PART I: RESULTS ACHIEVED

The government of Liberia, WFP and WorldBank deliver rice, cereal and USAID vegetable oil to an Ebola-quarantined household in Monrovia. The 7 people living in the house had been quarantined since March 1 were medically monitored for 21 days and received psycho social counselling. Photo: World Bank/Dominic Chavez

PHASE ONE: TAKING THE HEAT OUT OF THE OUTBREAK

At the height of the outbreak between August and October 2014, hundreds of people were getting sick and dying each week. Until this time, national and international partners, including frontline non-governmental actors, particularly Médecins Sans Frontières (MSF), members of the UN country teams and the UN Mission in Liberia (UNMIL), had been active on the ground in responding to the outbreak, but the growth in transmission continued to outpace response capacity. Significantly more financial resources, trained medical personnel and clinical capacities were needed to rise to the challenge.

On 29 August 2014, the Presidents of Guinea, Liberia and Sierra Leone jointly wrote to the Secretary-General, requesting a UN resolution on a comprehensive response to the Ebola outbreak and calling for the United Nations to take the lead in coordinating the international response. In response to this letter, and with the unwavering support of the General Assembly, on 17 September, the Secretary-General informed the General Assembly of his intent to establish the United Nations Mission for Ebola Emergency Response (UNMEER), which deployed to the region ten days later with the objective of supporting the scaling up of the UN system in response to this unprecedented outbreak.

Usually, the effective response to an Ebola outbreak is to identify sick people, isolate them, offer care and treatment, then trace and follow people with whom they are in contact and ensure they are treated immediately if they show signs of infection. But at the height of this outbreak the intensity of transmission was so great that the conventional control approach had to be complemented with additional measures.

Reducing transmission meant stopping people with the disease from infecting others—when they are alive or (if they do not survive) when they died. This means that people with symptoms of Ebola have to be helped quickly to move away from their families, out of their communities and into safe places where they can receive the investigation and treatment they need with a view to achieving the best possible cure rate. If they die they must be buried in ways that minimise the likelihood that others will be infected.

Many people in the affected countries were initially confused and frightened by this new danger in their midst. They doubted that the illness was caused by an infection spread through contact with people—especially through bodily fluids. Those involved in the response had to do more than provide basic messages on how people could avoid infection. Responders had to understand how people in different communities behaved when they were sick and how they treated their dead. They had to build trusting relationships with people and encourage them to change long-held traditions around burial practices which were implemented with care by surviving relatives to ensure that the spirits within those who die were treated respectfully. So within the response there was an emphasis on the safe conduct of burials, in a dignified and respectful manner, and in ways that religious leaders and relatives could accept. In practice, most communities did change practices quite quickly, though some were—and still are—reticent about doing so.

Andrew Koroma and Mohamed Conteh (Sierra Leone)

On a bright, hot day, Andrew Koroma and Mohamed Conteh walk through Freetown's congested Rokupa community, armed with a megaphone, posters and flyers. This small team of social mobilizers is here because one particular community is currently under its second 21-day quarantine after recording an Ebola death.

"This community is one of the worst cases," says Mr. Koroma. "We have around 28 quarantined homes, 30 survivors, 20 deaths and 5 who are in treatment centres. Mr. Koroma and Mr. Conteh are among 788 'hotspot busters' in Sierra Leone. Hotspot busters deploy rapidly to communities that are considered hotspots of the epidemic, as part of an immediate response to an outbreak. Members of the community themselves, hotspot busters are trained to intensify social mobilization activities and increase engagement of communities to stop the spread of Ebola. They conduct one-on-one sensitization sessions, house-to-house visits and public awareness-raising.

To ensure that the hotspot is covered, the social mobilizers activate youth, women and volunteer networks in each community and reach approximately 9,000 households every week. They are involved in active community surveillance and are approached by community members to call the 117 Ebola hotline to refer sick loved ones to a hospital.

Since the initiative began, hotspot busters have carried out social mobilization in more than 344 hotspot communities nationwide. Some 275,103 households have been reached on their house-to-house visits.

[Adapted from: Social mobilizers empower 'hotspot' communities to fight Ebola in Sierra Leone, January 2015 http://www.unicef.org/emergencies/ebola/75941_78953.html]

THE THREE B'S

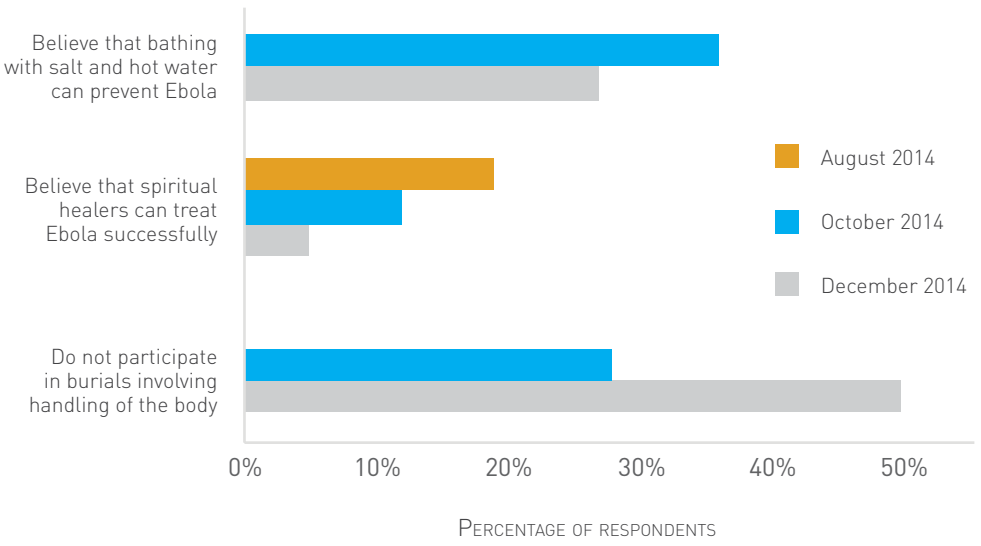
The classic approach to managing an Ebola outbreak was followed until August 2014 when the spread of disease was outstripping the response. The additional response measures focused on "the three B's": behaviour, beds and burials. **Behaviour** had to adapt and change across communities. Safe and staffed **beds** had to be provided for the sick. Given that corpses are highly infectious, **burials** of those who died from Ebola needed to be safe, acceptable within the context of local customs, and dignified.

