWAS member states include Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.



The Program will address the systemic weaknesses within the animal and human health sectors that hinder effective disease surveillance and response. It contributes to the region's progress in meeting obligations under the IHR 2005, the integrated disease surveillance and response (IDSR) strategy, and the OIE animal health standards. The Program is also in line with the GHSA objectives and is structured to contribute to four of the key action packages defined in the GHSA strategy: surveillance and reporting; laboratory capacity; health workforce; and epidemic preparedness and response.

The economic analysis of the REDISSE Program identifies all potential benefits of the components and activities, quantifies them into monetary units and compares them with project costs through a cost-benefit analysis (CBA). There is a strong economic case for investing in integrated disease surveillance and response systems. Preventing and controlling zoonotic disease outbreaks yields large economic benefits by reducing the threats of epidemics and pandemics. Such benefits of disease surveillance go well beyond the health benefits of reducing the number of infections, mortality and morbidity, and health care costs. Disease outbreaks also affect economic activity by decreasing demand (as personal income, investment, and exports fall) and supply (as agriculture production falls and businesses in many sectors close), and by reducing labor, capital, and productivity, which are the major components of growth.

There are three primary rationales for a publicly-provided regional approach to disease surveillance and response network in West Africa.

- 1. The first rests on the status of a disease surveillance system as a global public good, which is both non-rival and non-exclusive.** The benefits of a surveillance and response system go beyond national borders since an undetected, or uncontrolled outbreak is more likely to spread to other countries. These benefits accrue to all countries and thus describe a “pure” global public good.

- 2. The second rationale is simply the overwhelming economic burden that infectious diseases, individually and collectively, place on the region, constraining regional and national economic development.**
- 3. The third rationale is based on the sharing of resources to enhance efficiency. Examples of resurgent polio, meningitis, cholera, and yellow fever in West African countries that were thought to have eliminated or controlled them demonstrate the need for a coordinated regional response.** Costly high-level resources, such as level 3 reference laboratories, specialized research institutions, and advanced training facilities may efficiently serve the needs of more than one country.

The REDISSE Program is being implemented as an inter-dependent series of projects (iSOP) that will eventually engage and support all 15 ECOWAS member countries in an effective and sustainable regional surveillance network. The first project in the series (REDISSE iSOP 1) provided US \$110 million in International Development Association (IDA) financing to Guinea, Sierra Leone, Senegal, and the West Africa Health Organization. REDISSE iSOP 2 is a US \$147 million IDA financed project which includes Guinea-Bissau, Liberia, Nigeria, and Togo. It was approved by the World Bank Group's Board of Directors on 1 March, 2017. REDISSE iSOP 3 (est. US \$130 million) will expand the program to additional countries in West Africa in 2018, including Benin, Mali, Mauritania, and Niger. Regional coordination of the REDISSE Program is primarily the responsibility of The West Africa Health Organization (WAHO) in Burkina Faso and the Regional Animal Health Center (RAHC) in Mali.

# THE PRIVATE SECTOR'S ROLE IN PANDEMIC PREPAREDNESS

by **ALLISON NEALE**

**Director, Public Policy, Henry Schein, Inc.**



Our company, Henry Schein, is the world's largest provider of health care products and services to office-based physicians, dentists, and veterinarians. As a company that employs more than 22,000 Team Schein Members in

32 countries, and sits at the nexus of more than 4,000 manufacturers, approximately 1.5 million health care providers, and the countless patients they care for, global health security is of critical importance to Henry Schein.

As part of our corporate social responsibility efforts, Henry Schein has been deeply engaged in disaster preparedness and relief for more than two decades. We approach disaster preparedness and relief as we approach any complex global health issue: public private partnerships are essential for success. We have also found that coordination within the private sector is vitally important, and we do this through a variety of channels. The World Economic Forum (WEF) is the quintessential public-private partnership and an exceptional platform for engagement. And, for the past two and a half years, we have been pleased to serve as a member of the Steering Committee for the GHSA PSRT, which has provided an invaluable opportunity to work together with like-minded companies, link with public sector players, and effectively harmonize our efforts.

There are very few who would question the fact that we must re-double our efforts to better prepare for a more efficient global response to pandemics. But, let me pose a fundamental question: While it is obvious that the public sector has a critical role to play in global health security, why should the private sector engage?

If the international community learned anything from the Ebola outbreak, it is that we are underprepared in every aspect of effective response. Disease does not stop at national borders. A global health crisis anywhere in the

world poses a global security and economic risk everywhere. And we know that the risk of a virulent airborne infectious disease, like pandemic influenza, and the threat posed by antibiotic resistance, are ever-present. Hundreds of millions of lives are at risk, and the World Bank Group and others have estimated that global economic disaster could result from a single large pandemic.

No single sector can effectively address global health crises alone. Each sector has core competencies essential to this effort, which is why public-private partnership is vital to success. Given all that it brings to the table in terms of infrastructure, expertise, and relationships, the private sector must be engaged as a true partner and problem solver. We have found that one critical area for this engagement is in supply chain.

The Ebola crisis highlighted the serious supply chain challenges we face in effectively responding to global health crises. Henry Schein swiftly responded to the requests of our partner NGOs and other public entities, donating essential health care products, beginning in the early days of the crisis. Many other companies did the same. But we faced significant difficulties: identifying the most pressing needs; accessing a supply chain capable of getting supplies on the ground swiftly in West Africa; and ensuring that the product got into the right hands. Other compounding problems included the difficulty manufacturers faced in meeting surging demand combined with the irrational buying of scarce product that often happens in a crisis.

