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UNNECESSARY

EBOLA-RELATED DEATHS

Building Citizen Trust in Health Systems

Helen Epstein

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Abbreviations and Acronyms

A-CDC	African Centres for Disease Control and Prevention
AFRICOM	United States Africa Command
AFRO	Regional Office for Africa
APORA	African Partner Outbreak Response Alliance
CCCs	Community Care Centres
CDC	Centers for Disease Control and Prevention
DART	Disaster Assistance Response Team
DASD	Deputy Assistant Secretary of Defense
DoD	Department of Defense
EML	Ebola Mobile Laboratory
ETUs	Ebola Treatment Units
EVD	Ebola Viral Disease
Gavi	Global Alliance for Vaccines and Immunization
GHSA	Global Health Security Agenda
GOARN	Global Outbreak Alert and Response Network
HSS	Health System Strengthening
IDA	International Development Association
IFC	International Finance Corporation
IHR	International Health Regulations
IMS	Incident Management System
MOU	Memorandum of Agreement
MSF	<i>Médecins Sans Frontières</i>
NATO	North Atlantic Treaty Organization
NGOs	Non-governmental organisations
NICD	National Institute for Communicable Diseases
NIH	National Institutes of Health
OIE	World Organization for Animal Health
OSD	Office of the Secretary of Defense
PCR	Polymerase Chain Reaction
PVS	Performance of Veterinary Services
RCC	Regional Collaborating Centers
UNICEF	United Nations Children’s Emergency Fund
USAID	United States Agency For International Development
WADPI	West African Disaster Preparedness Initiative
WHO	World Health Organization

Foreword by Olusegun Obasanjo



Strengthening Africa's Economic Performance

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During the Ebola crisis in West Africa I visited the most affected countries – Liberia, Sierra Leone and Guinea – and witnessed first-hand the devastating impact Ebola had on individuals, families and communities. I met with the African leaders grappling with this crisis as well as the Emergency Response teams combating the outbreak on the ground. The Africans I met in all three countries acted with extraordinary fortitude, compassion and courage, but the scale of the disaster required something more, which is why I became personally involved in mobilising support from the African Union, Africa's private sector and the international community. The countries most affected by Ebola need our help to recover and rebuild. But if the crisis taught me anything, it was the need for Africa and the rest of the world to urgently find ways to ensure such outbreaks do not happen in the future.

But if any unforeseen epidemic outbreak happens, the international community and Africa must be adequately prepared for immediate intervention to prevent the spread of the outbreak. In the case of Ebola, the reaction of the international community was slow, the awareness and cultural practices and the healthcare infrastructure in the communities concerned did not help.

In the end, the national and international build-up got to grips with the situation albeit after many lives had been lost and many economies, including those which were just starting to pick-up after many years of civil war, were ravaged.

The experiences and lessons learnt must prepare all of us in Africa to be able to cope with any unforeseen natural disaster, epidemic or human disaster.

In particular, it is time for Africa's scientific and health community to step up research and preparation for prevention and cure of the scourge of Ebola and other diseases which affect our continent so profoundly. For that to happen, we in Africa – and especially our governments – need to invest lifelong in our scientists and laboratories, as well as our health professionals. If we can build health systems able to cope with the next unexpected outbreak, we'll know that Africa has come of age and we are on the way to achieving Goal Number 3 of the Sustainable Development Goals by 2030.

Olusegun Obasanjo
Former President of Nigeria
Chairman of the Brenthurst Foundation Advisory Board

Foreword by Wilmot James



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Cape Town, May 25, 2016

‘Ebola has weakened already fragile health systems’ in Liberia, Sierra Leone and Guinea, the World Bank’s David Evans wrote in *The Lancet* and, therefore, ‘Ebola’s devastating impact should be the catalyst to strengthen the health systems far beyond their pre-Ebola levels.’ The *Brenthurst Foundation’s Ebola Report* is a most worthwhile contribution to this catalytic moment, where nations traumatised by the sweep of a health catastrophe seek to rebuild themselves on the back of a renewed global effort to prevent, contain and respond to outbreaks of pathogenic disease that will, by the nature of these things, come again. The *Brenthurst Foundation’s Ebola Report* spells out what needs to be done. My country South Africa is in a unique position to assist in this effort by putting our infectious disease diagnostic and other capabilities at the disposal of other African countries (Health Minister Aaron Motsoaledi has already given such a commitment to *Southern African Development Community Countries*) and, with our infrastructure of medical schools of world renown, assist in health workforce development in service of the *Global Health Security Agenda* and the *African Union’s African Centers for Disease Control* initiative.

Wilmot James

Dr. Wilmot James, MP
Shadow Minister of Health

Foreword by Rosa L DeLauro

Congress of the United States
Washington, DC 20515

May 17, 2016

The Brenthurst Foundation's Ebola Report succinctly lays out what needs to be done to prepare nations to fight global health crises so they do not spin out of control. The last Ebola crisis was fraught with delay, public distrust on many continents (including my country, the United States), and numerous deaths that should have been avoided. Borders are irrelevant to infectious diseases and the world community must learn from past mistakes. That is why the Brenthurst Foundation's Ebola Report is so important. We are destined to jump from public health crisis to public health crisis unless we invest in building the capacity, systems, and infrastructure around the world that is needed. A true global health security system needs to be fully developed and invested in. Thank you, Helen Epstein, the author of the Report, for providing us a road map.



Rosa L. DeLauro
Member of Congress
United States House of Representatives

Every year it seems, a new global health crisis emerges. Today, Zika virus sows panic throughout Latin America and may soon spread north. In 2014–5, it was Ebola, which killed 11 312 people in the West African nations of Liberia, Sierra Leone and Guinea in just 18 months. Why aren't we better at preventing these epidemics? Why do we lurch from crisis to crisis and lapse into complacency in between? On 31 March 2016 an international group of public health experts gathered at the Carnegie Council for Ethics in International Affairs in New York for a meeting convened by the Hanna Arendt Center of Bard College to consider these questions, by assessing the response to the West African Ebola epidemic.

Background

Since Ebola was first identified in 1976, there have been 25 known outbreaks, but the West African epidemic killed more than ten times as many people as all previous ones combined. On 6 August 2014, the World Health Organization declared the West African Ebola Epidemic a Global Health Emergency and the international community responded at once. By then cases were doubling rapidly and some experts were estimating that there could be over a million cases by the end of the year if nothing was done. The crisis had come to be seen not only as a health issue, but also as a matter of global security, calling for military involvement. The Pentagon established a Disaster Response Team to plan interventions. In September, US Secretary of State John Kerry, Defense Secretary Chuck Hagel and National Security Advisor Susan Rice joined representatives from 55 other countries at the UN Security Council to plan the way forward. They resolved that the US would take primary responsibility for the response in Liberia, and Britain and France would concentrate resources in their former colonies, Sierra Leone and Guinea, respectively. Cuba sent doctors; Japan, South Korea and China contributed millions of dollars to the response as well, along with the EU, Australia and other countries, and philanthropists such as Bill Gates, Mark Zuckerberg and Paul Allen.

