



 **PRINCETON UNIVERSITY**

# Tackling the Next Plague

RECOMMENDATIONS FROM THE EBOLA CRISIS  
TO PREVENT AND DEAL WITH FUTURE EPIDEMICS



The Princeton-Fung Global Forum

2015



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# FOREWORD

Established in 2012, the Princeton-Fung Global Forum is a series of meetings that Princeton University hosts with the help of a generous gift from William Fung, a Princeton University alumnus and former trustee, and group chairman of Li & Fung.

The Princeton-Fung Global Forums bring together colleagues from around the world to share views from a wide range of disciplinary and professional perspectives. It is one of Princeton's signature intellectual events, attracting attention from academics and policymakers, showcasing some of the best work done at Princeton and enhancing the relationships between Princeton's faculty members and their counterparts in other countries.

The third Princeton-Fung Global Forum, "Modern Plagues: Lessons Learned from the Ebola Crisis," took place in Ireland on Nov. 2–3, 2015, at the University College Dublin. Framed around the 2013–2016 Ebola epidemic in West Africa, this conference brought together multidisciplinary perspectives with the aim of identifying methods for mitigating the damage from health crises. Speakers came from academia, government and non-governmental sectors as well as the media.

This monograph captures the thinking, analysis and discussion presented at the conference. I hope that the lessons learned and shared by this extraordinary collection of experts will help us to cope more effectively with the threats posed by "modern plagues."

**Christopher L. Eisgruber**, President, Princeton University



Christopher L. Eisgruber, president of Princeton University, kicks off the 2015 Princeton-Fung Global Forum in Dublin, Ireland. (Photo credit: Angela Halpin)



Christopher L. Eisgruber, William Fung, Cecilia Rouse and Sylvia Chou Fung participate in the first day of the forum. This annual event is made possible with the help of a generous gift from Mr. Fung. (Photo credit: Angela Halpin)

# EXECUTIVE SUMMARY

## RECOMMENDATIONS

### SHORT-TERM

- Responsible authorities must act quickly.
- Help survivors reintegrate and celebrate their role in advancing understanding of Ebola
- Use some of the Ebola health care infrastructure to tackle common childhood infectious disease killers
- Work with local government as well as local authorities
- Be alert to, and respect, cultural sensitivities
- Listen to the local population and recognize indigenous expertise
- Involve anthropologists in medical response teams
- Engage proactively with local leaders and health care workers in vulnerable countries
- Take steps early on to allay fear and suspicion; mobilize local trusted religious leaders and traditional healers to counteract rumors
- Work with people in affected areas to develop consistent, timely and accurate messaging from the government, media and health care workers
- Tell positive stories of appropriate care, data collection and survival
- Use the media to force the issue onto the wider political agenda
- Focus on health system strengthening and adequately resource it

*“There was a perfect storm. Two countries—Liberia and Sierra Leone—were emerging from wars. Guinea also had problems of years of corrupt dictatorship, the collapse of its health infrastructure and of trust in government. There was also inaction at a time when the epidemic could have been contained. But none of these factors made the epidemic inevitable.”*

**Peter Piot**, Director,  
London School of  
Hygiene & Tropical  
Medicine

## MEDIUM-TERM

*“We have to be more rights based in our health work. We have to understand that the more we empower communities, the more we work with and strengthen them, the more we can avoid at least some of the problems.”*

**Mary Robinson,**  
President of Ireland  
1990–1997,  
United Nations  
High Commissioner  
for Human Rights  
1997–2002, Founder  
of the Mary Robinson  
Foundation – Climate  
Justice, U.N. Special  
Envoy for Climate  
Change

- Take collective action to establish a global vaccine fund
- Develop an internationally agreed-upon ethical framework for carrying out clinical research during an epidemic
- Invest in research and development into diseases with epidemic potential
- Relax regulations/protocols for timely human research trials on emerging infectious diseases
- Create more public-private partnerships to speed up development of diagnostics, drugs and vaccines
- Strengthen health systems with better funding to ensure swift control of outbreaks
- Train local people for key roles in treatment and infection control
- Create a global rapid response task force that can be scaled up within days
- Use existing available communication technologies to ensure quick scale-up
- Design information and monitoring systems that “talk” to each other and government health ministries
- Forge agreements with search engines and social media to open up access during emergencies and enable mining of real-time health search data
- Commission long-term ethnographic research before the next epidemic
- Strengthen and incentivize the World Health Organization (WHO) international health regulation reporting systems

- Speed up the flow of funds to the worst-hit areas
- Support and strengthen the role of regional bodies such as the African Union
- Devise criteria for situations in which money would and wouldn't help
- Attach specific funds to specific problems
- Understand the limitations and unintended consequences of aid
- Aim for a sustainable legacy rather than funding projects that will collapse when aid is withdrawn

## LONG-TERM

- Reform the WHO: make it a global leadership organization that is properly funded and respected
- Support the long-term funding of local health care volunteers
- Prioritize the funding of all activities involved in the prevention and control of Ebola, rather than just one or two
- Make development and democratization a condition of funding and investment
- Examine governance and the level of political will and commitment to development before injecting large sums of cash into countries
- Collect digital exhaust and found data in a useable format
- Invest in technology systems in individual countries, rather than just harvesting data
- Replace the current emergency-funding paradigm with a form of prepaid insurance

*“A strong global health body is needed to unite them and lead on equity and access. The World Health Organization is best suited to that role—just not in its current guise. Reform is crucial. Its strength lies in its representation of 194 countries, but it needs to be given the mandate to lead, rather than to manage, and the world’s rich countries must respect and fund it properly.”*

**Jeremy Farrar,**  
Director,  
Wellcome Trust

# INTRODUCTION

*“There was a perfect storm. Two countries—Liberia and Sierra Leone—were emerging from wars. Guinea also had problems of years of corrupt dictatorship, the collapse of its health infrastructure and of trust in government. There was also inaction at a time when the epidemic could have been contained. But none of these factors made the epidemic inevitable.”*

**Peter Piot**, Director,  
London School of  
Hygiene & Tropical  
Medicine



## **THE WORLD WAS TOO SLOW TO REACT AND INITIALLY GOVERNMENTS FAILED TO TAKE THE EBOLA OUTBREAK SERIOUSLY ENOUGH**

*The international effort saved lives, but many cases could have been avoided if the authorities had acted more quickly, argues Peter Piot.*

In my last year in medical school, I went for career counseling. The verdict was unanimous. There was no future in infectious diseases. However, being a bit stubborn and believing that you need to follow your passion, I still went into it.

Two years later, in 1976, my life changed when a thermos arrived at our laboratory at the Institute of Tropical Medicine in Antwerp, Belgium. This thermos contained two glass vials. They contained blood from a missionary who died from what looked like yellow fever. It was, in fact, the first isolate of the Ebola virus, named after

a river near the epicenter of the first-ever recorded Ebola epidemic that took place that year. The Centers for Disease Control and Prevention confirmed identification of a new virus.

### **Understanding Transmission**

I went to Zaire to investigate. I wanted to know how Ebola was transmitted. The fatality rate was enormous—90 percent—still the highest of all outbreaks. It was a confusing illness because initial symptoms were mild—headaches, fever, myalgia and abdominal pains. But, after a few days, in 20 to 35 percent of cases there was bleeding with massive attacks on the victim's organs, and then this terrible case fatality rate.

Within days, we had found the main mode of transmission. It was clear that the risk of infection increased the closer someone lived to the hospital. It also emerged that the outbreak started to decline once the hospital was closed. Few children were affected, even though more than half the population was under 18 years old. We also found that, between the ages of 15 and 29, there were twice as many female victims as men. Most of these women had attended the antenatal clinic, where they had been infected via contaminated needles. Nobody who was infected via needles survived. The other mode of transmission seemed to be through attending a funeral, as well as caring for someone with Ebola or touching someone who had Ebola. Today, we also know that sexual transmission can spread the infection.

### **Ebola Goes International**

For a long time, Ebola was a Central Africa issue. All epidemics happened in the Democratic Republic of Congo and surrounding countries. They were limited in time and space and did not affect

large cities. All that changed in 2013. The first case appeared in the Republic of Guinea in December that year, but it took three months before the diagnosis was made. You only find what you are looking for. The public health infrastructure was in a sad state. Not until May or June 2014 did things change dramatically and become very different from other outbreaks.

There was a wave of infection in Sierra Leone in May and then also in Liberia in early June 2014. My alarm increased when there was a case in Conakry, the capital of Guinea. Once Ebola is in the slums of Conakry, Freetown or Monrovia, it is a very different proposition. Yet the world did not react, and the governments initially did not take it seriously in those countries.

### **Slow Reaction**

In mid-August 2014, the World Health Organization (WHO) declared this was an outbreak of public health importance, only after 700 cases had already occurred. Each country had different patterns, and even within a country there were different patterns.

This was not a new type of Ebola virus. We were encountering the Zaire strain of Ebola. There are five types, and the Zaire type is the most virulent. It is the same strain and type as found in Zaire and, as time goes by, there are mutations. This does not make the virus behave very differently, but genomic typing of virus isolates is very useful when we find new cases. It helps for checking whether there is a new transmission chain.

We were seeing a combination of environmental and political factors that can create a perfect storm, which had not happened before. Two countries—Liberia and Sierra Leone—were emerging from wars. Guinea also had problems coming out of decades of corrupt dictatorship, including the collapse of its health

infrastructure and of trust in government. People were also much more mobile than in the previous Ebola outbreaks. So what was, at first, a local or regional outbreak soon began to have major international ramifications, which added hugely to the costs. There was also inaction at a time when the epidemic could have been contained. None of these countries had health systems that even nearly compared with a developed economy. In Liberia, there were 70,000 people for every physician.

Nevertheless, none of these factors made the epidemic inevitable. The Democratic Republic of Congo contained an epidemic at the same time in 2014. It was contained within six weeks. That's because the Ministry of Health went to the outbreak and acted promptly.

### **Sexual Transmission**

We now know that sexual transmission is possible. In 1976, Ebola was isolated from seminal fluid of a researcher at Porton Down, the high security laboratory near London. But this did not prove that semen could be infectious. However, the *New England Journal of Medicine* has reported two cases showing sexual transmission, that the virus can be secreted in semen. There are thousands of survivors from this Ebola epidemic. We don't know how many people could be infectious via this route, and several long-term studies are going to find out how frequent and for how long survivors are infectious.

### **Impact on Daily Life**

Ebola has had serious effects beyond killing more than 10,000 people in three countries over several years. It shuts down a country. It also shuts down a health system because those in charge of it—health workers—are badly affected. These countries were already short of health professionals. Over 500 doctors, nurses

and health workers died of Ebola in hospitals treating patients. So when someone breaks a leg, there is nobody left to treat it. More people probably died in these countries because of the health system shutting down than because of Ebola itself. There were increases in maternal mortality—more women died because they had nowhere to go for help. Also, infant mortality was affected. Education closed down for a year. Farmers could not sell goods and so on. In the slums, there were also major incidents in opposition to the control efforts.

When all the external assistance and new Ebola treatment regimes were in place, did they make any difference? There were months of inaction except for Médecins Sans Frontières and local non-governmental organizations, but help really got going in September 2014 in the form of international aid alongside strong community responses. This is estimated to have saved about 56,000 lives. However, if beds had been there earlier, 14,000 cases would have been avoided. The lesson is to act early and save more lives.