The global supply chain also faces several ever-present risks, any one of which could impact millions of people around the world. We think of these as the "4Ps": pandemic, powerful weather, port closures, and political unrest. These challenges are amplified by customs challenges and the fact that the health care industry relies on certain regions for the raw materials for some health care products.

So how can we address this threat? At the 2015 World Economic Forum, leaders from business, international organizations and government resolved to develop a public-private partnership for a more effective pandemic

response. Our partnership, called the Pandemic Supply Chain Network, includes prominent members of the international community, including International Organizations, NGOs, and corporations.

Over the past three years, we have been working intensively together to increase supply chain capacity to more effectively match health care products with urgent needs to save lives. So far, through our work together, we have met face-to-face seven times around the world, developed a list of critical products and other tools, and conducted two simulations to identify gaps.

### WE ARE NOW WORKING TO:

- Develop a global platform to better connect supply and demand and allow for enhanced transparency into the availability of product for those that need it;
- Develop an information sharing platform to enable better private sector surge capacity;

- Identify items to be expedited through customs in times of crisis; and
- Connect to financing mechanisms that exist to support the response of national governments to pandemics.

There is no question that every organization has its own norms and regulations, and it takes time to accomplish something meaningful through a complex partnership. However, the members of our Pandemic Supply Chain Network embrace a shared vision to create a safer world through pandemic preparedness and response, and we have made a common commitment to make a meaningful contribution to the world, together.

While we have made important progress, gaps remain and there is much work to be done. We are deeply committed to continuing on this path together. After all, when it comes to pandemics, complacency is not an option.

## DATA SHARING FOR GLOBAL HEALTH SECURITY

by **MAIMUNA (MAIA) MAJUMDER**  
Computational Epidemiology Research  
Fellow, HealthMap



Founded in 2006, HealthMap is a global leader in utilizing non-traditional digital data sources for disease detection, outbreak monitoring, and real-time surveillance of emerging public health threats. Based out of

Boston Children's Hospital and Harvard Medical School, our team is comprised of a highly interdisciplinary group of public health researchers and practitioners, data scientists, and software developers. The HealthMap digital disease surveillance platform—which is publicly accessible via the website <http://www.healthmap.org> and mobile app Outbreaks Near Me—combines disparate data sources to deliver real-time intelligence on a broad range of pathogens for local health departments, government agencies, and the general public. Data sources

utilized by the HealthMap platform include online news aggregators, expert-curated forums, eyewitness accounts, and validated official reports. Through an automated process—which runs 24 hours a day, 7 days a week, and 365 days a year—the platform monitors, organizes, integrates, filters, visualizes, and disseminates digital information about infectious diseases in 15 languages, facilitating early detection of public health threats worldwide. By combining the HealthMap digital disease surveillance platform with data processing and analytics, domain-level expertise, and novel research methods, our team aims to provide insight into the current global state of infectious diseases and their effect on human and animal health.

One of the most critical barriers to global health security is access to universal disease surveillance. This is especially palpable within the context of public health threats such as disease emergence (i.e. spillover events) and large-scale outbreaks. Developing countries around the world are uniquely prone to such threats not only due to poor public health infrastructure, but also because of ecosystem disruption as well.<sup>1,2</sup> Unsurprisingly, traditional disease surveillance, though vitally important, is often

inadequate in these contexts, and in our increasingly connected world, these insufficiencies can have serious global health security consequences, including exportation and sustained transmission of novel pathogens across international borders.<sup>3,4</sup>

## HEALTHMAP AND GLOBAL HEALTH SECURITY

Non-traditional digital data sources like those employed by the HealthMap platform can help fill critical knowledge gaps when traditional surveillance is incomprehensive; nevertheless, existing sources are generally restricted to the provision of population-level data. Still, these data—such as incidence of a given disease over time or descriptive reports of ongoing management activities in a region of interest—can yield extremely useful applications. For example, in combination with simple phenomenological modeling methods, such data can allow for near-real-time estimation of transmission dynamics and case count projections during large-scale outbreaks, as well as the distance appraisal of interventions.<sup>5,6</sup> Though restricted to population-level assertions, these applications can help preserve global health security by informing regional deployment strategies for resources that are critical to reducing disease transmission, such as personal protective equipment and vaccinations.

Higher resolution data such as individual-level biometric, demographic, and mobility data, in combination with data on disease incidence at multiple scales, can provide even greater utility with respect to outbreak management. Whereas biometric and demographic data can lend perspective into risk factors for infection, mobility data can help foretell how an outbreak will progress spatiotemporally. While the latter allows for the deployment of outbreak-containment resources with improved location-specificity, the former data types allow for deployment of targeted infection prevention campaigns to at-risk individuals. At present, however, traditional individual-level data collection methods (e.g. field survey, cohort study, etc.) can be challenging to finance and execute during outbreaks.

## RECOMMENDATIONS

Given the barriers to global health security highlighted above, private sector partners are uniquely positioned to lead within the disease surveillance space. A wide variety of high resolution, individual-level data are regularly collected from private sector consumers—either in the form of metadata, or as information collected through the use of a product itself. Via well-regulated data sharing with public sector partners, these data can be immensely useful in mitigating public health threats; however, privacy considerations for consumers, as well as ethical limitations to human subjects' research, must be considered. Responsible data sharing practices can be operationalized through the following recommendations:

**EXPERT CONSULTATIONS:** Foremost, it is essential to determine how to process your data properly for the use of health-related study. An information (or data) privacy expert, as well as a bioethicist with experience in the use of non-traditional data streams for human subjects' research, should be consulted. Note that the mode of data sharing (below) may impact the degree of processing required.