In Liberia, the US military built treatment centers where Ebola patients received basic nursing care and

In addition to discussing flaws in the response to the West African crisis, participants also debated three bold international initiatives that will help avoid future epidemics: Vaccines, Health System Strengthening to improve health-care delivery in developing countries and the Global Health Security Agenda, a vast international partnership among nations and international organisations and NGOs to prevent and respond to emerging threats. A fourth approach, using diplomatic measures to foster respect for human rights and better governance in order to inspire popular trust in government and foster more effective health promotion, was also discussed.

the US Centers for Disease Control and Prevention (CDC) mobilised 200 doctors, epidemiologists and other experts to try to control the epidemic, the largest deployment in the agency's history. They set up a call center where the public could phone in reports of suspected cases and organised logistics that reduced the response time so that ambulances arrived within hours instead of days. The CDC also set up mobile labs that reduced the time between case identification and diagnosis from days to hours. South Africa's National Institute for Communicable Diseases set up a similar system in Sierra Leone.

Most Ebola cases are acquired through exposure to bodily fluids via physical contact with sick or dead victims. The most vulnerable people were health workers and relatives caring for the sick or carrying out traditional funeral rituals that involve washing the dead body. With no vaccine or treatment – as yet – the only preventative weapon we have against Ebola is behavioural change. Even before the WHO's (World Health Organization) declaration, local government health departments in the three countries had been issuing clear warnings to the general public, urging people to report suspected Ebola cases to the authorities and to avoid close contact with them. But for months people ignored these warnings and behaviour didn't change. In Liberia in particular, many nurses continued to offer care on a private basis in the communities where they lived.

Since they had no protective gear, hundreds acquired the infection and died. In Sierra Leone, teams from *Médecins Sans Frontières* (MSF) were stoned when they arrived to investigate outbreaks in communities.

Gradually, the massive international response and deployment helped restore people’s faith in the public health system. This was especially true in Liberia, where popular mistrust of the government

contributed to widespread refusal to comply with behavioural change message issues by local health workers. Such behavioural changes were slower to occur in Sierra Leone and Guinea, which may explain why, although Liberia’s epidemic was much more severe early on, it subsided more rapidly than in the other two countries.

What Went Wrong? And What Went Right?

Blame for the severity of the epidemic has been cast far and wide.¹ Wilmot James, South African MP and Shadow Health Minister noted that the WHO inexplicably declared a ‘health threat of international concern’ very late in the day and that the three most severely affected countries, Liberia, Sierra Leone and Guinea may have had economic interests in resisting such a declaration. Local health systems were in a dreadful state and emergency response health professionals and workers were thin on the ground. Local financial systems could not process aid, philanthropic and private donations rapidly, sometimes not at all, and local communities were suspicious of their governments’ intentions and responded to health warnings too late.

Blame for the severity of the epidemic has been cast far and wide

The challenges were enormous even after help arrived. The Conference was fortunate to hear from two men who had been in the vanguard of the response in Liberia and Sierra Leone. Frank Mahoney, a CDC infectious disease epidemiologist has been battling emerging infectious diseases since he joined the agency in 1992 and was team leader for the Ebola response in Nigeria and Liberia. Janusz Paweska, Head of the Special Pathogens Unit of South Africa’s National Institute for Communicable Diseases (NICD) is a pioneer in viral diagnostics, detection and discovery. He set up a remarkable mobile Ebola diagnostic lab in Sierra Leone in 2014. Mahoney and Paweska both conveyed the challenges of fighting an epidemic that communities, nations

and international actors had allowed to spiral out of control.

In Liberia, Mahoney explained, the government at first attempted to impose an involuntary quarantine in an urban slum where officials believed, erroneously, that cases were concentrated. International public health officials had warned that quarantine would not staunch the epidemic even under the best of circumstances because the virus had already spread throughout the country and in any case, quarantines are very difficult to maintain, but this advice was ignored. Soldiers were deployed at the entrances to the slum and the population, already disgruntled by the slow pace of development in the country and what they saw as a pattern of corruption, rioted.

The quarantine was rapidly lifted and the Liberian Health Ministry with help from the CDC and other partners changed course. An Incident Management System (IMS) was set up to focus efforts on five tasks: (1) safe transport, isolation, and treatment of patients with suspected disease followed by laboratory testing and contact tracing; (2) ensuring safe burials; (3) promoting infection control throughout the health care system; (4) providing clear and effective communication to affected communities and the general population; and (5) strengthening the national incident management structure to support the response.

At first, patients were isolated within existing healthcare facilities but nosocomial (clinic or hospital acquired infection) transmission and fear among healthcare workers led many of those facilities to close and the IMS team eschewed attempting to treat patients in Liberian health facilities. The early symptoms of Ebola resemble malaria and other diseases common in this part of Africa and local health

facilities were at first unable to properly identify and refer Ebola patients because health workers hadn't been trained to do so, and they lacked the protective PPE suits to keep them safe. In some areas, up to 20 per cent of Ebola cases were health workers themselves, and this along with fear of the disease led to reduced healthcare provision, avoidance of presentation to local facilities, and a further reduction in the capacity to provide isolation and care.

MSF, CDC and WHO had all dealt with previous Ebola outbreaks and based on their experience, they urged the government and international partners to build dedicated Ebola Treatment Units (ETUs) – most in large towns and cities – to safely isolate and care for patients. The ETUs were tent camps staffed with doctors and nurses in protective gear where patients could receive basic nursing care. However, training adequate numbers of staff, providing sufficient personal protective equipment and finding and building suitable facilities was slower than hoped. To reduce transmission in the meantime, Community Care Centers (CCCs) where patients could be kept near their families were also constructed in villages experiencing outbreaks.

There was no one-size-fits-all strategy to deal with such a crisis

The IMS strategy team also strengthened the dedicated ambulance service to transport suspected patients to ETUs. Early on, it was clear that isolation of patients at home was impractical and potentially dangerous, particularly in cities and towns because Ebola patients produce increasingly copious amounts of highly infectious diarrhoea and vomit as the disease progresses. Even the sweat of a sick person or corpse can transmit Ebola to a caregiver. Many relatives, neighbours, faith-based healers, and others had been exposed to Ebola while transporting patients and dead bodies via taxis, motorcycles, or on foot.

The greatest challenge was prevention. By early August, suspect and probable Ebola cases were doubling every two weeks in Liberia. Back at the CDC headquarters, statisticians were predicting that if the virus' swift spread continued, more than a million

people might succumb to the disease. There was no one-size-fits-all strategy to deal with such a crisis. The virus was spreading in both dense urban and remote rural areas, and operational challenges were numerous.