### **Research During the Epidemic**

For the first time in this type of epidemic, there was also some good research on new treatments and on new vaccines. There is a so-called ring vaccination trial with a recombinant vesicular stomatitis vaccine designed to contain the Ebola virus. People who had contact with a person with Ebola were given the vaccine. The results showed that the vaccine was very effective in this setting. Other vaccines are also being trialed. It may be that we need two vaccines—one for containment and one for the long-term protection of the population and health workers. Nonetheless, our system for developing vaccines where there is no market incentive is not good.

We need another mechanism, probably based on public-private partnership that will provide incentives to develop vaccines against emerging diseases.

We should remember that all these new epidemics come from animals. The reservoir of Ebola is most probably from a bat. Influenza originates in birds. The drivers for emerging pathogens are intensifying over time so probably there will be more of these outbreaks. Ecological, agricultural and demographic pressures increase, and exposure to animals, and greater mobility accelerates the spread of pathogens in the world. We cannot deal with epidemics without considering what is happening to people.

AIDS and Ebola are the defining epidemics of our time. They have a lot in common. Each required an international response. They are the only two health issues discussed at the United Nations Security Council. That's the right level for this sort of crisis. AIDS in a sense created a global health and put it on national and global agendas. The Ebola epidemic should now change how the world handles epidemic threats. It is a momentum that cannot be missed.

### **Doing a Better Job Next Time**

We owe it to the 11,000 people who died to do a better job next time. But who will do the job? There is a disconnection between where the areas of highest risk for epidemics exist and where the resources are located. In January 1977, the WHO organized a meeting in London to say it would invest in a health system to ensure that the 1976 epidemic in Zaire would never happen again. The commitment was to support a region under threat from Ebola. I have been back to where that epidemic occurred. I have seen the equipment used in hospitals and labs. It is poor. People there feel

abandoned. When Ebola hits that place again, it will be the same disaster. Let's make sure that does not happen. We must make sure that the lessons of all this suffering are understood in order to prevent further outbreaks. The priority is to support countries vulnerable to deadly epidemics so that they are better prepared to detect and respond.

## **KEY OBSERVATIONS AND RECOMMENDATIONS**

- Emerging infections will continue to arise from animals.
- The response has been driven by rapid adoption of science and human rights. The fact that there are now 50 million people on antivirals in low-income countries means it is not acceptable for people to be deprived of access to treatment even if they are poor.
- We need to listen to people. We would have been able to tackle Ebola better if we had understood funeral rites properly. It needs an anthropological approach.
- Politics can make a big difference. Making difficult decisions and leadership are important to the outcome of such crises.
- We need specific mechanisms for research and development. A global vaccine facility fund is required.
- Health systems must be strengthened with better funding to ensure swift control of outbreaks.
- Responsible authorities must act quickly.

## **SPEAKER**

**Peter Piot**, Director and Handa Professor of Global Health,  
London School of Hygiene & Tropical Medicine

# HISTORY OF PLAGUES



*“History does not provide a clear blueprint for action... but if we choose appropriate examples, it is possible to learn something useful from it.”*

**Mark Harrison,**  
Director of the Wellcome Unit for the History of Medicine and Professor of the History of Medicine, University of Oxford

## FEAR, SOCIAL FRAGMENTATION AND MIGRATIONS CHARACTERIZE EPIDEMICS THROUGH THE AGES

*Epidemiology tends to be more important than science in turning the tide—recovery is sometimes quicker than anticipated.*

Modern knowledge of genetics and virology is helping us to understand disease outbreaks of the distant past. History reveals three common themes that have characterized epidemics such as bubonic plague (Black Death) and Ebola. They are widespread fear and uncertainty, fragmentation of the social and political infrastructure and the movement of people.

### **The Fear Factor**

Extraordinary fear and uncertainty, fueled by the suddenness and severity of symptoms, can spread more rapidly than the disease

itself. This was as true of the Black Death as it was of Ebola. Despite Ebola's confinement to three countries thousands of miles away, opinion polls in October 2014 suggested that half of the U.S. population believed that a family member would become infected.

Fear can legitimize interventions, but managing it effectively is crucial to contain the disease, particularly as pandemics/epidemics tend to be destabilizing. They undermine confidence in key figures in society and understanding of who is responsible.

Information has a key role, but timing and content are important. It can be counterproductive if overhyped, as it was in the reporting of the one Ebola case in Dallas. There is also often a gap between the understanding of the epidemiology of a disease and the public conversation. To some extent, a pandemic is a product of globalized fear: the concept didn't exist before the end of the 19th century, when news coverage became more immediate.

### **Inflaming Tensions**

Epidemics rely on the movement of people and goods. Plague was carried across trade routes from Constantinople into Europe, while ships plying the Atlantic brought cholera during the 1830s. Air travel facilitated the spread of Ebola.

But controlling the movement of people to curb the spread of infection is politically, socially and economically contentious. An epidemic can inflame existing social or racial tensions, undermining social cohesion and increasing distrust of the government.

Cholera illustrates this. In Russia, the Tsarist authoritarian government had already seeded distrust, so people believed it was responsible for spreading the infection. When the authorities used quarantine and military force to control the situation, there was a backlash. A similar situation arose a few years later in Paris, then in the throes of a revolution.

Yet in Britain, the response was more muted, with public anger mostly directed towards physicians, some of who had been illicitly acquiring bodies for dissection. Efforts to halt the march of the third plague pandemic, at the end of the 19th century, provoked violence in Bombay and Hong Kong, but in Egypt the government tried to reach an accommodation with community leaders, which eased social tensions.

History shows that the involvement of the communities affected is often neglected during epidemics/pandemics, with public health becoming an arm of the state, and security concerns trumping individual rights. Governments often come under intense international, political and economic pressure to bring the disease under control.

### **Behavioral Change**

Prevention, detection and response are all needed to contain disease and are equally important. Plague and cholera were brought under control in the 19th century, not only by detection, but also by improvements in sanitation and the creation of a health care infrastructure. By the first decade of the 20th century, an international response to control infectious disease had evolved, largely because of the detrimental economic impact of containment measures, such as quarantine, and the need to stabilize the global economy. A coordinated international response is still required today.

The plague affected disproportionate numbers of the poor, as did Ebola. During the last outbreak of the plague in London in 1665, the poor were the first to succumb to the disease, and proportionately more of them died from it; the rich had the means to escape and were better nourished.

Many contagious diseases, such as cholera, thrive in crowded and insanitary slum conditions, but not all of them. Polio emerged as an epidemic among people who were relatively well off. Infants living in congested insanitary conditions contracted the virus and developed a fever, followed by immunity; the more hygienic conditions of wealthier children meant they didn't become exposed to the virus until they were older, when the effects were much more devastating. Similarly, when the HIV epidemic first emerged in Africa, it was among better educated (and better off) young women who were more empowered and sexually active than their less well-educated peers.

Understanding behavior is essential for understanding the nature of an epidemic and future prevention. But effecting behavioral change is often much more difficult than other public health interventions. Even though it's now known that HIV is primarily transmitted through straight sex, there are still 2 million new cases every year. Sexual choices and cultural norms play their part. While condoms are one of the most effective means of curbing the spread of HIV, it is very difficult for women to negotiate their use in eastern and southern Africa. And transactional sex—the exchange of sex for material support—as opposed to prostitution, is commonplace.

### **Limitations of Science**

Since the 20th century, the prevailing view has been that scientific knowledge should inform public health, and that medicine is the answer. But in the 19th century some of the most successful public health interventions were not based on the understanding of the causative agents of disease. Rather, they were informed by an understanding of epidemiology, disease rates and urban infrastructure.

Ignaz Semmelweis (1818–1865), for example, showed that hand washing by medical staff in maternity hospitals reduced deaths by preventing the spread of puerperal fever, without quite understanding why that was so; and John Snow (1813–1858) discovered that susceptibility to cholera in London depended on whether the source of the water pump was upstream or downstream of the River Thames. Medicine didn't conquer the plague in Europe either; preventive measures—such as the removal of sewage, the imposition of quarantine and prohibitions on public gatherings—banished the disease long before the advent of antibiotics and vaccines. And, in the early 20th century, it took some time before virology was recognized as a different science that couldn't be applied to bacterial infections.

### **A New Pandemic Era?**

There's a tendency to believe that we are now entering a new era of pandemics, with the emergence of new diseases. Once again, history is instructive. The 19th century was the first age of pandemics amid the confluence of new diseases such as cholera, old ones such as the bubonic plague, and many localized endemic diseases, such as tuberculosis and malaria, taking on the scale of an epidemic. This development was driven by the emergence of the first truly global economy and new forms of technology, such as steam navigation and the telegraph. There are clear parallels with modern day epidemics.

In 2009, the World Health Organization produced a more elastic definition of a pandemic, describing it as a public health emergency of international concern. Up to that point, the term had referred to exceptionally high mortality as well as rapid spread over two or more continents. The swine flu pandemic didn't kill at scale, prompting questions about the usefulness of the term for

understanding the impact of global health emergencies.

The declaration of a pandemic/epidemic focuses attention and marshals valuable resources, but this can be at the expense of other pressing basic health problems. During the 19th century, governments focused on cholera and plague, which were of economic and political importance, particularly to the colonial powers. Yet diseases such as tuberculosis and malaria, which killed many more people every year, were neglected. Malaria still kills 400,000 people in Africa every year. Maternity and immunization services suffered during the HIV crisis in Africa and the Ebola epidemic.

The definition of famine in the new millennium has similarly been called into question. With the exception of the 2011–2012 famine in Somalia, which was the joint product of severe drought and war, the death tolls during recent famines everywhere have been modest. As with pandemics, the declaration of a “famine” helps to attract food and donations, but it also runs the risk of trivializing the issues; malnutrition is an ongoing problem.

### **Recovery**

In the 14th century, the bubonic plague killed around 45 percent of the population of Europe, which greatly boosted the bargaining power of laborers and lessened that of landowners. Wages were consequently higher in Western Europe than elsewhere up to the 19th century. The last outbreak in the 17th century was confined to London, and although the population fell by one-fifth, it recovered quickly thanks to immigration. The Ebola epidemic more closely resembles the 17th century plague outbreak: although it killed 11,000 people, that figure is low compared with the 200,000 who died during the Somalian famine of 2000. The World Bank’s outlook for Liberia, Sierra Leone and Guinea remains very positive.

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**Anne Case**, Alexander Stewart 1886 Professor of Economics and Public Affairs, Department of Economics and Woodrow Wilson School of Public and International Affairs, Princeton University

**Mark Harrison**, Director of the Wellcome Unit for the History of Medicine and Professor of the History of Medicine, University of Oxford

**Cormac Ó Gráda**, Professor of Economics, University College Dublin

**Keith Wailoo**, Townsend Martin Professor of History and Public Affairs, Department of History and Woodrow Wilson School of Public and International Affairs, Princeton University

Moderator: **Sheri Fink**, *The New York Times*

## SCIENCE

*“We have to think in the round. We have to think about the economics and the politics in parallel with all the epidemiology and molecular biology. And you can’t ignore improving the health systems in these countries, which would improve trust as well.”*



**Bryan Grenfell,**  
Kathryn Briger and  
Sarah Fenton Professor  
of Ecology and  
Evolutionary Biology  
and Public Affairs,  
Woodrow Wilson  
School of Public and  
International Affairs,  
Princeton University

### **SCIENCE SETS OUT WAYS TO CURE AND CONTROL FUTURE EBOLA OUTBREAKS**

*Readiness for drug trials during another wave of the disease is vital as research focuses on possible risks from a viral reservoir in some survivors.*

The drama and urgency of a full-scale humanitarian crisis can sometimes push respect for cultural sensitivities down the list of priorities. But the Ebola epidemic shows just how important it is to be mindful of these issues, not only to curb the spread of infection, but also to ease the grief and suffering of those whose families and way of life were torn apart by the disease.

