How Ebola Roared Back

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On the flight back to Atlanta, Dr. Pierre Rollin snoozed in Seat 26C in his usual imperturbable way, arms folded, head bobbing, oblivious to loudspeaker announcements and the periodic passing of the galley cart.

This routine had become part of his lore. During each viral outbreak, Dr. Rollin, the top Ebola expert at the Centers for Disease Control and Prevention, would outlast his younger colleagues in the hotel lobby, staying awake until 3 or 4 a.m. to plug new cases into a database. He managed to do this at 61 because he possessed an uncanny ability to sleep anywhere anytime, whether on the hardwood floor of a staff house in Zaire (Ebola, 1995) or in a back seat lurching down a cratered road in Madagascar (Rift Valley fever, 2008). On this trip home from Guinea on May 7, Dr. Rollin (pronounced Ro-LAHN in his native French) found himself at particular peace. His five-and-a-half-week stay as the C.D.C.'s team leader in the opening days of Guinea's effort to control Ebola had gone about as well as one could have hoped.

The number of Ebola cases reported each week had been declining steadily for a month. It had been more than 10 days since doctors had seen a new patient in Conakry, the capital, where Dr. Rollin worked alongside other early responders from the World Health Organization and Doctors Without Borders.

New patients had slowed to a trickle in the Forest Region of southeastern Guinea, the center of the outbreak, and there had not been a report across the border in Liberia for four weeks. Sierra Leone, although surrounded by Guinea and Liberia, had not discovered a single confirmed case.

Like the 10 Ebola crises he had handled before, in Uganda and Sudan and the Democratic Republic of Congo, this first substantial outbreak in West Africa seemed to be burning itself out after a few months and a few hundred infections.

"This is close to over," Dr. Rollin told himself, a view common among the virus hunters. "That's it for this outbreak."

Or so he thought. In fact, Dr. Rollin and other well-intentioned veterans of past Ebola campaigns had tragically underestimated this outbreak, overlooking clues that now seem apparent. Viewing the West Africa epidemic through the prism of nearly two dozen previous outbreaks across the continent, they failed to appreciate that the 2014 version would be unique in catastrophic ways.

After more than 20,000 cases and 7,800 deaths, it can be hard to recall that there was a moment in the spring when the longest and deadliest Ebola outbreak in history might have been stopped. But without a robust and coordinated response, an invisible epidemic was allowed to thrive alongside the one assumed to be contained.

Although conditions were ideal for the virus to go underground, some of the world's most experienced Ebola fighters convinced themselves that the sharp decline in newly reported cases in April and May was real.

Tracing those exposed to Ebola and checking them for symptoms, the key to containing any outbreak, had been lacking in many areas. Health workers had been chased out of fearful neighborhoods. Ebola treatment centers had gained such reputations as deathtraps that even desperately ill patients devoted their waning strength to avoiding them.

With the affected countries often lacking the most basic medical infrastructure, the health care challenges proved staggering. But the most tragically missed opportunities stemmed from the poor flow of information about who was infected and whom they might have exposed.

A two-month investigation by The New York Times into this largely unexamined period discovered that the W.H.O. and the Guinean health ministry documented in March that a handful of people had recently died or been sick with Ebola-like symptoms across the border in Sierra Leone. But information about two of those possible infections never reached senior health officials and the team investigating suspected cases in Sierra Leone.

As a result, it was not until late May, after more than two months of unchecked contagion, that Sierra Leone recorded its first confirmed cases. The chain of illnesses and deaths links those cases directly to the two cases that were never followed up in March. Sierra Leone has since tallied about 9,400 reported Ebola infections, more than any other country. The same missed cases are linked to Liberia's vast second-wave outbreak, identified in late May, with almost 8,000 reported infections to date.

The leaders of the initial response agree that they did not deploy nearly enough people to the region, and that they withdrew too soon. There was managerial confusion in the W.H.O., which was already stretched by budget cuts and competing demands. Some in the W.H.O. along with Guinean officials played down the threat, leading to overconfidence and inattention. Other international and nongovernment groups devised public-education campaigns that in some instances did more harm than good.

Dr. Peter Piot, who helped discover Ebola in 1976, and Jeremy Farrar, a British infectious disease specialist, called the West Africa outbreak "an avoidable crisis" in an editorial published online in September in The New England Journal of Medicine. In the same issue, W.H.O. officials said of the March to July period that "modest further intervention efforts at that point could have achieved control."

Like all who followed them, the early responders demonstrated remarkable courage and dedication. But those qualities did not guarantee an understanding of how geography and culture would make this outbreak so distinctive.

Most previous outbreaks had started in remote villages in Central and East Africa, where the virus could be surrounded and isolated. All told, they had killed 1,590 people over four decades, only a fifth of the toll of the epidemic still unfolding across West Africa.

