## Emergencies preparedness, response

# Liberia: a country – and its capital – are overwhelmed with Ebola cases

One year into the Ebola epidemic. January 2015

**When the virus entered Monrovia, the outbreak's calm start turned into an illusion.**

WHO/P. Desloovere

CHAPTER 5 - Liberia's first two cases of Ebola, in the Foya district of Lofa county near the border with Guinea, were confirmed on 30 March 2014. On 2 April, an infected traveller from Lofa passed through Monrovia, the country's capital, but was not known to have transmitted the virus to others.

On 7 April 2014, the country reported 21 confirmed, probable, and suspected cases and 10 deaths. All five laboratory-confirmed cases died, including one in Monrovia. In a pattern that would become a striking feature of the outbreak, those numbers included three cases in health care workers, all fatal.

The situation in Liberia then stabilized throughout the rest of April and most of May, with cases still largely concentrated in Lofa county. For weeks on end, WHO's Disease Outbreak News about the Ebola situation in West Africa reported "no new confirmed cases in Liberia" or described the situation as "stable". By the end of May, Liberia had reported no new cases since 9 April.

Further cases were detected in early June, mainly in Lofa county, but the trend still looked calm, especially when compared with the situation elsewhere. At the end of June, Liberia reported 51 cases, compared with 390 in Guinea and 158 in Sierra Leone.

### Monrovia turns a calm start into an illusion

That appearance of calm turned out to be an illusion. The first additional

cases in Monrovia were reported in mid-June 2014. The city was ill-prepared to cope with the onslaught of infections that rapidly followed.

> "This morning, I went into my community, searched house to house and interviewed a few people. It is something I love to do because it will save my community."
>
> **Robbin George, student, an active Ebola case finder**

Monrovia was home to the country's only large referral hospital, the John F Kennedy Medical Center, but that facility had been heavily damaged during the civil war and never fully repaired. Frequent floods and electrical fires were hazards for patients and staff alike. Several prominent doctors working there became infected and died. By the end of September, Liberia would have the highest number of infections in health care workers – at nearly 200 – among the three countries.

No hospital anywhere in the country had an isolation ward. Few medical staff had been trained in the basic principles of infection prevention and control. Facilities had little or no personal protective equipment – not even gloves – and virtually no knowledge about how to use this equipment properly.

Under such conditions, treatment of the first hospitalized patients ignited multiple chains of transmission, among staff, patients, and visitors, in ambulance and taxi drivers who ferried the sick to care, in relatives, neighbours, and eventually entire neighbourhoods. Case numbers that had multiplied quickly began to grow exponentially.

On 6 August, President Sirleaf declared a three-month state of emergency and announced a string of new regulations, which included the closing of markets, curfews, and restrictions on the movement of patients and their contacts, to be enforced by the country's military. In her view, such restrictions were justified as the disease threatened to undermine the nation's "economic and social fabric".

In August, Liberia made the cremation of people who died from Ebola mandatory in Monrovia. That decree followed the refusal of several Monrovian neighbourhoods to allow burials near their homes, leaving hundreds of highly infectious bodies unattended.

### A WHO emergency team begins its investigation

In mid-August, a WHO team of emergency experts, working alongside staff from the Ministry of Health and other key partners, began a three-week long investigation of the situation in Liberia. That investigation revealed that an outbreak had been simmering in the country for at least several weeks before the first cases in Monrovia were detected, giving the virus a huge head-start on control measures.

All agreed that the demands of the Ebola outbreak had outstripped the government's and partners' capacity to respond. By that time, 14 of the country's 15 counties had reported confirmed cases. Some 152 health care workers had been infected and 79 of them had died, representing a significant loss of talented and dedicated doctors and nurses at a time of

immense need.

By 8 September, Liberia had the highest cumulative number of reported cases, reaching nearly two thousand cases and more than one thousand deaths.

In Monrovia, bed capacity could not keep up with the growing number of very ill Ebola patients. New treatment centres were opened by MSF and others, but were rapidly filled to overflowing. The WHO team estimated that 1000 beds were needed just for the treatment of currently infected patients. Only 240 beds were available. Although another 260 beds were planned, the shortage meant that only around half of patients could be admitted to treatment facilities over the next several weeks and months.

One treatment facility, quickly set up by WHO at the Ministry of Health's request, was equipped and staffed to manage 30 patients but had 70 as soon as it opened.

At the end of August, the government quarantined the city's West Point slum, home to at least 75,000 people crowded together under unsanitary conditions, as part of efforts to slow the explosive spread. Violence broke out and one teenager was killed as armed forces struggled to contain the event.