An unprecedented range of actors—from Presidents to Non-Governmental Organisations

(NGOs)—used multiple techniques in their attempts to build trust and persuade people that Ebola was real and to encourage safer behaviours. As communities and their leaders saw sickness in their community and began to believe that Ebola was a disease that both existed and could be prevented, people were more willing to change behavior when they realized that Ebola-specific treatment facilities were more widely accessible. They were even more likely to change when they were able to get treatment—and to appreciate that early treatment greatly increased the likelihood of survival. UNMEER and WHO proposed that by 1 December 2015, 60 days after UNMEER was deployed, 70% of people with Ebola would receive treatment and 70% of those who died would be afforded safe and dignified burials.

More and more people have learnt how Ebola spread, how to avoid it and how to react at the first signs of possible infection (see Figure 1).

Figure 1. Changes in knowledge, attitudes, and practices Sierra Leone[2]



Beds were an essential complementary investment to behaviour change. For family members to agree to isolate a sick person, they needed confidence that their relative would be adequately cared for. They needed to know where the relative was and be informed of their wellbeing. Care needed to be effective—so that survival rates were high; and safe—so that Ebola would not be transmitted to health workers. And the beds needed to be in appropriate locations, rural or urban, in line with the progression of the outbreak. A network of services and infrastructure was also required. Once communities accepted the facts of Ebola, they needed to be able to quickly notify health facilities that someone was sick. Without easy access to telephones, no functioning emergency services, no diagnostic laboratories and a natural resistance to isolating sick people, none of this was easy.

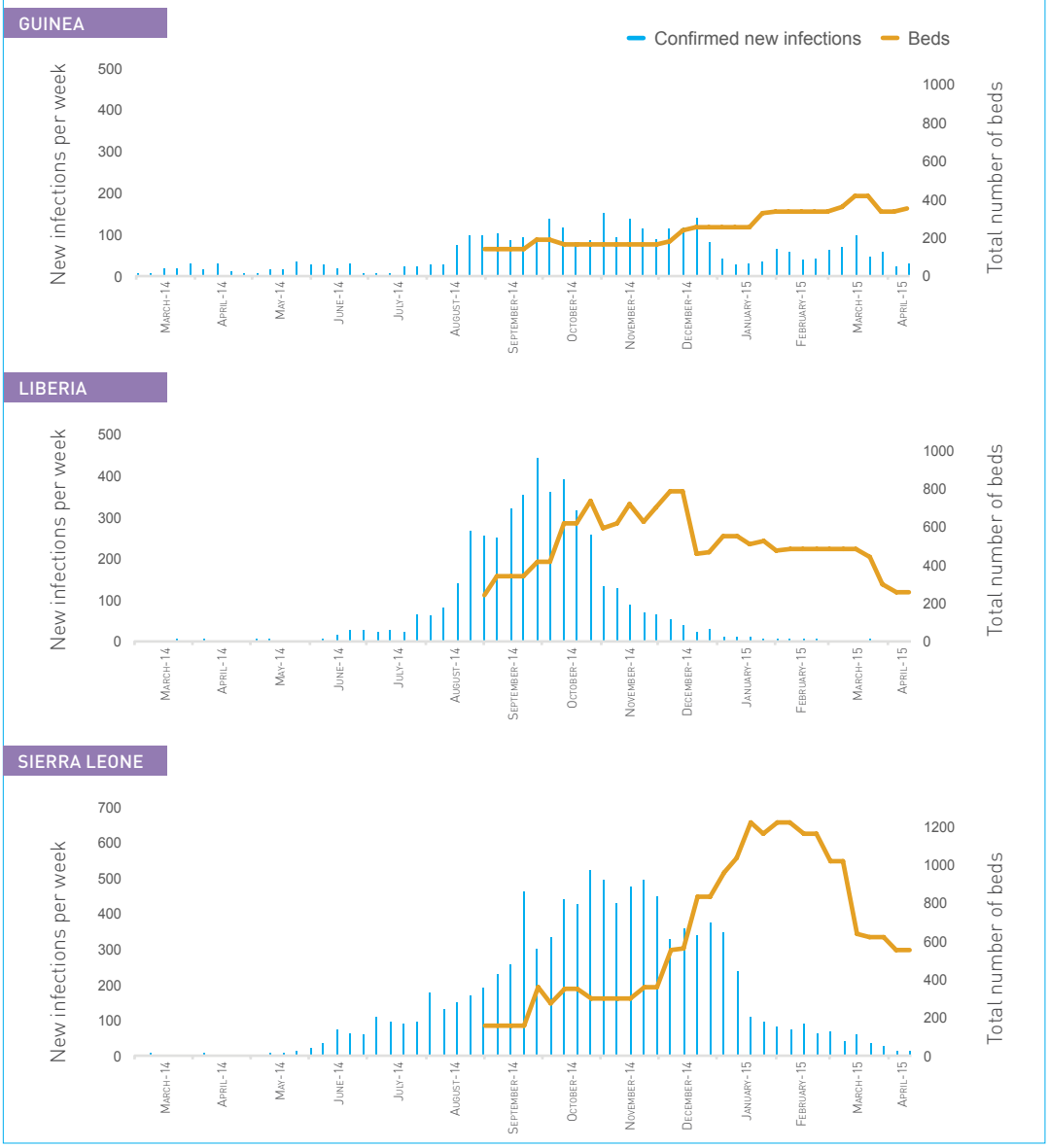
Building sufficient beds where care could be provided safely was key to encouraging people to come forward if they were sick. In Sierra Leone, *"There was a really important moment*

2 Highlights of Sierra Leone KAP Studies. Presentation by UNICEF, March 2015.

in December where for the first time really in the whole course of the outbreak, we had enough beds to get every patient … safely isolated and that didn't just mean they got good care, it meant we could protect their families at home from being exposed."[3]

In late August 2014, there were just over 500 beds available in Guinea, Liberia and Sierra Leone in eight public sector Ebola Treatment Units (ETUs)—five run by MSF and three by the Ministries of Health with WHO support, plus a private sector ETU run by Firestone Liberia, Inc.[4] The number of ETU beds rose to more than 1,500 at the beginning of December 2014 and peaked at 2,044 in the week of 8 February 2015, with 49 operational ETUs (see Figure 2).

Figure 2. Total number of beds in Ebola Treatment Units and number of new infections per week[5]



3 Dr. Oliver Johnson, Kings College, https://soundcloud.com/isurvivedebola/bbc-world-have-your-say from 27.01 minutes.
4 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6342a6.htm.
5 Based on data from WHO.

But the scale up and staffing of beds was still unable to keep up with the rapidly increasing number of people with Ebola. Patients often had to be moved long distances to treatment centres in order to receive care. Faced with unchecked and highly mobile transmission in October 2014, communities started to construct local Community Care Centres (CCCs) where people who were sick could stay near their families. They were helped to do this by local and national Governments, NGOs and the United Nations. The total number of beds in CCCs increased from 60 in mid-November 2014 to more than 1,500 in approximately 63 CCCs in early March 2015.[6] In Liberia, home hygiene kits, containing chlorine, soap and protective gear, were distributed from September 2014, to reduce risk associated with the increasing number of people who were sick with Ebola in communities.