In some of the worst luck in epidemiological history, this outbreak occurred at the bustling intersection of three of the world's poorest and least developed countries. Doctors in the region were rarer than paved roads — Liberia, for instance, had fewer than 250 physicians for four million people — and clinics and hospitals, where they existed, often lacked essentials like running water, hand soap and gloves.

International health groups had largely pulled out of West Africa during the civil wars that devastated Liberia and Sierra Leone during the 1990s. When the Ebola outbreak began, the C.D.C.'s staff in the region consisted of one malaria researcher in Guinea.

Complicating matters, the same ethnic group — the Kissi — inhabited the forested region across all three nations, and extended families moved easily on foot and by dugout canoe across a pinwheel of disregarded national borders. Although roads were unpaved and bumpy, they were passable enough for villagers to ride motorcycles into dense capital cities, carrying the virus on board.

Distrust of government ran so high after decades of civil war and corruption that many West Africans had to be convinced Ebola was real and not a plot to attract foreign aid. They reacted with indignation to outsiders who demanded they stop providing hands-on care to the sick, considered a sacred obligation by many West Africans, whether Muslim, Christian or traditionalist.

Governments attempted to broadcast the message that Ebola was spread through contact with vomit, feces and blood, and that bodies remained highly contagious after death. But communities often continued to wash the bodies of the dead, a step considered essential to a dignified burial and a contented afterlife. The arrival of moon-suited health workers in convoys of white trucks, armed with chlorine sprayers and thermometers, bred resistance and secrecy.

"Old disease in new context will bring you surprises," Dr. Margaret Chan, the director-general of the W.H.O., said in an interview in December in her office in Geneva.

On conference calls before leaving Guinea last May, Dr. Rollin advised his supervisors in Atlanta that the situation seemed stable enough that the C.D.C. could probably pull out after another month. Having stayed beyond the standard four-week tour, he looked toward reuniting with his wife, Dominique, a C.D.C. microbiologist he met in high school, and to seeing what their three young grandchildren had learned in his absence.

But not long after his return, Dr. Rollin noticed disturbing trends in the reports landing in his inbox. First, an uptick in cases in southeastern Guinea. Then the first confirmed infections in neighboring Sierra Leone. Then a death at a hospital in Monrovia, Liberia's capital, and the first case in Conakry in a month.

After a deceptive lull, the virus was back, with ruthless force.

"Damn," the old Ebola hand thought, “we missed it."

When Dr. Rollin arrived in Guinea on March 31, the outbreak was already three months old. In Meliandou, a leafy village in the hills of southern Guinea, a year-old boy named Emile had taken ill in late December with fever, vomiting and bloody stool. He died Dec. 28, and a W.H.O. investigation would later conclude he was probably the first Ebola casualty. Members of his family, a nurse, doctor and other health workers soon died also. “We thought it was a mysterious disease,” said Dr. Kalissa N’fansoumane, the director of the nearby Guéckédou Hospital.

Local health officials accompanied by a Doctors Without Borders logistician investigated the cluster of deaths in January. They concluded that a cholera-like diarrhea had been the cause. Unaware of signs like persistent hiccups, health workers made faulty assumptions, and some paid with their lives.

Remarkably, it would take 12 weeks to diagnose the ravaging virus. Ebola was all but unknown in West Africa — there had been a single nonfatal case in Ivory Coast in 1994 — and its symptoms were similar to those of endemic diseases like malaria, cholera and Lassa fever.

At W.H.O. headquarters in Geneva on the morning of March 21, Dr. Robert Fowler sensed the buzz as soon as he walked into the Strategic Health Operations Center, where epidemiologists seated around a blond, horseshoe-shaped table were monitoring new reports. There had been suspicions for several days about hemorrhagic fever in West Africa.

At 2:13 a.m., an email from Sylvain Baize, an infectious disease specialist at the Pasteur Institute, had announced that initial testing on blood samples flown from Guinea by Doctors Without Borders revealed a filovirus, which can cause hemorrhagic fevers like Ebola and Marburg. There were already 49 suspected cases and 29 deaths.

The researchers hovered intensely over their laptops as others talked in clusters beneath the digital world clocks. At 7:06 p.m., Dr. Baize sent another email: “Les résultats confirment la présence du virus Ebola.”

“Oh, God,” thought Dr. Fowler, a critical care physician from Canada who was spending a year helping the W.H.O. respond to crises around the world.

The timing could not have been worse. Created by the United Nations in 1948 to coordinate international health efforts, the W.H.O. had been hobbled by recessionary cutbacks and was strained to its limits by concurrent emergencies and outbreaks: the MERS virus in Saudi Arabia, a new avian influenza A strain in China, polio in war-torn Syria, conflicts in the Central African Republic and South Sudan. Now add Ebola.

