March 31, 2012

In Haiti, Global Failures on a Cholera Epidemic

By DEBORAH SONTAG

MIREBALAIS, Haiti — Jean Salgadeau Pelette, handsome when medicated and groomed, often roamed this central Haitian town in a disheveled state, wild-eyed and naked. He was a familiar figure here, the lanky scion of a prominent family who suffered from a mental illness.

On Oct. 16, 2010, Mr. Pelette, 38, woke at dawn in his solitary room behind a bric-a-brac shop off the town square. As was his habit, he loped down the hill to the Latem River for his bath, passing the beauty shop, the pharmacy and the funeral home where his body would soon be prepared for burial.

The river would have been busy that morning, with bathers, laundresses and schoolchildren brushing their teeth. Nobody thought of its flowing waters, downstream from a United Nations peacekeeping base, as toxic.

When Mr. Pelette was found lying by the bank a few hours later, he was so weak from a sudden, violent stomach illness that he had to be carried back to his room. It did not immediately occur to his relatives to rush him to the hospital.

“At that time, the word ‘cholera’ didn’t yet exist,” said one of his brothers, Malherbe Pelette. “We didn’t know he was in mortal danger. But by 4 that afternoon, my brother was dead. He was the first victim, or so they say.”

In the 17 months since Mr. Pelette was buried in the trash-strewn graveyard here, cholera has killed more than 7,050 Haitians and sickened more than 531,000, or 5 percent of the population. Lightning fast and virulent, it spread from here through every Haitian state, erupting into the world’s largest cholera epidemic despite a huge international mobilization still dealing with the effects of the Jan. 12, 2010, earthquake.

The world rallied to confront cholera, too, but the mission was muddled by the United Nations’ apparent role in igniting the epidemic and its unwillingness to acknowledge it. Epidemiologic and microbiologic evidence strongly suggests that United Nations peacekeeping troops from Nepal imported cholera to Haiti, contaminated the river tributary next to their base through a faulty sanitation system and caused a second disaster.

“It was like throwing a lighted match into a gasoline-filled room,” said Dr. Paul S. Keim, a microbial geneticist whose laboratory determined that the Haitian and Nepalese cholera strains were virtually identical.

And, as the deaths and continuing caseload indicate, the world’s response to this preventable, treatable scourge has proved inadequate. Cholera, never before recorded in Haiti, stayed one step ahead of the authorities as they shifted gears from the earthquake recovery. While eventually effective in reducing the fatality rate, the response

was slow to get fully under way, conservative and insufficiently sustained.

“In the future, historians will look back and say, ‘Wow, that’s unfortunate,’ ” said Dr. Paul Farmer, co-founder of Partners in Health, a nongovernmental organization that provides health care for the poor. “This unfolded right under the noses of all those NGOs. And they will ask, ‘Why didn’t they try harder? Why didn’t they throw the kitchen sink at cholera in Haiti?’ ”

While the world has dedicated $230 million so far to combating the unexpected epidemic, the United Nations is now pleading for an additional $53.9 million just to get the vulnerable displaced population through the rainy months ahead.

At the same time, Haitian cholera victims are seeking compensation from the United Nations, pressing it to accept responsibility. Early on, protests against the United Nations hindered the construction of treatment centers and the delivery of lifesaving supplies. Now distrust of some cholera programs lingers, and the issue has strained the peacekeepers’ relationship with the Haitians they are protecting in an eight-year-old mission to stabilize the politically volatile nation. So, too, have unrelated allegations that they engaged in criminally abusive behavior.

“In telling the truth, the U.N. could have gained the trust of the population and facilitated the fight against cholera,” said Dr. Renaud Piarroux, who led an early investigation into the outbreak. “But that was bungled.”

The United Nations maintains that an independent panel of experts determined the evidence implicating its troops to be inconclusive.

Questioned for this article, though, those same experts said that Dr. Keim’s work, conducted after their own, provides “irrefutable molecular evidence” that Haiti’s cholera came from Nepal, in the words of G. Balakrish Nair, an Indian microbiologist.