The isolation measures – ETUs and CCCs – as well as simple behavioural change initiated by communities themselves, finally helped to interrupt Ebola transmission in Liberia. The most important features of the response, according to Mahoney, were that it was government led, flexible, involved a strong strategic working group of government and development partners, including WHO, CDC, UNICEF, MSF and other NGOs, as well as US government agencies that included DART, USAID, DoD, NIH and the CDC. The greatest obstacles to rapid progress were Liberia's weak disease surveillance systems which relied on inappropriate reporting forms and inefficient data management, a weak system of contact tracing and late recognition and response to the needs of survivors.

The isolation measures as well as simple behavioural change initiated by communities themselves, finally helped to interrupt Ebola transmission

Meanwhile, in Sierra Leone, Paweska was setting up a system to rapidly diagnose Ebola in suspected patients. He and his team arrived in late August, when many patients were being stranded for days in Ebola Holding Centers – similar to Liberia's ETUs – without knowing if they had Ebola or something else. Slow diagnosis was contributing to overcrowding of facilities and fear of seeking treatment, which contributed to further spread of the virus.

Paweska's mobile Ebola molecular diagnostic lab in Sierra Leone was a part of the WHO–Global Outbreak Alert and Response Network (GOARN). Testing could be done on the spot, obviating the need for shipping specimens to regional centres or even other countries, and greatly simplifying patient management. Staff worked with national laboratory

counterparts, the WHO country office, and the international response team.

By March 2015 Paweska’s NICD group had deployed eight teams to operate the Emergency Medical Lab in Freetown-Lakka. Each team comprised three to five members, rotating in every four to seven weeks. The teams intensively trained Sierra Leonean scientists and technical personnel in facility operational logistics, biosafety and diagnostic procedures which allowed for successful handover of the Lab to the Sierra Leonean Ministry of Health and Sanitation on 24 March 2015. By 29 February 2016 the Lab had tested 9 161 clinical specimens of which 26 per cent were positive for Ebola.

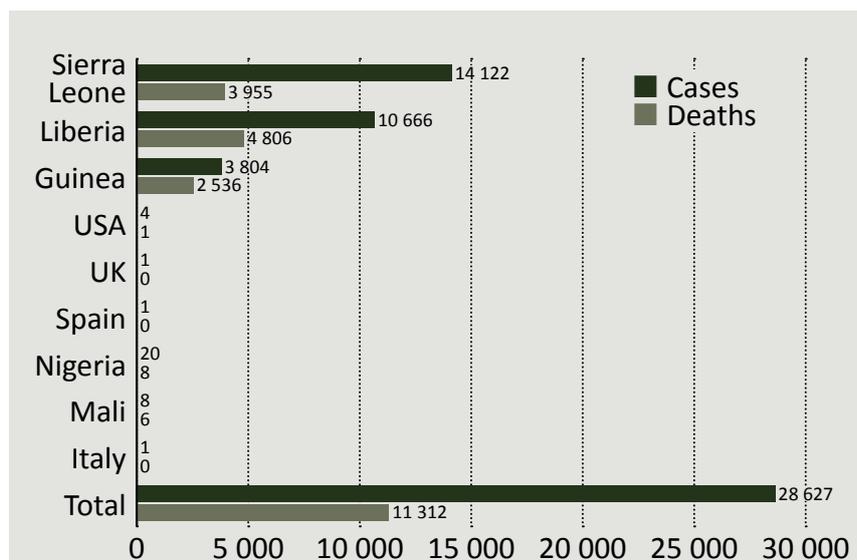
The Lab was set up in the Western Urban Area of Sierra Leone, an early Ebola hotspot, and for weeks

it was the only unit with the capacity to diagnose the huge number of suspect cases coming in. The greatest challenges included electrical outages, and other infrastructure problems that caused equipment to malfunction. Particularly vulnerable were the PCR diagnostic machines, which overheated due to high ambient temperature and problems with the power supply. Dysfunctional air-conditioning units made work in the biocontainment chamber, glove box and other lab areas highly uncomfortable, especially for those wearing full BSL3 lab gowns. This posed the threat of human errors and safety risks. Other potential risks to laboratory staff included unsafe packaging and inappropriate primary containers for blood and buccal swabs from suspected Ebola patients. The lab had to be closed several times for technical reasons.

Ebola Statistics as on 11 May 2016

	Deaths	Cases
Italy	0	1
Mali	6	8
Nigeria	8	20
Spain	0	1
UK	0	1
USA	1	4
Total	15	35

	Deaths	Cases	Case Fatality Rate (%)
Guinea	2 536	3 804	66.67
Liberia	4 806	10 666	45.06
Sierra Leone	3 955	14 122	28.01
Total	11 297	28 592	39.51



HEALTH CARE WORKERS

852
Diagnosed

492
Deaths

58%
Case Fatality Rate

Source WHO

Where Do We Go From Here?

Ebola Vaccines

As the University of Minnesota vaccine expert Michael Osterholm informed the conference, the global community has redoubled efforts to develop an Ebola vaccine in the past two years. Such a vaccine had been in the works for over a decade before the West African epidemic, but lack of funding and a general assumption that Ebola outbreaks were invariably small and easily contained, meant progress had stalled. Since then, numerous clinical trials have been initiated or completed, and a phase 3 trial has demonstrated clinical efficacy for Merck's candidate Ebola vaccine known as rVSV-ZEBOV.

Dealing with future epidemic crises will require an alert, capable and adaptable disease control and prevention system

The Global Alliance for Vaccines and Immunization (Gavi) has agreed to stockpile 300 000 doses of pre-licensed rVSV-ZEBOV and Merck has submitted an application to the World Health Organization for it to be used in emergencies and plans to apply for full licensure soon. Johnson & Johnson and GlaxoSmithKline also have promising Ebola candidate vaccines in clinical trials.

These vaccines alone won't eliminate the Ebola threat, let alone the threat of other epidemics. More data is needed on the safety and efficacy of these vaccines; the regulatory processes in African countries needs to be expedited, and African public health leaders must plan for how the vaccines will be used. All of these activities, along with the refinement of the vaccine itself need to be prioritised, and it is hoped the international community won't drop the ball just because Ebola no longer seems as scary as it did in 2014. Most importantly, a greater emphasis on epidemic preparedness in Africa in general is needed.

The Global Health Security Agenda

With those thoughts in mind, the Conference participants discussed two important new epidemic preparedness strategies now being advanced by high level development partners, one top-down, and the other bottom up. Andy Weber, former Deputy Coordinator for Ebola Response at the US State Department, Theresa Whelan, Principal Deputy Assistant Secretary of Defense for Stability Operations and Low Intensity Conflict and Wilmot James, MP, discussed the Global Health Security Agenda (GHSA), while Kristina Talbert-Slagle, Lecturer in the Yale School of Public Health, discussed Health System Strengthening (HSS).

James, Whelan and Weber convincingly argued that dealing with future epidemic crises will require an alert, capable and adaptable disease control and prevention system much like America's CDC or the national infectious disease monitoring and response systems of other developed countries. In February 2014, President Barack Obama established the GHSA that aims to prevent avoidable epidemics – whether naturally occurring or caused by intentional or accidental release of microorganisms – detect threats early, and respond rapidly.