“It’s like if a plane crashes in the Hudson in the morning, and there’s a snowstorm in the afternoon and floods in the subways in the evening,” Dr. Fowler said. “And then you have two planes hit the World Trade Center in the middle of the night.”

But a lack of resources was not the W.H.O.'s only problem. Its clunky governance structure and overlapping power bases invited political meddling and sowed confusion on the ground.

In addition to its headquarters staff in Geneva, the W.H.O. has largely autonomous offices in each of six regions. The powerful African regional director — Dr. Luis G. Sambo, an Angolan, who finishes his 10 years in the post next month — is nominated not by Geneva, but by the health ministers of the region’s 47 countries. His office, in Brazzaville, Republic of Congo, then proposes representatives in each country, with approval from headquarters.

Dr. Chan and her staff in Europe sent aid and experts, but largely delegated leadership of the early response to W.H.O. regional representatives on the ground.

The paucity of health care in West Africa meant that the W.H.O.'s central coordinating role would be critical. But its capacity had shrunk. In recent years, its epidemic response department, including a network of anthropologists to help overcome cultural differences, had dissolved, with duties parceled out to other branches.

The African region’s budget for epidemic preparedness and response had been more than halved over five years to $11 million for 2014-15, from $26 million in 2010-11, according to Dr. Sambo. Nine of 12 emergency response specialists had been laid off, said Dr. Francis C. Kasolo, the region’s director of disease prevention and control.

The W.H.O. country representatives were, in the view of many who worked with them, earnest but overmatched. Recent W.H.O. audits had found alarming accounting deficiencies in the offices in Guinea, Liberia and Sierra Leone, as well as in the regional office.

Dr. Nils Daulaire, who until February sat on the W.H.O. executive board as the assistant secretary for global affairs at the United States Department of Health and Human Services, said the Africa office had long been seen as “a place where politics often trumps substance” and where key appointees “often are not the cream of the crop.”

Dr. Sambo wrote in response to emailed questions that such criticism “is not fair at all,” adding that “W.H.O. is not a political organization.”

The disconnect between the W.H.O.'s offices in Geneva and in Brazzaville revealed itself almost immediately in the agency’s dealings with the C.D.C., which was accustomed to being brought into outbreaks quickly and given a primary role. It perturbed the C.D.C.'s director, Dr. Thomas R. Frieden, to hear in late March that the team headed by Dr. Rollin,

which was being dispatched at the W.H.O.'s request, had been held up by bureaucratic demands.

He got in touch with Dr. Keiji Fukuda, the W.H.O. assistant director-general for health security in Geneva. “They are asking to see résumés of our staff, they are asking if they are qualified to go,” Dr. Frieden said he had complained. He had been told by a high-level W.H.O. official that the regional staff in Africa wanted to prove they could handle this one without help, he said.

“People shouldn’t die because someone’s embarrassed that they can’t do it themselves,” Dr. Frieden said. Dr. Fukuda fixed the problem.

Similarly, Dr. Pierre Formenty, the W.H.O.'s top Ebola authority, said that when he arrived in April, he was passed over as team coordinator in favor of a W.H.O. official in the Guinea office who had never been involved in an Ebola outbreak.

“Obviously,” said Dr. Formenty, 54, who had worked on 17 outbreaks, it was “only because I was coming from Geneva.” Which part of the W.H.O. was in charge? “It was not clear to us,” Dr. Frieden said.

The virus quickly jumped Guinea’s Forest Region, and by the end of March, cases had been confirmed in densely populated Conakry, and across the border in northwest Liberia.

Along with Dr. Rollin, the seen-it-all veterans parachuted into Conakry, joining forces with in-country staff from Unicef, the Red Cross and other aid groups. The virus hunters revived the camaraderie of past campaigns with bear hugs in the lobby of the Palm Camayenne Hotel, while casting wary eyes at potential competitors for groundbreaking research.

The affable Dr. Rollin, born in colonial Morocco to French parents (he is white but refers to himself impishly as an African-American), was well-suited for deployment to French-speaking Guinea. He developed an instant rapport with the country’s president, Alpha Condé, and convinced him it would be counterproductive to close borders and schools, a decision later reversed.

He stood repeatedly before gatherings of government officials and health workers, his hair wispy white, a slight paunch overhanging his belt, and explained the science of Ebola. He was known for his ability to demystify the disease for any audience, and his recorded remarks were converted into public-service announcements.

As the team leader, he set his four colleagues about the tasks of debugging new software to track the virus and establishing a process to trace anyone who had been exposed. After long and wearying days, they typically continued working over dinners in the hotel restaurant with their laptops open next to their meals.

As the coordinating agency, the W.H.O. took a decidedly anti-alarmist approach. In March, the organization's offices placed 38 people in Guinea: epidemiologists, logisticians, data managers and others, most from the Africa region. By comparison, there are 338 W.H.O. personnel in West Africa now.