## MODES OF DATA SHARING

- **Collaborate:** If you believe that the data your company is collecting may be useful to public sector partners working in the global health security space, reach out and connect!
- **Create a formal online requisition pathway:** Make clear what data are available for access and give public sector partners the option to request a subset (or the complete data set) through a form.
- **Consider a public Application programming interface (API):** Provided that your company collects enough data to warrant doing so, grant public access to a randomly sampled subset.

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<sup>3</sup>M.S. Majumder et al. 2014 Ebola Outbreak: Media Events Track Changes in Observed Reproductive Number. *PLOS Currents Outbreaks*, DOI: 10.1371/currents.outbreaks.e6659013c1d7f11bdab6a20705d1e865, 2015

<sup>4</sup>M.S. Majumder et al. Utilizing Nontraditional Data Sources for Near Real-Time Estimation of Transmission Dynamics During the 2015-2016 Colombian Zika Virus

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<sup>5</sup>J.A. Patz et al. *Unhealthy Landscapes: Policy Recommendations on Land Use Change and Infectious Disease Emergence*. *Environmental Health Perspectives*, 112(10):1092–1098, 2004.

<sup>6</sup>B.A. Wilcox and D.J. Gubler. *Disease Ecology and the Global Emergence of Zoonotic Pathogens*. *Environmental Health and Preventive Medicine*, 10(5):263–272, 2005.

*READY TOGETHER* was fortunate to have additional interested parties, who were unable to attend, submit written comments.

## THE PRIVATE SECTOR: A PARTNER IN GLOBAL HEALTH SECURITY AND UNIVERSAL HEALTH COVERAGE



by **DR. JEFFREY L. STURCHIO**  
**President and CEO,**  
**Rabin Martin**

I have been working in global health for more than 25 years, in a variety of roles in the research-based pharmaceutical industry, in leadership

positions in non-governmental organizations (including the Global Health Council, the BroadReach Institute for Training and Education [BRITE], and the Corporate Council on Africa), and today as head of a global health strategy firm that works at the intersection of public health and private industry to help advance the health of millions around the world. Through these experiences, I've observed the private sector become a progressively more prominent actor in global health in recent decades, on issues as diverse as neglected tropical diseases (NTDs), maternal and child health, HIV/AIDS, TB, malaria and increasingly, non-communicable diseases and global health security.<sup>1</sup> Historically, industry has largely provided

monetary and in-kind contributions to support public health programs, but over the years, that model has shifted dramatically, with many companies lending their expertise, capabilities, and other resources to drive progress on important global health issues.

Three years ago, during the height of the Ebola crisis in West Africa, the global community witnessed the power of the private sector as a partner in tackling the massive challenges of an acute health emergency.

The PSRT of the GHSA was created in 2015 by the Chief Medical Officers of Johnson & Johnson and the GE Foundation in response to the need for multisectoral engagement to prevent, detect, and respond to emerging health threats and to build resilient national systems to prepare for such threats. The PSRT embodies the spirit of whole-of-society cooperation to strengthen global health security, not least by mobilizing industry to support countries in addressing gaps revealed by their JEEs by peer countries in the GHSA. Further, the PSRT understands that global health security is intrinsically a cross-disciplinary field that requires the expertise of many sectors, including health care, logistics, and supply

chain management, energy, and data and analytics, among others. For example, Intel Corporation and Qlik are critical partners because technology is an essential component of collecting, analyzing, and communicating real-time data and bringing virtual technical assistance where it is needed. The logistics companies, such as UPS, that deliver commercial goods to our homes can apply those same skills to deliver essential supplies during health crises. Working together as a coalition, the PSRT has been able to engage key stakeholders in the public sector and civil society and amplify the contribution of the private sector across different industries.

The GHSA, instrumental in bringing 60 countries together to combat disease threats, has welcomed the private sector and other prospective partners to join the discussion through the JEE Alliance, led jointly by Finland and Australia.<sup>2</sup> As a result, PSRT companies have been better able to understand country-level needs and glean insights on how they can most effectively support efforts already under way. They have consulted with government stakeholders to align priorities, listen, and engage in a forward-thinking way. Other global health initiatives would do well to emulate the GHSA model of engagement of the private sector and other partners to support broader health systems strengthening and advance progress toward achieving universal health coverage (UHC), a critical element of the Sustainable Development Goals.

At its core, UHC protects people from catastrophic financial ruin because of seeking health services. Most important, it seeks to enable greater access to health care services to the working poor and the middle class who can neither afford out-of-pocket costs, nor be eligible for government subsidies.

Since taking office, WHO Director-General Tedros Adhanom Ghebreyesus has rightly brought UHC to the fore of global health policy. UHC can be a powerful tool in the global health security arsenal in that it fosters health systems strengthening and with it the prevention and early detection of emerging health threats—two major tenets of GHSA. As Dr. Tedros has observed, global health security and UHC “are two sides of the same coin.”<sup>3</sup> Given that preventing epidemics costs far less than responding to them, investing in health security makes economic sense—not just for countries, but also

for businesses. UHC brings with it economic dividends, job creation, and increased workforce productivity, along with an uninterrupted cadence of commerce. These are all areas that are important to companies that work in or are contemplating further investment in geographic regions at risk of pandemics or other emerging health crises. Robust public-private partnerships to strengthen health system preparedness are good for society and good for business.

Beyond their impact on morbidity and mortality, epidemics also pose a major toll on the economy, which highlights the interdependence of health and wealth in every society. Aside from the absolute cost of epidemic response, health crises can cause major disruptions to the day-to-day functioning of an enterprise. From sick employees to broken supply chains, businesses big and small across sectors can be affected. Indeed, smaller businesses with narrow margins are least able to sustain these stressors to the bottom line. Because a country's health budget is reliant on its overall economic stability, these are very real concerns for both the public and the private sectors.<sup>4</sup>

As we think about the next phase of the GHSA, engaging finance ministers to understand and plan for the impact of global health security and UHC to long-term economic development will be important to secure enhanced resources for health. While they may not be well versed in the nuances of epidemic control, they will understand the worrisome impact of diseases disrupting economic stability and growth. The local private sector can be a powerful ally in this effort. This not only includes local affiliates of multinational corporations, but more important, prominent domestic businesses that provide the backbone of national and regional economic growth.