In addition to more beds, there was a need to accelerate the delivery of Ebola test results so that healthy people could be sent home faster, people who were sick could be treated more quickly and survivors could be discharged earlier. This involved establishing systems for handling samples (ensuring that they were safely collected and quickly transported to laboratories, labelled accurately and indelibly), as well as the establishing and managing of laboratories (reliable electricity, supply systems and staff) and efficient reporting of results (communicated promptly back to the health facility from which they came).

The International Organization for Migration (IOM) set up a mobile clinic to provide basic healthcare services to the population of about 1400 people in Gbaigbon and neighboring communities in Bomi County, Liberia, who would otherwise be unable to reach a healthcare facility. A team of one doctor, three nurses, and two ambulance drivers, who helped in screening the patients, treated close to 100 persons on the site, with some more severe cases being provided first aid and then taken to Bomi Hospital. Dr. Nisar Ul Khak, Medical Coordinator for the IOM Ebola treatment unit in Tubmanburg, said "UNMEER helps in coordinating the agencies and NGO's who are willing to support the mobile clinic." Gbaigbon, Bomi County, Liberia, on 24 March 2015. Photo: UNMEER/Simon Ruf

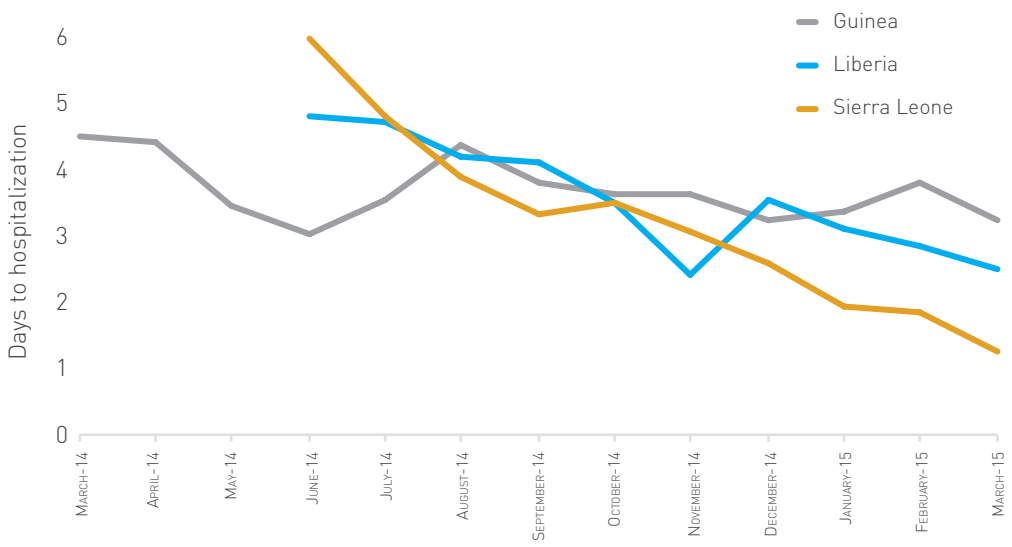
WHO reported that in October 2014 in Liberia, *"health workers had to wait 2 to 5 days to have a preliminary Ebola diagnosis confirmed by sending blood samples to another lab facility in Monrovia."* Between late August 2014 and mid-January 2015, sixteen new laboratories were constructed, taking the total in the three countries from 11 to 27. By January, it took an average of 0.7 days in Guinea, 0.5 days in Liberia, and 0.8 days in Sierra Leone from collection of a patient sample to communicating the test result to a national Ministry of Health.[7]

As the knowledge in communities about the virus grew and people could see the Ebola response system was working, people started reporting their symptoms earlier. Over the

6 WHO Ebola Situation Report, 19 November 2014, and data obtained from WHO.
7 WHO Ebola Situation Report, 28 January 2015.

course of the outbreak, the average time from the onset of symptoms to hospitalization has decreased. For the three countries taken together, that time went down from 4.4 days in June 2014 to 3 days in December 2014 and then to 2.3 days in March 2015 (see Figure 3).

Figure 3. Average time from onset of symptoms to hospitalization[8]



When the Governments of Guinea, Liberia and Sierra Leone decided to provide a safe and dignified burial for everyone who died there was a need to expand the availability of burial teams. Efforts to persuade families to report a dead body or to stop ceremonial body-washing were quickly undermined if the burial teams took too long to arrive or treated the body without the proper sensitivity and respect. Each burial team needed vehicles, fuel, personal protective equipment and disinfectants. Team members needed to coordinate with the swab collectors (who collected samples from those who died to undertake post-mortem checks for Ebola), with laboratories, contact tracers, quarantine teams, home decontaminators and people who provided food to quarantined homes. Graves must be marked and family members needed to know their locations.

In August and September 2014, the numbers of people dying as a result of the outbreak were too many given the limited capacities of burial teams. Burials could not be carried out quickly enough and bodies were left in the streets. In August 2014, the President of Liberia took the decision to introduce cremation. *"Cremation is not our culture. It was due to necessity that we had to cremate people, but it worked very well,"* said Tolbert Nyenswah, head of the Government's Ebola task force. Cremation was so far from traditional practice that, in March 2015, its impact was still being felt. In advance of "Decoration Day" when family members honour the dead, the ashes of 3,000 people who had been cremated were transferred from Monrovia's crematorium and reinterred at an Ebola safe burial site. Traditional leaders asked for forgiveness from the ancestors.[9]