#### **Understanding Local Culture**

Burial practice was one such example. It became a focus of concern during the epidemic, as it is customary for the body to be

washed and touched after death. This greatly increases infection risk. In a bid to contain this, the bodies of those who had died in treatment centers were not returned home and were often buried in unmarked graves before the advent of safe and dignified burials.

This denied families and communities the opportunity to grieve for their loved ones or be present at the burial—something that would have been unthinkable in the West. It also stoked pervasive fears that getting into an “ambulance” (4x4 truck) destined for a treatment center that was frequently only reached after many hours of arduous travel, was synonymous with certain death in an unknown place, and never being seen again.

The Centers for Disease Control and Prevention (CDC) ambulance project, which encouraged people to look inside these vehicles, helped allay some of these fears. But this kind of initiative should take place at the start of an outbreak, not several months later. Similarly, enabling families to visit the treatment centers and see their loved ones from behind the safety of fenestrated wires or balconies, helped quell suspicions about the purpose of these centers.

Nevertheless, relatives still need to be adequately prepared for the shock of witnessing preparations for hygienic burial. These involved completely undressing the body, spraying it with chlorine and wrapping it in plastic—a far cry from traditional practice.

### **Person-Centered Care**

Person/patient-centered care is about openness and honesty, and a focus that extends beyond the purely medical. It is key to resolving such cultural dissonance and garnering support for treatment and infection control efforts. This became evident during the course

of case finding, which usually involved a relatively large team of people going from house to house in remote village areas, and contact tracing, which is inevitably inquisitorial and intrusive, and was accompanied by quarantine in Sierra Leone.

Deploying local villagers to do contact tracing and bringing in the expertise of anthropologists can help mitigate some of these issues. In Sierra Leone, anthropologists suggested creating family trees of those affected. This proved very popular with the families concerned and extremely useful for the health care teams.

Contact tracing is labor intensive and time consuming. Although an essential element of infection control, lack of resources meant it wasn't started sufficiently early on in the outbreak. This demonstrates the need for a properly funded global task force that can scale up an international response to public health emergencies within days rather than months. Such readiness requires political will so that countries come together and commit funds to this over the long term.

### **Research Priorities**

Case finding unearthed cases of infection, but sometimes the diagnosis wasn't clear-cut. This underscores a need to develop rapid diagnostic tests that can be used in the field. But it also speaks to the prioritization of research and development into neglected tropical diseases that have epidemic potential. It is vital to create an ethical framework for running clinical trials in the midst of an outbreak.

Take the drug ZMapp that was thought to be a promising candidate for tackling Ebola. It has been tested only in a small clinical trial in West Africa, and the results were ambiguous, so

it's not clear if it will ultimately prove useful. Vaccines are in development, and there are several potential targets for treatment. For example, the virus encodes ribonucleic acid (RNA) so that it can replicate, and disrupting that activity could stop it in its tracks. More knowledge is needed about the optimal balance between the impact of behavioral changes and infection control measures, which eventually curbed the spread of Ebola. It seems rather unlikely that Ebola could become airborne. But it is important to monitor whether and how it evolves, and to make safe, effective vaccines a major priority for future research.

Getting people to take part in clinical trials can be problematic. Even educated health workers questioned the safety of the experimental vaccines used during the epidemic. That's why it's important to engage local communities and work with them throughout. This has proved successful in other health initiatives, such as raising awareness of the source of malaria and the value of using bed nets to stave off the disease. Good engagement has also secured buy-in from mothers to vaccinate their children against the potentially deadly rotavirus.

### **Ebola's Legacy**

Another key research question is viral persistence in survivors, and whether this is primarily residual and harmless or represents a reservoir of infection. The first reported case of viral transmission in semen was in 1976, when a man recovered from an infection with Marburg virus, a relative of Ebola, but six weeks later his wife died from the same infection.

A study in the *New England Journal of Medicine* found that Ebola RNA was detectable in the seminal fluid of 1 in 4 of those who had been infected with it up to nine months after recovery.

A companion study reported on a match between the DNA sequencing in a man's seminal fluid after recovery from Ebola and that of his wife's blood. We don't yet know how common this is likely to be. But it's consistent with what is known about the behavior of viruses: they can hide in the body, particularly in "immune privileged" areas where the inflammatory response is muted, such as the brain, eyes and testicles.

Whatever the clinical consequences of Ebola infection, it leaves a psychological legacy. It's thought that post-traumatic stress disorder afflicts around 1 in 4 survivors, and they are often treated as outcasts. If sexual transmission becomes an issue, it is likely to stigmatize survivors further and could deter those who develop symptoms from seeking prompt treatment. Survivors require help to reintegrate; they should be promoted as an invaluable source of knowledge and key to advancing our understanding of Ebola. Their immunity should be celebrated and championed rather than stigmatized.

## RECOMMENDATIONS

- Be alert to, and respect, cultural sensitivities
- Take steps early on to allay fear and suspicion
- Involve anthropologists in medical response teams
- Train local people for key roles in treatment and infection control
- Invest in research and development into diseases with epidemic potential
- Make the development of safe, effective vaccines a major priority for future research
- Develop an internationally agreed-upon ethical framework for carrying out clinical research during an epidemic
- Create a global rapid response task force that can be scaled up within days
- Help survivors reintegrate and celebrate their role in advancing our understanding of Ebola

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**George Armah**, Associate Professor, Noguchi Memorial Institute for Medical Research, University of Ghana

**Gabriel Fitzpatrick**, Chairman, Médecins Sans Frontières Ireland

**Bryan Grenfell**, Kathryn Briger and Sarah Fenton Professor of Ecology and Evolutionary Biology and Public Affairs, Department of Ecology and Evolutionary Biology and the Woodrow Wilson School of Public and International Affairs, Princeton University

**Rebecca Levine**, Epidemic Intelligence Service Officer, Centers for Disease Control and Prevention

**Thomas E. Shenk**, James A. Elkins Jr. Professor in the Life Sciences and Co-director of the Program in Global Health and Health Policy, Department of Molecular Biology, Princeton University

Moderator: **Pam Belluck**, *The New York Times*

# COMMUNICATIONS



*“We have all evolved to understand numbers; it’s how we measure ourselves and others. Numbers can be very reassuring but they can also engender fear.”*

**David Blazes,**  
Director, Military  
Tropical Defense,  
U.S. Department of  
Defense; Professor,  
Uniformed Services  
University of the Health  
Sciences

## SMART USE OF INFORMATION TECHNOLOGY OFFERS GREAT OPPORTUNITIES TO CONTROL FUTURE EPIDEMICS

*Vital ingredients for success include designing tools for the existing ecosystem, plus good access to mobile network operators, social media and search engines to counter misinformation.*

Trust is vital if essential information about epidemics is to be understood well by the public. It goes to the heart of effective health advice/education, surveillance and media reports. Access to timely and accurate information is one of the most effective means of controlling epidemics, both from the perspective of health officials and the public. To obtain this information, systematic collection of health data is required. Also known as disease surveillance, this can be done with pencil and paper if more efficient electronic means are not available.

## **Importance of Gaining Public Trust**

In Sierra Leone in September 2014, public trust had been deeply undermined by civil war, poor access to health facilities and good quality care, as well as corruption. In Liberia, people suspected that Ebola was a government ploy to drum up overseas development aid; their refusal to allow local newspapers to take photos meant there was no visual evidence that the government was telling the truth. That's why it is helpful to engage trusted members of the local community, such as religious leaders and traditional healers, to disseminate important and accurate information to allay fears and dispel misinformation.

The term “surveillance” can arouse suspicions because of its associations with government control. In the context of Ebola, it requires careful scientific counting or the systematic collection, analysis, interpretation and use of health information to serve public health. In theory, every sovereign government is party to a binding treaty—the International Health Regulations from the World Health Organization—stipulating that it should be capable of detecting, responding to and reporting any disease that has the potential to affect other countries. In practice, only a third of countries meet these requirements.

Regional, as well as country surveillance, is critical because borders are porous and crossings often go unreported. Disease surveillance can help to identify outbreaks, but it can also generate information that can be used to monitor the evolution of epidemics, the extent of spread and the impact of public health interventions. Used transparently, it can improve public understanding of complex health issues such as Ebola epidemics. Health officials, the media and the public all have their part to play in an epidemic response, but the prerequisite is reliable information.

## **“Digital Exhaust” and “Found Data”**

Increasingly, other sources of monitoring are emerging. These include “digital exhaust,” the automatically generated by-products of daily activities, such as use of mobile phones or credit cards. The Centers for Disease Control and Prevention (CDC) used Google real-time health search data to predict flu trends in the United States. There will soon be much more of this type of data: (Mark) Zuckerberg’s law states that digital exhaust doubles annually. However, this rich source of data is typically not in a format that scientists are used to working with because it’s essentially unplanned “found data.” It can take several weeks to collect, aggregate and analyze.

“Digital drift”—changes in the numbers using an information system and how they use it—can undermine data reliability. Google, for example, engineered its system to boost searches for health-related terms. This move inadvertently damaged the reliability of its data cache for predicting numbers of flu cases.

To capitalize on data’s potential and adapt it to emergency situations, it is important to gather these new sources and extract their best features in a useable format.

## **Technology Challenges**

Reliable data informs better public health decisions. The public health informatics field has grown exponentially in the developed world over the past decade and increasingly in the developing world as well. Use of “big data” is now common, and independent software development is leading to a variety of innovative solutions to manage it. But public health systems often cannot afford the most innovative, commercial software solutions.

Open Source Software may offer an opportunity to drive innovative solutions to global public health challenges. Some examples used in the Ebola response include: the creation of an Application Program Interface (API) for Ebola data that allowed users' sites to access the Humanitarian Data Exchange through a web query; and the OpenStreetMap API, which allowed users to see real-time maps of affected regions and road conditions.

But it's not always a question of introducing new technology, but of making much better use of existing tools and solutions in challenging and under-resourced environments: in Liberia most mobile phones in use in 2014 were Nokia 3310s. So, bringing in sophisticated technology often isn't the answer, as it can't be scaled up quickly enough. Better, in such circumstances, to support the existing system that can send out a text message designed to generate a response, which can then be aggregated. That approach requires prior agreements among national and international network operators in readiness for possible humanitarian crises.

Widespread penetration of search engines and social media in emergencies could help us learn more about prevailing misperceptions. Mobile applications such as WhatsApp and Snapchat can be useful, but they also can't be controlled and can quickly spread misinformation, such as the rumor in Nigeria that salt cured Ebola. Yet, the truth needs to be disseminated quickly. So these applications should agree to grant open access to public health experts during emergencies.

That said, to maintain trust, information system safeguards are needed so that the data can't be accessed by accident. People also need to feel assured that, if details were unintentionally released, they wouldn't cause harm.

Data harmonization can only be achieved if all developers and non-governmental organizations come together to work with governments. Currently, technology developers are competitive rather than collaborative. There is a lack of compatibility with national health ministry data systems.

### **Consistency and Timeliness of the Message**

In a climate of fear, messaging should be consistent. In Sierra Leone, the CDC worked with the government and local journalists to help people protect themselves. They focused on “big idea of the week,” plus messaging about the importance of early treatment; advice to call for help but not to touch family members; the slogan “safe burials save lives”; and the celebration of survivors and good care.