Finally, it's important to remember that countries are in the driver's seat. It is incumbent on countries to develop national strategies and action plans that set out clear priorities for strengthening health security and adopt national consultation processes to engage a wide range of public and private sector partners to address some of the gaps. With continued collaboration, coordination and open communication, the private sector in all of its diversity can become an even more central partner in securing health around the world.

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<sup>2</sup>Global Health Security Agenda (Accessed 12/05/17) <https://www.ghsagenda.org/> JEE Alliance (Accessed 11/29/2017) [www.https://www.jeealliance.org/](https://www.jeealliance.org/)

<sup>3</sup>Ghebreyesus, Tedros Adhanom. "All roads lead to universal health coverage." *The Lancet*, vol. 5, no. 9, 2017

<sup>4</sup>World Bank. 2017. *From panic and neglect to investing in health security: financing pandemic preparedness at a national level*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/979591495652724770/From-panic-and-neglect-to-investing-in-health-security-financing-pandemic-preparedness-at-a-national-level>

## WHERE IS THERE POLICY PROGRESS ON AMR?

by LORD JIM O'NEILL



It is now 13 months since the UN announced a so called high level agreement on Antimicrobial Resistance (AMR). This was only the fourth time in the UN's history that it had reached such an agreement and represented the culmination

of a lot of hard work and effort by many different people and bodies. For me having chaired the UK Independent Review on AMR, it was a very proud moment as promoting ideas that might contribute to such an agreement was one of the tasks set for my review, and it became one of our ambitions. Thirteen months on, I thought it might be interesting for me to reflect on that agreement but also offer my views as to where I believe policy progress is being made and where it isn't. As our Review progressed, we realised that to solve AMR would involve serious policy efforts in ten broad areas. We dubbed these the AMR 10 Commandments and our final 27 specific recommendations all came from these areas. I thought I would talk about progress, or the lack of it, in this context.

The bottom line is, there appears to have been better progress than I expected in three areas, very little in three others, and in four, I am either unsure or find it hard to be decisive!

Let me go through them briefly. But let me begin by highlighting our two big baseline "what happens if we do nothing." Today's probable 700,000 annual deaths would become 10 million a year by 2050, and the world economy would miss around US \$100 trillion it otherwise may have.

Of the three areas I am positively surprised by progress, one of these is simply that there appear to be more AMR researchers than before. I base this on the highly scientific conclusion of the number of times I get asked to speak at academic events. Second, and why this might have happened, rather encouragingly, there has been a number of initiatives to invest more money into early stage research and development (R+D). I would highlight initiatives from CARB-X Global Partnership in the U.S., joint financing on this initiative by the Wellcome Trust, the joint UK and Chinese government initiatives on their innovation fund, and the announcement following their G20 hosting by the German government to host an R+D hub in Germany. The combined total of all of these initiatives is consistent with our recommendation for around \$2 billion over five years. It is quite pleasing.

The third area, which frankly six months ago I would not have expected to be writing this, relates to the inappropriate use of antibiotics in agriculture. At their July G20 meeting, participants agreed in their statement to stop using antibiotics as a growth promoter in animals. This is quite pleasing (although how countries follow through

on implementation is key) and means that some big countries changed their views—I know that during UN negotiations some G20 members, along with others, blocked any efforts to include agriculture at the time. It is also worth highlighting that a number of important food producing companies in the U.S. have started to promote initiatives to not sell products from antibiotic fed animals. This is also rather positive.

Against these three efforts there are three areas where I detect little or no progress.

First, I am unaware of any initiatives to develop the scope of vaccines in infectious disease prevention, either in human- or animal-related AMR challenges. I remain surprised that more attention had not focused on the role of vaccines, especially in animals, as effective vaccines, of course, which would remove the need for the use of antibiotics. We need action here.

Second, there has been lots of talk but little action in terms of finding new useful drugs. We suggested the idea of lump sum Market Entry Rewards, which appeared to have quite a lot of conceptual support, but despite lots of supportive talk from policymakers and persistent talk of intent from pharmaceutical companies, there is nothing of substance that has yet materialized. Many say that no one has committed the money to incentivize the companies, which appears to be true, but our proposals should not be outside the capability of policymakers to find, nor for pharmaceutical companies to show more enlightened self-interest in contributing either.

Third, and just as concerning, there are no major initiatives in terms of introducing state-of-the-art diagnostics. Perhaps the single most aggressive of our 27 recommendations was to suggest that, in the most developed countries, no antibiotics should be prescribed without acknowledged credible diagnostic techniques being observed. We need some bold aggressive steps to reduce the inappropriate use of antibiotics, with increasing urgency.

Turning to the other four, first, public awareness has almost definitely risen as result of the UN agreement, our U.K. Independent Review and plenty of other initiatives, but has it risen enough? Almost definitely not. We need major efforts in many parts of the world so that ordinary people realize that as useful as antibiotics are, they need to be only used when they are really needed. Access not excess, is a motto I have learned to really respect.

Second, in terms of improved surveillance, again there has been progress, with the UK government announcing the launch of the Fleming Fund for lower-income countries to use to develop better surveillance techniques, but the scale of the challenge almost definitely requires a lot more.