8 Based on data from WHO.
9 http://www.globalcommunities.org/node/38066.

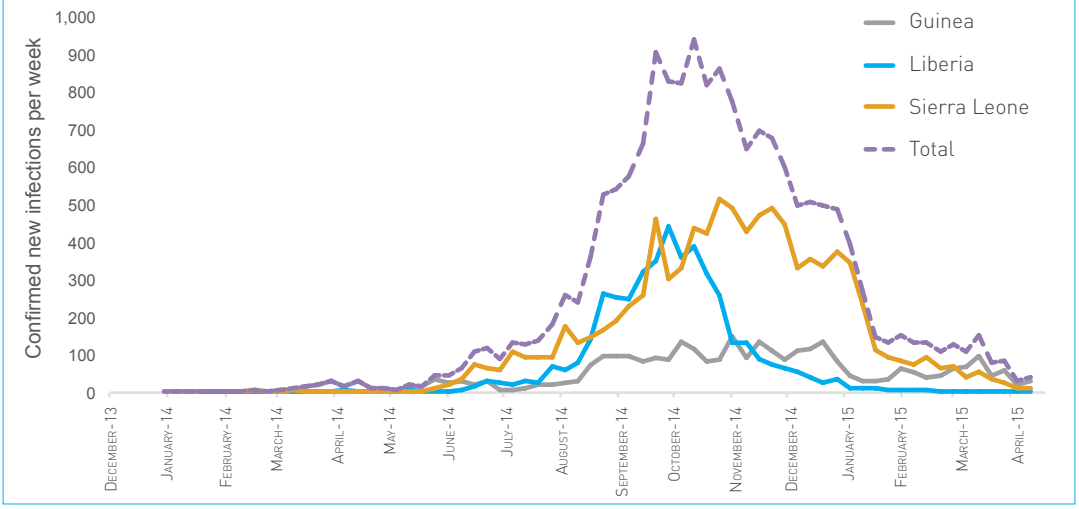
The deployment of burial teams and the active engagement of communities in ensuring that burials are safe have led to a reduction in unsafe burials. For the three most affected countries, the number of burial teams went up from 140 in October 2014 to 243 in December and to 283 in March 2015. Their work generated demonstrable results. At their peak, in the week to 8 February 2015, 84 unsafe burials were reported. By March 2015, the weekly number had fallen to around 20.

The outstanding efforts of the affected countries, communities and people, with the support of the international community, and the targeted action on behaviour, beds, and burials yielded results: the epidemic curve of "new infections per week" started to plateau and then decline in Liberia during September, and some weeks later in Sierra Leone. The projections of 1.4 million people with Ebola in Liberia and Sierra Leone by mid-January 2015[10] were avoided. By the week to 18 January, the weekly number of people newly infected had been reduced to 146 - 15% of what it had been in September. Progress was now clearly visible (see Figure 4) and the outbreak had begun to cool down.

PHASE TWO: GETTING TO ZERO

In places where Ebola incidence had declined, the response entered its second phase. Emphasis was shifted from the three B's to the three C's: **community ownership**, **case finding** and **contact tracing**. The second phase could be applied because the quality of local-level information on the outbreak and response had improved greatly by the end of 2014. A greater emphasis was placed on the district-level, and responders increasingly focused their attention and assets at local level, working closely with local officials and community leaders. As more epidemiologists and anthropologists were recruited and deployed, information systems improved, more granular data became available, and the epidemiological information was more easily interpreted. This brought a better understanding of how the virus spread and where to concentrate efforts and resources: it meant that the response could be better matched to local conditions.

Figure 4. Number of new confirmed infections per week[11]



10 "Estimating the Future Number of Cases in the Ebola Epidemic—Liberia and Sierra Leone, 2014–2015", Morbidity and Mortality Weekly Report, 26 September 2014 (Martin Meltzer, et. al.).
11 Based on data from WHO.

THE THREE C'S

The involvement of communities and their ownership of the response has been fundamental to all aspects of the effort to end the outbreak. Social mobilization teams—often working with direct support from national presidents—have engaged in dialogue directly with people as well as with their religious, traditional, and political leaders. They have involved the communities themselves in the promotion of behaviours that reduce risks of infection and help prevent the spread of the disease. Where messages have been adapted to the local context, are respectful of local customs, and are owned by the people themselves, efforts to encourage behaviour change have been more successful. Efforts to encourage community ownership are increasingly being guided by skilled anthropologists.

But even when attempts were made to engage communities some groups have not welcomed teams of responders. In late November 2014, a safe-and-dignified burial team from the Red Cross was attacked in Conakry, Guinea. *"The team was forced to retrieve a buried body, and their vehicle was destroyed".* [12] This was – unfortunately – not an isolated incident. But as demonstrated by a survey in Liberia in February 2015, burial practices can be adapted, *"Way back when someone dies, there is a culture, you bathe the body, sit down near the body, sometimes the body sleep with us... But now whenever someone dies, spray the body, carry the body, put it in bag, all that one. We are feeling bad about what is happening but we just have to adjust to the situation".* [13]

Augustine Turay and Abdul Rahman Parker

As a volunteer with the Sierra Leone Red Cross Society, Augustine Turay goes to four or five houses daily in communities around Freetown to collect the bodies of people who may have died of Ebola and to conduct safe and dignified burials. Once the teams collect the bodies, they bring them to Abdul Rahman Parker, Manager of the King Tom Cemetery in Freetown. In January 2015, numbers varied but the cemetery could bury 70 people a day. For Parker, the hardest part of the job is the stigma that comes with it: "as long as you work for the Ebola team, people stigmatize you - your friends, your family, your wife."

But despite the risks and stigma, both Parker and Turay continue to carry out the essential task of safe and dignified burials of Ebola victims. "You just have to take your inner power, your inner strength to just keep you going," says Parker, adding that burial teams "are saving our nation." "I know it's very dangerous but we do it because we want to help our country and we love our society as well," adds Turay.

[Adapted from the "It's my community. It's my country." 21 January 2015, UNMEER, https://ebolaresponse.un.org]

As confidence between people and responders improved, attitudes and practices changed. Community ownership of the response led to people with symptoms of Ebola receiving treatment more rapidly and moving out of their communities before they infected others (see figure 3). It led to greater acceptance of safe burials and contact tracing, and more widespread adoption of hand washing and other hygienic practices.

Alongside more accessible information on the state of the outbreak at district level, better understanding of local culture has been key to success in phase two. Well-planned and executed procedures for community engagement have reduced the extent of denial and built the trust necessary to ensure people's participation in the response. More than 30 anthropologists have been directly involved in the response. They have demonstrated the importance of engaging with communities on their terms, using traditional approaches when outsiders

12 IFRC Real Time Evaluation: http://reliefweb.int/sites/reliefweb.int/files/resources/Links%20to%20all%20documents%20-%20Ebola%20RTE_0.pdf.
13 National KAP Study on Ebola (Liberia), Male adult, Grand Cape Mount, Liberia.

wish to meet with them, and ensuring that explanations are both understandable and in the right language.

Private sector companies also helped to engage communities providing information directly to employees. Up to 50,000 people received information in this way through the 55-company Ebola Private Sector Mobilization Group (EPSMG). Widespread community engagement has led to reductions in the instances where communities have resisted being part of the response in all three countries. In Guinea, the proportion of locations reporting resistance went down from almost 80% during several weeks in January, to 12% for most weeks in March. The work is ongoing: in April, two four-day emergency campaigns were organized in Forécariah and Coyah. UN partners and UNICEF organized community and health workers into over 1,100 teams that made door-to-door visits to 120,000 households and 2,209 educational talks and over 13,000 awareness sessions were held in the same period. They were supported by rural radio stations that continued to broadcast messages - delivered by local leaders - about health and hygiene in the context of Ebola.[14]

The full engagement of people and their communities is a pre-requisite for successful **case finding**. Case finders start out from places where people gather, and then go house-to-house (on the basis of information received) to seek out any people with symptoms or to follow up on reports of deaths. If sick people are found, the families are encouraged to seek health assistance.