The GHSA is a collaboration of more than 50 nations and international organisations to reduce biological threats worldwide. In the US, it is led by the Department of Defense (DoD). The DoD has long had myriad public health and humanitarian assistance programmes, including various labs and bio-surveillance programmes, but through the Global Health Security Agenda, the DoD's efforts are becoming more coordinated. In Liberia, the DoD was able to respond quickly, providing engineering support, medical training and lab assistance. It also built ten additional ETUs, as well as a mobile medical facility specifically to treat healthcare workers. The Department's logistics hub in Senegal helped the Liberian government, other US agencies and the international donor community to mobilise their own resources. Among the DoD's most important contributions was building the confidence of the Liberian government which was struggling to recruit health workers, many of whom were frightened of contracting the disease.

Now that the epidemic has subsided, the DoD is working to strengthen national bio-surveillance and disaster management in West Africa and beyond through its Cooperative Biological Engagement Program, or CBEP. The DoD's Chemical and Biological Defense Program is also working with the National Institute of Health and the CDC on Ebola vaccine and therapeutics trials in West Africa. And the Africa Command's (AFRICOM) African Partner Outbreak Response Alliance programme, or APORA, is training military medical leaders in 11 West African nations in leadership, transparent communication, defining military roles, identifying regional capabilities and addressing gaps. AFRICOM's West African Disaster Preparedness Initiative (WADPI) recently trained approximately 800 African military health workers in the development of Ebola preparedness and response plans; chemical, biological, radiological, and nuclear incident prevention and management; hazardous materials decontamination and crisis communication. Plans are in the works for more such courses across the African continent.

The involvement of the US Department of Defense in beating Ebola in West Africa marked a change in the discourse on health and security. In security circles there is talk of the Pentagon's increasing involvement in health, and in the increasing involvement of health organisations like the CDC in the security domain. Because defence establishments

tend to have higher budgets, the former sees their new role as an opportunity, whereas some in the health community see the encroachment of security organisations on their turf as a threat. No doubt some balance will emerge, but this is new territory for both disciplines and professions. Diplomats must recognise that infectious disease outbreaks are increasingly seen as security issues that call for more than humanitarian charity. At the same time, we must be concerned about military support, necessary and welcome though it was in West Africa. As the US learned when it attempted to use soldiers to deliver food aid in Somalia in the early 1990s, retooling armies for humanitarian purposes carries grave risks if troops are seen to be taking sides in local conflicts. Human rights are also too easily suspended in settings where they never had much force in the first place.

The GHSA also envisions a network of African Centres for Disease Control and Prevention (A-CDC) Regional Collaborating Centers (RCC) with one in northern, eastern, western, central and southern Africa. These will be fully-fledged public health institutes designed to deliver technical support to the continental A-CDC. At the moment, Africa's regional economic communities are in the process of nominating one national public health institute per region. With technical input from their partners, the AU requested the regional economic communities

The Six Building Blocks of a Health System

- Good **health services** are those which deliver effective, safe, quality personal and non-personal health interventions to those that need them, when and where needed, with minimum waste of resources.
- A well-performing **health workforce** is one that works in ways that are responsive, fair and efficient to achieve the best health outcomes possible, given available resources and circumstances (i.e. there are sufficient staff, fairly distributed; they are competent, responsive and productive).
- A well-functioning **health information** system is one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status.
- A well-functioning health system ensures equitable access to essential **medical products, vaccines and technologies** of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use.
- A good **health financing** system raises adequate funds for health, in ways that ensure people can use needed services, and are protected from financial catastrophe or impoverishment associated with having to pay for them. It provides incentives for providers and users to be efficient.
- **Leadership and governance** involves ensuring strategic policy frameworks exist and are combined with effective oversight, coalition-building, regulation, attention to system-design and accountability.

to nominate one national public health institute per region to do the job.

The African Union has since signed a Memorandum of Agreement (MOU) with the US government to establish the A-CDC which will focus on surveillance, emergency preparedness and response and strengthening International Health Regulations which govern reporting, transport, trade and communications in the event of a health emergency.

Health systems don't only depend on donor largesse. They also require political commitment from national leaders and the communities they govern

Some diplomats have expressed concerns about the capacity of the AU to deliver programmes. Few AU members pay their dues on time and some don't do so at all and thus it is not surprising that the AU is a slow-moving bureaucracy. High-level leadership has sometimes seemed aloof from the affairs of the Union. Still, the AU is the one body with the credibility to get African governments to work together, as they must in order to deal with diseases that know and respect no national boundaries.

Health Systems Strengthening

Kristina Talbert-Slagle concluded with pleas for strengthening local health care systems in developing countries. Since 2000, donor governments have spent billions on programmes to control malaria, HIV, tuberculosis and other diseases, but relatively little on supporting the health care systems – the doctors and other personnel, the supply chains for drugs and supplies, the infrastructure and equipment, the information systems and the governance structure – that perform the daily work of keeping populations healthy. For years, public health experts have decried the concentration of resources on a small set of killer diseases, sometimes to the detriment of the health systems that would make programmes to fight those diseases sustainable. But health systems don't only

depend on donor largesse. They also require political commitment from national leaders and the communities they govern.

The neglect of health systems, especially in Africa, has partly resulted from the retreat from the public sector that followed the end of the Cold War. Only when disaster strikes does the international community recognise how important a well-functioning public sector is. In Liberia, the Health Ministry did warn locals early on about the dangers of Ebola, and urged people to report suspected cases. But many people, perceiving the government of neglecting their needs and engaging in corruption, did not heed this advice. A well-functioning health system that met local citizens' needs before the crisis hit would have inspired greater trust, and effected faster behaviour change in response to warnings. A robust health system would have also meant that local nurses would have been adequately paid, and would not have needed to moonlight to earn extra money, which is how many became infected. A robust health care system would have meant that hospitals and clinics would have been adequately staffed and equipped to handle the early cases when they were few in number before the epidemic spiralled out of control.

Unfortunately, in the battle between the affected countries' health care systems and Ebola, the virus won. In Liberia, for example, nurses, doctors and other health personnel were approximately 30 times more likely to be infected with Ebola than the general population. The country's health system, already understaffed, lost hundreds of workers, with grave consequences for the future, even though Ebola itself has been all but eradicated.² This Ebola-related shock to the health care system is predicted to result in a 111 per cent increase in maternal mortality to 1 347 deaths per 100 000 live births – the second highest in the world, after Afghanistan.³ The aftershocks of Ebola are also projected to increase infant mortality by 20 per cent (from 54 to 64 per 1 000 live births), and under-five mortality by 28 per cent (from 71 to 91 per 1 000 live births).⁴

Talbert-Slagle described the characteristics of a strong, resilient health care system that could deal with crises like Ebola.⁵ Such a system would have a strategic health information system and surveillance networks that monitor the status of the system and impending health threats. It would address a broad

range of health challenges, enhancing public trust in normal times so that new threats could be recognised and addressed more rapidly, in cooperation with the population.