“When you take the circumstantial evidence in our report and all that has come out since, the story now I think is stronger: the most likely scenario is that the cholera began with someone at the Minustah base,” said another expert, Daniele Lantagne, an American engineer, using the French acronym for the United Nations mission.

Even so, Anthony Banbury, a United Nations assistant secretary general, said last week, “We don’t think the cholera outbreak is attributable to any single factor.”

Many health officials consider the cholera response “pretty remarkable,” as John Vertefeuille, the Centers for Disease Control and Prevention’s director in Haiti, said.

A sky-high initial fatality rate of over 9 percent has declined to 1.3 percent (less than 1 percent is considered a well-managed epidemic). And the most recent statistics show new cases dropping to 120 daily.

Others, though, believe the bar for success was set too low and more lives could have been saved. Some critics

bemoan weak disease surveillance and case-tracking, others inadequate water distribution and latrine building, and still others what they see as a penny-pinching reluctance to use antibiotics and cholera vaccine.

Also, some think cholera could have been stymied, even eradicated, last winter during the dry season after the first wave. Instead, it flared with the rains even as aid groups shuttered or reduced operations. And now, after another winter without an aggressive prevention and eradication effort, the health authorities fear a reprise.

“I think it’s going to be another bad year for cholera,” said Dr. John Carroll, an Illinois doctor who works in Haiti.

A Rapid Death

Here in the epicenter of the epidemic, all signage relates to life in the time of cholera. Surrounding the town square are heart-adorned posters that say, “Living with cholera: Always wash your hands with clean water and soap.” Banners slung across the streets, in contrast, bear skulls and crossbones: “Justice and reparations for all victims of the Minustah cholera.”

Inside City Hall, the deputy mayor, crisply dressed in a chambray shirt and slacks, described how he personally buried 27 bodies for fear that workers would not take precautions, how he nearly lost two of his own children to cholera and how he seethed every time Nepalese troops entered his offices.

“They were in my face every day, and the feeling inside me got stronger and stronger,” said Ocxama Moise, the deputy mayor. “A few months ago, I even considered killing a soldier or two to see what would happen. I shared the idea with some friends, and they said, ‘Don’t. You’re an official.’ But it’s only a matter of time before the population finds a way to get justice.”

After the earthquake, when Haitians were living amid cadaver-filled ruins in the sprawling Port-au-Prince area, international health officials were concerned that infectious diseases would rip through the tent camps.

Well before the earthquake, Haiti was fertile ground for a disease that spreads primarily through fecal contamination of water: in 2008, only 12 percent of the population had access to piped, treated water, and only 17 percent to “improved sanitation,” which includes the simplest pit latrines. Haitians’ latrine access actually declined, from 24 percent in 1990.

“For decades we as partners have failed to ensure safe water and sanitation is provided to every resident of Haiti,” said Dr. Jon Kim Andrus, deputy director of the Pan American Health Organization.

But Haiti had escaped the cholera that raged through Latin America in the 1990s, and even the cholera that struck the Caribbean in the 19th century. It appeared “extremely unlikely” that cholera would present itself, a C.D.C. post-earthquake brief said.

“The risk of cholera introduction to Haiti is low,” it said, noting relief workers were “likely to have access to adequate hygiene and sanitation facilities within Haiti, such that any cholera organisms they import would be safely contained.”

Seven months later, that assumption would be challenged.

On Oct. 8, 2010, hundreds of Nepalese troops began arriving in Haiti after a cholera outbreak in their homeland, where cholera is endemic; the country weathers outbreaks well, with that one causing nine deaths.

Cholera also affects individuals differently; many infected develop no symptoms or only mild or moderate diarrhea.

Falling violently ill in October 2010, Mr. Pelette was not one of the lucky ones. Severe cholera causes profuse watery diarrhea, often accompanied by vomiting. Treatment is straightforward: replacing lost fluids and electrolytes, orally or intravenously. But those like Mr. Pelette who get no treatment can become so dehydrated that they go into shock and swiftly die.