On March 23, the day the outbreak was announced, the W.H.O. spokesman Gregory Härtl took to Twitter from Geneva to stress that "there has never been an #Ebola outbreak larger than a couple of hundred cases." He doubled down two days later when the agency classified the outbreak a Level 2 emergency out of three. "Ebola has always remained a very localised event," he posted.

Not everyone saw it that way. Doctors Without Borders, which received the Nobel Peace Prize in 1999 for its humanitarian work, had a longstanding malaria project in Guéckédou in the Forest Region. Within 10 days of the initial diagnosis, it had opened an Ebola isolation ward there, as well as in the nearby town of Macenta and in a hospital in Conakry. The private charity dispatched 60 health care workers and flew in 40 tons of equipment.

"We are facing an epidemic of a magnitude never before seen in terms of the distribution of cases in the country," Mariano Lugli, the coordinator of the group's Conakry clinic, said in a March 31 news release. A three-day Twitter war ensued. "No need to overblow something which is already bad enough," Mr. Härtl wrote.

Closer to the action, some early responders suspected that subduing the outbreak would be complicated. There were so few beds and so little staff to treat or isolate Ebola patients that doctors found themselves stepping over the dying and the dead in hospital corridors.

What alarmed Dr. Kamalini Kalahe-Lokuge, a Doctors Without Borders epidemiologist working in Conakry, was that the patients were coming from all across the city, many from unrelated chains of viral transmission. That meant they had probably infected others who had not been found. In April in the staff tent at Donka Hospital, she unfolded a giant city map she had dotted with red, blue and green ink to track cases.

"This is just the tip of the iceberg," she told her colleagues. "This is going to blow up."

Guinea's government worked to paint a rosier picture. In morning meetings in April, Dr. Aboubacar Sidiki Diakité, the health official in charge of the early response, spoke about the need for "positive communication" so as not to scare away airlines and mining companies, according to several people present.

Dr. Diakité insisted that only test-confirmed cases — a third to half of all known potential cases at that point — be reported to the local news media, said Dr. Formenty of the W.H.O. and Dr. Rollin of the C.D.C.

Underreporting of all kinds hampered the crucial process of locating those with possible exposure, isolating them if needed and monitoring them daily. When the C.D.C. team

began working in Conakry on April 2, they found a single pair of W.H.O. trackers ping-ponging across town, managing to see fewer than half of the 71 registered contacts, said Andrea McCollum, an epidemiologist on Dr. Rollin's crew. When she arrived in the Forest Region two weeks later, only 67 of 390 contacts were being seen, she said.

There had been little effort to recruit volunteers, and there were problems making even nominal payments of $4.25 a day to contact tracers. "It's really not clear to me why more wasn't being done," Dr. McCollum said.

Cross-border cooperation was sporadic. In the early weeks, the W.H.O. hosted daily teleconferences involving officials from West Africa. But it did not set up a regional coordinating center in Guinea until July, and two earlier meetings in border towns were devoted to generic updates rather than an exchange of data on chains of transmission, according to several people present. Many officials met their counterparts from neighboring countries for the first time and exchanged phone numbers.

"In French, we call it 'un grand mess,'" said Michel Van Herp, an Ebola expert with Doctors Without Borders who was in Guinea.

Denial and stigma had always posed obstacles to containing Ebola outbreaks. But the early responders in West Africa arrived with little understanding of the long-exploited region's deeply rooted suspicions of outsiders and government.

From the 16th century to the 19th, its inhabitants were captured by slave raiders and shipped to Europe and the Americas. During the era when Guinea was a French colony, the people of the Forest Region were forced to build roads and tap rubber, up to the 1940s. After independence, Guinea's authoritarian ruler sought to suppress their indigenous culture and ancestral beliefs, while conscripting much of their harvests of rice, coffee and palm oil.

It did not take long for resistance in the villages to grow aggressive. Relief workers confronted accusations that they had brought Ebola to Guinea themselves. They heard assertions that the disease was a curse, or a scheme to sell body parts. On April 4 in Macenta, a seething crowd chased a surveillance team from a neighborhood and sacked the Doctors Without Borders treatment center, forcing it to close for a week.

Around the same time, Dr. Fowler of the W.H.O. and an Argentine colleague from Doctors Without Borders, Dr. Fernanda Méndez Baggi, set out to find a woman in an impoverished neighborhood in Conakry. The woman's husband and another wife of his had died of Ebola at Donka Hospital, and health workers had been tipped that she was symptomatic. They hoped to bring her in for treatment.

It was midafternoon when the doctors left in a Toyota Pathfinder. By the time they crawled through Conakry's traffic, found the unmarked house and negotiated their way in with family members, the light was vanishing. They were conscious of the time because they did not want to risk a precarious return trip in the dark with a sick patient. They

found the woman near sundown on a mat on the floor, too weak to move or to consent to hospitalization.