A resilient health system would be capable of containing novel health threats while delivering core health services, so as not to propagate instability throughout the system. This will require excess capacity that could be mobilised quickly in times of crisis. This in turn will require long-term investments in infrastructure and health worker training, as well as capability for emergency measures like isolation units.

Truly resilient health systems would also bring together diverse actors, ideas, and groups to share information and coordinate activities under the guidance of a designated focal point that would also handle the crucial and delicate task of communication with the public.

Such a system would be constantly adapting to long-term epidemiological and demographic

change. When health crises did occur, such adaptability would enable lessons to be learned quickly, so that short-term performance is improved. Too often the humanitarian response to health emergencies has a short half-life, leaving little benefit for the larger health system post-crisis. The ability to adapt depends upon strong and flexible leadership, a good data system and the capacity to use it, as well as responsive bureaucracies.⁶

In Liberia, this will mean hiring and training thousands of new, properly remunerated health workers to be deployed around the country, converting Ebola Treatment Units and Community Care Centres into health facilities and improving the nation's health infrastructure generally, including systems for maintenance, transportation and referral and construction of new health facilities. Liberia will also need a National Public Health Institute, an improved surveillance and response system and public health laboratories.

Conclusion

The Global Health Security Agenda is already finding support from the US government and African partners. Health System Strengthening, a more complex set of tasks seen as benefitting mainly local African women and children, has, until recently, been a harder sell. Thankfully, the Gates Foundation, WHO and the World Bank have recently taken up the challenge.⁷

Important as these initiatives are, even more work is needed at the higher level of governance, democracy and human rights in Africa. We still don't know what made the West African Ebola epidemic different from the previous 24 Ebola epidemics, all of which occurred in African countries lacking a network of CDC Global Health Security institutes, and many of which had even worse health care systems than Liberia's, Sierra Leone's or Guinea's in 2013. However, some experts have pointed to particularly poor relations between the governments of the three countries and their people.⁸ While popular discontent with national leaders exists in many African countries, including those that have been better able to cope with Ebola in the past, Guinea, Sierra Leone

and Liberia all have recent histories of bitter civil conflict, and allegations of high level corruption appear almost daily in the press. This has reawakened popular suspicion concerning the integrity of the leaders of these countries and fuelled the spread of rumours through the social networks upon which most people typically rely for news and information. It was this particular political mood that some maintain contributed to the particular catastrophic situation in West Africa by delaying behaviour change. If so, the implications of this reality are subtle. It doesn't mean that all countries with unpopular governments are vulnerable to outbreaks of Ebola. Indeed, it is very unlikely that if Ebola were to break out again in West Africa that people would respond as they did in 2013. But it does mean that in addition to applying global measures such as a more robust emergency preparedness system for Africa and improved health systems, more care must be taken to understand the particular political climate of each country, and if possible, implement programmes to foster democracy, human rights, impartial justice and intolerance of corruption and inspire greater trust in government.

Such changes will not occur overnight, but the international donors can help accelerate progress by standing with those fighting against corruption and

defending human rights, especially in those countries that rely on them for foreign aid.

Endnotes

- 1 See Final Report of the Ebola Interim Assessment Panel (WHO, July 2015); and WHO Secretariat Response to the Report of the Ebola Interim Assessment Panel (WHO, August 2015).
- 2 Liberia Health Workforce Program Proposal.
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Appendix I: Janusz Paweska

Timeline on the rise, decline and impact of Ebola Viral Disease in West Africa

It would have been difficult for the geographical point of origin of the Ebola Viral Disease (EVD) in West Africa to have occurred in a more complex terrain. The disease broke out in impoverished post-conflict countries with weak health systems, on a virgin soil with no previous experience of Ebola. The outbreak began spreading in a small village in Guinea on 26 December 2013, but was not identified as Ebola for several months. Initial misdiagnosis as more common disease conditions and delayed identification catalysed the rapid spread of the EVD epidemic. From the original epicentre in south-east Guinea, Ebola spread rapidly to neighbouring countries. The epidemic was further fuelled by poor management of cases, ineffective outbreak responses and weak healthcare systems in countries with inadequate healthcare personnel, under-resourced health facilities, unsafe burial ceremonies and poor infection control.

Retrospective studies directed by WHO and Guinean health officials identified the index case in West Africa's Ebola epidemic as an 18-month-old boy who lived in Meliandou, Guinea. The boy developed an illness characterized by fever, black stools, and vomiting on 26 December 2013 and died two days later. The exact source of his infection has not been identified, but likely involved contact with wild animals. The remote and sparsely populated village of Meliandou is located in Gueckedou District, known as the Forest Region. Much of the surrounding forest area has, however, been destroyed by foreign mining and timber operations. Some evidence suggests that the resulting forest loss, estimated at more than 80 per cent, brought potentially infected wild animals, and the bat species thought to be the virus' natural reservoir, into closer contact with human settlements. Prior to symptom onset, the child was seen playing in his backyard near a hollow tree heavily infested with an insectivorous bat species, *Mops condylurus*. In 1996 this bat species was shown to be susceptible to the Ebola Zaire virus experimental infection without showing any clinical symptoms.

By the second week of January 2014, several members of the boy's immediate family had developed a

similar illness followed by rapid death. The same was true for several midwives, traditional healers, and staff at a hospital in the city of Gueckedou who treated them. During the following week, members of the boy's extended family, who attended funerals or took care of ill relatives, also fell sick and died. By then, the virus had spread to four sub-districts via additional transmission chains.

The first alert was raised on 24 January, when the head of the Meliandou health post informed district health officials of five cases of severe diarrhoea with a rapidly fatal outcome. That alert prompted an investigation the next day in Meliandou by a small team of local health officials. The reported symptoms, including diarrhoea, vomiting, and severe dehydration, appeared similar to those of cholera, one of the area's many endemic infectious diseases. However, no firm conclusions could be reached. A second larger team, including staff from MSF went to Meliandou on 27 January. Microscopic examination of patient samples supported the conclusion that the unknown disease was likely cholera. Following the team's visit, other deaths occurred, but were neither reported nor investigated.

On 1 February the virus was carried into the capital, Conakry, by an infected member of the boy's extended family. He died four days later at a hospital where, as doctors had no reason to suspect Ebola, no measures were taken to protect staff and other patients. As the month progressed, cases spread to the prefectures of Macenta, Baladou, Nzerekore, and Farako as well as to several villages and cities along the routes to these destinations. The Guinea Ministry of Health issued its first alert of the unidentified disease on 13 March 2014. On that same day, staff at WHO's Regional Office for Africa (AFRO) formally opened an Emergency Management System event for a disease suspected to be Lassa fever. A major investigation, involving staff from the Ministry of Health, WHO AFRO, and MSF, took place from 14 to 25 March, involving site visits to Kissidougou, Macenta, Gueckedou City and Nzerekore. That investigation found previously unknown epidemiological links between outbreaks and identified Gueckedou City as the epicentre of transmission for a disease that still had no known cause.

