HARVARD PUBLIC HEALTH
MAGAZINE OF THE HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

The Ebola Response

A special report

As the deadly infection rages through West Africa, Harvard Chan faculty, students, and alumni are waging a counterattack: on the ground, in the lab, on the humanitarian front, and in the political sphere. A special report byHarvard Public Health editor Madeline Drexler.

ON THE GROUND: Alumnus Battles the Nightmare in Liberia

The first Ebola case that Mosoka Fallah saw with his own eyes was in early April 2014. The woman had come from Lofa County, in northwestern Liberia. She had cared for her brother, who died of the infection. Sickened herself, she took a taxi bound for Monrovia, the capital. She stayed one night in a crowded squatters' district named Chicken Soup Factory, left the next morning, and died. Miraculously, no one else was infected.

Fallah, MPH '12, saw his second case on June 27. A young woman—the only surviving member of a family of seven who had died from Ebola—was brought from neighboring Sierra Leone by her uncle. They made their way to New Kru Town, a coastal suburb of Monrovia. She died and was buried by her relatives—five of whom contracted Ebola and also died. The woman's infection spread to hospital staffers, who died. By now, Fallah had read extensively about the highly transmissible and fatal infection. He knew that the country's defenses were weak—the bureaucracy slow and resources meager—and that health workers were chasing outbreaks instead of anticipating them.

In interviews and in gripping emails chronicling the Ebola epidemic as it unfolds —"[t]his is the perfect storm for an exponential increase in the transmission of the disease," he wrote on August 15—he warned that the new clusters of Ebola would not be contained as readily as the first case in April. By the end of August, Liberia reported 225 confirmed deaths. Soon after, Fallah lost count of the dead and dying.

Mosoka Fallah, MPH '12, meets with residents of New Kru Town, Liberia. Fallah helped launch grassroots public health efforts by winning the trust of Ebola-stricken communities. DANIEL BEREHULAK/THE NEW YORK TIMES/REDUX

"I was telling people back in August: 'It's going to engulf this country. We could not operate like a normal mood. We had to operate from the framework of extreme emergency,'" he said in an interview with *Harvard Public Health* in early November. "But many persons weren't listening."

Bringing a Harvard Chan Education to an Ebola Epidemic

As he helps direct Liberia's emergency response to Ebola, Mosoka Fallah's education at the School has frequently informed his work. "First of all, we learned a perspective of social justice. That was drilled in our heads over and over—whether it was health-systems strengthening, infectious disease,

ecology. Richard Cash—what a great instructor, looking at health from a human rights perspective. These are issues that really got deep in my heart."

In classes with the late Marc Roberts, professor of political economy emeritus, and Daniel Wikler, the Mary B. Saltonstall Professor of Population Ethics, Fallah learned the terms "natural lottery" and "social lottery." "Maybe I have the IQ and my IQ allowed me to go to Harvard. Maybe because of that I have a new social class and social connections. It's likely that I will have some opportunities in life because of the friends I make.

"But there are those who may not be as fortunate. Those in West Point—for three generations they have been there. Maybe their mom and dad are poor peddlers. In the grand scheme of things, they may not have won the lottery. Do we victimize them? Do we create a health care system that only caters to guys like me? During an epidemic, nobody shouldn't have access to health care."

"We are in trouble."

August 12 was a day of ceaseless rain. Fallah and his fellow workers were toiling in the impoverished Monrovia township of West Point. "We pulled six bodies from houses that day." At the time, it took two or three days for ambulances or burial crews to remove the dead. "We picked up a dead person, and I saw this lady crawl out of the house, vomiting and toileting blood all around. West Point is very congested, no sanitation," he recalled.

He phoned his boss, the assistant minister for vital statistics in Liberia's Ministry of Health and Social Welfare. "We are in trouble," Fallah said. "Ebola has come to West Point.'"

Luckily, Fallah had become a trusted presence among local tribal chiefs and community leaders. He himself had grown up in West Point and in Chicken Soup Factory. His secret to earning trust was no secret.

"Let them see you as part of them" he said. "When I entered West Point, I never stayed in my car. I got out and I walked and I met the leaders. I walked with them in the houses and in between the houses. I never touched them—it was an epidemic, and I kept my distance. But I wasn't bringing this big Harvard degree to them. I wasn't telling them that I knew it all. I let the leaders make decisions and I guided them and followed them." Even when he was approached by a criminal gang for a handout—"It was about $1 U.S."—he was showered with praise. "One of them said to me, 'You are a true friend of West Point. You never abandoned us.'"