Third, in terms of basic sanitation and cleanliness, sadly many countries around the world are simply not doing enough. AMR needs to be put in the middle of health system plans to improve basic hygiene and in some cases, perhaps urgently. I have found myself sympathizing with those who even suggest there is role for the IMF to include analysis of country health system development in their respected Article 4 reviews, to get countries to treat these basic issues more seriously.

Finally, we talked about the need for international coordination. Thirteen months ago, the UN agreement suggested we had it aplenty. Along with now two consecutive G20 meetings having punchy statements on AMR, this is quite something. But as we all know, words are usually easier than effective action, and we need more serious, focused efforts from those in policy, as well as other key areas, to stop the potential for AMR to cause such devastation. Otherwise it surely will.

So, yes, there is some progress but so much more needs to be done. And I sincerely hope that this conference at Harvard will result in some new initiatives, especially in areas where the need is greatest. I only wish I could be there to cajole everyone on in person!



## IN CONCLUSION

by **DR. REBECCA KATZ**  
Georgetown University



The global community will continue to be plagued with infectious disease outbreaks. That, we know as a certainty. With less certainty, we can predict that there will be a pandemic within our lifetimes, and that pandemic will

have significant impact on not just morbidity and mortality, but on all sectors of society, resulting in massive economic losses. For far too long, however, inadequate resources and attention have gone toward preparedness for such an event, endangering lives and economies. It is a difficult sell, though, to governments and other actors who are forced to prioritize limited resources, while addressing a wide range of current challenges. Preparing for a future possible event, where the best possible outcome is that nothing happens, is challenging.

Effective preparedness and response clearly requires a whole-of-society engagement. Response to outbreaks is an inherent public sector function, but is most effective when all sectors of society are engaged, and enabled

to contribute resources and expertise. Engagement is not purely for altruistic purposes. The private sector is directly impacted by infectious disease events, and strong preparedness, rapid response, and resilient communities all contribute to the ability of the private sector to function, profit, and thrive. Some corporations—particularly those that were impacted by the Ebola outbreak in West Africa—have embraced this reality. Most others, however, require more information about the risks and potential contributions. Most public sector entities need to work through how to effectively engage nontraditional partners, recognize the unique contributions from other sectors, and incorporate them into preparedness plans.

We see this conference as a start, the beginning of a process that has recently begun to effectively engage whole of society to prepare for and respond to infectious disease events. This is a call to action—for the private sector to become more engaged and for the public sector to embrace them and ensure that contributions are integrated into larger preparedness and response plans.

Nothing about this is simple, but it is essential that when faced with the next infectious disease crises, we are **READY, TOGETHER.**

## APPENDIX A: BIOGRAPHIES

### ASHLEY ARABASADI

**Chair of the Global Health Security Agenda Consortium, Global Health Security Policy and Advocacy Advisor for Management Sciences for Health (MSH)**

Prior to her work at MSH, Ashley Arabasadi worked for International Medical Corps, leading the organization's efforts on the Global Health Security Agenda after managing the disaster response programs in Asia. Arabasadi also worked with USAID's Global Health Bureau's Office of Health, Infectious Disease and

Nutrition office, supporting the Child Survival Health Grants program and the Leadership Initiative for Public Health in East Africa program. Arabasadi is a formally trained physical anthropology and archaeologist specializing in health and disease in human skeletal populations.

### DR. JOHN PAUL CLARK

**Senior Health Specialist, World Bank Group**

Dr. John Paul Clark, an epidemiologist and health planner, is coordinator of the West Africa Regional Disease Surveillance Systems Enhancement Program at the World Bank Group. Dr. Clark also provides technical leadership and guidance on maternal and child health and the control of malaria, HIV/AIDS, NTDs, and other commu-

nicable diseases. Dr. Clark held senior positions at the World Health Organization (WHO), USAID and the US Department of Health and Human Services (HHS), as well as adjunct faculty appointments at the Johns Hopkins University, the University of Michigan, and the University of Maryland.

### GRAHAM DAVIDSON

**Managing Director of Simandou, Rio Tinto**

Graham Davidson has been with Rio Tinto for over 25 years where he has held senior management positions in various locations, including Rio Tinto Coal Australia; Kaltim Prima Coal Indonesia; Rio Tinto Procurement Australia; and Rössing Uranium Namibia. Prior to this, Davidson

was Chief Executive Officer of Port Waratah Coal Services in Newcastle, Australia and has held several board appointments, in private and not for profit sectors, and has vast experience managing large operations with external stakeholders.

### REBECCA FISH

**Vice President of Marketing and Product Strategy, Emergent BioSolutions**

Prior to Emergent BioSolutions, which develops medical countermeasures against biological and chemical threats including anthrax, smallpox, and botulism, Rebecca Fish worked at GlaxoSmithKline as Global Head of Medical Countermeasures, Executive Director of Vaccine, Antibiotic, and Biodefense Policy, and Senior Director of Public Customer Marketing. Fish also spent many years at Merck & Co. Inc., where she held senior sales and

marketing positions. In addition to her private sector work, she served as Senior Policy Advisor to The Deputy Assistant Secretary of Health within the Department of Health and Human Services, leading the Vaccine Policy, Science, and Strategy Team and development of the US National Adult Immunization Plan. Fish worked within the Centers for Medicare and Medicaid services, developing new strategies for drug reimbursement policy.