On 21 March, the *Institut Pasteur* in Lyon, France, a WHO Collaborating Centre, confirmed that the causative agent was a filovirus, narrowing the diagnosis down to either Ebola virus disease or Marburg haemorrhagic fever. The next day the laboratory confirmed that the causative agent was the Zaire species, the most lethal virus in the Ebola family. That same day the government alerted WHO to what was described as a ‘rapidly evolving’ outbreak of Ebola virus disease.

WHO publicly announced the outbreak on its website on 23 March. Forty-nine cases and 29 deaths were officially reported. The fear that Ebola virus would become embedded in impoverished, congested, urban areas soon became a dramatic reality. EVD cases were confirmed in Conakry by late May, in Monrovia by mid-June and in Freetown by late July. In the ensuing months, Ebola also spread to Senegal, Mali, the USA and the UK, but in contrast to Guinea, Liberia and Sierra Leone, it was controlled. In the three most affected West African countries the outbreak was out of control, cases were rising faster than the ability to contain them and interventions were urgently needed to stop the outbreak at source and reduce risks of further spreading.

Eventually on 8 August 2014, the WHO declared the Ebola outbreak in West Africa as a Public Health Emergency of International Concern, and on 19 September 2014 the UN Security Council declared Ebola outbreaks in West Africa as a Threat to Peace and Security. Eventually a massive deployment of resources and international donations began to flow to avert an EVD disaster.

Thousands of health care and relief workers, laboratorians and other professionals from countries around the world descended on the towns and cities in Guinea, Liberia and Sierra Leone in a struggle to contain the EVD epidemic over two years. While the Ebola crisis spurred an unprecedented international response, the many failures in the Ebola responses and lessons learned (underfunded national health systems, delays in international response, inefficient resource mobilisation, ill-defined responsibilities, insufficient coordination) prompted a need for transformation of the existing worldwide health systems, including the building of robust national health systems and the empowerment of the WHO.

Filovirus outbreaks are commonly associated with limited surveillance and resource-constrained health system, both partially as a result of impoverished conditions (prevention, detection, diagnosis, bio-surveillance, response and research activities).

Control of the EVD epidemic in West Africa would have been impossible without a large-scale international response. Rapid laboratory confirmation of EVD cases was essential in bringing the outbreak under control and minimising its further geographic spread.

Countries with weak health systems cannot withstand a sudden emergence of deadly pathogens. Under the weight of the EVD epidemic, health systems in Guinea, Liberia and Sierra Leone collapsed. People stopped receiving or seeking health care for other more common disease conditions that cause more deaths annually than EVD. The severity of EVD compounded by fear from both within and outside the affected countries, caused schools, universities, markets, businesses, airline and shipping routes, and borders to close, further deepening the setback to struggling economies. What began as a health crisis snowballed into a humanitarian, social, economic and security crisis. The Ebola crisis underscored a point often made by the World Health Organization: ‘fair and inclusive health systems are the bedrock of social stability, resilience and economic health’.

The unprecedented outbreak of EVD in West Africa from 2013 to 2016 has highlighted the need for improved rapid diagnostic assays. Timely laboratory testing of suspected viral hemorrhagic fever cases is critical for patient management, reducing the risk of infection, and for limiting virus spread. Provision of rapid and more widely accessible diagnostic capacity in West African countries affected by the EVD epidemic was one of the priorities to combat the Ebola crisis. A bottleneck in rapid testing for Ebola virus infection left patients stranded in Ebola holding centres for days and thus contributed in raising fears of seeking treatment. Rapid and accurate laboratory confirmation of EVD suspected cases was paramount in the control of the EVD epidemic and minimising its further geographic spread.

In response to the public health emergency caused by the EVD outbreak in West Africa many countries deployed mobile laboratory facilities to aid

rapid Ebola diagnosis on the scene of the outbreak hotspots. The NICD established an Ebola Mobile Laboratory (EML) diagnostic capacity in Freetown in the second half of August 2014 as a part of the WHO–GOARN to the Ebola epidemic in West Africa. The Western Urban Area of Sierra Leone, where the NICD teams worked, remained an EVD epidemic hotspot for months. For weeks during the EVD crisis in the capital of Sierra Leone, the NICD EML was the only Ebola diagnostic capacity able to respond to the overwhelming and increasing demand for EVD diagnosis.

From the beginning of the EML operation in Freetown, NICD teams undertook the training of Sierra Leonean scientists and technical personnel in operational logistics of the facility, biosafety and diagnostic procedures. This effort culminated in the successful handover of the EML to the Sierra Leonean Ministry of Health and Sanitation on 24 March 2015. The EML is still operational and now plays an important role in the WHO recommended enhanced surveillance of Ebola cases post-Ebola outbreak. As of 31 May 2016 the NICD-established EML tested more than 10 000 clinical specimens (blood and buccal swabs) from suspected EVD cases.

Although WHO terminated the Public Health Emergency of International Concern for the Ebola outbreak on 29 March 2016, the affected countries must remain vigilant and focused on getting to and sustaining zero Ebola cases in Guinea, Liberia and Sierra Leone, especially with flare-ups of the disease. There must be a focus on helping these three countries recover and rebuild their economies and health systems.

Further facts about Ebola in West Africa

The World Bank ascribed losses of over US\$2.2 billion to Guinea, Liberia and Sierra Leone for 2015 to the EVD outbreak. Whilst billions were spent by countries around the globe to keep the EVD outbreak at bay, another US\$1.62 billion are being invested by the World Bank for recovery efforts in the wake of the outbreak.

The World Bank Group worked closely with the affected countries, the UN, WHO, bilateral, civil society and private sector partners to support response and recovery. This includes restoring basic health services, helping countries get all children

back in school, farmers back planting in their fields, businesses back up and running, and investors back into the countries.

One of the top priorities of the World Bank Group support is to build a strong and well-trained health workforce in the three countries, and build resilient health systems that can deliver essential, quality care in even the most remote areas; improve disease surveillance; and quickly detect, treat and contain future outbreaks.

The primary cost of the EVD epidemic is in human lives and suffering – but the crisis has also wiped out hard-earned development gains in the affected countries, and will worsen already entrenched poverty.

On 17 April 2015, the World Bank Group issued an economic update showing the Ebola crisis continues to cripple the economies of Guinea, Liberia and Sierra Leone, even as transmission rates show significant signs of slowing. The World Bank Group estimated that these three countries would lose at least US\$2.2 billion in forgone economic growth in 2015 as a result of the epidemic.

Recent studies have found that the socio-economic impacts of Ebola in Liberia and Sierra Leone have included job losses, smaller harvests and food insecurity, though the use of public services appears to be improving.

To ensure that the world is better prepared and responds much more quickly to future disease outbreaks, the World Bank Group, WHO, and other partners, developed a plan for a new Pandemic Emergency Facility that would enable resources to flow quickly when outbreaks occur.