Alphonso Kanboh

"I've been a teacher for 22 years, and people around here trust me, so when I and my colleagues approach them telling them how to prevent being infected by Ebola, they are more likely to listen." Alphonso Kanboh is one of 11,000 teachers and principals from across Liberia trained by the country's Ministry of Education and UNICEF. He volunteered to undertake the training and then go from door-to-door to raise awareness on how communities can protect themselves and prevent the transmission of Ebola.

A teacher at the community school in Paynesville, Kanboh is at the heart of community outreach and his message is simple: "Ebola is still very much real here in our town. So you have to keep washing your hands before you eat. Don't touch sick people. Call the number on the poster if anyone in your family becomes sick." He also educates communities about signs and symptoms and about measures to prevent getting infected. "My whole life is about teaching the next generation," says Kanboh. But while he waits to re-enter the classroom, he is bringing education on Ebola to the community level and helping to defeat the outbreak.

[Adapted from "A teacher's turf: Community outreach in the fight against Ebola", 5 December 2014, UNICEF, www.unicef.org]

Case finding and surveillance need particular attention at national boundaries to ensure that people are not lost when they cross them: *"As we continue to fight Ebola, the focus is on proactive screening, surveillance and active case finding. To avoid infection and the possible spread from one county to another the checkpoints are an important element,"* explains Eric Peti, the Outreach Team Coordinator at an ETU managed by the International Organization for Migration (IOM) in Tubmanburg, Liberia.

To end the outbreak and "get to zero" it is critical to trace everyone who has been in direct contact with a person who has Ebola. Tracing contacts and monitoring their health ensures that those who get sick can be identified immediately. They can then be isolated and treated earlier, and each chain of transmission can be stopped. People will only come forward as a contact if they are not afraid of the consequences. They need reassurance that they can access effective treatment if they do turn out to have Ebola. They need to know that if their house

14 UNICEF Situation Report for Guinea, 15, 22 and 29 April 2015.

gets quarantined, they won't be stigmatized and that food, water and fuel will be provided. Governments and their partners seek to ensure that quarantined homes receive the food they need: much of this was provided by the UN World Food Programme.

The number of contact tracers has increased considerably over the course of the outbreak and they are now better linked to other parts of the response, including through use of information technology, global positioning systems and communications equipment such as tablet computers and smart phones. At the peak of the outbreak, UNFPA mobilized around 8,000 contact tracers in the three countries with 5,000 in Sierra Leone alone, which helps lay the ground for future regional disease surveillance systems.

A key indicator of success in contact tracing is an increase in the proportion of people newly diagnosed with Ebola who are already identified as contacts of people known to have the disease. Although that proportion has fluctuated since the start of 2015, the overall trend is positive in each affected country (see Figure 5).

Guiba Kondé

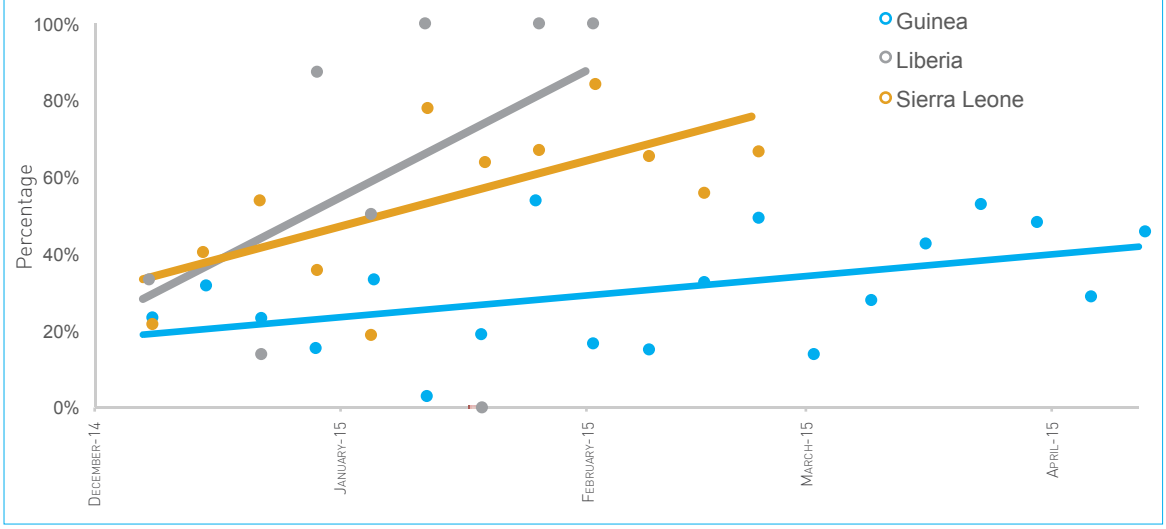
Guiba Kondé is part of the IOM border surveillance team in the isolated post of Nougani, Mali. With his colleagues, he registers the passage of all travellers from bordering Guinea, collects data such as vehicle number, nationality, age, telephone number, and origin and destination. These are validated at corresponding checkpoints on either side of the border. If any of the information does not match, the travellers are immediately turned back.

But Kondé says that one of the most important parts of his job is outreach: "We find that many of the travellers don't know about the risks of Ebola or how to stay safe. They tell us that the information we give them is really helpful." He teaches proper hand washing hygiene and explains the risks of transmission of Ebola. He also takes travellers' temperatures before allowing them to proceed.

With around 500 people transiting every day at Nougani "Flow Monitoring Point", Kondé says: "When you're here, like me, every day, and you see just how many people cross the borders every day – it never stops – you understand the risks."

[Adapted from the "Guinea-Mali Border Surveillance Stepped Up in Fight Against Ebola", 8 February 2015, UNMEER, https://ebolaresponse.un.org]

Figure 5. Proportion of new weekly infections arising from registered contacts (with trend-lines)[15]



15 Based on data from WHO.

Mohammad Bailor Jalloh

"Community engagement is the cornerstone of any public intervention. Ebola started in the community and it will end in the community." It's with that conviction, and through the NGO he founded in 2012, that Mohammad Bailor Jalloh entered the fight against Ebola in Sierra Leone.

In August 2014, the NGO, FOCUS 1000, conducted the first Knowledge, Attitudes and Practices (KAP) study on Ebola in Sierra Leone, in partnership with the United Nations Children's Fund (UNICEF) and in collaboration with Catholic Relief Services (CRS), the Centres for Disease Prevention and Control (CDC), and the Ministry of Health and Sanitation. Since then, two more studies were published and a fourth one is on its way. The aim was to capture the knowledge, perception and behaviours of the public to Ebola so that the Government and partners could offer the most adapted and targeted response.