Nobody knows for sure, but people here believe that Mr. Pelette was the first Haitian to die of cholera, and, though he was not named, he was presented as the "first case" in The American Journal of Tropical Medicine and Hygiene in January.

Some details in that widely cited article, like Mr. Pelette's age and date of death, did not match those on his death certificate, obtained by The New York Times. Also, Mr. Pelette does not offer an example of untreated mental illness, as the article contended; he had received care at a hospital for chronic mental diseases, his brother said.

"When he took his pills, he was calm," Malherbe Pelette said, speaking on the porch of his sundry store. "He would come here every day, stand at the door waiting for a soda or cookies, and give a fist bump to everybody who came in. Sometimes, he showed up completely naked. He had a terrible speech impediment, and when he was agitated, it was really hard to understand him.

"Still, my friend, I cried when he died — a lot, a lot."

Enter the Epidemic

A couple of hours after Mr. Pelette died from what the family priest proclaimed to be a poison of some sort, Rosemond Laurimé, 21, a "small businessman" in his family's description, got sick in nearby Meille.

In Haiti, small businesses are minuscule, selling mangos or charcoal today to survive tomorrow. Mr. Laurimé peddled soap at a stand outside the Nepalese base, which sits on the banks of a fly-specked stream that flows into the Latem and then into Haiti's longest river, the Artibonite.

Around 6 p.m. on Oct. 16, when he returned to his shack near the base, he was clutching his stomach. Soon, doubled over from violent diarrhea and vomiting, he begged for help.

His grandmother, 70-year-old Marie-Jean Ulysse, did her best, finally summoning a moto-taxi at daybreak to take Mr. Laurimé to the hospital in Mirebalais, run by a Cuban medical brigade.

By the time he got there, it was too late: “His body had lost all its water,” Ms. Ulysse said.

On Oct. 17, Mr. Laurimé became the first to die of cholera at a hospital in Haiti. The next day the Cuban doctors, who had seen five dozen cases of acute diarrhea in preceding days, notified the Haitian Health Ministry that something was terribly wrong.

Mr. Laurimé’s grandmother also fell ill and, hovering near death, witnessed the frightening explosion of the epidemic as she lay absorbing fluids intravenously on a hospital cot. She saw a chain of sick prisoners stripped of clothing and handcuffed one to the next. She watched an endless parade of patients carried in, bodies carried out.

“I said to my children, ‘Please do your best to take me home because I don’t want to end up in the big hole where they’re dumping all those bodies,’ ” she said.

While she is fine now, Mr. Laurimé’s mother is not. Yverose Fleury wears a cloth binding her midsection in an effort to contain her sorrow. She said neighbors had ripped up her son’s photograph because she keened over it incessantly.

“Nothing is the same with us after the cholera,” she said. “My husband is weak and cannot work, my remaining son has a mass on his neck, my little daughter can’t hold down food, and I am sick in the head.”

From Meille, the epidemic coursed through the Artibonite River valley, landing with a thump 46 miles northwest, and downstream, in the coastal St. Marc area. On Oct. 19, three children died in rapid succession in a classroom in the rice fields. On Oct. 20, the St. Nicholas Hospital was overrun.

Patients sprawled on every surface, doubled and tripled up on beds, in the halls, in the courtyard and even on the sidewalk outside. By nightfall, there were 404. Forty-four died.

“At that moment, I felt like I didn’t want to live any longer myself,” said Dr. Yfto Mayette, the hospital director. “It was so sudden and so brutal.”

On Oct. 21, as a brass band accompanied Mr. Pelette’s white coffin to the cemetery, the national laboratory completed its analysis of the bacteria.

At 11 that night, Dr. Jordan W. Tappero of the C.D.C. got a call in Atlanta from the laboratory’s director: “Jordan,” he said, “It’s positive.”

Louise C. Ivers, Haiti mission chief for Partners in Health, had just arrived in Boston for a meeting. “My first thought was, ‘You can’t be serious.’ Everyone was exhausted.”