The World Bank Group also has established an Ebola Recovery and Reconstruction Trust Fund to address the urgent and growing economic and social impact of the crisis in the region.

As of 1 December 2015 the World Bank Group has mobilised US\$1.62 billion in financing for Ebola response and recovery efforts to support the countries hardest hit by Ebola. This includes US\$260 million for Guinea, US\$385 million for Liberia and US\$318 million for Sierra Leone.

The US\$1.62 billion total also includes US\$1.17 billion from IDA, the World Bank Group's fund for the poorest countries and at least US\$450 million from the IFC, a member of the World Bank Group,

to enable trade, investment and employment in Guinea, Liberia and Sierra Leone.

According to the new World Bank report *Healthcare Worker Mortality and the Legacy of the Ebola Epidemic* published in *The Lancet Global Health*, the outbreak of Ebola in West Africa could leave a legacy significantly beyond the deaths and disability caused directly by the disease itself. ‘The loss of health workers to Ebola could increase maternal deaths up to rates last seen in these countries 15–20 years ago’. The loss of health workers due to the Ebola epidemic in West Africa may result in an additional 4 022 deaths of women each year across Guinea, Liberia and Sierra Leone as a result of complications in pregnancy and childbirth. Maternal mortality could increase by 38 per cent in Guinea, 74 per cent in Sierra Leone, and 111 per cent in Liberia.

Since the Ebola epidemic hit Guinea, Liberia and Sierra Leone, health workers have died at a higher rate than any other population group, exacerbating skill shortages in countries that had very few trained health personnel to begin with. Even once the countries reach zero Ebola cases, this will negatively affect the health of their populations.

As of May 2015, 0.11 per cent of Liberia’s entire general population had died due to Ebola, as compared with 8.07 per cent of its health workers, defined in the study as doctors, nurses and midwives. In Sierra Leone, the loss was 0.06 per cent of the general population compared with 6.85 per cent of the health workers, while 0.02 per cent of Guinea’s overall population had died compared with 1.45 per cent of all health workers.

According to the report this translates into a 10 per cent reduction of doctors in Liberia

(which only had about 50 to start) and an 8 per cent reduction in nurses and midwives. In Sierra Leone, it means a 5 per cent reduction in doctors and a 7 per cent reduction in nurses and midwives. In Guinea, the reduction is smaller, 2 per cent for doctors and 1 per cent for nurses.

At the outset of the epidemic, WHO ranked Liberia, Sierra Leone, and Guinea as 2nd, 5th and 28th from the bottom, respectively, among 193 countries in terms of doctors per 1 000 people.

‘Ebola has weakened already very fragile health systems in these countries’, says David Evans, Senior Economist at the World Bank Group and co-author of the report. ‘Ebola’s devastating impact should be the catalyst to strengthen the health systems far beyond their pre-Ebola levels.’

The report suggests that to save these lives, 240 doctors, nurses and midwives would need to be hired immediately across the three countries. This is a small fraction of the 43 565 doctors, nurses and midwives that would need to be deployed in Guinea, Liberia and Sierra Leone to achieve sufficient access to essential health services as implied by the Millennium Development Goals.

‘These countries require urgent investment in health systems starting with a substantial increase in the number of trained health workers,’ says Dr. Tim Evans, Senior Director of Health, Nutrition and Population at the World Bank Group. ‘This is to ensure that Guinea, Liberia and Sierra Leone are not only equipped to deal with future deadly epidemics but that every day, mothers have access to the quality health care they need that will save their lives and prepare them for a more promising future.’

Appendix II: Wilmot James

Global Health Security Agenda

The Global Health Security Agenda is an effort by nations, international organisations, and civil society to accelerate progress towards a world safe and secure from infectious disease threats. It aims to promote global health security as an international priority, and to spur progress toward full implementation of the WHO International Health Regulations 2005 (IHR), the World Organization for Animal Health (OIE) Performance of Veterinary Services (PVS) pathway, and other relevant global health security frameworks.

The GHSA seeks to:

Prevent Avoidable Epidemics: including naturally occurring outbreaks and international or accidental releases by:

- Preventing the emergence and spread of antimicrobial drug resistant organisms and emerging zoonotic diseases and strengthening international regulatory frameworks governing food safety:
 - Reduce the individual and institutional factors that enable antimicrobial resistance and the emergence of zoonotic disease threats;
 - Increase surveillance and early detection of antimicrobial resistance microorganisms and novel zoonotic diseases;
 - Measurably enhance antimicrobial stewardship;
 - Strengthen supply chains;
 - Promote safe practices in livestock production and the marketing of animals; and
 - Promote the appropriate and responsible use of antibiotics in all settings, including developing strategies to improve food safety.
- Promoting national biosafety and biosecurity systems:
 - Promote the development of specific multi-sectoral approaches in countries and regions for managing biological materials to support diagnostic, research and bio surveillance activities, including identifying, securing, safely monitoring and storing dangerous pathogens in a minimal number of facilities

while advancing global bio-surveillance, and frameworks to advance safe and responsible conduct;

- Reducing the number and magnitude of infectious disease outbreaks; and
- Establish effective programmes for vaccination against epidemic-prone diseases and nosocomial infection control.

Detect Threats Early: including detecting, characterising, and transparently reporting emerging biological threats early through real-time bio-surveillance, by:

- Launching, strengthening and linking global networks for real-time bio-surveillance:
 - Promoting the establishment of monitoring systems that can predict and identify infectious disease threats;
 - Interoperable, networked information-sharing platforms and bioinformatics systems; and
 - Networks that link to regional disease detection hubs.
- Strengthening the global norm of rapid, transparent reporting and sample sharing in the event of health emergencies of international concern:
 - Strengthen capabilities for accurate and transparent reporting to the WHO, OIE, and FAO during emergencies, with rapid sample and reagent sharing between countries and international organisations.
- Developing and deploying novel diagnosis and strengthening laboratory systems:
 - Strengthen country and regional capacity at the point-of-care and point-of-need;
 - Enable accurate and timely collection and analysis of information; and
 - Laboratory systems capable of safely and accurately detecting all major dangerous pathogens with minimal bio-risk.
- Training and deploying an effective bio surveillance workforce:
 - Build capacity for a trained and functioning bio-surveillance workforce, with trained disease detectives and laboratory scientists.

Respond Rapidly and Effectively to Biological threats of international concern by:

- Developing an interconnected global network of Emergency Operations Centres and multi-sectoral response to biological incidents:
 - Promote establishment of Emergency Operations Centres;
 - Trained, functioning, multi-sectoral rapid response teams, with access to a real-time information system, and capacity to attribute the source of an outbreak.
- Improving global access to medical and non-medical countermeasures during health emergencies:
 - Strengthen capacity to produce or procure personal protective equipment, medications, vaccines, and technical expertise, as well as

the capacity to plan for and deploy non-medical countermeasures.

- Strengthen policies and operational frameworks to share public and animal health and medical personnel and countermeasures with partners.