**Overwhelmed by a runaway virus**

As the first week of September ended, data indicated that that exponential growth of cases had overwhelmed response capacity in the capital city. Taxis filled with entire families, of whom some members were almost certainly infected with Ebola, constantly crisscrossed and circled the city, searching for a treatment bed. They found none. MSF announced that its facilities were overstretched and began to turn patients away.

WHO sent one of its most experienced emergency responders to Monrovia to head its office there. More logisticians arrived from Geneva to address urgent material needs, while field epidemiologists were deployed to undertake case finding and contact tracing. Nonetheless, the outbreak still ran ahead of all these stepped-up efforts.

The lack of adequate numbers of treatment beds provided the most dramatic evidence of a runaway virus. It also jeopardized key control measures, such as the isolation of confirmed and suspected cases, and ensured that the virus would continue to race through families and neighbourhoods. The country's President pushed partners hard to build more treatment centres.

In September, WHO began construction of a new treatment centre in Monrovia, using teams of 100 construction workers labouring in round-the-clock shifts. On 21 September, the Island Clinic was formally handed over by WHO to Liberia's Ministry of Health. The clinic added 150 Ebola treatment beds to the city's existing 240 beds. However, within 24 hours after opening, the clinic was overflowing with patients, again demonstrating the desperate need for more treatment beds.

Epidemiological trends were difficult to assess. Accurate monitoring of the situation suffered from the weak surveillance and reporting systems

in place prior to the start of the outbreak. The onslaught of cases strained those mechanisms further. At times, the overwhelmed systems were unable to confirm or discard probable and suspected cases, as laboratory backlogs delayed testing and confirmation of positive cases – sometimes for weeks.

### The first drop in Ebola cases: a model of success

The first encouraging trend was detected during the last days of September, when reports of new cases in Lofa County, the initial epicentre of intense transmission, began showing an apparent decline. WHO watched that encouraging trend with hope but also caution, given the well-known problems with under-reporting.

By the end of October, WHO could conclude that the decline of cases in Lofa was persistent, consistent, and likely real. The trickle of cases then dried up in November, with no new cases reported for four consecutive weeks. Confidence that Lofa had indeed beaten back the virus increased throughout December. No new cases were reported.

In one of the most encouraging investigations in all three countries during 2014, WHO was able to find a direct link between implementation of the full package of control interventions, including community engagement, acceptance, and ownership of the response, and the decline and then end of new cases. Those findings were all the more impressive given Lofa's proximity to Guinea, where transmission was still ongoing and intense.

The situation in Lofa underscored the value of stratifying the response to this extremely complex and challenging outbreak to meet the unique context and challenges at the district level in all affected countries. This was not an epidemic with three different national patterns, but likely hundreds of distinct patterns, with their own transmission dynamics, playing out within individual districts and sub-districts.

Fortunately, that observation coincided with better reporting at the district level as WHO deployed more experienced epidemiologists to the field. The US CDC likewise sent more staff to help correct deficiencies in the surveillance and reporting systems.

### Support escalates in Monrovia

At the start of October, WHO estimated that 1,500 treatment beds were needed in addition to those already in place or planned. Support escalated, as commitments, made by the US government and others following the September emergency meeting of the UN Security Council on Ebola, began to materialize. Two US Navy mobile laboratories arrived and began processing samples in Bong and Monrovia on 5 October.

More treatment facilities were built by US military personnel. They used WHO master plans for a treatment centre that strictly separated "hot" and "safe" zones, allowed no contaminated wastes to leave the patient ward, and provided space for safe triage. Safe triage reduced the risk that people suffering from another illness or entirely healthy contacts would be placed near confirmed cases, increasing the risk of infection.

The number of trained and supervised staff conducting case finding and

contact tracing, and the daily monitoring of contacts increased considerably in Monrovia, but was still insufficient elsewhere in the country. Laboratory capacity improved, but WHO concerns about the quality of data and the under-reporting of cases continued.

The first signals that the situation in Monrovia had stabilized began in late October, with a slow decline detected in the early weeks of November. As a precaution, WHO staff conducted a study of data collected from funeral homes, crematoria, and coffin makers to assess the likelihood that hidden burials might account for the decline in reported mortality. The results of that study supported the conclusion that the decline in cases and deaths in Monrovia was real and robust. In mid-November, the government set a target of no new Ebola cases by 25 December.

As the year concluded, the main risks in Liberia were two-fold: complacency as a traumatized population began to feel safe and vigilance relaxed, and the move of the virus from cities to remote rural areas.

### Exchanging one set of problems for another?

During the second week of December, only 6 of the country's 15 counties reported new cases. That situation contrasted sharply with the one reported by WHO on 22 October, when all counties had recorded at least one case and Monrovia was reporting more than 300 new cases each week.