In Port-au-Prince, Jocelyne Pierre-Louis, a senior Haitian health official, had steeled herself. “We were in a way waiting for the other shoe to drop,” she said. “We had barely picked ourselves up after the earthquake when the cholera fell on us.”

Dr. Pierre-Louis reported to the large tent that replaced her collapsed office after the earthquake. Dr. Ivers took the next plane back, and Dr. Tappero flew in, too, with the first of 119 C.D.C. employees who would deploy to Haiti.

“It was a herculean effort at the time, people working 18, 20 hours a day, trying their best to make a difference,” Dr. Tappero said.

There was much to do, from treating patients to treating water, from importing personnel to training Haitians, from distributing supplies to distributing basic disease and hygiene information.

But there were also fundamental decisions to be made, and nobody was firmly in charge. International health officials deferred to the Haitians — “our partners” — but in reality held the purse strings and know-how. This led to an often awkward collaboration, colored by Haitians’ resentment that cholera had been imported in the first place.

It did not help that the initial projection used by international officials for planning purposes — 200,000 cases in six months — was an underestimate. There would be that many cases in three months’ time, with a daily death toll of more than 100 by mid-December.

As the epidemic took off, the players who operated outside the “health cluster,” a consortium of humanitarian groups, were able to react most nimbly.

At first, Doctors Without Borders and the Cuban medical brigades, both self-financed, handled the overwhelming majority of cases. “We felt quite lonely at the beginning,” said Yann Libessart, spokesman for Doctors Without Borders. “It made no sense. Everybody was in Haiti. It was the biggest density of humanitarian actors in the world, and we two organizations were dealing with 80 percent of the cholera.”

Gaëtan Drossart, mission chief for Doctors Without Borders-Belgium, said the health cluster had good intentions, “but there’s a lot of meetings and a lot of blah blah blah.” He said other groups were limited by agreements with donors to working in the earthquake zone and could not redeploy quickly.

Also, everybody initially worried most about the epidemic’s arrival in Port-au-Prince. But Haiti’s meager health care resources have always been concentrated in the capital, and after the earthquake humanitarian personnel and supplies were, too. That would eventually increase the cholera survival odds in Port-au-Prince, which would have a 0.7 percent fatality rate compared with 4.5 percent in the southeast.

But it took several deadly weeks for the disease to forcefully strike the capital, where rehydration solutions were warehoused; water, latrines and medical professionals were more plentiful; and organizations had had time to set up proper treatment centers.

Proper treatment centers maintain rigorous infection control to keep from becoming cholera contamination centers: chlorine sprayers to disinfect shoes, hand-washing stations, cots with holes and buckets underneath,

disposal systems for waste and bodies.

None of this was in place at the start. Doctors Without Borders sent a team to the St. Marc hospital. “It was really, really awful,” Mr. Drossart said. “There were an enormous number of cases, it was totally disorganized, the cholera patients were not isolated, and they were not being treated correctly.”

Even four months later, that hospital did not have cholera cots; patients defecated in bed or risked a potentially fatal drop in blood pressure by getting up, United Nations investigators found.

“Hospital staff reported walking on feces in cholera units,” they added.

Understaffed hospitals sometimes discharged patients too soon, sending them home to their deaths. They deputized relatives as caretakers although many patients arrived so dehydrated that they needed intravenous lines and nurses to watch over them. Pregnant women were a particular challenge.

“Our greatest heartbreak is that while the women survived, we only saved one pregnancy,” said Ian Rawson, managing director of Albert Schweitzer Hospital in central Haiti.

Truth vs. ‘The Blame Game’

Within a week of the outbreak, officials in Mirebalais were pointing fingers at the United Nations base, and United Nations officials were trying to stifle what they portrayed as rumors. The struggle began between those who thought that determining the epidemic’s origin was important and those who lamented “the blame game.”

At first, the United Nations said the base’s handling of its waste met international standards — that it used sealed septic tanks, which were regularly emptied by a Haitian contractor, with the waste buried in a proper landfill.