On that drenching August day when Ebola surfaced in West Point, Fallah discreetly approached some of the leaders and carried on whispered conversations in the corner of a community room. He pressed for details about the outbreak. "It became apparent that what we were seeing was the tip of the iceberg. There had been secret burials. The people had been sworn to secrecy."

Residents of West Point—a township in the Liberian capital of Monrovia—stand behind a rope forming one of the quarantine lines in August 2014. The controversial quarantine was lifted early. © KIERAN KESNER / ALAMY

Concerned that keeping the sick in densely crowded West Point would spark an uncontrollable explosion of the deadly disease, Fallah made a decision that, in retrospect, he considers a mistake: He convinced his boss at the health ministry of the need for a holding center for Ebola-sickened residents. "The people did not understand. They said we were trying to bring Ebola to West Point." After a mob stormed the center, the government ordered an army-enforced quarantine of the entire township. A series of misunderstandings led to violent

protests.

Fallah once again acted as a trusted go-between, negotiating a de-quarantine and organizing a homegrown active case finding program that has since become the national model of local surveillance during the crisis. To his amazement, communities that once fearfully denied Ebola are now coalescing around the crisis and organizing task forces and awareness teams.

"The enemy is the person you love most."

An epidemiologist and immunologist, Fallah came to the School in 2011 to study global health, with a concentration in infectious disease epidemiology. He focused on maternal, newborn, and child health in the slums of Monrovia. After earning his MPH, Fallah worked at Massachusetts General Hospital, studying the psychological ravages that followed Liberia's two recent civil wars.

How does the trauma of the Ebola epidemic compare? "The pain is not too visible yet," he explains, "but people are in shock. They are not going to even know where to start from. During the civil war, there were front lines, there were enemies.

"The thing about this epidemic that is even more deadly than the civil war is that the enemy is the person you love the most. The enemy can well be your mom or your husband or your children. How do we explain a family that has lost everyone except a single child? Will there be hopelessness? Fear? Aggression? Paranoia and psychosis? I don't know the answer."

IN THE LAB: TRACKING A NEW OUTBREAK

The Ebola epidemic in Sierra Leone was sparked in late May 2014, when 13 women prepared for burial the body of a traditional healer who had been working in neighboring Guinea. Pardis Sabeti, associate professor in the Department of Immunology and Infectious Diseases at Harvard

T.H. Chan School of Public Health, and colleagues traced the path of the lethal virus from the healer to her burial attendants (see graphic below). The Sabeti lab has also been tracking key genetic mutations as the virus spreads. During the course of the outbreak, Sabeti has lost five African colleagues to Ebola infection. Last August, she told the *Boston Globe*: "We wake up, we learn some news, we bawl our eyes out, and we try to figure out what we can do."

"Am I losing my humanity?"

Nor does he know how he himself has survived psychologically. "On August 29th, l lost my sister in Ghana. She had a lung illness. I'm a very emotional person. The morning my sister died and I got the call, I was just about to go to West Point." He asked another sister to inform their mother, and he drove to West Point, as he did every day, with the firm resolve to stop Ebola. "I didn't cry or break down."

When he returned home that night, he fell into bed exhausted. He remembers asking himself: "Am I losing my touch of humanity? I just lost my sister but I'm not crying. Is it because there's so much death and dying around me? Is it that I'm in survival mode?"

He does cry when a baby dies. "It breaks my heart. So much innocence. They haven't even started life and Ebola has already taken it away."

A Refuge for Women and Children

In 2013, before the Ebola crisis, Fallah was hired by Indiana University for a USAID project to develop a public health certificate program for mid-level health workers. After nine-and-a-half years of study in the U.S., he returned home that January to launch the program. Its mission was to train midwives and nurses in techniques that would reduce maternal and child mortality. Fallah also used the opportunity to construct a clinic catering to women and children in Monrovia's slums. Refuge Place clinic began operation in early June 2014. A few weeks later, Ebola struck. The newly minted public

health students were dispatched to the center of the crisis. But as the epidemic mounted and medical staffs around the country were becoming infected, Fallah decided to shutter Refuge Place.

By the fall, he had changed his mind. "I realized that pregnant women and children were still dying of common diseases—malaria, diarrhea, acute respiratory infections. They didn't have anywhere to go." And so, after rigorously training his staff in infection control and prevention, Fallah reopened Refuge Place in early October as a medical haven for pregnant women and children under 5, with all services free of charge.

"Not all of the sick have Ebola," Fallah said. "It's a complex paradox. On the one hand, you're trying to stay alive in an epidemic. On the other hand, my fear is that we're going to see a great increase in deaths from common, preventable diseases."