## DR. KENDALL HOYT

**Assistant Professor, Dartmouth Medical School, Advisor, Coalition for Epidemic Preparedness Innovations**

As Assistant Professor at the Geisel School of Medicine at Dartmouth Medical School, Kendall Hoyt focuses on US biodefense policy, global health policy, and biomedical R&D strategy. Dr. Hoyt is also a lecturer at the Thayer School of Engineering at Dartmouth College where she teaches courses on technology and biosecurity. Author of Long Shot: Vaccines for National Defense, she currently

serves as an advisor to the Coalition for Epidemic Preparedness Innovations (CEPI). Hoyt has also worked in the International Security and International Affairs division of the White House Office of Science and Technology Policy, McKinsey & Co, and the Center for the Management of Innovation and Technology at the National University of Singapore

## DR. ASHISH JHA

**Director, Harvard Global Health Institute**

Dr. Ashish Jha is also the K.T. Li Professor of Global Health at Harvard University, Senior Associate Dean for Research Translation and Global Strategy at Harvard T.H. Chan School of Public Health. His research focuses on improving the quality and costs of health care systems with a specialized focus on the impact of policies. Dr. Jha,

who has published over 200 papers and heads a personal blog focusing on using statistical data research to improve health quality, is a member of the Institute of Medicine at the National Academies of Sciences, Engineering, and Medicine.

## DR. GAGIK KARAPETYAN

**Senior Technical Advisor, Infectious Diseases, World Vision**

Dr. Gagik Karapetyan leads World Vision's Infectious Diseases programming with public and private donors, nongovernmental organizations, and universities, including USAID and The Bill & Melinda Gates Foundation. With infectious diseases and program management experience, including management of the Global Fund to Fight AIDS, Tuberculosis and Malaria Program, Dr. Karapetyan pro-

vides technical expertise for tuberculosis, malaria, neglected tropical diseases (NTD,) and other infectious diseases. He worked in Haiti after the 2010 earthquake, where he managed emergency response programs and contributed to a multi-sectoral assessment for post-earthquake recovery, and recently provided technical coordination of World Vision's response to the Ebola epidemic in West Africa.

## DR. REBECCA KATZ

**Associate Professor of International Health and Co-Director of the Center for Global Health Science and Security at Georgetown University**

Prior to coming to Georgetown, Rebecca Katz spent ten years at The George Washington University as faculty in the Milken Institute School of Public Health. Her research is focused on global health security, public health preparedness, and health diplomacy. Since 2007, much of her work has been on the domestic and global implementa-

tion of the International Health Regulations (IHR). Since 2004, Katz has been a consultant to the US Department of State, working on issues related to the Biological Weapons Convention, pandemic influenza, and disease surveillance.

## DR. ANN MARIE KIMBALL

**Senior Consulting Fellow for the Centre on Global Health Security, Chatham House**

Dr. Ann Marie Kimball, physician and epidemiologist, has served as technical and strategic lead for the Bill and Melinda Gates Foundation surveillance strategy formation and as Professor of Epidemiology at the University of Washington (UW) School of Public Health. During her tenure at UW, Dr. Kimball founded and directed the

APEC Emerging Infections Network and led research and training programs in Peru and Thailand. She is the author of *Risky Trade: Infectious Diseases in an Era of Global Trade* and numerous scientific publications. Most recently she led the Rockefeller Foundation evaluation of their global disease surveillance network portfolio.

## CAPTAIN DR. NANCY KNIGHT

**Director of the Division of Global Health Protection, Centers for Disease Control (CDC)**

Throughout Captain Dr. Nancy Knight's international career, she has led the development, coordination, and implementation of key public health policies and programs. She has extensive experience advancing public health priorities through her leadership and close collaboration with government officials and partners. Dr. Knight began her career with the US government in Health Resources

& Service Administration's (HRSA's) Bureau of Health Professions, focusing on improving the quality of primary care medical education and services. She has also worked in public health at the local government level, providing primary healthcare services, and working on a number of response teams responsible for local and regional disaster response planning and coordination.

## BEN PLUMLEY

**Manager of Global Public Health, Chevron**

Ben Plumley is responsible for leading Chevron's global workforce strategies to minimize the impact of infectious diseases and how to anticipate and respond to new infectious disease outbreaks. Plumley is a public health policy advocate and strategist, with over 25 years of experience in the private, non-profit, UN, and governmental sectors. He was previously Chief Executive Of-

ficer of Pangaea Global AIDS, a global infectious disease think-tank, and technical assistance provider to countries and communities most affected by HIV, TB, hepatitis, and malaria. He was Director of the Executive Office for UNAIDS' founding Executive Director, Professor Peter Piot, and co-founded the Global Business Coalition on HIV/AIDS with the late Ambassador Richard Holbrooke.

## MAIMUNA (MAIA) MAJUMDER

**Computational Epidemiology Research Fellow, HealthMap**

Maimuna (Maia) Majumder is an Engineering Systems PhD candidate at MIT and computational epidemiology research fellow at HealthMap. Her research interests involve probabilistic modeling, data mining, and systems

epidemiology in the context of public health. She also focuses on novel techniques for data procurement and creating meaningful data visualizations.



## RYAN MORHARD

### Project Lead, Global Health Security, World Economic Forum (WEF)

Prior to joining the WEF, Ryan Morhard served in the US Department of Health and Human Services (HHS). At the HHS, he led engagement in several multilateral, regional, and bilateral partnerships to support domestic and international response to Ebola, Zika, and other pub-

lic health emergencies—as well as to strengthen collective preparedness for such emergencies. Morhard was an Associate at the Center for Health Security and has taught Global Health Diplomacy at the George Washington University School of Public Health.

## ALLISON NEALE

### Director of Public Policy, Henry Schein, Inc.

Allison Neale has worked in global health, corporate social responsibility, and human rights for two decades. Since 2008, Neale's work at Henry Schein, Inc. has focused on global health, public policy, corporate social responsibility, and communications. Neale also leads

several major public-private partnerships in global health, including Henry Schein's engagement as private sector lead of the Pandemic Supply Chain Network, an initiative aimed at enhancing global pandemic preparedness and relief efforts.