That's also how FOCUS 1000 specifically decided to engage religious leaders in the Ebola response. "The KAP showed that apart from radio, religious leaders were the most popular and effective source of information," says Jalloh. "Religious leaders are usually trusted in their communities and people turn to them for advice especially in times of social calamities."

Among other actions, the NGO assisted religious leaders to search for scriptural evidence from both the Quran and Bible to support the public messages being promoted to prevent Ebola transmission. It also trained 50 senior religious leaders who in turn trained more than 5,000 imams, pastors, women and youth leaders in some 4,000 mosques and churches across the country.

Jalloh says that "religious leaders have contributed immensely in helping to dispel rumours and misconceptions, addressing stigma and changing traditional beliefs and practices." "Behaviour change goes beyond the message," he adds, "it calls for a trusted messenger that can deliver accurate messages in a manner the people can understand and accept. And to sustain the behaviour change, you need to create the enabling and supporting environment – which is what we have done with the engagement of religious leaders. "

Another important indicator of success in contact tracing is a reduction in the number of people who have died in their communities and who are confirmed, after death, to have suffered from Ebola. This is made possible through the analysis of samples taken at the time of death. In 2015 there was encouraging progress: across the three countries this number fell from 273 in February to 98 in March.

There have been several groups—local and national Government, faith groups, civil society and international responders—involved in community engagement, case finding and contact tracing at district, county and prefecture level in each country. Coordinators at local levels have sought to ensure the sensitive application of standard procedures and effective follow-up in case any gaps in the response are detected. The closer to the end of the outbreak, the more important it is that these systems function correctly.

People who survive Ebola need support as they seek to maintain their physical and mental health and their livelihoods. A high proportion of the survivors report that they experience emotional distress and physical health problems, and many have lost family members—and even their caregivers—to the disease. Numerous survivors report that they struggle to

regain their livelihoods: they lost possessions when they were undergoing treatment and face stigmatization from their communities. Programmes to support survivors were already initiated in the first phase of the response. For example, in December 2014, the Ministry of Social Welfare, Gender and Children's Affairs in Sierra Leone, with support from international partners, arranged special conferences for more than 400 Ebola survivors.[16] Survivors received psychosocial support and survivors' kits, which included household items and a resettlement allowance. By May 2015, several more survivor organizations had become established in all three countries and many survivors have become active in the response themselves.

ESSENTIAL SERVICES AND PREPAREDNESS

The three B's and the three C's are the public health "lines of action" that reduce the transmission of the Ebola virus. Alongside this, it has been critical (a) to sustain and restore services that are essential for ensuring the security of people's livelihoods and (b) to improve the preparedness of unaffected communities and countries to prevent the further spread of Ebola – within countries and across the region.

Governments were concerned that both the Ebola outbreak and measures taken to control it (especially restrictions on people's movements) would impair people's ability to meet their basic needs. They sought to maintain **essential public services**. Vulnerability assessments and efforts to safeguard people's access to food has been a key feature of the response. Targeted food assistance is essential when communities are quarantined and to ensure the well-being of people receiving medical treatment. Individuals and families that have survived Ebola, as well as families that have lost an income-earner (especially orphans) need continuous support to ensure they can access the nutritious food they need, and avoid the risk of malnutrition. The WFP and many partner NGOs have come together to support local and national authorities with a view to ensuring people's food and nutrition security. As of the end of February, WFP and its partners had provided food assistance to about 2.5 million beneficiaries in Guinea, Liberia and Sierra Leone.[17]

Concerted efforts have been made to mitigate the effects of school closures and the reduced use of health facilities. "School in a radio" was used across the affected countries to broadcast the key elements of the curriculum in a child-friendly way. Solar-powered radios, designed to be used without electricity or batteries, have been distributed to increase the number of listeners in Liberia.[18] Since the beginning of the year, schools have reopened safely in all three countries after intensive teacher training and provision of supplies by UNICEF and education partners, allowing for the return of 2.1 million children in Guinea from 19 January, 1.35 million in Liberia from 16 February and 1.8 million in Sierra Leone from 14 April. Fees for government schools have been waived in Sierra Leone and for certain categories of students in Liberia. And in Guinea, WFP expanded its school-feeding programme to encourage attendance: by March 2015, 88% of the 2013/2014 primary school classes were back at school.

As both schools and regular health services are re-opening, careful decontamination of facilities that were used to treat patients with Ebola is underway and enhanced measures to improve sanitation and hygiene—such as the distribution of sanitation kits and the installation of water distribution points—are being introduced.

16 http://www.unicef.org/media/media_78207.html.
17 WFP West Africa Ebola Response. Situation Report #27, 10 April 2015.
18 http://www.lr.undp.org/content/liberia/en/home/presscenter/articles/2014/12/18/bringing-information-to-new-georgia-undp-donates-solar-powered-radios/.

During the outbreak, the use of health services was significantly reduced. For example, in Guinea use of health services was reduced by over 50% from 2013 to 2014 and in November 2014, 94 health facilities (or 6%) were closed because of absence or death of healthcare personnel. Assisted deliveries were down by about 20% in Guinea and the number of DPT3 vaccinations administered fell by 30% between 2013 and 2014. As part of reopening health services, immunization campaigns have been organized in all three countries.