Indeed, in early November, when he spoke to *Harvard Public Health*, a national lab in Monrovia had found that among the clinical samples it was testing, only 36 percent tested positive for Ebola; the rest were familiar infections endemic in the country. Today, said Fallah, there is a dire need for ambulances to transport to treatment these non-Ebola sufferers who in normal circumstances could easily be saved.

What finally compelled Fallah to reopen Refuge Place was a horrifying scene he witnessed in the capital. "A pregnant woman was denied care because she could not afford the $300 for delivery. While she was walking from the private hospital that turned her away, she gave birth to twins in the street. *In the street*. A guy helped her deliver—he had to wear plastic bags. Then we arrived on the scene. That is fundamentally unfair: that one person should have access to health care in the middle of an epidemic and a pregnant woman should be condemned to die. I gave the family $20 to charter a taxi to the next hospital."

Taming the Epidemic

At times, Fallah is cynical about the world's tardy notice of the public health wildfire that has ravaged West Africa. "Not until an American doctor became infected—not until it became an international threat—did they mount an effective response. If we had invested one-tenth of what we're investing now back in July, when there were just a few hundred cases, this epidemic could have been stopped." By early November, Fallah estimates, the toll was likely 5,000–6,000 in Liberia alone—far more than the official estimates.

Today, the epidemic curve seems to be flattening. New cases are diminishing. Fallah worries that the success wrought by the all-out campaign that he has helped lead will lull Liberians into relaxing their vigilance. "The last mile," he warned, "is when you must intensify your intervention."

Mosoka Fallah makes his way to a community meeting in Monrovia, Liberia. Fallah grew up in Monrovia's poorest neighborhoods before studying at Harvard Chan. DANIEL BEREHULAK/THE NEW YORK TIMES/REDUX

What will it take to extinguish the epidemic? Perfect contact tracing. Right now, said

Fallah, health workers have been able to directly meet and follow some 60–70 percent of the contacts of infected people. Working with the U.S. Centers for Disease Control and Prevention, he and his colleagues are synthesizing treatment data, contact data, and GPS information from body retrievals and burials to sharply delineate the changing contours of the epidemic.

Every night, the data are analyzed at the Ministry of Health. Every morning, thousands of volunteers are handed address lists for known contacts of the infected. When they find these contacts, they ask them to go into 21-day quarantine, with the promise that neighbors will bring food and water. Other volunteers conduct active contact tracing, moving house to house to ferret out cases that haven't come to light.

Fallah's goal is to train 6,000 active case finders throughout Liberia. "If we can find 100 percent of the contacts, we can break the transmission."

Years from now, what does Mosoka Fallah see in his mind's eye when he looks back on Liberia's Ebola nightmare? He answers in the present tense, as if he can't imagine that this bad dream will recede in memory. "All of the unsung heroes. Some of them are ordinary people, uneducated, poor. The guys who track cases. The guys who pick up the phone and give us updates every day. The guys who stand by me. There are many good people in Liberia."

On the Humanitarian Front: Scaling Up

Michael VanRooyen

When the World Health Organization (WHO)
belatedly declared Ebola virus disease a Public Health Emergency of International Concern, its parent agency, the United Nations, was already

grappling with three other humanitarian catastrophes: in Syria, the Central African Republic, and South Sudan. A week after the WHO's Ebola announcement, the UN added Iraq to the list of countries with "Level 3" emergencies—the highest classification of crisis, requiring a swift and massive response from the UN.

For Michael VanRooyen, director of the Harvard Humanitarian Initiative, the congruence of five system-wide emergencies underscores the case for dramatically more money and political commitment to disease prevention, public health services, and humanitarian aid. But will the Ebola crisis spur such engagement?

Zero to Sixty

As the epidemic gathered steam, HHI launched into action on many fronts. It convened global leaders and Ebola experts to discuss the practical implications of the crisis. It shared advanced database software to collect up-to-date information on the disease's spread for the UN. And it advised NGOs working in the stricken countries.

From the start, VanRooyen realized through conversations with relief groups that this Ebola epidemic was different from earlier outbreaks. It erupted at the intersection of three impoverished nations; two had just emerged from civil wars, and all had seen a brain drain of medical providers. Their health care systems barely functioned. Local public health workers could not keep up with the task of identifying patients, tracking down their contacts, and educating residents to prevent the infection.

In contrast to the 2010 Haiti earthquake, when thousands of organizations converged on Port-au-Prince, aid groups were reluctant to address Ebola,

because health workers' lives were at risk. They didn't have the expertise, infrastructure, training, and deep logistics capacity.