In order to encourage progress toward these goals, the Atlanta-based CDC developed Action Packages to facilitate regional and global collaboration toward specific GHSA objectives and targets. Following the May 2014 GHSA Commitment Development meeting in Helsinki, countries identified discrete GHSA Action Packages, which were discussed further at the August 2014 Global Infectious Diseases Meeting in Jakarta.

GHSA Action Packages

All countries that support the GHSA are welcome to participate in one or more of the Action Packages listed below and are asked to consider specific commitments across these areas on a national, regional, or global basis:

1. Antimicrobial Resistance
2. Zoonotic Disease
3. Biosafety and Biosecurity
4. Immunisation
5. National Laboratory Systems
6. Real-Time Surveillance
7. Reporting
8. Workforce Development
9. Emergency Operations
10. Linking Public Health with Law and Multisectoral Rapid Response
11. Medical Countermeasures and Personnel Deployment

<https://www.cdc.gov/globalhealth/security/actionpackages/default.htm>

Participants in the conference

Learning from the West African Ebola Epidemic: The Role of Governance in Preventing Epidemics

Thursday, 31 March 2016

*Carnegie Council for Ethics in International Affairs,
New York City*

Roger Berkowitz: Associate professor of political studies and human rights at Bard College; Academic Director, Hannah Arendt Center for Politics and the Humanities. Author of *The Gift of Science: Leibniz and the Modern Legal Tradition*; co-editor of *Thinking in Dark Times: Hannah Arendt on Ethics and Politics*.

Helen Epstein: Visiting Professor of Human Rights and Global Health at Bard College. She is a writer specialising in public health and has advised numerous organisations, including the United States Agency for International Development, the World Bank, Human Rights Watch, and UNICEF. She is the author of *The Invisible Cure: Why We Are Losing the Fight Against AIDS in Africa* and has contributed articles to many publications, including the *New York Review of Books* and the *New York Times Magazine*.

Wilmot James: Member of Parliament of South Africa and the official opposition's Shadow Minister of Health. He spent most of his professional life at universities in South Africa, the US, and the UK. The author and editor of 17 books, James says his greatest honor was to coedit the late Nelson Mandela's presidential speeches published as a book titled, *From Freedom to the Future*, and given to Mr. Mandela on his 85th birthday. James is non-residential senior fellow at the HAC at Bard College and Honorary Professor at the University of Cape Town's Medical School. He spent 12 years as a trustee of the Ford Foundation and entered public life in 2009. James received a Ph.D. from the University of Wisconsin-Madison.

Frank Mahoney: Infectious disease epidemiologist seconded by the CDC and Prevention to the Health Department at the International Federation of the Red Cross and Red Crescent Societies. He received

his medical degree from the University of Texas Medical School in Houston and completed a residency in family medicine at Baylor University in the Texas Medical Center. He joined the CDC in 1989 as an epidemic intelligence surveillance officer and completed a preventive medicine residency in 1992. He has worked on a variety of domestic and international assignments throughout his career, with a focus on emerging infectious diseases, outbreak response, and immunisation. He was the CDC team-lead for Ebola response in Nigeria and Liberia.

Michael Osterholm: Internationally recognised expert in infectious disease epidemiology. He is a member of the National Academy of Medicine. Osterholm led investigations into infectious disease outbreaks during his 15 years as state epidemiologist at the Minnesota Department of Health. He is the Director of the Center for Infectious Disease Research and Policy. He served as a special advisor to former Secretary of Health and Human Services Tommy Thompson on issues related to public health preparedness.

Janusz Paweska: Head of the special pathogens unit of the National Institute for Communicable Diseases (South Africa). His field of interest is viral diagnostics with a focus on development of novel techniques for rapid pathogen detection and discovery, epidemiology and ecology of arboviruses, and viral hemorrhagic fevers and virus-host interactions. Paweska has been a part of international research expeditions and international outbreak response missions for Ebola, Marburg disease, and Rift Valley fever. He led the discovery of a new Old World arenavirus that he named Lujo virus.

Amy Savage: Visiting Assistant Professor of Biology at Bard College and the Director of the Citizen Science Program, a core curricular academic experience intended to develop and elevate scientific literacy of the College's first-year class. Savage is a molecular parasitologist specialising in zoonotic and vector-borne infections of medical and veterinary importance. Savage received her B.S. from the University of Connecticut, M.S. from the University of Florida, and Ph.D. from Yale University in the epidemiology of microbial disease.

Kristina Talbert-Slagle, Ph.D.: Senior scientific officer of the Yale Global Health Leadership Institute and a lecturer in the Yale School of Public Health. Her research focuses on exploring parallels and intersections among complex molecular, individual, community, and population systems, with a focus on global health security. She is interested in better understanding how viruses like HIV and Ebola exploit fragility in national systems and how to anticipate and protect against similar infectious disease outbreaks worldwide. Talbert-Slagle has recently engaged with colleagues at Yale and in Liberia to support efforts to strengthen health management in Liberia post-Ebola. She teaches courses at Yale University on the biology and social context of HIV/AIDS, health systems strengthening in Liberia post-Ebola, and methods of global health research. Talbert-Slagle received her B.S. and B.A. degrees from the University of Kentucky and her Ph.D. from Yale University in the epidemiology of microbial disease.

Andrew C. Weber: Former Deputy Coordinator for Ebola Response at the US Department of State. In this role, Weber helped lead diplomatic outreach to ensure a speedy, effective, and truly global response

to the Ebola crisis. President Barack Obama emphasised the need for a whole-of-government response that utilised global resources and talent to stop the epidemic. Weber worked with partners from across the US government and around the world to bring the epidemic under control.

Theresa Whelan: Principal Deputy Assistant Secretary of Defense for Special Operations/Low Intensity Conflict in the Office of the Secretary of Defense (OSD). She has over 28 years of experience as a career civil servant in the defense intelligence, defense policy, and national intelligence communities, 22 of which have been focused on African issues. Her prior leadership positions include those of national intelligence officer for Africa on the National Intelligence Council, Deputy Assistant Secretary of Defense (DASD) for Homeland Defense Domains and Defense Support to Civil Authorities, DASD for Defense Continuity and Crisis Management, and DASD for African Affairs. Other positions in OSD included those of Principal Director for African Affairs, NATO Team Chief on the Balkans Task Force, and Countries Director for Southern Africa and West Africa.



THE HANNAH ARENDT CENTER PRESENTS

Learning from the West African Ebola Epidemic:

The Role of Governance in Preventing Epidemics

Carnegie Council for Ethics in International Affairs
New York City
March 31, 2016

Building public trust in effective organizations is essential for fighting health crises such as Ebola. By bringing together social scientists, political leaders, and infectious disease specialists, we will investigate how educational, governance, and healthcare resources can be better deployed against future outbreaks.

“Learning From the West African Ebola Epidemic” is grounded in the Global Health Security Agenda, which was established in 2014 to advance a world safe from infectious disease by preventing future epidemics, detecting threats early, and responding to outbreaks rapidly and effectively.

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