During late November and early December, rural outbreaks were seeded as people who had been working in the cities returned to their rural homes, sometimes to die. By mid-December, the virus had largely moved from cities to remote rural areas that lie well beyond the places where the road system ends.

Apart from continuing – though declining – cases in Monrovia, the districts of greatest concern included Grand Bassa, Bong, Grand Cape Mount, and Margibi. In a Ping-Pong effect, the genuine successes recorded in Monrovia and Lofa risked coming unravelled: travellers from affected rural areas could re-ignite infections in the cities. Based on available evidence, WHO viewed that risk as greater than the risk that new cases would be imported, especially from Sierra Leone.

Given the very different challenges seen in urban and rural areas, the virus' retreat from the cities might turn out to mean that one set of problems has been exchanged for another. As experience has shown, especially in Guinea, areas that come under control remain at risk of re-infection as long as virus circulation continues anywhere in the country or its neighbours.

In Grand Bassa and Grand Cape Mount, health officials struggled to cope with almost no staff properly trained in case detection, patient management, contact tracing, and the safe collection of patient samples. Personal protective equipment was in short supply, as were essential medicines. Almost no villages had ambulances or trained ambulance crews and burial teams. The few vehicles available were poorly maintained and fuel was scarce.

These problems were vastly amplified by the absence of transportation and telecommunications networks. Some villages can be reached only after an eight-hour hike across rough terrain. Prompt reporting of cases and responses to calls for help have been further impaired by patchy and sporadic telecommunication services. Health staff in these remote counties were lucky to have brief internet access once or twice per week.

In yet another complication, patients in rural areas did not want to be sent for treatment to Monrovia, where abundant beds were available, as they knew that bodies in the capital city would be cremated, in line with the President's August decree. In Liberia, "Decoration Days" – holidays when the graves of relatives are cleaned and decorated – are a deep-seated cultural tradition.

At year-end, Liberia had 10 beds available for each Ebola patient in Monrovia, but faced an urgent need to shift this capacity to rural areas. As experience has shown, moving testing and treatment facilities closer to where cases are occurring is a far better strategy than moving patients, often over long distances, to treatment facilities. Such movements are hard on patients, poorly accepted by families, and fraught with risks of further transmission en route.

WHO has shifted its strategy to the use of rapid response teams sent to rural areas. In the best-case scenario, these teams will catch flare-ups early enough to stamp them out – before entire villages are paralyzed by illness and deaths and the virus inevitably spreads to new areas. However, the difficulty of reaching these remote areas and the absence of so many essential services, personnel, vehicles, and other material support work against the kind of speed that is so badly needed.

### Getting an upper hand on the Ebola virus?

As the year concluded, four important lessons could be drawn from Liberia's experiences with the Ebola virus.

First, Lofa county, which reported no new cases since early November, demonstrated the feasibility of "bending the curve" and defeating the virus – even in heavily affected areas with intense transmission.

Second, intensification of technical interventions, like increased laboratory capacity, more treatment beds, and a larger number of contact tracing and burial teams, will not bend the curve in the absence of community engagement and ownership.

Third, with the right support, a country can permanently improve its capacity to collect and report health-related data, even under the demanding pressures of a severe outbreak. At year-end, laboratory capacity had improved, in less than three months, to the point where all probable and suspected cases were being tested, with the results promptly reported.

Finally, strong, hands-on, and frequently courageous support from the country's President helped match the severity of the disease with forceful – though sometimes controversial – control measures. President Sirleaf also undertook numerous field visits to severely affected areas to show citizens the level of her engagement and concern.

This leadership helped coordinate the activities of a large number of partners, including US government agencies and military personnel, supporting the response effort.

A Presidential Task Force on the Ebola response, which brought partners and donors together with senior government officials and civil society leaders, was established on 26 July and functioned through the end of September, when it was replaced by a Presidential Advisory Committee on Ebola, or PACE, again chaired by the President. Additional task forces operated in each county to tailor the response to local needs and keep partners working in tandem.

In a worrisome trend, six health care workers were infected nationwide during the first week of December, of whom three died. An investigation was launched to determine how staff were getting infected and what additional protective measures were needed.

At year-end, despite imperfections in the surveillance and reporting systems, evidence indicated that Liberia – which long showed the most explosive transmission – was getting an upper hand on the virus.

**Stories from Liberia**

- Local students become active Ebola case finders
- Working with communities is the key to stopping Ebola
- Austin Jallah, an Ebola survivor, sharing his experience fighting the disease
- New Ebola mobile lab speeds up diagnosis and improves care

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