And with Ebola, one of the biggest challenges was "scale-up": landing in a country with the ability to set up a 200-bed treatment center, protect the staff, and activate a robust supply chain. As VanRooyen puts it, "You have to go from zero to sixty very fast." The 2014 Ebola disaster might have been averted, he adds, if the UN and wealthy governments had funneled more money early to NGOs with proven know-how to fight infection and scale up quickly.

Fighting the Last Threat—Not the Next One

The larger problem, VanRooyen says, is that in public health, resources tend to be steered toward the last emergency—rather than preparing for the next one. He would like to see health systems in vulnerable nations proficient in monitoring not just Ebola, but all lethal and highly transmissible diseases. One model: Uganda, which has effectively responded to deadly hemorrhagic infections—such as those caused by Lassa, Marburg, and Ebola viruses—through early case identification and timely quarantine.

Despite a slow and uncoordinated intervention, this latest Ebola epidemic will likely be controlled, VanRooyen says. Sadly, more lethal infections in the region will not soon go away. When officials look at excess mortality statistics from Liberia, Sierra Leone, and Guinea a year from now, the main cause will be not Ebola, but untreated malaria, diarrheal illness, maternal and infant infections, and other tragically commonplace threats.

In the United States: Public Health and Politics

Ashish Jha

When the Ebola virus was first diagnosed in the United States in September 2014, journalists, commentators, and political leaders responded in tones ranging from sensationalistic to philosophical, from fearmongering to factual. But the School's Ashish Jha, MPH '04, K.T. Li Professor of International Health and director of the Harvard Global Health Institute, sees the lessons learned as starkly instructive. He spoke in early November with *Harvard Public Health*.

Q: Thomas Eric Duncan, a Liberian who had been visiting his family in Dallas, died of Ebola in early October at Texas Health Presbyterian Hospital. He had originally been sent home after showing early symptoms of the disease. Two of the nurses who cared for him also became infected. What went wrong?

A: In the first 48 to 72 hours, the hospital's leadership spent its time being defensive, finding other people and systems to blame for what happened. Instead, their CEO should have come out the morning after the diagnosis and said: Look, we messed up. We did not catch this and I am deeply sorry. We're going to do two things. First, we're going to focus right now on taking really good care of this patient. Second, we're going to have a thorough accounting of what happened, where we messed up, where the systems failed, and how best to address those errors.

Q: Are you saying that during a public health crisis, the admission of failure is reassuring?

A: Normally, a lot of communications and crisis management people think the public needs to be assured, and the way you assure people is by telling

them it's all under control. But the public is smarter than that. Especially now, with the proliferation of social media, if you try to hoodwink the public, they will figure it out quickly and you will lose credibility. I think honesty and humility are key to being reassuring.

Q: As you look back, what did the U.S. do admirably well when Ebola reached our shores?

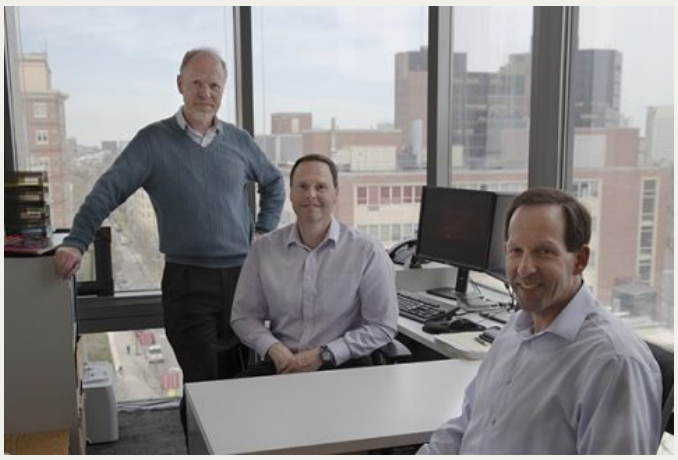
A: We're a very dynamic country. There was an evolution in our response. The Centers for Disease Control and Prevention stayed faithful to the science. Despite the political pressure, they didn't give in to the ill-conceived notion of the 21-day quarantines for everybody. Despite the politics, President Obama didn't buckle. So while some politicians in New York and New Jersey clearly focused more on the politics than the science, the policy apparatus fundamentally got it right.

Visit Harvard Chan's Ebola in the News website at hsph.harvard.edu/ebola-in-the-news for the latest information from the School on the crisis and what it means for public health globally.

News from the School

The sexual exploitation of child migrants

Americans divided on future of healthcare



Two decades of innovation

First molecular genetic evidence of PTSD heritability