Ensuring that positive stories are also told helps to counter misinformation and promote acceptance of health workers in local communities.

Phrasing should be developed in collaboration with people on the ground to make sure that it’s appropriate and timely. In the early months of the Ebola outbreak, emphasis was placed on hand washing and encouraging people to seek medical help early. However, the appropriate equipment and infection control protocols weren’t in place. It sometimes took four or five days to get a diagnosis.

Health workers require the right information. When hospitals in Liberia were hit by Ebola, health workers went on strike, effectively closing them down. The walk-out was not about money, as the government believed, but about safety. The government then worked with the CDC, John Snow, Inc. (JSI) and the United

Nations Children's Fund (UNICEF) to ensure health workers had the equipment they needed and received “keep safe, keep serving” training in the correct use of protective clothing.

### **Role of the Media**

Distortion and sensationalism can occur in media reporting during disasters and epidemics. Often, they suggest that a Western scientist has come up with the solution and saved the day. Yet it's almost always people on the ground who contribute the most and whose invaluable insights are frequently ignored.

Nevertheless, the media has a key role. It can save more lives than medics, by conveying accurate information, stoking public anger and forcing the issue onto the wider political agenda. Governments can be slow to act. It is often only when an issue starts affecting them—their popularity, finances, the population's health or security—that they respond.

An image, even of a single child, can be enormously powerful. The photograph of a migrant toddler found drowned on a Turkish beach during the influx of refugees to Europe in summer 2015 shifted public opinion. But empathy fatigue can be a problem for the media.

## RECOMMENDATIONS

- Develop surveillance systems before the next outbreak that are based on open source software that is locally developed and coordinated with local governments
- Design information and monitoring systems that “talk” to each other and government health ministries
- Understand the existing technological ecosystem so communications are developed using existing technology to enable faster scale-up
- Use real-time data collection tools to understand service gaps, as well as misperceptions and rumors that need to be countered
- Mobilize local trusted religious leaders and traditional healers to counteract rumors and allay fears
- Ensure health workers have correct information
- Use the media to force the issue onto the wider political agenda
- Tell positive stories of appropriate care, data collection and survival
- Create general and timeless agreements with mobile network operators outlining how their services can be mobilized in times of emergency, so that when disasters hit, communication dissemination can be up and running quickly without the need to create new agreements
- Forge agreements with search engines and social media to open up access during emergencies and enable mining of real-time health search data
- Collect digital exhaust and found data in a useable format
- Invest in technology systems in individual countries, rather than just harvesting data

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**Barry Andrews**, CEO, GOAL Ireland

**David Blazes**, Director, Military Tropical Defense, U.S. Department of Defense; Professor, Uniformed Services University of the Health Sciences

**Christopher Fabian**, Senior Advisor on Innovation to the Executive Director, UNICEF

**Penelope Riseborough**, Director of Communications, John Snow, Inc.

**Matthew Salganik**, Professor of Sociology, Department of Sociology, Princeton University

Moderator: **Brooke Gladstone**, *National Public Radio's "On the Media"*

# HUMAN RIGHTS



## HUMAN RIGHTS WERE NOT VERY WELL RESPECTED IN THE COUNTRIES THAT WERE HARDEST HIT BY EBOLA

*Neglect of human rights, inadequate protection of health workers, poor understanding of the problem and an overuse of quarantine led to fear, argues Mary Robinson.*

When I finished my five years as high commissioner for human rights in the United Nations, I felt there was a lack of focus on rights that are very important when in situations of poverty and conflict. Those rights are to food, safe water, health, education and shelter. And so I established a small non-governmental organization (NGO) called Realizing Rights to pioneer how to work on economic and social rights as an NGO.

*“We have to be more rights based in our health work. We have to understand that the more we empower communities, the more we work with and strengthen them, the more we can avoid at least some of the problems.”*

**Mary Robinson,**  
President of Ireland  
1990–1997,  
United Nations  
High Commissioner  
for Human Rights  
1997–2002, Founder  
of the Mary Robinson  
Foundation – Climate  
Justice, U.N. Special  
Envoy for Climate  
Change

## **Pioneering a Different Approach**

We supported governments in Africa to strengthen their health systems. We encouraged the ministers of health in their discussions with the ministers of finance and then tried to hold the government accountable.

We pioneered a slightly different way of working on human rights, because NGOs like Amnesty and Human Rights Watch had tended to focus more on civil and political rights, and generally named and shamed, pointing out the pitfalls and gaps.

But if you are working on economic and social rights, you've got to help countries to build their systems, and then try and hold them accountable.

## **Human Rights and Ebola**

I was in Sierra Leone just a few days after the president had implemented access to free health care for pregnant women and children under age five. I saw huge queues at the clinics. Suddenly it became clear that because of the fees, so many pregnant women and children had simply not been able to access medical care.

Sierra Leone was one of the three countries deeply affected by Ebola. There were really five countries at risk. Senegal and Nigeria managed to contain Ebola and not let it spread: they clearly had systems that were resilient enough to help them fight it.

It does seem as if human rights were not very well respected in the three countries that were desperately trying to cope with this huge crisis. Time and time again, there was a lack of respect for the human rights of the population, a lack of adequate protection of

health workers, a lack of understanding of the general dimensions of the problem and an overuse of quarantine that the population didn't understand and which spread fear.

We must learn one important lesson, which is that we have to be more rights based in our health work. We have to understand that the more we empower communities, the more we work with and strengthen them, the more we can avoid at least some of the problems.

### **Factors in the Epidemic**

The reasons why the three countries suffered so much is that they were clearly post-conflict, they had weak health systems and little basic public health infrastructure, so they were not able to withstand the shock. And this was compounded by fear and lack of full respect for human rights.

There wasn't any capacity for surveillance for cases that spread from Guinea to Liberia and Sierra Leone, so they weren't able to combat Ebola in the way that Nigeria and Senegal did.

There's no single way of bringing an epidemic like Ebola under control; it's a matter of using several approaches, but in a more rights-based way. And community engagement is extraordinarily important.

If you have very weak health systems, then you will have pandemics and epidemics of the type we have seen. But you can't build health systems if you don't have health workers, and, the trouble is, health workers are still migrating from countries of high health problems and under provision of health workers.

There's still a tendency of the countries where they go to think of the individual health worker as moving to a place of safety and higher income, and not think that they are depriving under-resourced countries of their health workers. We urged the World Health Assembly to encourage rich countries that take health workers from poor countries to pay for the education and training of at least one health worker in their native country. We need to think seriously about that.

### **Climate Change Threat**

It's quite clear that the global warming we are already seeing as a result of climate change is causing health vectors to change, and causing malaria to spread and Dengue fever to become a problem where it wasn't before. This must be a very real worry for health professionals because if you are not used to coping with a problem, it's much more difficult to know how to counteract it.

There is a huge nexus between environment, health and climate change. I often borrow an expression from Archbishop Desmond Tutu, who said at a panel on social media in New York a couple of years ago: "I am not an optimist; I am a prisoner of hope." We all have to be prisoners of hope in some of the difficult areas we are working in.

### **SPEAKER**

**Mary Robison**, Former President of Ireland 1990–1997, United Nations High Commissioner for Human Rights 1997–2002, Founder of the Mary Robison Foundation – Climate Justice, U.N. Special Envoy for Climate Change

# WORLD HEALTH ORGANIZATION



*“The watchword is this: be prepared for the unexpected. Constant mutation and adaptation are the survival mechanisms of the microbial world. There will always be surprises.”*

**Margaret Chan,**  
Director-General, World Health Organization

## WELL-FUNCTIONING HEALTH SYSTEMS IN VULNERABLE COUNTRIES SHOULD BE THE FIRST PRIORITY

*They build social trust in the government and stability, offering resilience that protects populations against shocks, explains Margaret Chan.*

Ebola is not a new disease. The first outbreaks, in what is now South Sudan and the Democratic Republic of Congo, date back to 1976. Prior to the current outbreak, Ebola was a rare disease, largely confined to rural areas isolated by lack of transportation by road, air or water.

Much about the disease was poorly understood. The previous 22 outbreaks, which occurred in Ebola’s traditional geographical home in equatorial Africa, were controlled using measures like isolation and quarantine that date back to the Middle Ages.

We are now into the second year of the outbreak in West Africa, which is by far the largest, longest, most deadly and most complex Ebola outbreak in history. Much research has been undertaken, and knowledge of the disease, its patterns of transmission, and its clinical features, has improved considerably.

What the World Health Organization (WHO) and all other responders failed to grasp quickly enough was the potential of Ebola to behave very differently in West Africa than it had in equatorial Africa.

### **Sustained Outbreaks Can Be Prevented**

In terms of lessons for future outbreaks, one overarching conclusion is this: outbreaks of new and emerging diseases cannot be reliably predicted, but large, severe and sustained outbreaks can be prevented through adequate vigilance, preparedness and quick detection and response.

The watchword is this: be prepared for the unexpected. Constant mutation and adaptation are the survival mechanisms of the microbial world. There will always be surprises.

This was Ebola's first appearance in West Africa. The disease was neither expected nor suspected. In Guinea, where the first case occurred in December 2013, the virus circulated undetected, off every radar screen, for three months. The earliest cases in Liberia and Sierra Leone were likewise missed.

This late detection gave the virus a momentous head start, which further accelerated when the disease reached capital cities. National and international responders did not begin to catch up until October of last year. As studies now show, the late detection and delayed intervention contributed to the outbreak's size.

For vigilance, preparedness and early response, the context of modern plagues is extremely important, especially in a century characterized by striking inequalities in wealth and fundamental state capacities.

Communications technology played a decisive role in ending the 2003 outbreak of severe acute respiratory syndrome (SARS), the first severe new disease of the 21st century. SARS was very much a modern plague. It revolutionized our understanding of the power of real-time communications during an outbreak.

One set of statistics illustrates that power well. In mid-March 2003, the WHO used the Internet to alert the world to a deadly new disease, of unknown cause, that was spreading quickly in sophisticated, urban hospitals. The message was widely reported by the world media, amplifying its reach.

The March alert provided a clear line of demarcation between the earliest outbreaks in China, Hong Kong, Hanoi, Singapore and Toronto, all of which were severe, and the 26 additional countries and territories where cases were imported by international air travelers.

Areas with outbreaks prior to the March alert accounted for 98 percent of the global total number of cases and 79 percent of total deaths. The additional sites, characterized by high levels of vigilance and preparedness, were able to prevent further transmission or limit it to just a handful of cases. The WHO declared the outbreak was over less than four months after the alert was issued.

### **Ebola Hit the Poorest Countries**

The Ebola outbreak in West Africa evolved within a very different context. Whereas SARS was largely a disease of sophisticated

urban settings, Ebola took its heaviest toll on three of the poorest and least prepared countries on earth. All three were recovering from years of civil war and unrest that left health services and infrastructures severely damaged or destroyed.

Deep poverty, a disruptive political history and centuries-old cultural beliefs and traditions created immense barriers to rapid containment. Poverty meant that there was not enough of anything: doctors and nurses, isolation wards, hospital beds, laboratories, medical supplies, ambulances, daily provisions for people held in quarantine or even protective gloves and body bags. Transportation and communication systems were primitive. In rural areas and also in some cities, real-time reporting of suspected cases and lab results was out of the question.

Many rural areas could not be reached by any form of communication, not even by mobile phone. Every day that symptomatic patients were left in the community, waiting for test results or transportation to a treatment center, gave the virus multiple opportunities to spread.