## LORD JIM O'NEILL

Lord Jim O'Neill served as Commercial Secretary to the Treasury in the U.K. from May 2015 until September 2016. During that time, Lord O'Neill chaired a formal Review into AMR (antimicrobial resistance) and reported its final recommendations. Previous to this, Lord O'Neill chaired the Cities Growth Commission in the UK and worked for Goldman Sachs, Swiss Bank Corporation, Marine Midland Bank, and Bank of America. He is the creator of the acronym "BRIC" and has conducted

research about these and other emerging economies. He has published various books on the topic, and in early 2014 made a documentary series for the BBC: MINT: The Next Economic Giants. Lord O'Neill is the Honorary Chair of Economics at Manchester University and is one of the founding trustees of the UK educational charity, SHINE, and following his move into government, became their lifetime President.

## DR. SAMUEL ABU PRATT

### Director of Programmes, FOCUS 1000

Before joining FOCUS 1000, Dr. Samuel Abu Pratt worked in the Ministry of Health of Sierra Leone for over 24 years as a District Medical Officer. As a health specialist at UNICEF, he contributed to the development, implementation, and evaluation of child survival programs. Over his 37 years working in public health, Dr.

Pratt has co-ordinated public health divisions and acted as a national trainer to address environmental sanitation, maternal and child health, family planning, immunizations, endemic disease control, epidemic investigation and management, and nutrition.

## DR. JONATHAN D. QUICK

Senior Fellow, MSH

Dr. Jonathan D. Quick is a family physician and health management specialist. He focuses on global health security and provides strategic counsel to the MSH-led multipartner No More Epidemics campaign. Dr. Quick has worked in international health since 1978 and has carried out assignments in over 70 countries in Africa,

Asia, Latin America, and the Middle East. Dr. Quick is the author of *The End of Epidemics: The Looming Threat to Humanity and How to Stop It* (forthcoming January 30, 2018 from St. Martin's Press/Scribe).

## PETER SANDS

Research Fellow, Harvard University

Prior to Harvard, Peter Sands served as Group Chief Executive of Standard Chartered PLC and a Director of McKinsey & Co. Sand's engagement with global health issues includes: chairing the US National Academy of Medicine's Commission on a Global Health Risk Framework for the Future; chairing the World Bank's

International Working Group on financing preparedness; lead Non-Executive Director on the Board of the UK's Department of Health; and as an active member on the US National Academy of Science's Committee on Ensuring Access to Affordable Drugs and its Forum on Microbial Threats.

## DR. JAMES M. STONE

James M. and Cathleen D. Stone Foundation

Dr. Stone received his Ph.D. from Harvard and was then appointed Lecturer in Economics. In 1975, he was named Massachusetts Commissioner of Insurance. Four years later, he was appointed Chairman of the U.S. Commodity Futures Trading Commission, the federal agency with principal regulatory jurisdiction over derivatives trading. In 1983, he founded the Plymouth Rock group of insurance companies, where he remains CEO. He is a member of the general partnership of Lindsay Goldberg, a private equity firm. Dr. Stone served on the board of

The Boston Globe and as Vice Chairman of Global Post, an international news service. He is currently a member of the Board of ProPublica. Stone served for ten years as a director and Chairman of MSH, a public health non-profit operating in over forty countries. He is on the Executive Committee of Cold Spring Harbor Laboratory, a genetics institute; and chairs the School on the Move prize panel, which provides an annual award to the most improved Boston public school.

## DR. JEFFREY L. STURCHIO

President and Chief Executive Officer, Rabin Martin

Previous to Rabin Martin, Dr. Sturchio was Former President and CEO of the Global Health Council, Vice President of Corporate Responsibility at Merck & Co. Inc., President of The Merck Company Foundation, and Chairman of the U. S. Corporate Council on Africa (CCA). While at Merck & Co., Inc., he was a leader of the company's global HIV/AIDS policy and was central to the UN/Industry Accelerating Access Initiative es-

tablished in 2000 to help improve HIV/AIDS care and treatment in the developing world. Sturchio is currently chairman of the Corporate Council on Africa, chairman of the BroadReach Institute for Training and Education, and a member of the boards of ACHAP, the Chemical Heritage Foundation, and Friends of the Global Fight Against AIDS, TB and Malaria.

## MARIAN W. WENTWORTH

### President and Chief Executive Officer, MSH

Marian W. Wentworth has over 25 years of experience leading international public health initiatives. Previous to MSH, at Merck & Co, Wentworth led global strategy across marketing, manufacturing, and research for a \$6 billion vaccines business. A champion for women's and girls' health, she led the global sales and marketing launch of the world's first cervical cancer vaccine, Gardasil.

Wentworth, who has managed a portfolio of adult vaccines for shingles, influenza, pneumococcal disease, hepatitis B, hepatitis A, and tetanus, has worked extensively with major policy decision-makers including Gavi, the World Health Organization, the Bill & Melinda Gates Foundation, and various ministries of health.

## JULIE WHIPPLE

### Global Head of Corporate Social Responsibility, Qlik

At Qlik, Julie Whipple focuses on empowering community-based and humanitarian non-profits to most effectively serve vulnerable populations through "Change Our World." Prior to her current role, Whipple managed relationships with large enterprise organizations within the financial services industry and public sector; deliver-

ing valuable analytical solutions. Whipple's work focuses on delivering innovative solutions through the creation of collaborative partnership. She is also the Founder and President of WeSeeHope USA Inc, a not for profit supporting youth programs in Africa, and serves as a Board Member to the Friends of Dana Farber Cancer Institute.