But on Oct. 27, Al Jazeera filmed peacekeepers with shovels “working furiously to contain what looks like a sewage spill.” Latrines appeared to be emptying black liquid directly into the river, a reporter said, and the air smelled foul with excrement.

That same day, The Associated Press observed an overflowing septic tank at the base and discovered the landfill to be open pits in a residential area uphill from the community’s bathing stream.

Even four months later, the United Nations’ own experts, examining the base’s supposedly improved sanitation, discovered haphazard piping with “significant potential for cross-contamination” between toilets and showers.

They also noted the “potential for feces to enter and flow from the drainage canal running through the camp directly” into the tributary. Contaminants would have been distributed throughout the river delta in two or three days — a timeline consistent with epidemiological evidence tracing the cholera trail, the experts said.

Before long, hundreds of Haitians were marching on the base, with demonstrations spreading to Port-au-Prince and riots developing in Cap Haitien.

Edmond Mulet, then head of the United Nations stabilization mission, complained that it was “really unfair to accuse the U.N. for bringing cholera into Haiti.” United Nations officials believed that agitators were taking advantage of the issue to sow unrest before November elections. But many Haitians were genuinely incensed — and fearful. Some wanted an explanation, others a scapegoat. Voodoo priests were being lynched for their supposed role in bringing the curse of cholera on Haiti, the government said.

In early November, the C.D.C. said that Haitian cholera samples matched strains commonly found in South Asia.

Dr. Piarroux, an infectious diseases specialist and parasitologist from Marseilles, arrived to lead a three-week French-Haitian investigation. He and his colleagues built a database of cases, identified geographic clusters and mapped the epidemic’s movement.

His conclusion: the only explanation for an outbreak of South Asian-style cholera in a rural area of Haiti home to a Nepalese Army base with a faulty sanitation system had to be infected soldiers on the base itself.

In early December, Dr. Piarroux’s mission report was posted on the Web site of the newspaper Le Monde. Eventually his findings would be peer-reviewed and published in the C.D.C.’s Emerging Infectious Diseases journal.

But at that point, he said, he was considered “a renegade and a mythomaniac.” A leading medical journal, The Lancet, rejected his study after publishing an editorial that said, “Although interest in how the outbreak originated may be a matter of scientific curiosity for the future, apportioning blame for the outbreak now is neither fair to people working to improve a dire situation, nor helpful in combating the disease.”

Nonetheless, Ban Ki-moon, the United Nations secretary general, announced an independent panel “to get to the bottom of this and find answers the people of Haiti deserve.”

Money and Lives

From the start, financial concerns colored the response to the epidemic, which had killed more than 3,600 Haitians by the first anniversary of the earthquake. It was partly a question of getting money flowing. Some donors hesitated, given the plodding pace of the earthquake reconstruction; others had to wait for a new budgetary year. Some institutions had time-consuming grant or contracting processes.

It was also a question of philosophy.

Some health officials wanted to use the least expensive prevention and treatment strategies and to marshal resources for the long battle ahead.

Others wanted to employ every available weapon at once, from free drinking water and antibiotics to aggressive case-tracking, mass vaccination, and water and sewer system building.

If that meant spending more upfront, so be it, they said. A year after the earthquake, many organizations were

sitting on donations that remained unspent. The American Red Cross, for one, still had nearly half of the $479 million it had raised; it would ultimately dedicate $18 million directly to cholera prevention and treatment. Doctors Without Borders would spend $45 million.

Dr. Farmer of Partners in Health, who calls himself "a maximalist," said he wanted "health equity" — for the developed world to respond to cholera in Haiti as it would at home.

His organization initially requested potable water be trucked into the Haitian heartland so that a traumatized population would not have to filter and treat its water. Purification tablets were delivered instead because it was considered cheaper and simpler, he said.

"There was a fetishization of the simple," Dr. Farmer said. "But there's nothing simple about the introduction of a new pathogen or stopping its spread in a water-insecure place. There's nothing cheap about it, either."