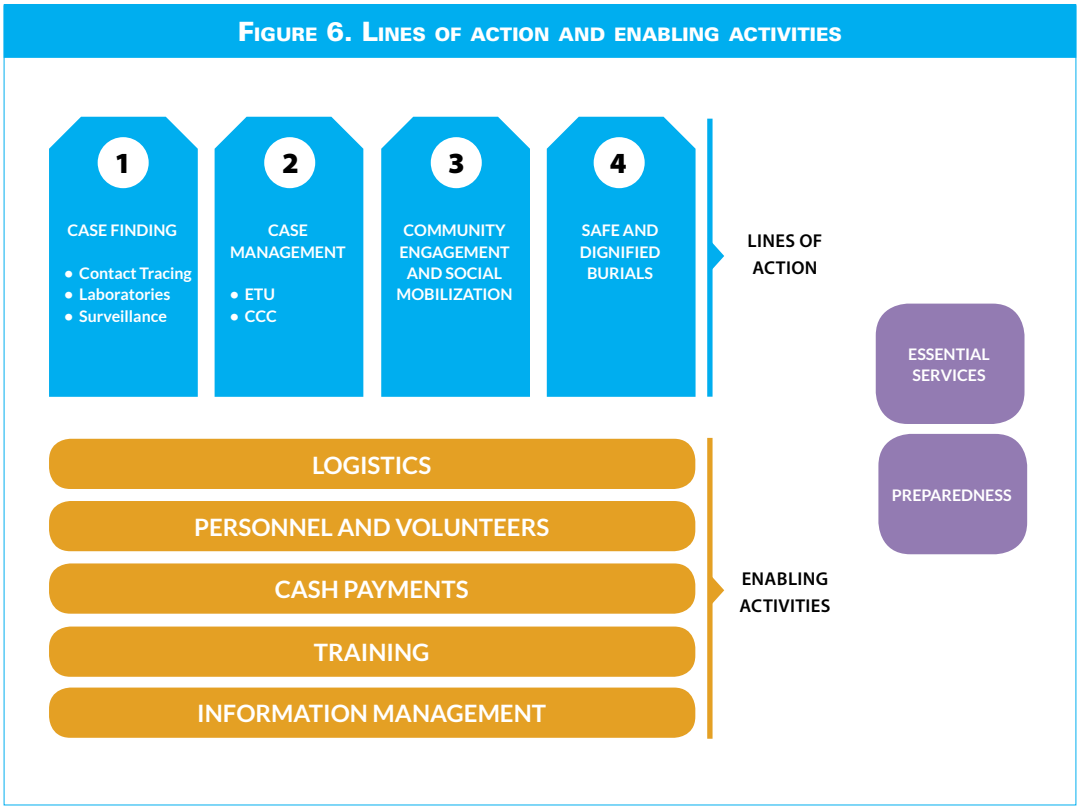
Of the 17,000 orphaned children, 8,000 have now benefited from cash transfers in Guinea and Liberia and a new initiative of cash transfers has been launched by UNICEF with the Ministry of Social Welfare, Gender and Children Affairs and the World Bank in Sierra Leone.

Efforts have been made to strengthen **preparedness** capacities both within the three most affected countries and for other countries in the region. Over the course of the current outbreak, the level of preparedness has improved in a range of areas from coordination to epidemiological surveillance and from budgetary planning to laboratory capacity. The lessons from simulation exercises have proved to be the optimal means for improving preparedness. With strengthened capacities, countries will be increasingly well prepared and better positioned to combat future outbreaks.

ENABLING ACTIVITIES

The Operational Planning Conference in Accra in mid-October 2014 played a significant role in helping the UN system and partners to maximize their contributions to a scaled-up response. At this event the priority lines of action were clarified. Essential enabling activities were identified. And the roles and responsibilities of the different actors were agreed (see Figure 6).

Figure 6. Lines of action and enabling activities



Vaccines and Therapies

There are as yet no vaccines to protect against Ebola licensed for use in humans but four vaccine candidates have been shown to be safe and efficacious in animals. They are currently at various stages of evaluation in humans.

The two most advanced are the ChAd3-ZEBOV vaccine, developed by GlaxoSmithKline in collaboration with the US National Institute of Allergy and Infectious Diseases, and the rVSV-ZEBOV vaccine, developed initially by the Public Health Agency of Canada and now licensed to NewLink Genetics (which collaborates with Merck Sharp & Dohme to register vaccines). After successful Phase 1 clinical trials conducted in various countries in North America, Europe and Africa, Phase 3 evaluation of these two advanced Ebola vaccine candidates started in the Ebola-affected countries in February 2015. The objective of these trials is to assess whether the vaccines protect against Ebola and to further document safety.

The first Phase 3 trial (PREVAIL) is a randomized controlled trial which is comparing the two vaccine candidates with an inactive placebo. It is being conducted jointly by the Liberian Government and US-NIH. While the initial stages of the trial have now been completed, successful control of Ebola virus disease in Liberia means that this trial will not be able to reach its objective of demonstrating efficacy of the vaccines, and investigators are exploring a possible extension of the PREVAIL trial to Guinea.

The Phase 3 trial (STRIVE) in Sierra Leone has a modified stepped-wedge design to test the rVSV-ZEBOV vaccine in health care workers. It is conducted in collaboration between the national Government and US-CDC and was initiated in April 2015.

The Guinean Phase 3 trial is conducted by an international collaboration including notably the Guinean Government, Norway, Canada, MSF and WHO. Started in early March 2015, the trial intends to test the efficacy of the rVSV-ZEBOV vaccine first, followed by the ChAd3-ZEBOV vaccine, through using a strategy called "ring vaccination". For this Phase 3 clinical trial, as well as for the STRIVE trial in Sierra Leone, success in demonstrating efficacy of an Ebola vaccine candidate will be largely dependent on whether there will be enough cases of Ebola in the coming weeks.

Two additional vaccines have now reached Phase 1 clinical trials in humans: a prime-boost regimen of Ad26- and MVA-EBOV developed by Johnson & Johnson and a recombinant particle made of EBOV glycoprotein produced in tobacco plants, developed by the biotech company Novavax.

Introduction of an Ebola vaccine in populations of affected countries will depend on the results of the clinical trials and review by regulatory authorities of vaccine safety and efficacy, and on the evolution of the epidemic.

Other treatments and therapies being evaluated currently in Ebola-infected patients in Sierra Leone and Guinea include transfusion of convalescent plasma donated by patients who have recovered, a cocktail of monoclonal antibodies produced in plants (ZMapp; BioLeaf TM), an siRNA produced by the company Tekmira and an antiviral drug (favipiravir; FujiFilm). Both ZMapp and siRNA have demonstrated efficacy against Ebola virus in test tubes (in vitro) as well as in monkeys infected with Ebola.

Progress was also made in the development of new diagnostic tools which allow quicker screening of suspected cases of Ebola virus disease and can be used in the field.

WHO, with World Bank funding, is working with all relevant stakeholders on each of the potential therapies, vaccines and diagnostics to continue to accelerate identification, verification, development and, if safety and efficacy are found, deployment. Final decisions on introduction are made by the Ministries of Health in the affected countries.