As Dr. Méndez Baggi assessed her by flashlight, dozens of family members and neighbors began agitating outside. Word had spread that patients who went to Ebola treatment centers rarely came back. “I won’t let her go,” someone yelled. The shouts grew louder and more menacing.

“Fernanda, time to go,” Dr. Fowler said. She looked at him, shocked that he would consider leaving the patient and exposing even more people.

“Fernanda, listen.” She stopped for a second, then nodded. After counseling the woman’s family, they returned empty-handed to the hospital, where another W.H.O. clinician, Dr. Tom Fletcher, chided Dr. Fowler. “Your job is to go out and get this patient,” he said, “and we failed.”

But the next day, Dr. Fletcher also tried and was rebuffed by an agitated crowd. Finally, days later, the family dropped the woman at the treatment center, near death. Remarkably, with intensive treatment, she recovered. But dozens of additional people had been exposed by the delay.

“She had an enormous amount of contacts, made worse by the number of days that she remained very symptomatic,” Dr. Fowler said. “It took weeks and weeks to sort through.”

The challenges of caring for such patients could be hard to anticipate for doctors like Tim Jagatic, a 33-year-old family practitioner from Canada who had enlisted with Doctors Without Borders. He arrived at Donka on March 29 with some training in infectious diseases but no experience with Ebola.

He found it difficult to wear an impermeable protective suit in tropical heat for even the 45- to 60-minute maximum stretches recommended by Doctors Without Borders. Some of the sick were dying in narrow toilet stalls, making it a challenge to remove the bodies safely. He learned from his own exposure to a nurse who tested positive with only a low-grade fever that prevailing guidelines for symptoms were not absolute.

As health workers fell sick, it became frighteningly clear that rigorous adherence to precautions might not be enough.

“No place is safe,” he realized. “I was like, ‘Wait a minute, these were not the rules we agreed to.'”

Once, while moving a patient in a bed, Dr. Jagatic felt his mask filling with condensation, could not catch his breath and collapsed to his knees. He knew he needed to get out, and fast, but he first had to be sprayed down with chlorine and then had to meticulously remove his gear. “Don’t cut corners,” he coached himself, before finally lifting the mask and taking three gulping breaths.

By mid-April, the C.D.C. and other groups had enlisted hundreds of community volunteers for contact tracing. While falling well short of 100 percent, the coverage began to improve. Resistance in some communities gradually softened as the death toll rose.

Based on the patterns of previous outbreaks, it seemed to make sense that the number of newly reported cases was falling. While 29 new confirmed and suspected infections had been recorded in a three-day stretch in mid-April, there were only five from May 3 to May 7.

President Condé traveled to Geneva on April 30 for consultations with the W.H.O., and sounded more confident than cautious. “For the moment,” he told reporters, “the situation is well in hand. And we touch wood that there won’t be any more cases.”

Even before Ebola was officially identified, the virus traveled to Liberia by motorbike along a rough dirt road where children at play rolled bicycle wheels with sticks. It arrived in mid-March when Tewa Joseph picked up her ailing sister, Finda Tamba, in Guinea and took her to Liberia’s Foya-Borma Hospital.

The physician who examined her, Dr. Raphael Shamavu, was from the Democratic Republic of Congo, and thought he recognized her symptoms as those of a virus that had ravaged remote pockets of his country, hospital workers said. Others on staff did not know what Ebola was until somebody looked it up online.

Ms. Tamba died at the hospital, a modest complex of pavilions under corrugated roofs, on March 20, according to the assistant medical director, Philip Azumah. Soon others, including her sister Ms. Joseph, became sick.

When Ms. Joseph showed up at the hospital on March 26 after Ebola had been identified in neighboring Guinea, Mr. Azumah said he could not admit her because he had no protective clothing for his frightened staff. He sent her home with medications for fever, and checked on her daily. Several days later, he learned that she had taken a taxi some 12 hours into Monrovia, a capital city of nearly one million people, and scrambled to find her.

It fell to the Liberian health ministry, Unicef and nongovernmental organizations to devise public-education campaigns that would warn a diverse population about Ebola. Fewer than half of adults were literate, according to the World Bank.

Ill-conceived early efforts might have helped drive the outbreak into the shadows. Many fliers, posters and radio advertisements inadvertently reinforced a hopeless message that Ebola had no cure, deepening people’s fears that they would be cut off from dying relatives if they took them to health centers.

“It spreads quickly and kills!” read a handout with a message from the United Nations Mission in Liberia and the Ministry of Health. It was distributed by blue-shirted workers from Samaritan’s Purse, a Christian aid organization, whose leaders said they tried for weeks to persuade health ministry officials to revise their messages.