Dr. Farmer said he kept thinking about the many water stations at the New York City Marathon: "That's for a sport, for heaven's sake. You're telling me the giant humanitarian aid machine can't do that in an epidemic?"

Mark Henderson, a Unicef official, said water trucking was done inside the town of St. Marc. "I don't know if it would have been logistically possible to send a water truck to every village in the Artibonite," he said. "And I'm not sure it would have yielded better results than getting water, which is available locally, and applying chlorine."

There was also a reluctance to use antibiotics, which can reduce diarrhea, spare suffering and potentially limit the disease's spread.

The Cubans alone, who claimed in a report that without their help "another 1,000 Haitians would have died at Haitian Health Ministry institutions," dispensed antibiotics to all cholera patients and preventively to their relatives.

World health authorities, concerned with cost and drug resistance, initially said antibiotics should be reserved for severe cases. Nearly three months later, the C.D.C. recommended antibiotics for moderate cases, too.

The fiercest disagreement was over vaccination. Again, citing cost as well as limited supplies and logistical challenges, world health officials initially did not endorse it. Some worried aloud that Haitians could get a false sense of security and become lax about hygiene.

Also, one of the two oral vaccines available — Shanchol, the cheaper one — was still under review by the World Health Organization.

But proponents argued that vaccines could save lives and buy time until long-range solutions like water and waste systems were put in place. They called for fast-tracking approval for Shanchol and increasing vaccine production by offering manufacturers purchase commitments. In mid-December, after a C.D.C. analysis indicated that using the available vaccine doses could reduce the caseload by 22,000, the Pan American Health Organization agreed a pilot vaccination project would be useful.

Influenced by arguments against vaccination, though, the Haitian government said no. Choosing a small group to be immunized would inflame tensions, it said; at least 500,000 needed to be vaccinated, said Jean Ronald Cadet, Haiti's vaccination chief. "They brought us cholera, they have to take responsibility for taking care of it," he said.

Delay and Disbelief

In February 2011, nearly four months after the outbreak, the United Nations' independent experts arrived in Haiti.

The secretary general's office wanted them to move quickly but not too quickly; it did not want the findings released until the Nepalese contingent had concluded its six-month rotation, Ms. Lantagne said.

When the experts revealed their findings in May, the secretary general's staff members were surprised, Ms. Lantagne said. Early theories had proposed environmental and climatological explanations for the outbreak. "I believe they fully expected our results to be that there was no possibility cholera was imported into Haiti," she said.

Instead, the panel said not only that the cholera had come from South Asia but that it originated in the tributary behind the Nepalese base.

Yet the United Nations experts noted that "the introduction of this cholera strain as a result of environmental contamination with feces could not have been the source of such an outbreak without simultaneous water and sanitation and health care system deficiencies."

And they diplomatically concluded that the epidemic was "not the fault of, or deliberate action of, a group or individual."

The panel had examined the Nepalese base's infirmary logs and found no reports of severe diarrhea in September or October of 2010. Many took that to mean that the soldiers were probably unwitting, asymptomatic carriers of cholera. But Dr. Piarroux did not think that asymptomatic carriers would have shed enough bacteria to have caused such a sudden, marked contamination of the river. He believed that many soldiers must have had diarrhea — even if it was only mild or moderate diarrhea that, being military men, they did not report to the infirmary.

Testing the soldiers would have been the only way to learn the truth, Dr. Piarroux said. But Haitian health officials were not permitted onto the base to examine the soldiers.

After the United Nations panel dispersed, Danish and American scientists collaborated to scrutinize the Haiti-Nepal connection using the most comprehensive type of bacterial genetic analysis — whole-genome sequence typing.

Dr. Rene S. Hendriksen of Denmark persuaded the Nepalese to provide samples from their outbreak. Dr. Keim's

Translational Genomics Research Institute in Arizona sequenced the DNA, comparing it with Haitian samples already sequenced by the C.D.C.

The Haitian and Nepalese strains were virtually identical — a conclusion the Nepalese were reluctant to accept. "They were trying to fish around for whether our analysis was properly conducted," Dr. Hendriksen said. "But finally they gave up simply because our data was valid. We agreed we would balance the paper and not get into the blame game."