## DR. MICHELLE A. WILLIAMS

### Dean, Harvard T.H. Chan School of Public Health

Dean Dr. Michelle A. Williams is an internationally renowned epidemiologist and public health scientist, an award-winning educator, and a widely recognized academic leader. Her scientific work focuses on integrating genomic sciences and epidemiological research methods to identify risk factors, diagnostic markers, treatments,

and prevention targets for disorders that contribute to maternal and infant mortality. In 2011, President Barack Obama presented her with the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Williams was elected to the National Academy of Medicine in 2016.

## APPENDIX B – ABBREVIATIONS

<b>ADP</b>	Area Development Program	<b>JEE</b>	Joint External Evaluation
<b>AMR</b>	Antimicrobial resistance	<b>KAP</b>	Knowledge, attitude and practice
<b>API</b>	Application programming interface	<b>KMN</b>	Kombra Media Network
<b>BARDA</b>	Biomedical and Research Development Authority	<b>LMG</b>	Leadership, management, and governance
<b>BRITE</b>	BroadReach Institute for Training and Education	<b>MSF</b>	<i>Médecins Sans Frontières</i>
<b>BRT</b>	Business reliance teams	<b>MSH</b>	Management Sciences for Health
<b>CBA</b>	Cost-benefit analysis	<b>MW</b>	Market women
<b>CBG</b>	Compagnie des Bauxites de Guinée	<b>NGO</b>	Nongovernmental organizations
<b>CBO</b>	Community-based organization	<b>NME</b>	No More Epidemics campaign
<b>CDC</b>	Centers for Disease Control and Prevention	<b>NTD</b>	Neglected Tropical Disease
<b>CEPI</b>	Coalition for Epidemic Preparedness	<b>OECD</b>	Organization for Economic Cooperation and Development
<b>CHW</b>	Community health care worker	<b>OIE</b>	World Organization for Animal Health
<b>DGHP</b>	CDC's Division of Global Health Protection	<b>PEF</b>	Pandemic Emergency Financing Facility
<b>DRAFT</b>	Dialogue, reflection, action planning, facilitation, track changes	<b>PSRT</b>	Private Sector Roundtable
<b>ECOWAS</b>	Economic Community of West African States	<b>PVS</b>	Performance of Veterinary Services
<b>ETU</b>	Ebola Treatment Unit	<b>RAHC</b>	Regional Animal Health Center
<b>EVD</b>	Ebola Virus Disease	<b>REDISSE</b>	Regional Disease Surveillance Systems Enhancement program
<b>FAA</b>	Federation Aviation Administration	<b>RL</b>	Religious leaders
<b>FOCUS 1000</b>	Facilitating and Organising communities to Unite for Sustainable Development	<b>SKIN</b>	Stop, keep, improve, new
<b>GFADR</b>	World Bank Agriculture Global Practice	<b>SLTHU</b>	Sierra Leone Traditional Healer's Union
<b>GHNDR</b>	World Bank Health, Nutrition, and Population Global Practice	<b>TH</b>	Traditional healers
<b>GHSA</b>	Global Health Security Agenda	<b>WAHO</b>	West Africa Health Organization
<b>GHSAC</b>	Global Health Security Agenda Consortium	<b>WEF</b>	World Economic Forum
<b>IDA</b>	International Development Association	<b>WFP</b>	World Food Programme
<b>IDSP</b>	Interdependent series of projects	<b>WHO</b>	World Health Organization
<b>IDSR</b>	Integrated Disease Surveillance and Response	<b>WV</b>	World Vision
<b>IHR</b>	International Health Regulations	<b>WVSL</b>	World Vision Sierra Leone
<b>IMF</b>	International Monetary Fund	<b>UHC</b>	Universal health coverage
		<b>UN</b>	United Nations



## SPONSORS

### JAMES M. AND CATHLEEN D. STONE FOUNDATION

The mission of The James M. and Cathleen D. Stone Foundation is to promote a more knowledgeable and inclusive society, in collaboration with Harvard University and The Boston Foundation, with an emphasis on education, science, mitigation of economic inequality, biodiversity, and urban sustainability.



### NO MORE EPIDEMICS

No More Epidemics is a five-year global campaign to encourage governments and key stakeholders to better prevent, prepare and respond to infectious disease epidemics. Established by Management Sciences for Health (MSH), International Medical Corps (IMC), Save the Children (SC), and the African Field Epidemiology Network (AFENET), the Campaign was officially launched in November 2015.



### MANAGEMENT SCIENCES FOR HEALTH

Management Sciences for Health (MSH) saves lives and improves health by ensuring equitable access to healthcare for people most in need. For more than 45 years in over 150 countries, MSH has partnered with governments and communities to build strong, locally-led health systems that improve reproductive, maternal, and child health; fight infectious disease; and control chronic illness.



### HARVARD GLOBAL HEALTH INSTITUTE

The Harvard Global Health Institute is committed to surfacing and addressing broad challenges in public health that affect large populations around the globe. We believe that solutions that will move the dial draw from within and beyond the medicine and public health spheres to encompass design, law, policy, and business. We do that by harnessing the unique breadth of excellence within fields at Harvard and by being a dedicated partner and convener to organizations, governments, scholars, and committed citizens around the globe.



*GEORGETOWN UNIVERSITY*  
**Georgetown University Medical Center**  
*Center for Global Health Science and Security*

## GEORGETOWN CENTER FOR GLOBAL HEALTH SCIENCE AND SECURITY

The Center for Global Health Science and Security at Georgetown University Medical Center was formally established in September 2016. The Center's multi-disciplinary team develops evidence for action, providing decision makers with the tools they need for sustainable capacity building to prevent, detect, and respond to public health emergencies. The team incorporates expertise in epidemiology, microbiology, virology, animal and human health systems, demography, econo