The political history of conflict and unrest left populations deeply mistrustful of government authorities, their policies and advice, their military and their public health systems. People preferred to seek care from traditional healers under conditions that virtually guaranteed explosive spread.

Foreign health care workers were even more deeply mistrusted, frequently to the point of violent resistance. In some countries, competing political factions used the outbreak to promote their own agendas. In fact, cultural beliefs and practices proved to be one of the most difficult barriers to address. Responders took too long to learn how to break this barrier down.

In the beginning, many communities refused to believe Ebola was real. Rumors spread that all this “Ebola business” was just that: a business run by government officials to secure foreign funds to pad their personal fortunes.

### **Public Health Messages Backfired**

To counter these and other rumors, health officials communicated the message that Ebola was indeed real. In fact, this was an extremely deadly disease with no vaccine, treatment or cure.

That message backfired. If hospitals offered no hope, communities found it logical to care for infected loved ones in their homes, where they could die surrounded by familiar faces. Traditional cultural beliefs also dictated funeral and burial practices that involved washing, cleansing and caressing of corpses that remain extremely infectious for several days after death.

Even after safe burial teams were organized and made quickly available, secret unsafe burials continued. The WHO estimates that up to a quarter of all infections in the three countries could be linked to high-risk funeral and burial practices.

As we learned, communities must be helped to understand the importance of control measures on their own terms. Simply telling them to “do this” or “don’t do that” does not work. “Listen to the people” was one of the most important lessons learned.

When communities saw for themselves that hiding patients in homes could lead to the death of entire households, they found their own way to separate the healthy from the infected. They found their own way to identify and quarantine close contacts and keep symptomatic travelers from entering the village. These changes in community behaviors helped bring some of the earliest hotspots under control.

Could digital communication systems and Internet networks have been used to solve some of these problems and bring about changes earlier? I have some doubts, given the realities on the ground during this crisis. How can communications technologies help if the messages are not trusted or the content is inappropriate? As we learned, when technical interventions go against culture, culture will always win.

In recent years, several systems for digital disease detection have been developed, also in collaboration with the WHO. These systems use dedicated software applications programmed to search open websites, news wires, discussion groups and blogs for words and phrases, in nine languages, that signal a possible outbreak or other health emergency. In many cases, this electronic gathering of disease intelligence operates as an effective, real-time early warning system.

### **Difficulties With Early Warning Systems**

In West Africa, the effectiveness of these systems is blunted for two reasons. First, these countries simply do not have a modern telecommunications system. Health-related data that might be picked up by digital systems for disease detection are sparse.

This is a reality in poor countries worldwide. Some 85 countries, representing 60 percent of the world's population, do not have reliable systems for collecting, recording and analyzing even the most basic health data. They do not register births and deaths and do not investigate or record causes of death.

Second, most poor countries in tropical areas have a heavy burden of other infectious diseases—like malaria, Lassa fever, typhoid fever, yellow fever, cholera and Dengue fever—which have nonspecific early symptoms similar to Ebola. In the midst of so

much background noise, how can surveillance systems, which are almost universally weak, pick up an unusual disease event?

### **Excellent Response in Nigeria**

Elsewhere, experiences in countries with more robust information technology systems in place show some positive results and some negative consequences. In July 2014, an air traveler from Liberia brought Ebola to Lagos, Nigeria, one of the most densely populated cities in Sub-Saharan Africa. Lagos has large numbers of people crowded together in slums with little sanitation and vast daily population movements in and out of the city. Under these circumstances, many predicted a catastrophic urban outbreak.

That never happened. Nigerian health authorities caught the first case quickly and responded forcefully, with support from the Centers for Disease Control and Prevention, Médecins Sans Frontières, the WHO and the private sector. State-of-the-art technology, developed for the country's polio eradication program, was repurposed to support the search for contacts of the first Ebola patient, the tracing of chains of transmission and the real-time reporting of results.

Nigeria had excellent laboratory support and good isolation and quarantine facilities. Remarkably, the country was able to hold the number of Ebola cases to just 20. Equally remarkable, investigators could link every one of these cases to the chain of transmission that began with the Liberian air traveler.

In wealthy countries around the world, information technology, including social media, allowed fear to spread faster than the virus. This fear could not be contained by the well-documented facts that Ebola is not airborne and spreads only under conditions involving very close contact with infected bodily fluids. In reality,

the risk of onward transmission following an imported case is very low in countries with high standards of living and well-developed health systems.

Despite these facts, numerous airlines canceled flights to all of West Africa, and some countries refused to issue visas for travelers from affected countries. The cancellation of flights made it extremely difficult to move badly needed personnel and supplies into the three countries. Apart from impeding the speed of the international response, these measures isolated and stigmatized the three countries even further.

### **Put Health Systems in Place**

In my view, the first priority must be to get well-functioning health systems in place, especially in fragile or vulnerable countries. A well-functioning health system includes surveillance and laboratory services, but also offers comprehensive care, close to people's homes.

Surveillance functions not just to detect outbreaks early, but also to detect chronic noncommunicable diseases early, like heart disease, cancer and diabetes, when the chances of treatment are best and the costs are lowest. A well-functioning and inclusive health system builds trust in the government but also contributes to social cohesion and stability.

It offers the kind of resilience needed to protect populations from sudden shocks, whether these come from a changing climate, natural disasters or a runaway virus.

### **SPEAKER**

**Margaret Chan**, Director-General, World Health Organization

# LEARNING



*“Epidemics are inevitable; and as someone once said, pandemics are optional. We are not passive observers of history. We can change the tide of things... We will never have another opportunity, such as this.”*

**Jeremy Farrar,**  
Director,  
Wellcome Trust

## **WORLD HEALTH ORGANIZATION SHOULD CONTINUE TO PROVIDE GLOBAL LEAD ON CONTROL OF EPIDEMICS**

*We can predict future flu and Ebola outbreaks, and we need a system that can respond promptly in high-pressure situations, argues Jeremy Farrar.*

It’s easy to feel daunted by the challenges of global health. But a great deal has been achieved, albeit not fast or equitably enough. Take malaria. Thanks to scientific research, 700 million fewer people have been infected with the disease since the turn of the century. Between 2000 and 2012, the estimated mortality fell by 42 percent in all age groups, and by 48 percent among those under five. If that pattern is sustained, those figures will have grown to 52 percent, and 60 percent, respectively, by the end of 2015, which is close to the World Health Assembly target of a 75 percent reduction in the malaria death rate by this point in time.

This trend shows that if the right decisions are made, development and support can really transform people's lives within a generation, as the experience of Singapore and Vietnam shows.

### **Health Care Issues**

For most of the world's population, the most common reason for coming to a hospital is not readily identifiable, and even in the most technologically advanced clinical centers, finding out what's wrong is difficult, irrespective of how experienced the clinicians are.

That makes effective surveillance difficult. Ebola, for example, is not dissimilar to flu, Dengue fever or malaria, and the diagnostic tests currently available are not sufficiently discriminating or widely available—something that has to change.

True public health interventions, such as sanitation, vaccinations and better nutrition in the 19th century, drove down the toll taken by infectious disease in developed countries. But since the mid-20th century, noncommunicable diseases, such as obesity, diabetes, cardiovascular disease and mental health, have taken their place on a global scale.

The problem for low- and middle-income countries is that they now have to contend with the scourge of infectious and noncommunicable diseases at the same time. Because these require different types of health care systems—as we have seen with the transformation of HIV and tuberculosis into long-term conditions—this is a real challenge.

It's important that we learn the very painful lessons of HIV, for which effective treatments were available, but they took far too long to arrive in the developing world. Advances in medical science must be rapidly translated into clinical practice everywhere.

## **Emerging Infections**

Emerging infections, such as Ebola, are not rare events, as U.S. Health Map surveillance data shows. Minor regional and national epidemics are constantly occurring; it's just that we only tend to hear about them when they reach the media. The critical issue is how to sift through the huge amount of data to pinpoint what is really important, especially when the completeness and quality of the data are not guaranteed.

Apart from Ebola, there are several infections for which we either have no immunity and/or treatment. These include H7N9 virus (bird flu); enterovirus 71, which has caused huge outbreaks in the Far East over the past three to four years and has the capacity to become a serious brain infection; enterovirus 68, which has caused several outbreaks in the United States in the past couple of years; MERSCoV, which spread from a zoonotic reservoir in the Middle East; drug resistant malaria; chikungunya in the Caribbean; hepatitis E, which could spread in refugee camps where the average length of stay is 20 years; cholera; typhoid; Zika virus in Latin America and the Caribbean; and Dengue fever.

## **Resistance**

The biggest challenge of the 21st century, however, will be resistance to drugs and insecticides. We shouldn't assume that the antiretroviral drugs we have at our disposal will be able to control HIV in the future. It's inevitable that as they are rolled out across the globe, resistance will develop. And second and third line treatments tend not only to be more expensive, but also more toxic, so we must pursue the development of an HIV vaccine, no matter how difficult this will be. Counterfeit drugs, which contain a fraction of the active ingredient or none at all, just exacerbate the problem, as has proved the case in drug resistant malaria.

All of this is happening in the context of seismic geopolitical changes, with shifts in the old world order, the rise of nation states and the totally porous movement of people across the globe. Migration is continuing on a scale that most people would struggle to comprehend.

One of the most dramatic increases in the movement of people and trade over the past century has been between South and Southeast Asia and Sub-Saharan Africa. This will continue to grow and will have huge ramifications for the transport of mosquitoes and the spread of drug resistance, for which most of Europe, North America and Asia are ill-prepared. Cities like Chongqing in China are home to 45 million people.

### **Learning From Our Mistakes**

The window of opportunity for learning lessons that will have an impact on what happens throughout the rest of an epidemic is very short. The 1918 flu pandemic, which killed 20 to 40 million people when global connectivity was very different from what it is today, shares something in common with the H1N1 flu pandemic in Mexico in 2009. Excess mortality returned to normal after six weeks (42 days).

The question is: have we learned anything since the Nipah and SARS epidemics at the turn of the century? There have been several epidemics since then, and several international forums, which have called for change.

Global surveillance is improving. But we can't blame Ebola on poor surveillance. The information was there in March 2014; it just wasn't acted on. Epidemiology has also become better; social science and anthropology are more engaged, while public health has resumed its public service remit. And media reporting, on the

whole, has not been bad. The public has also responded well. There have been advances in immunology and virology, and international cooperation has improved, with a noticeable shift towards basing policy on the evidence—with the exception of closing airports during the Ebola epidemic.

But the patient-focused and community-focused aspects of these epidemics have not improved. If bird flu were to adapt to spread from person-to-person, we would have no idea who to treat, with what or for how long. We don't really know whether interventions such as social distancing, shutting schools or closing down transport systems really do help stave off secondary transmission. We still don't know how to communicate risk management and uncertainty effectively, nor are we very good at coordinating and sharing our learning internationally. And we still don't fully understand the animal-human interface of infection.

And there's little strong clinical evidence on which to base policy. A systematic review of 150 studies on flu led to the World Health Organization (WHO) global recommendations, which are based on very low quality evidence, while a recent BMJ study concluded that oseltamivir doesn't work. We missed an opportunity in 2009 when 16 percent of the world's population was infected with H1N1 to derive some rather stronger evidence.

### **Research Paradigm**

We must change our international capacity for doing research before, during and after epidemics such as Ebola. But we have overcomplicated research involving human subjects to the point where the disincentives are so great that it's not getting done, and lives are being lost. On average, it takes around 600 days from idea to recruitment of the first patient, but our window of opportunity in emerging epidemics to improve patient care and outcomes is just 42 days—in Ebola this was probably the first three months.