During this conference it was evident that multiple organizations—with a variety of professional and organisational cultures—were engaging in the response. They were involved in an extremely complex and unpredictable exercise. The Governments of each country sought to ensure that responders were enabled to be fully effective: with the support of UN entities, donor organisations, NGOs, businesses and external militaries they have been implementing *enabling actions*. Taken together, these constituted the operational support platforms that underpin the entire response: over time they have become increasingly organized and predictable. Through the support platforms, people and goods are transported; logistics and supply systems function; personnel are recruited, deployed, trained and supported (in ways that help them avoid infection); bona fide responders receive the payment to which they are entitled in remote places where there are no banks; and systems are established for managing information. Examples of these enabling actions follow:

Logistics

Many groups contributed to the transport of supplies into and within the region by air, sea and road. Through the UN's air operation for fixed wing aircraft and helicopters, WFP and UNMEER have facilitated the transport of 64,000 m^3 of cargo since September 2014.[19] This has included essential equipment such as ambulances and mortuary pick-up trucks. In addition the UN Humanitarian Air Service has transported more than 11,000 aid workers, doctors and officials, providing improved access to the region and facilitating the movement of personnel within countries to Ebola hotspots.[20] In its largest response ever in terms of supplies delivered, UNICEF has shipped almost 8,000 metric tonnes of supplies, including Personal Protective Equipment (PPE), medicines, family hygiene kits, school kits, and vehicles.[21] Several governments, including France, Germany, the Netherlands, United Kingdom, and United States, as well as non-governmental partners and businesses also contributed air, road and sea transportation capacity.

Personnel and volunteers

International technical experts, including medical, nursing, epidemiological, anthropological, logistic and management professionals, have been deployed to assist the Governments of Guinea, Liberia and Sierra Leone. They have supported local healthcare and community workers, and helped to enrich the response.

IFRC said, *"Human Resource recruitment has been one of the biggest challenges of the Ebola response".*[22] Indeed, most partners reported challenges with deploying staff. The commonly stated reason was their concern about access to medical treatment in case they became ill. But there were substantial difficulties with recruitment, ensuring medical clearance, deployment, establishing in-country healthcare and securing medical evacuations—especially from remote field locations. This meant the expansion of the international personnel presence in the region was slower than anticipated.

Many organisations including, but not limited to, the African Union (AU), MSF, the WHO and the US CDC, as well as bilateral partner governments, the Global Outbreak Alert and Response Network (GOARN), many NGOs and the Red Cross movement have provided personnel. The GOARN contribution included the establishment of a consortium of laboratories. Several organisations contributed to Incident Management and Emergency Operations Centres.

19 WFP West Africa Ebola Response, Situation Report #27, 10 April 2015.
20 http://wfpusa.org/blog/hope-looks-plane-way.
21 UNICEF. Life-saving supplies to Ebola-affected countries.
22 IFRC Real Time Evaluation: http://reliefweb.int/sites/reliefweb.int/files/resources/Links%20to%20all%20documents%20-%20Ebola%20RTE_0.pdf.

This massive input of technical advice and operational expertise was critical in shaping the response and prioritizing the necessary activities. People with experience in working in previous Ebola outbreaks have made invaluable contributions. This was particularly the case for some volunteers from African nations (as part of the AU contribution) who had worked with Ebola and for those from CDC China who had worked on Severe Acute Respiratory Syndrome (SARS).

It has not proved easy to estimate the total number of international responders who eventually participated. As one example, by 14 April 2015, around 1,000 WHO and nearly 200 UNMEER personnel were deployed throughout the three countries, including field coordinators in sub-national offices.

The broad range of international partners from all over the world that has been involved is an extraordinary feature of the response. Many have returned for second or third tours of duty. We recognise and appreciate their individual and collective contributions!

Payments

A large and ever-changing number of national Ebola response workers needed to be paid. At times, threats of strikes or loss of morale by Ebola response workers posed a very real risk to the continuity of the response. Part of the solution has been to create innovative new

In August 2014 in Sierra Leone, members of the Health For All Coalition put up a 'Kick Back Ebola' poster in Kailahun District, to raise awareness about Ebola virus disease (EVD) and best practices to help prevent its spread. Cases of Ebola have been confirmed in the district. By 20 August, a total of 2,615 EVD cases (laboratory-confirmed, probable and suspected) and 1,427 deaths had been reported in Guinea, Liberia, Nigeria and Sierra Leone. Sierra Leone has borne 392 of these deaths. Photo: UNICEF/NYHQ2014-1380/Douglas

payment mechanisms: these have been supported by UNDP and the private sector. As of early March, 95–100% of registered Ebola workers were linked to payment mechanisms and in most payment cycles, more than 90% of the workers were paid on time. In Sierra Leone, 100% of the workers have been paid digitally since December 2014.

Training

Thousands of responders have been trained to contribute effectively to the response at the local level. WHO has provided pre-deployment training in person to more than 1,900 responders—in Geneva and in Accra, as well as online training to more than 5,000. Together with MSF, International Federation of the Red Cross and Red Crescent Societies (IFRC), Spanish, French and German Red Cross provided 762 pre-deployment trainings to international responders. More than 10,000 national Red Cross volunteers were trained in various aspects of the Ebola response. IOM and partners trained more than 4,500 frontline healthcare workers at the National Ebola Training Academy in Freetown since 1 December 2014. Across all affected countries, MSF provided advice, support and guidance as well as direct training to other organisations that were stepping up their work on Ebola.

Information management

Access to accurate real-time data is essential for an effective response to any outbreak of viral haemorrhagic fever. Both responders and affected communities need information about Ebola and how it is transmitted. In practice, getting, sharing and managing information proved to be among the biggest challenges faced at local level. To begin with, lack of connectivity—for data transfer, for mobile money transfers, or even for contact with sick family members—hampered the response. Coalitions of responders worked together to improve communications and came up with innovative responses including public-private partnerships to establish wireless hotspots that provided internet connectivity to district Ebola response centres.

John Mwikaria and Jonas Tewelde

When asked why they volunteered to come to Liberia, John Mwikaria, an emergency registered nurse, and Dr. Jonas Tewelde, a general practitioner, have a similar answer. "It is our responsibility to help our brothers here in Africa," says the first man. "The biggest driving force was to give our professional assistance to our brothers and sisters in West Africa," echoes the other.

Mwikaria, from Kenya, now works at Rennie Hospital, while Tewelde, from Ethiopia, is stationed at the Redemption Hospital. Both are part of the 835 medical personnel deployed to Guinea, Liberia and Sierra Leone under the AU Support to the Ebola Outbreak in West Africa (ASEOWA). The AU's contribution makes up the largest part of the more than 1,300 foreign medical personnel who have been deployed to the three countries, which also includes a Cuban team of 230 medical personnel.

These foreign medical workers have joined local health workers to help treat and care for patients, boost local health capacity, manage ETUs, and resume essential health services for non-Ebola conditions.

"This is one of the occasions in which the governments of Africa have shown that their solidarity, their union, can tackle any problems of the continent," says Tewelde. Mwikaria says he has been encouraged by the willingness of the local medical personnel "to serve the people despite the challenges and fear that people have…. You look at their spirit -- it's encouraging," he adds.

Their story is an example of the courage and bravery shown by several hundred international personnel who joined the response.

[Adapted from "Health Workers on Ebola Frontlines Serve Countries, Risk Own Lives", 7 April 2015, World Bank, www.worldbank.org]