One poster warned that “most of the people who catch it will die.” Many early posters used English that was more technical than the colloquial words used in the affected areas. A flier focused disproportionately on avoiding the wild animals that are thought to be original carriers of Ebola, diluting messages about preventing human-to-human transmission. “Do not play with Monkeys and Baboons,” it said. “Do not eat bush meat. Do not eat plums eaten by bats.” Radio advertisements and jingles produced for the national response urged family members to speed the sick to hospitals “quick-quick,” contrary to a safer protocol of calling trained ambulance teams.

Even well-crafted messages often found an unreceptive audience. “People were accustomed to a certain way of life,” Liberia’s president, Ellen Johnson Sirleaf, said in an interview in a palava hut on the grounds of the presidential mansion. “The messages about don’t touch the dead, wash your hands, if somebody is sick, leave them — these were all strange things, completely contrary to our tradition and culture.”

After rounds of meetings, the ad campaigns were eventually altered, removing references to bush meat and advising those with symptoms to stay put and call a health worker. “You can survive Ebola!” one of the new posters declared.

The country dug in for a long fight. But unlike in Guinea, where patients still trickled in to treatment centers, reports of new infections dried up quickly in Liberia. The last of 12 cases had been isolated by April 9, only 10 days after discovery of the first. By the end of the month, Liberia had made it through 21 days, the virus’s maximum incubation period. If another 21 passed, the outbreak would officially be considered defeated.

Watching enviously from Guinea, Dr. Rollin figured the response in Liberia, where the C.D.C. had placed only two people, had been “either good or very lucky.” On May 6, Samaritan’s Purse ended the operation of its disaster response team in Liberia. It had moved six beds for Ebola patients into the chapel of the Monrovia hospital it supported, but they had never been filled. “We felt that things were contained,” said Kendell Kauffeldt, the group’s Liberia director.

By mid-May, Doctors Without Borders had withdrawn its staff and redeployed to Guinea. Things looked so upbeat two weeks later that its workers decontaminated the treatment center in Conakry and the group made plans, literally, to fold up tents. “We can only congratulate ourselves collectively,” Marc Poncin, the group’s emergency director in Guinea, wrote to Dr. Diakité, in the health ministry.

After a meeting in mid-May, the C.D.C.'s David Blaney mentioned to Dr. Bernice Dahn, the Liberian health ministry’s response coordinator, that he and a colleague were about to cycle out. She told him she hoped they would be replaced.

The agency “couldn’t justify it,” he reported back, “because it really isn’t an active outbreak anymore.” He said the team in neighboring Guinea would be available in case of emergency, but by May 28 the C.D.C. had pulled out of there as well.

The W.H.O., which sent 59 people to Liberia and Guinea in April, posted only 29 in May. One of its periodic reports, on May 18, anticipated that just a few days later, on May 22, the 42-day mark would pass and the outbreak in Liberia “could be declared over.”

The group’s leaders turned their attention to the annual World Health Assembly, which opened on May 19 in Geneva, where Dr. Chan gave a speech and mentioned Ebola just once in passing.

When the 22nd arrived, Dr. Dahn marked the milestone at the morning meeting at the health ministry, unfurling her words slowly and methodically. No one dared declare “mission accomplished,” not with active cases in Guinea, but victory was in the air.

“We were all happy,” Dr. Dahn said. “We thought it was something we could manage. We were not actually expecting Ebola to come back and overwhelm us.”

While Liberia battled Ebola, the government of Sierra Leone did not even realize it had an outbreak. On March 14, a team of six scientists and two drivers had set out from Guinea’s capital with orders to document the mysterious fever that had killed eight people along the border. The team, which included epidemiologists and a lab specialist, had been drafted by the W.H.O.'s Guinea office and Guinea’s Ministry of Health to take blood samples and collect case histories.

They traveled across the Forest Region, interviewing health officials and following leads to the families of the dead. People told recurring stories of relatives dying months earlier with similar symptoms, including little Emile, according to the 17-page report they produced.

On the fifth day of the mission, the team spoke with villagers near Guéckédou and learned of a woman named Sia Wanda Koniono, 37, who had died March 3 after suffering from fever, vomiting, diarrhea and bleeding. Ms. Koniono, the investigators noted in their report, lived not in Guinea but in a nearby village in Sierra Leone. Now another young woman in Sierra Leone was fighting similar symptoms, the villagers said. It was Ms. Koniono’s daughter.

While the investigators dutifully recorded these suspected cases along with dozens of others in Guinea, the information never reached the government team doing surveillance across the border in Sierra Leone, three team members and other health officials said in interviews. Instead, the virus spread silently, fueling Sierra Leone’s outbreak and later rekindling Liberia’s.