There's a pressing need to speed up the process and differentiate between trials needed for conditions such as high blood pressure, and emerging epidemics. The overregulation is also turning off a whole generation of prospective young researchers.

The Ebola epidemic was unprecedented in that it spread across three countries, making it almost impossible to control. It's helpful to divide it into two phases: the first, from December 2013 to July 2014, is the one we really need to learn from; the international community should take credit for the second phase, from August onwards, because decisions taken then brought the infection under control. Phase II needed to be applied to phase I within a matter of days rather than months.

We can predict future flu and Ebola outbreaks, and we need to have a system that can respond promptly in high-pressure situations, whether that's epidemiological surveillance, or fully fledged clinical trials with the funding, consent and ethical approval already in place.

### **Changing Context**

Since 1976, the year of the first Ebola outbreak, the virus has not become more transmissible or virulent. But society has changed. In 1976, the contacts of an individual case numbered between five and eight; in 2014 the number ranged between 100 and 150, making it difficult to carry out effective surveillance and contact tracing on that scale.

And unless we bring together clinicians, epidemiologists, public health doctors and those who understand how societies operate—anthropologists and social scientists—it will be hard to respond effectively in the future and curb the far-reaching social, economic and health impacts of this and other diseases.

Universities have a crucial role in this, but the concern is that the collaboration and mutual respect for different disciplines will be

eroded by the need to specialize earlier and earlier to cope with the vast knowledge base required for an academic career.

### **Role of the WHO**

But it's not just academic silos that are being created—there are many different players in epidemics: nation states, Médecins Sans Frontières (MSF), Google, funding bodies, the commercial sector—who all need to be accountable to someone, plus a proliferation of separate initiatives all pursuing their own objectives.

A strong global health body is needed to unite them and lead on equity and access. The WHO is best suited to that role—just not in its current guise. Reform is crucial. Its strength lies in its representation of 194 countries, but it needs to be given the mandate to lead, rather than to manage, and the world's rich countries must respect and fund it properly.

There are only a handful of organizations, such as MSF and the Centers for Disease Control and Prevention, that have the capacity to respond to epidemics; and the world has to up its game and the vehicle for that is the WHO. Without it, there will be more Ebola outbreaks.

Several commissions and panels will report on the Ebola epidemic: it's what we do with those reports that will count, and one of the issues that desperately needs tackling is the development of diagnostics, drugs and vaccines. This has been portrayed as a market failure, but we can't expect the commercial sector to work only for the public good. As taxpayers we have to accept our share of the responsibility. This is not a market failure; it's a failure of society.

## RECOMMENDATIONS

- Relax regulations/protocols for timely human research trials on emerging infectious diseases
- Create more public-private partnerships to speed up development of diagnostics, drugs and vaccines
- Reform the WHO: make it a global leadership organization that is properly funded and respected
- Apply the learning from the Ebola outbreak

## SPEAKER

Jeremy Farrar, Director, Wellcome Trust

# POLITICS OF PLAGUES



## TRUSTED GOVERNMENTS, FOCUSED ON CITIZENS' WELFARE, CAN PROTECT POPULATIONS, ENERGIZING COMMUNITIES DURING CRISES

*As well as working with national authorities, developing relationships with local authorities helps ensure better understanding of the situation on the ground.*

National emergencies call for governments that can prioritize their citizens' welfare, work collaboratively and transparently and which are prepared to devolve power locally. Inevitably, some are better at doing this than others, but the Ebola epidemic proved the importance of these attributes in coordinating a swift response and halting the spread of the disease.

*"Better local government autonomy allows for direct and transparent negotiation with donors, effectively bypassing central government. When all these negotiations are done in public, it's very difficult for them to be politicized."*

**Leonard Wantchekon**,  
Professor of Politics  
and International  
Affairs, Woodrow  
Wilson School  
of Public and  
International Affairs,  
Princeton University

## **Government Responses**

Governments can get into difficulty when, politically, they need to be seen to be responding to a crisis, but yet react in a way that is counterproductive. Nigeria and Senegal successfully contained Ebola when it crossed their borders. Both governments exhibited strong leadership and took prompt action. But other factors played their part.

Senegal, which has been a democracy for more than a century, started its response at the level of local, rather than national, government. It is easier and quicker to mobilize local people, and this approach helps secure the buy-in of citizens because it increases transparency and trust.

On the other hand, in Liberia, which is also a democracy, the government treated Ebola victims as threats rather than as patients. It dispatched the military to impose a lockdown on the freedom of movement, which, understandably, sparked protests, particularly as people were told they posed a threat not just to others in Africa, but also to those in other continents.

Protectionism and containment were not unique to Liberia. Until the United Nations (U.N.) Resolution 2177 was passed, a quarter of international states imposed travel restrictions that went beyond the World Health Organization (WHO) recommendations. This sent out the message that building a wall around the problem would solve it, and it kept vast numbers of the population “off the grid,” which is unacceptable in any emergency.

It also created logistical problems: the ban made it difficult to bring supplies in, get people out and recruit international health workers because there were no options for flying them back home for treatment and/or burial if they fell ill.

## Value of Evolved Health Systems

Senegal also has one of West Africa's leading medical schools in Dakar and an evolved health care system. By contrast, in Sierra Leone, the improving health care infrastructure had been decimated by the prolonged civil war, and it struggled to cope with the additional demands that Ebola placed on it.

Strengthening the health care system is essential if vulnerable countries are to develop emergency preparedness and avoid future disasters on the scale of Ebola. But there's no quick fix. It fundamentally involves building up the capacity of local communities over many years to create resilience, rather than primarily relying on parachuting in cadres of experts and creating new structures, as happened in the wake of Haiti and the 2004 tsunami.

Local health workers, who understand the culture, and who are known to their communities, are the lynchpin of disease containment. Nevertheless, the focus of the response was on the creation of beds for treatment rather than on prevention and the adoption of a more holistic approach. Strengthening local health systems isn't just about ensuring adequate numbers of health workers, it means plugging all the potential gaps, because if there's one break in the chain, the whole system is liable to collapse.

In Freetown, Sierra Leone, for example, health care workers at the Ebola command center relied on a simple white board to track and trace cases, which at their peak numbered between 400 and 600 a day; the ambulance drivers hadn't been paid for weeks; the ambulance seats weren't covered in plastic, so they couldn't be sterilized properly; and health care professionals received just 30 minutes of training in safety procedures, which didn't include use of protective clothing.

## **Health Linked to Development**

But Ebola wasn't purely a health crisis; it was also a development crisis. The WHO didn't have the capacity to manage these multiple aspects. The U.N. might have been more suitable for this role, but its political clout and logistics capacity were brought in too late. And it's not clear whether it would have had the depth to penetrate communities at the local level. The issue is: has the WHO learned lessons from the Ebola crisis about its leadership, foresight and future capacity to respond? Irrespective of which organization takes the lead, they have to work effectively with local government and international aid agencies. This didn't happen in Sierra Leone or Liberia, where there was an initial power vacuum and a lack of clarity about how this would be filled, and by whom.

The international response machinery that springs into action in emergencies can be very alienating for governments and local communities that have not experienced it before. Engagement outside formal structures—with local tribal leaders and health care workers—needs to happen before crises occur.

## **Encouraging Future Development**

There is a danger that international development aid (which, for this discussion is distinct from emergency humanitarian response) can create the impression that development is something bestowed on nations, rather than something they do for themselves. Over the past 20 years, Africa has enjoyed the third fastest growth rate in the world, with many countries doing comparatively well. The international community should better recognize the role of African governments in developing their own health care infrastructures and emergency preparedness.

By the same token, African governments must tackle endemic corruption, which is not always restricted to milking donor funds. In Freetown, for example, 100 beds were made available for Ebola cases, but 10 of them were used by government officials for their relatives. Nigeria is investing more in its infrastructure, but it has oil revenues to draw on, and government corruption is widespread. Regional cooperation is key in this context.

International governments and aid agencies should consider making some level of development and growth a condition of funding and target resources more carefully. Received wisdom is that globalization and injections of cash will narrow inequalities, but that's a myth.

### **Political Reform**

The other catalyst for change and citizens' rights lies in political activism. Most African countries have not been self-governing for that long, but a whole generation of people, regardless of income levels, fought for freedom and independence, and support for political reform is strong. The issue is how to harness that collectivism to galvanize the advance of democracy, which tends to go hand in hand with stronger economic growth, peace and stability.

Political activism is one way that citizens can demand better health care and health infrastructure. Once health becomes a right, it can be enforced.

For example, in Brazil, the right to health is enshrined in the constitution. This gave people in local community councils the leverage they needed to force the government to abide by its mandate when the country faced an HIV/AIDS epidemic during the 1990s. It resulted in a national health care system and an innovative policy of universal access to antiretroviral drugs, which became the gold standard of similar campaigns around the world.

But in countries that have not experienced the economic growth of Brazil and Senegal, and which have impoverished and corrupt governments, the ingredients for community action are not always there. African countries are still set to shoulder the largest proportion of infectious disease, so international governments need to help facilitate a more organic process of democratization.

### **Lessons for the Future**

Sierra Leone and Liberia will be better prepared to deal with another outbreak if the network of trained community health workers is sustained and expanded, because one of the key elements of health system strengthening is the workforce.

Funding flows also need to be expedited, as these were activated rather late in the course of the epidemic (Department for International Development for Sierra Leone and United States Agency for International Development for Liberia). Once in operation, funding sources did channel funding through existing mechanisms rather than setting up new systems.

A rethink on funding is required, however, because funding priorities tend to skew needs on the ground. By the second phase of the Ebola outbreak, for example, there were lots of empty beds because the disease was being managed, but the focus and funding were still on treatment rather than prevention. The aftermath of Ebola provides a valuable opportunity to reassess what is relevant and find the appropriate balance between short-term versus long-term interventions.

Consideration should also be given to the role of private sector investment in bringing in new skills, innovation and raising standards at scale. Donor funds and taxation alone won't be sufficient to strengthen health systems; public-private partnerships

should be explored. In Sierra Leone, the per capita spend on health is around \$3 to \$4, when the WHO recommends it should be \$34. Governments should be encouraged and incentivized to increase this spend. It may also be worth looking at the financial concessions given to mining companies and major corporations. These add up to around \$200 million and could be used to help fund health care.

The private sector is increasingly becoming involved in humanitarian crises but it needs to be able to work in partnership: the Sierra Leonean government hired a private consultancy whose recommendations contradicted international aid agency advice and expertise. And there must be safeguards to ensure that private sector finance doesn't create a two-tier system, like that of the Middle East and North Africa, which ends up widening rather than narrowing health inequalities.