Citing this study and other evidence, a legal claim was submitted to the United Nations in November on behalf of Haiti's cholera victims.

Anticipating compensation, thousands flooded treatment centers seeking medical certificates attesting to their cholera. Doctors Without Borders set up a special unit to process the requests, and has asked the United Nations to clarify whether a legal proceeding is even moving forward.

The victims' lawyers have asked the United Nations to establish a commission to hear the claim. Mr. Banbury of the United Nations said the claim is "under serious review by the legal affairs department."

"The U.N.'s choice is simple," the lawyers wrote in a legal article. "It can rise to the occasion and demonstrate that the rule of law protects the rights of poor Haitians against one of the world's most powerful institutions, or it can shrink from the challenge and demonstrate that once again in Haiti, 'might makes right.' "

A Breather, and Then Disaster

It is tempting now, when reported cholera cases are at a low, for Haitians to relax their guard and for health officials to take a breather.

"We are no longer 24/7 cholera," Dr. Pierre-Louis said. The same thing happened last year. Then the rains hit, and Port-au-Prince, like other places, experienced more cases — 24,000 — during a 42-day period than at the epidemic's start. It was a scramble to deal with the surge; many grants had expired, emergency workers had gone home, and treatment centers were closed.

"We had supplies and structures prepositioned, but it wasn't simple," said Mr. Drossart of Doctors Without Borders. "We couldn't keep mobilizing staff for Haiti. There are other things going on in the world."

Dr. Vertefeuille of the C.D.C. said a key focus now was making the response sustainable without a large international presence. But the government health system, weak and underfinanced, will be hard-pressed to assume greater responsibility.

Dr. Vertefeuille also said cholera was likely to persist in Haiti absent the development of water and sanitation systems, the cost of which has been estimated at $800 million to $1.1 billion.

A singular achievement was the opening of Haiti's first wastewater treatment site last fall. But humanitarian

groups fret that short-term water and sanitation solutions are not being pursued aggressively, and that tent camps have lost the free water and, in some cases, the latrine services that gave them a buffer against cholera.

Many also express keen frustration that the dry season is not being used for aggressive case tracking — chasing the disease into pockets where it flares, investigating and chlorinating the water source, and mobilizing the community.

“You can’t wait with your arms crossed until the rain falls again,” Dr. Piarroux said. “You have to go after these areas like firemen trying to extinguish every last burning ember of a forest fire.”

Those who now find the official response sluggish — “daily” epidemic surveillance is posted after a delay of weeks — point to what happened recently in Pestel in southwest Haiti.

On Dec. 10, a severely dehydrated man showed up at the cholera treatment unit. The man was too far gone to be resuscitated, said Dr. Seneque Philippe, the physician in charge.

Dr. Philippe’s cholera unit had been inactive because the government had not paid the staff’s salaries. He was not ready for another outbreak.

Within two weeks, however, Dr. Philippe believed that he was in the midst of one. People were dying during the long journey down from the rugged mountains to his coastal hospital.

He said that he alerted Health Ministry officials on Dec. 24, and that they were unresponsive. So he contacted an American missionary who had been working in Pestel for decades. She, in turn, tapped into an Internet network of health professionals involved in Haiti and gathered volunteers, supplies and money to pay Dr. Philippe’s nurses.

They arrived Jan. 10 to find the cholera treatment unit overflowing. Most patients were coming from the mountains, so the volunteers, bolstered by other recruits, set up remote treatment tents. They also conducted a door-to-door census in the villages. Including treatment records, too, they calculated 278 suspected cholera cases and 62 deaths in December and January, with most deaths occurring before the ad-hoc group of foreigners arrived.

In Port-au-Prince, Dr. Pierre-Louis of the Health Ministry maintained that the reported outbreak in Pestel had been a “false alarm,” with only 65 cases and three deaths. She said that “the local doctor” had rebutted the larger numbers.