Dr. Emmanuel Heleze, an epidemiologist on the Guinea team who helped write its report, said he gave a presentation that alerted the W.H.O. and the health ministry in Guinea to the possibility of crossover to Sierra Leone, but he could not say why the cases were not pursued. Guinea's director of disease control, Dr. Sakoba Keita, said he received the report but did not read it, and relied on the W.H.O. for information sharing. "They were the liaison between us, Sierra Leone and Liberia because of the language barriers," he said.

The W.H.O.'s Guinea representative at the time, Dr. René Zitsamelé-Coddy, declined to comment. His Sierra Leone counterpart, Dr. Jacob Mufunda, and Sierra Leone's director of disease prevention and control, Dr. Amara Jambai, said they did not recall receiving information about Ms. Koniono and her daughter. "We would have followed up," Dr. Jambai said.

Until late May, the W.H.O. continued to report that there were no confirmed infections in Sierra Leone and acknowledged that it did not station anyone on the Sierra Leone side of the border until June 15, after more than 50 cases had appeared in a few days' time.

In the interim, the health officers of Sierra Leone's Kailahun district, with its $10,500 budget for epidemic response, were left to prepare for Ebola's arrival along with scientists at a single laboratory hours away. They staged awareness campaigns with support from aid groups and received occasional visits from W.H.O. trainers, but they could do little to prepare hospitals and clinics, where protective gear was sparse.

Although health officials would never piece together the links, Ms. Koniono's contacts in her village and others nearby began to fall ill and die, relatives and survivors said in interviews. One of her in-laws, Kumba Yaya, died in a hospital in Sierra Leone on March 19, according to her husband, Fayia Yaya Thomas.

Ms. Yaya was visited throughout her illness by a close friend, Finda Nyuma. It seemed everyone in the area knew Ms. Nyuma, a tall, slender grandmother who was a traditional healer of some repute. She plucked herbs from the forest, drying and pulverizing them into curative powders or mashing them into juices to soothe the stomach.

The people in the village of Kpondu believed she could speak for the dead, and came to her with messages for lost loved ones. They often found her beneath a bamboo palm, reading the future by throwing "jagay," small white cowrie shells.

Ms. Nyuma became ill at the end of March — vomiting, headache, diarrhea — and retreated to the bedroom of her mud brick house, where her sisters, grandchildren and neighbors gathered around her bed. She died around April 8, according to her half sister, Finda Focko, and James Keppeh, a community health worker.

Now it would be up to Ms. Nyuma's descendants and friends to ensure that her path to the afterlife was a peaceful one, that she would become an ancestor who, in exchange for tribute and respect, might intervene with the spirits on their behalf.

The mourners came to her room the night she died. It was typical to pull back the covers and touch the body to say farewell, according to friends, relatives and neighbors who were present. A woman removed the many rings from Ms. Nyuma's fingers that were thought to impart powers. The next morning, four friends washed her body using soap and a towel.

Later, she would be washed again by four women from her family, according to local Muslim tradition. They removed her clothing. A cousin tied her hair tightly. Cupping tepid water in their hands, they doused her mouth, and nose and ears, then her feet, and bound her in a white cotton shroud. With hundreds of mourners watching, a group of men carried her body 100 yards into the bush to a freshly dug grave. Relatives then stayed several days in Ms. Nyuma's contaminated room.

Ms. Nyuma's husband died soon after, as did a grandson, several women who had prepared her body and others exposed to them. The W.H.O. estimates that at least 20 percent of the Ebola deaths in West Africa have stemmed from unsafe burial practices. The percentage was probably much higher at times.

Among the villagers, the cause of Ms. Nyuma's illness was assumed to be supernatural, more payback than pandemic. When Mohamed Lamin, a health surveillance officer, arrived in late May after the unexplained deaths, they told him that she and her husband died because he had disregarded her warning to never open a blue painted trunk that contained her belongings. When he did, they said, he was confronted by a large snake.

Mr. Lamin said he listened to the story and tried to set the villagers straight. "The snake you are talking about is Ebola," he told them. Denial bred transmission. A relative who washed Ms. Nyuma's body fell ill and died, passing the sickness to her mother, who then infected her daughter-in-law, Mamie Lebbie, a mother of two young children, according to Ms. Lebbie and other relatives.

Sulaiman Kanneh Saidu, who oversaw the small health center in the town of Koindu where Ms. Lebbie sought care, initially suspected cholera, but he sent an alert to a district surveillance team. On May 24, Ms. Lebbie's blood was drawn and a surveillance officer accompanied the sample over bad roads in the rain to the country's only laboratory equipped for Ebola testing, in Kenema. She was positive and became Sierra Leone's first confirmed Ebola case, lab professionals involved in the testing said.

Using genomic sequencing, scientists later found connections among a dozen Ebola patients, all women, who were thought to have been at the funeral, according to their study, published in August in the journal Science.

However the scientists were baffled to discover two slightly different versions of the virus circulating among the women. "It never made sense to us," said Dr. Pardis Sabeti of the Broad Institute in Cambridge, Mass., one of the study's authors.