## RECOMMENDATIONS

- While continuing to work with central government, it is important to work also with local authorities.
- Put a strong focus with adequate resources on health system strengthening
- Engage proactively with local tribal leaders and health care workers in vulnerable countries
- Support and strengthen the role of regional bodies such as the African Union
- Speed up the flow of funds to worst-hit areas
- Funding of all activities in relation to the prevention and control of Ebola should be prioritized and not just focus on one or two activities.
- Consider making growth and democratization a condition of development aid and investment
- Develop public-private partnerships as appropriate both in response to any future Ebola outbreaks and in strengthening the health care system
- Assist governments in making evidence-informed decisions relating to Ebola prevention and control

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**João Biehl**, Susan Dod Brown Professor of Anthropology, Department of Anthropology, Princeton University

**Amaney Jamal**, Edwards S. Sanford Professor of Politics, Department of Politics, Princeton University

**Dominic MacSorley**, CEO, Concern Worldwide

**Leonard Wantchekon**, Professor of Politics and International Affairs, Department of Politics and Woodrow Wilson School of Public and International Affairs, Princeton University

Moderator: **Joel Achenbach**, *The Washington Post*

## FINANCE

*“A perfect response, like a perfect health system, would certainly cost more than is being spent. These things can’t be done without money. On the other hand, throwing money at them, without addressing more fundamental problems, is unlikely to make things better and will often have unintended consequences.”*

**Angus Deaton,**  
Dwight D. Eisenhower  
Professor of  
International Affairs  
and Professor of  
Economics and  
International Affairs,  
Woodrow Wilson  
School of Public and  
International Affairs,  
Princeton University



### **WE NEED TO UNDERSTAND BETTER THE CIRCUMSTANCES IN WHICH AID HELPS AND WHEN IT DOES MORE HARM**

*It's vital to focus on governance and on understanding local politics before injecting large sums of cash into a country.*

A vast amount of money was spent on the Ebola crisis in West Africa. The United Nations (U.N.) has estimated that the sum was \$4.1 billion, while the World Bank puts the figure at \$8.2 billion. By comparison, the annual budget for the global operations of the United States Agency for International Development's (USAID) Office of U.S. Foreign Disaster Assistance is often in the range of \$700 million to \$800 million. So was the money put to the best possible use, and did it hinder more than it helped?

## **Local Is Best**

Few international relief and development organizations had really dealt with a crisis of this kind and magnitude before. They designed and implemented a number of programs to stop the transmission of the Ebola virus in the hope that something would work. A considerable amount of infrastructure was required—Ebola treatment centers, in particular, were very expensive to build. The predominantly clinical focus on the Ebola crisis was a compelling narrative for Western donors/audiences, as they could understand the role of foreign medical teams more readily than they could grasp the importance of local community leaders in containing the epidemic. But this medical model consumed vast resources, added to which it was inherently disempowering to be a patient, even when at the center of care.

Collaboration among regional governments, donors and international aid organizations, along with the insights provided by social scientists were invaluable, but work done at the community level made the most difference to turning the tide on the epidemic. This work was spearheaded by the emergence of exceptional local leaders and the efforts of community-based organizations. Yet three principal barriers stand in the way of sustaining this: USAID rules discourage community-level work; non-governmental organizations (NGOs) don't hire people who think like anthropologists; and current systems are designed to maximize the revenue of local aid and government workers.

## **Governance Matters**

In its analysis of the Ebola response, the U.K. Department for International Development (DFID) highlighted poor governance—within organizations and outside—as a key issue.

The early warning system worked well enough, but it wasn't followed up with prompt action. It's a pattern that has characterized many of the major humanitarian emergencies of recent years.

In Sierra Leone, the large sums of money coming in and financial incentives were coupled with governance issues, which were well known even before the Ebola epidemic started. And there was little commitment to tackling Ebola once it took hold.

Money is often needed, particularly in the short term, but it can create the wrong conditions. In very poor countries with little capacity, large cash injections can do more harm than good, because they attract the self-serving. In war zones, aid has definitely helped stabilize conflict, but helping the innocent victims often helps their oppressors at the same time. We need a taxonomy to define the situations in which money really helps and those where it doesn't, and to start thinking in terms of specific funds for specific problems.

### **Limitations of Aid**

The economist Tom Sargent has said that many things that are desirable are not necessarily feasible. Developed nations tend to think that they have the money and the know-how to solve crises. But we have to recognize that our actions can make things worse, especially if more fundamental and deep-rooted issues are not addressed. It's hard to improve the health of people who are starving or living under a brutal dictatorship. And difficult trade-offs often have to be made. Rwanda, for example, is still permitting aid agencies to help its children in exchange for being allowed to persecute its enemies and imprison them.

The critiques of international development aid are legion. Improving medical literacy is pointless if there's no funding

for education to teach children how to maintain good health. Investing more money in health care to improve population health hasn't worked in the United States and it's unlikely to work in Africa. Gallup polls taken across the continent indicate that health is low on the list of citizens' own priorities; what respondents say they want is infrastructure and jobs. Yet most of the development aid has switched from growth to health. It might, for example, be better to divert funds to build administrative systems so that taxes can be collected for long-term sustainability, and/or create a manufacturing sector to generate income and growth.

Some believe that the idea that development aid doesn't work, while emergency/humanitarian aid does, is misguided as a general proposition. History tells us otherwise. Humanitarian aid brought cholera to Haiti after the earthquake; aid money in Goma was used to train mass murderers to return to Rwanda and continue the genocide. Policy analyst David Rieff once said that if NGOs had existed in Germany in WWII, they would have referred to the Holocaust as a humanitarian emergency. Nevertheless, humanitarian aid did have a role in helping bring the Ebola crisis to an end.

### **Understanding Politics Is the Key**

Development is inherently "messy." Uganda is one such example. Yet the government there has still improved education and health indicators. Ethiopia is another country where international aid has helped bring down infant mortality and boosted primary school enrollment. But treating aid as a technocratic intervention won't further development. Money has to be aligned with politics to make progress.

The onus has to be on the funders to find out what is feasible, and that is only achieved by a firm grasp of the social, political and economic context. For many of the countries in which DFID works, the service delivery teams (education and health) have merged with the governance teams to better understand what works on the ground and where incentives are needed. This approach has been particularly effective in Ghana and Mozambique.

Aid should be thought of as a business rather than as acts of heroism. One of the Centers for Disease Control and Prevention's greatest achievements has been in Kenya where it has taught Kenyan clinicians to be field epidemiologists. It's not glamorous, but it's had a huge impact. We really have to think about whether we are helping people or making investments, and let some other body, such as the U.N. International Rescue Committee, decide if that investment is going to be worthwhile. It's also important to ensure that aid results in a sustainable legacy: for example, the funding of community health workers in an emergency is unlikely to continue afterwards.

### **New Funding Paradigm**

A rethink of the funding model for disasters and emergencies is long overdue. The current system relies heavily on the generosity of donor countries in the aftermath of an event, yet financing needs to be timely and at scale in these situations. It should be replaced by modern financial-risk management along the lines of a prepaid insurance model. In Ethiopia, farmers pay into funeral societies every month to make sure there is adequate money for a burial when the time comes.

There's already talk of pandemic insurance policies. These systems could be set up relatively easily, and sensible finance

plans, with built-in incentives, put in place. All that's needed are clear lines of accountability about who owns the risk, what the criteria are for payouts, and who would be responsible for disbursing funds. The African Risk Capacity Insurance Company works in this way—rainfall below a certain level triggers a payout to the scheme's member states: Kenya, Mauritania, Mozambique, Niger and Senegal.

### **Hubris and Humility**

Developed nations are often guilty of the “we hubris,” as in “we must make this happen,” or “we must reduce infant mortality,” expressed as their vision of what's needed. But they rarely specify who is responsible for realizing it, other than some ill-defined community of global well-wishers, and they almost always exclude the very people who should be involved in creating that vision for themselves. There's a great deal of knowledge, health and health care in Africa, which we tend to ignore. When the mortality of children under the age of five is brought down, life expectancy is as good as in many parts of the United States. Yet all too often the assumption is that these nations need us to tell them what to do. Colonialism was supposed to be a corrective for slavery; a lot of development aid is built on that logic.

However, we shouldn't be fooled into believing that aid can be part of a truly equitable partnership when we have all the money, and therefore the balance of power. We need to be honest about that, and to stop imagining we can turn the world into a version of Sweden. But we shouldn't lose sight of the fact that we can still do good, even if we sometimes, inadvertently, do harm.

## RECOMMENDATIONS

- Rethink the medical response model
- Look to governance and politics before injecting large sums of cash
- Devise criteria for situations in which money would and wouldn't help
- Attach specific funds to specific problems
- Understand the limitations, and respect the existence, of unintended consequences of aid
- Aim for a sustainable legacy rather than funding projects that will collapse when aid is withdrawn
- Replace the current emergency-funding paradigm with a form of prepaid insurance
- Recognize indigenous expertise

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**Emmanuel D'Harcourt**, Senior Health Director, International Rescue Committee

**Angus Deaton**, Dwight D. Eisenhower Professor of International Affairs and Professor of Economics and International Affairs, Department of Economics and Woodrow Wilson School of Public and International Affairs, Princeton University

**Stefan Dercon**, Professor of Economic Policy, Blavatnik School of Government, Department of Economics, University of Oxford

**Doug Mercado**, Ebola Disaster Assistance Response Team, U.S. Agency for International Development

**Carolyn Rouse**, Professor of Anthropology, Department of Anthropology, Princeton University

Moderator: **Griff Witte**, *The Washington Post*

## POLICY

*“The scale of the Ebola crisis brought people around the table who were not previously part of the conversation. Some of the big organizations became very humble. I saw the greatest nation on earth listen to some of the leaders of the poorest nations and make joint decisions.”*

**Alex Gasasira,**  
Representative to  
Liberia, World Health  
Organization



### **GET THE BASICS RIGHT—PRIMARY HEALTH INFRASTRUCTURE, LOCAL UNDERSTANDING, REPORTING SYSTEMS AND VACCINES**

*Building capacity to maintain health and to tackle breakdowns speedily and effectively is vital to averting further crises.*

The devastation wrought by the most recent Ebola epidemic was both humbling and shocking. The deaths may have stopped, but the political, socioeconomic and medical fallout continues. Despite the frequent media portrayal of Sierra Leone, Liberia and Guinea as having made no progress on improving the health of their citizens, the infant mortality rate in all three countries was still falling when Ebola struck. Liberia was one of the few countries in Africa on course to meet the Millennium Development Goal for this health indicator. But the infection decimated health care workers, who were already thin on the ground. Around 900 health care workers were infected and more than 500 died.

Many of the failures in the response to Ebola were at the international level, rather than at the individual country level. For example, the World Health Organization (WHO) didn't declare this outbreak as an international emergency or mobilize assistance until several months after Médecins Sans Frontières had flagged that the situation on the ground was out of control.

### **Survivors' Needs**

The experience of other epidemics shows that they have long-term effects on survivors' health. This includes stunting, intellectual impairment, mental illness, disability and increased susceptibility to other infections like measles. Consequently, even after Ebola has been fully contained, the health needs of these countries will be greater than before. In Sierra Leone, there are no psychiatrists or mental health services. Furthermore, it's not clear in Liberia who all the survivors are, because there was limited capacity for recording this at the height of the crisis.

### **Capacity Building**

Building up the capacity of community health workers is important, because they embody the elements that are needed for a successful response to epidemics—widespread trust, effective surveillance and quick mobilization. And their delivery of basic health services, particularly to women and children, is crucial. It was their dedication and sacrifice that stopped the march of the Ebola epidemic. Well-trained and supported community health workers will also have the capability to work with, and enjoy the trust of, international partners to control future epidemics, not only by helping to promote good hygiene practice, among other things, but also by feeding back on what's happening at local levels.

## Forging Trust

Trust is a key element of health care. But we need to be more sophisticated in our understanding of what it actually means. Historically, clinic attendance in eastern Sierra Leone, where the epidemic started and flourished, has been low. Additionally, delivering health care in remote rural areas with very basic facilities poses considerable technical challenges. But simply building more clinics, without taking account of people's preferred sources of health care and their cultural values, won't work. Long-term ethnographic research is needed to find out what people look for in health care and whom they rely on to get it. This type of research takes some time to complete, and needs to be started before, rather than after, a crisis develops.