But Dr. Philippe, the local doctor, while saying he is “personally aware of only about 15 deaths,” said he knew of 300 cases — a significant outbreak.

“I felt abandoned to handle the problem myself,” he said.

Farther north, one effort to use the dry season to establish a bulwark against the disease was running into other

problems.

Late last fall, the new government of President Michel Martelly had authorized a vaccination campaign. It was to start small, immunizing 50,000 residents of a Port-au-Prince slum and 50,000 rural residents in the St. Marc area.

The organizers, wishing they could have begun a year earlier and more broadly, were nonetheless relieved to have secured the new administration's cooperation; it helped that Shanchol, the cheaper vaccine at $1.85 a dose, had been approved.

The organizers — Partners in Health and the Haitian group Gheskio — were also pleased to be starting well before the rains; the vaccine, considered nearly 70 percent effective, is administered in two doses two weeks apart and takes another week to take effect.

In February, Djencia Augustin, 25, a petite, vivacious law student, was racing from mud hut to mud hut in the rice fields of Bocozel to register residents. She wore a T-shirt with a wordy slogan — "We are fighting cholera with Shanchol vaccine without forgetting the other principals of hygiene" — and, in the shade of breadfruit trees, gathered barefoot villagers in threadbare clothing around her as she recorded their information on a computer tablet.

"Some people think cholera is not in our country anymore," Ms. Augustin told them. "That's not true. Cholera will come to visit when the rains arrive, so you need to be prepared."

Bocozel seemed eager. Chavan Dorcelus, 58, said: "It's a real bonus for us. Plus it's free, and it can't hurt."

Told that pregnant women were ineligible, Fada Joseph, 24, patted her belly. "That's not really fair. I'm very scared of cholera," she said. "And if I got an abortion, would that help?"

But in mid-March, radio reports characterized the project as an experiment on Haitian guinea pigs. With $370,000 of vaccine sitting in coolers, a government bioethics committee took up the issue. The campaign appeared in peril. Dr. Farmer said last Thursday, however, that the Haitian health minister had just promised him that she would resolve the issue in the coming week.

'Would Have Burned It Down'

In Meille, the walled gate at the United Nations base is freshly painted now with the insignia of Uruguayan peacekeepers. The Nepalese are gone.

The mission itself is reducing its forces nationwide. Nepal's troop strength is being cut by two-thirds, more than any other country's. United Nations officials said that this was unrelated to tensions over cholera.

But people here think otherwise: "If they hadn't left, we would have burned it down," Deputy Mayor Moise said of the base.

In February, an Uruguayan advance guard was there, removing latrines and generally “sanitizing the operation so previous problems do not repeat themselves,” as one soldier said.

Across the street, the open pits where the base’s waste used to be deposited were fenced. “They stopped dumping the foreigners’ poo there after the cholera,” said Ludner Jean-Louis, a farmer, his two cows tied to trees.

Mr. Jean-Louis, who had survived the disease himself, added, “I don’t guess you can be mad at Minustah for the cholera. Only for the poo.”

Behind the base, the stream where the epidemic began bustles with life now as it did before the outbreak; many who live and work beside it have no other access to free water.

Recently, just behind the base’s barbed-wire periphery, Dieula Sénéchal squatted with her skirt hiked up, scrubbing exuberantly colored clothes while a naked 6-year-old girl, Magalie Louis, defecated by the bank, gnawed on a stalk of sugarcane and then splashed into the water to brush her teeth.

Approaching with a machete on his way to hack some cane, her gap-toothed father, Légénord Louis, said Magalie had contracted cholera late last year but after four days of “special IVs” was restored to health. He knew the river water was probably not safe, he said, but, while they brushed their teeth in it, they did not swallow.

For drinking water, Mr. Louis said, his family relies on a local well. But he lives from hand to mouth and cannot afford water purification tablets; the free supply he got in 2010 ran out long ago. So he gambles.

“If you make it to the hospital,” he said, “you survive the cholera.”

André Paultre contributed reporting from Port-au-Prince, Haiti.