The researchers did not know that villagers in Sierra Leone had already been falling sick and dying for more than two months before the women were tested. It has been widely reported that Ms. Nyuma's death had set off the country's outbreak, though hers was probably only one link in multiple chains. "That is fascinating, and it helps explain missing pieces from our sequence analysis," Dr. Sabeti said.

Eventually, the hidden outbreak in Sierra Leone revived the epidemic in Liberia. In late May, Harrison Sakilla, the principal of a mission school in a Liberia village near the border, walked two hours on a dirt path into Sierra Leone to visit his ailing mother in Kpondu, the same village where the healer died. He did not have to show a passport, he said. It was what people called a "common border."

Finding his mother depleted by diarrhea and vomiting, he set off for a medicine store. He walked for a mile along a path bordered by tall elephant grass, crossed a stream on a log and hopped a canoe across the Makona River into Guinea. He had touched foot in three countries in a matter of hours. After treating his mother for three days, and seeing that she was close to death, he walked to Liberia to buy the woven mats she would be wrapped in for burial, then returned.

After the funeral, he spent three more days visiting with family and other mourners. On the fourth day, as he walked back to Liberia, his body felt hot and his joints weak. He stopped and had diarrhea in the bushes. A walk that normally took two hours lasted four.

Mr. Sakilla survived Ebola to share his account. But his mother's sickness led to the deaths of family members in Liberia, Sierra Leone and Guinea. Simultaneously, another line of transmission in the Gbembo family, which was also linked to Ms. Koniono, the suspected case in Sierra Leone that was missed months earlier, crept across Liberia's borders and reached a Monrovia slum, according to family members and documentation from Doctors Without Borders. After an absence of two months, and the departure of experts from the W.H.O., the C.D.C., and Doctors Without Borders, Ebola was back.

The bad news then came like a fusillade. By June 21, Doctors Without Borders had pronounced the epidemic "out of control." Yet the W.H.O. waited until Aug. 8 to declare the epidemic "a public health emergency of international concern," its top threat level. That was two weeks after two American aid workers were infected in Liberia and a man sick with Ebola flew from Liberia to Nigeria. Soon after, President Sirleaf of Liberia took temporary charge of her country's response; President Condé of Guinea found a replacement for Dr. Diakité.

By September, the W.H.O.'s Geneva leadership and the United Nations had asserted control over the response. At Dr. Chan's instigation, the country representatives in Guinea, Liberia and Sierra Leone were reassigned in favor of experienced crisis specialists.

Today, even as infection rates are starting to decline in some areas, there can be more reports of new cases in just two days than were recorded in the first two months of the

outbreak. The governments and organizations that led the response now appear chastened. Many readily acknowledge that they did not devote enough people or resources to the early fight, and that they prematurely lowered their guard.

“Sure, in hindsight, I wish we’d had more staff on the ground,” said Dr. Frieden of the C.D.C., which has since devoted more resources to this outbreak than to any other outbreak of any kind in its history. “I don’t think any of our organizations would look back and say we did everything right.”

Even as they continue to battle Ebola across West Africa, the virus hunters find themselves soul-searching about how many lives might have been saved had there been a bigger, more effective initial response. If the epidemic in West Africa has demonstrated anything, it is that a foe as remorseless as Ebola must be met with a killer instinct that is just as unrelenting.

“There is no room for optimism as long as you are dealing with an Ebola virus,” said Dr. Bruce Aylward, who now leads the W.H.O. response. “It’s not about low numbers. It’s about zero. We have got to get to zero.”

Dr. Rollin of the C.D.C. accepts a share of responsibility. He and other leaders should have recognized how distinct West African culture was, he said. He should have better appreciated how lax the tracing had been, and that the virus’s disappearance from view did not mean that it was gone. But he also argues that scientists can act only on the facts as they know them, and that much of what happened in West Africa could not have been foreseen, at least not in the fog of an emerging crisis.

“It was an unprecedented outbreak; it never happened before,” he said. “There were a lot of things we didn’t know at that time. No one could have imagined that it would be what we have now.”

As the death counts rose, the C.D.C. sent Dr. Rollin back to Guinea in mid-June. The beds that sat empty in May were now filling. The hopeful mood of a month before had given way to defeat. As he looked at the rampaging caseloads across the border in Liberia and Sierra Leone, he could tell those countries were too overwhelmed to track the chain of transmission.

“They were just counting the dead,” he said. Before year’s end, Dr. Rollin would be dispatched to Liberia, by then flooded with Ebola cases; to Dallas, where a Liberian man, Thomas Eric Duncan, was deathly ill with the virus; to New York, where an American, Dr. Craig Spencer, developed symptoms after returning from Guinea; and to Mali, which reported its first cases this fall.

It would be awhile before he would get a full night’s sleep.