If people can see that the care provided is effective, they are more likely to seek it out. In Egypt, when oral rehydration was first introduced, mothers brought their daughters, but not their sons, who were too valuable to be experimented on, as they saw it. But when they realized how well it worked, they brought all their children.

The urgency and scale of response, however, can deprioritize key aspects of care, such as dignity, transparency and humanity. But these are important for maintaining and fostering trust as well as for the provision of high quality care. This didn't happen in the early stages of the outbreak and undermined efforts to control the spread of the infection later on. Continuity of care is also important for maintaining trust, but much of the infrastructure set up by the international community during the height of the epidemic has been dismantled.

## WHO Reforms

The WHO has come under fire for its failure to respond quickly enough and at scale. It had dealt with numerous outbreaks of Ebola before, but these were all small, and it was simply not prepared for the magnitude of this one. It was hampered by its own internal structures and the inadequacy of the international health regulations, which it devised in the wake of the SARS epidemic in 2003 to help countries build their own detection and rapid response systems, and facilitate real-time reporting.

All the member states had signed up to the regulations by 2005, but they are not mandatory, and almost a quarter of countries in the African region—including the three countries most badly hit by Ebola—had not reported on their resilience and preparedness to respond in an emergency. In some countries, no progress had been made at all. Ebola exposed the weakness of this arrangement, and the WHO is now looking at how countries can be incentivized to report regularly, even when progress has been minimal, and at how it can assist them to collect this information. This same issue arose in the wake of the 2009 pandemic, however, and nothing was done about it, so it's vital that this is rectified, and soon.

Similarly, the WHO is aware that it needs to provide a more integrated response to future crises. It became clear that some of the departments dealing with disease outbreaks differed from those dealing with humanitarian emergencies, while there were discrepancies in the tools and processes used. Lines of communication between country offices and its Geneva headquarters were not always optimal. But Ebola has focused minds, and there's now political will for radical change among the member states, although whether there will be sufficient funds to effect this change remains to be seen.

## **Channeling Resources**

Progress is being made. Liberia now has a state-of-the-art permanent emergency operations center, built and bequeathed by the U.S. government in Freetown. This center is able to access data from some of the country's remotest areas. The Ebola outbreak exposed the lack of adequate training and supervision of community health volunteers and the tendency of local funding to target specific interventions rather than health care across the board. The government has now put these volunteers on the payroll, and made them an integral part of the health care system and the country's recovery, earmarking 20 percent of the domestic budget for health for this purpose. The payment of community health workers continues to divide opinion, particularly as it needs to be sustained over the long term, and it's not clear how this will be achieved. But the role of community health workers is crucial, and arguably, full time. And in poor countries, it's hard for people to volunteer and earn enough to eat.

A huge amount of resource was mobilized in expectation of the toll Ebola was projected to take in Liberia, not all of which had been spent when the epidemic ended. This has now been channeled into bolstering the health care infrastructure. In light of that, given that most of the world's children die from malaria and diarrhea, it would be hugely beneficial if some of the health infrastructure put in place to deal with Ebola could be used for tackling these common killers.

## **Principal Lesson to Learn**

If this epidemic has taught us anything, it's that we need to learn from it in a way that we have singularly failed to do from the 15 or so epidemics that have preceded it over the past 30 to 40 years. HIV

is one of the most important emerging infections of our lifetime. It has killed around 30 million people in the past 30 years, and every year it infects 2 million more. There are now some 30 million people living with HIV as a long-term condition. But resistance to currently available treatments is just around the corner, so we need to act before that happens and develop effective vaccines.

### **Collective Action**

But despite the potential of microbes to wreak havoc, we are far too passive. This is exemplified by vaccine development. Three promising candidates for Ebola were discovered in the 1990s, but they were mothballed, forcing us to scramble to run a trial during the epidemic, which then took 18 months to set up. Part of the problem is that the vaccine industry is very concentrated; there are now only four or five companies in the developed world, and a similar number in the developing world. These companies are not geared up to producing new vaccines, and there is currently no mechanism for developing vaccines that are not going to be commercially viable, but which are nevertheless urgently needed. That has to change. A global vaccine development fund, similar to the one being set up for antibiotic resistance, would go a long way in helping to plug this gap.

## RECOMMENDATIONS

- Support the long-term funding of local health care volunteers
- Commission long-term ethnographic research before the next epidemic
- Strengthen and incentivize the WHO international health regulation reporting systems
- Use some of the Ebola infrastructure to tackle common childhood infectious disease killers
- Take collective action and set up a global vaccine fund

*This report represents the breadth of opinion expressed in the panel. Panelists occasionally disagreed, so this report is not the shared view of all.*

## PANELISTS

**Janet Currie**, Henry Putnam Professor of Economics and Public Affairs and Director of the Center for Health and Wellbeing, Department of Economics and Woodrow Wilson School of Public and International Affairs, Princeton University

**Raphael Frankfurter**, Former Executive Director, Wellbody Alliance

**Adel Mahmoud**, Senior Policy Analyst and Lecturer, Department of Molecular Biology and Woodrow Wilson School of Public and International Affairs, Princeton University

**Alex Gasasira**, Representative to Liberia, World Health Organization

Moderator: **Cecilia Rouse**, Dean, Woodrow Wilson School of Public and International Affairs, Princeton University

## FUTURE VISION



*“The power of these local health workers is not only to fight modern plagues but to bring health care to the furthest reaches of the planet. They have taught us that we are not defined by the epidemics and crises that strike our lives, but by how we respond to them.”*

### **THE BRAVERY OF ORDINARY COMMUNITY HEALTH WORKERS WAS CRITICAL TO CONTAINING EBOLA IN LIBERIA**

*A health worker for everyone everywhere will be critical to stopping pandemics like Ebola and addressing the everyday crisis of premature death, says Raj Panjabi, who leads a Liberian rural health non-governmental organization.*

Ten years ago, civil war had destroyed much of Liberia’s infrastructure. The capital city Monrovia lacked electricity, running water or even a single traffic light. The impact of the civil war on the country’s human infrastructure was devastating—a mere 51 doctors remained to serve a population of 4 million people. In remote and rural areas, people were dying anonymously from conditions—pneumonia, malaria and complications of childbirth—which no one should die from in the 21st century.

**Raj Panjabi**, CEO, Last Mile Health; Associate Physician, Division of Global Health Equity, Harvard Medical School and Brigham and Women’s Hospital

When remote villagers make the walk for hours or even days to seek care, they can often reach a clinic that lacks antibiotics or even oxygen. This is the pattern for too many people across our planet who reside in the world's most isolated, remote communities.

### **Isolated, Remote Communities**

Some 60 percent of all human diseases and 75 percent of all emerging infectious diseases are zoonotic (pathogens from nonhuman animal species). According to the Department for International Development's study in 2012, hotspots of zoonotic outbreaks occur most commonly in areas that are extremely rural and remote. However, when one looks at the health systems in these rural and remote areas, you see an inherent bias.

In Liberia, only 7 percent of roads are paved. If you live in a rural or remote area, you travel primarily along dirt roads, paths cut through the rainforest and log bridges. This means when someone falls sick, it can involve a two-day journey just to receive a diagnosis. Ministry of Health surveys suggest that people are 82 percent less likely to receive access to basic maternal care if they live 25 kilometers from the nearest clinic. Distance is a major obstacle to accessing life-saving care. Yet, hotspots of zoonotic outbreaks occur most commonly in areas that are extremely rural and remote. When a virus like Ebola begins to spread, it's extremely difficult to contain in remote regions. Health systems, with essential access to everything from primary health services to disease surveillance, do not reach the most remote places despite their critical importance.

### **Health Care Spending and Blind Spots**

Global health has many paradoxes. There has been an impressive increase in global health spending across the world over the past few years. Liberia has increased its own health care spending

in recent years, growing from \$3 per capita in 2006 to \$44 per capita in 2014. However, that funding is not distributed equally in rural and remote districts. There are 1.2 million Liberians who live over 5 kilometers away from the nearest health clinic. In Konobo District, the health spending in 2012 was less than \$1 per person. If we are going to solve the crisis of modern plagues, this has to change.

Residents of remote communities are too often deemed not meaningful enough as consumers to garner private sector support, too expensive for nonprofit support and too difficult for public sector support. One billion people worldwide have no physical access to care due to distance from a health facility.

### **Role of Community Health Workers**

Community health workers are particularly important in remote areas because they are often the first and only point of contact with the health system. However, if they do exist, they often fail because they have little training on only a few diseases, have poor supervision, lack equipment and are rarely paid. In fact, Liberia was calling them volunteers. The question my colleagues and I at Last Mile Health and the government of Liberia grappled with was could this workforce be professionalized and formalized to create greater value, increase delivery of health services and save more lives?

How we invest in these health workers is critical to stop modern plagues. Before Ebola, community health workers could take on up to 50 medical skills with high performance, with an extremely high diagnostic accuracy rate. The power of these health workers can be tremendous for routine care, such as complications during childbirth or cases of malaria. They can also be tremendous during times of crisis.

Last year, the Centers for Disease Control and Prevention projected as many as 1.4 million Ebola cases in West Africa. Community health workers were critical to halting this epidemic. The courage that's required to respond to Ebola in any circumstance—even in the richest, most well-resourced settings—is unimaginable. Yet more than 1,300 local health workers were trained to go from door-to-door in the rainforest collecting blood samples to send to the nearest lab, because there was no possibility of transporting people directly for testing to identify active cases. That is the sort of response that occurred throughout this crisis in remote and rural areas. President Ellen Johnson Sirleaf of Liberia recognized that community health workers had played a critical role in bringing Ebola under control. We won't be able to stop modern plagues without rural, frontline health workers.

### **Power to Improve General Health**

The impact of Ebola was far reaching. Facility-based delivery dropped by 300 percent during the crisis. It didn't have to happen this way. Women didn't go to clinics to deliver because they feared becoming infected with Ebola. But in areas with well-trained, equipped and paid community health workers, facility-based delivery dropped a mere 3 percent. Community health workers didn't miss a single dose of treatment for children with malaria or pneumonia. Investment in health systems that reach the most remote villages will not only reduce the risk of modern plagues, but also extend access to primary care for all.

The government of Liberia has launched a national plan to recruit and deploy more than 4,000 professionalized community health workers to rebuild the human infrastructure across the country. This is historic; not only will it help stop the next Ebola outbreak, but it will also extend much needed health care to every remote corner of Liberia.

## **Return on Investment**

Investment in health care is not a loss to the economy. According to a recent report by the United Nations, World Bank and others, the return on investment for professionalized community health workers can be as high as 10-to-1 due to increased productivity, job creation and a reduced risk of epidemics. Approximately 750,000 health workers are needed in Sub-Saharan Africa; they would cost \$2.2 billion and see a return of \$22 billion annually.

Five hundred local health workers lost their lives to Ebola during this crisis. The power of these local health workers is not only to fight modern plagues but also to bring health care to the furthest reaches of the planet. They have taught us that we are not defined by the epidemics and crises that strike our lives, but by how we respond to them.

A health worker for everyone everywhere will be critical to stopping pandemics like Ebola and addressing the everyday crisis of premature death.

## **SPEAKER**

**Raj Panjabi**, CEO, Last Mile Health; Associate Physician, Division of Global Health Equity, Harvard Medical School and Brigham and Women's Hospital



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