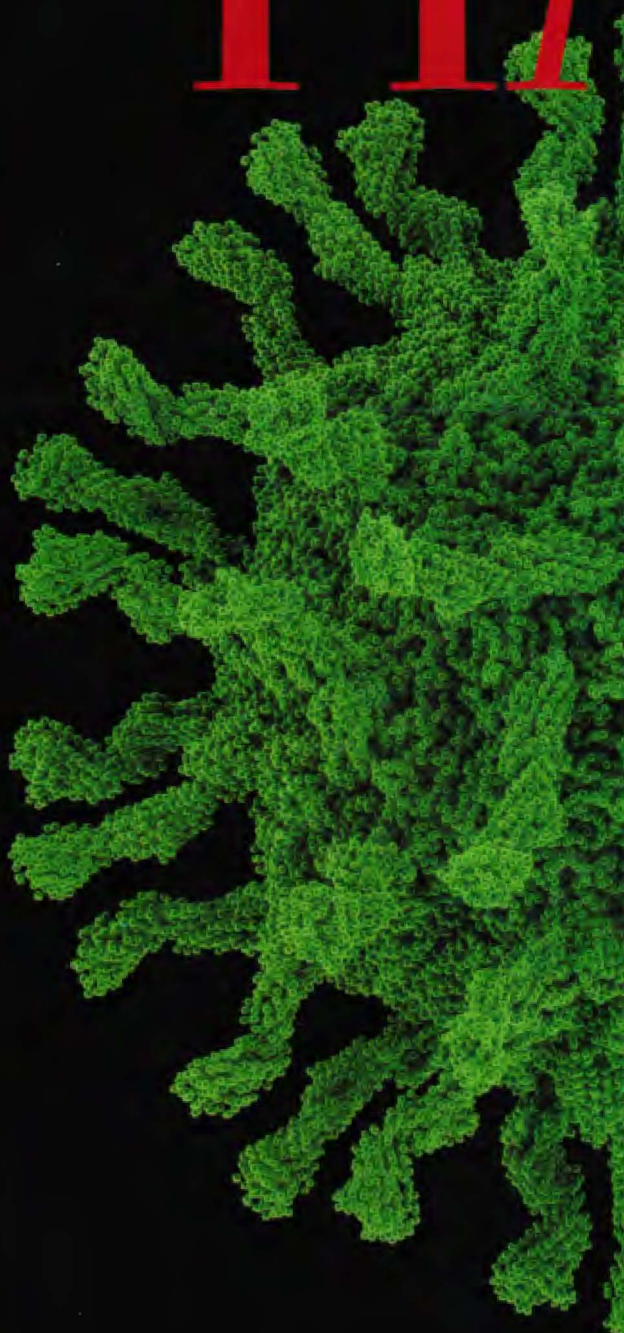


SUKETU MEHTA ON INDIA'S RAPE CULTURE

AFTER THE CLIFF: THE NEXT U.S. FISCAL CRISES

TIME



KILLING POLIO

One thing stands in the way of wiping out the virus for good: the Taliban

BY JEFFREY KLUGER



POLIO AND
POLITICS. A
GREAT SCOURGE
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WAR, MISTRUST
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THE DEATH OF
OSAMA BIN
LADEN COULD
GET IN THE WAY

By Jeffrey Kluger

Photographs by Diego Ibarra Sánchez for TIME



A lasting mark *The wasted legs of a young man in a Pakistani fishing community who contracted polio when he was 8*

THE CHILDREN IN GADAP TOWN LIKE TO PLAY TEA PARTY. THERE ARE NO LITTLE TEA SETS HERE, NOT IN THIS DENSELY PACKED, GRINDINGLY

poor Pakistani slum, the biggest in the megacity of Karachi. So children scavenge bottle caps from piles of trash near the foul-smelling stream that flows through the town. Using them as cups, they sip the filthy water, imagining perhaps what it would be like to sit down at a real tea party one day.

What the children don't think about is the poliovirus that swirls in the water, deposited there by human waste—the biggest reason the stream is so foul to begin with. They know nothing of the way a capful of water can introduce the virus to the mucus membranes of the mouth, where it binds with cells in the pharynx, replicates there and then migrates to the gut and the lymph system—multiplying explosively all the while—until it finds its way to the central nervous system, slaughtering the motor neurons that allow muscles to move as they should, leading to paralysis of the legs, sometimes the arms and occasionally the muscles that control breathing.

But Salma Khan thinks about that kind of thing a lot. Just a few months ago, her son Bilal would race tirelessly around their family compound in Sango, far to the north of Karachi, chasing his twin sister Urooj. Then one day he developed a fever that quickly grew worse. Within days, he could no longer walk. Today, Khan holds her son in her lap, lifts his left leg and watches as it drops limply back down. Just 18 months old, he is a toddler who can toddle no more. “Now all my dreams are shattered,” she says. “He will be paralyzed for life.”

The particular poliovirus that claimed Bilal's legs probably came from Gadap Town. Genetic profiling has tracked the slum strain to all four Pakistani provinces as well as to Afghanistan and China. “Gadap Town is a polio factory,” says Dr. Salah Tumsah, a polio expert with the World Health Organization (WHO). It's not the only such factory in the country. Anyplace there's an

open sewer or an unclean dish, anyplace children come into contact with children, the virus could be growing.

Pakistan once had plenty of company in battling the polio scourge. As recently as 1988, the disease was endemic to 125 countries, paralyzing or killing 350,000 people each year—mostly children. Thanks to exhaustive medical, philanthropic and political teamwork, the virus has been routed, corralled into only three countries: Pakistan, Afghanistan and Nigeria. In 2012, there were only 215 cases worldwide. Only one other time in human history has a disease—smallpox—been wiped out in the wild. Polio, that fearsomecripler of children, scourge of peasants and Presidents, could soon become the second, unless the entire crusade, so close to completion, itself becomes a casualty of war.

In December, during a polio-vaccine drive in Pakistan, nine field workers—six of them women or teenage girls—were killed in motorcycle drive-by shootings linked to the Pakistani Taliban. On Jan. 1, six more women and one man—all of them medical aid workers—were similarly shot to death. All of that bloodshed followed a Taliban order last June to halt the scheduled immunization of 161,000 children in North Waziristan province until American drone strikes stop.

“In the garb of these vaccination campaigns,” said one piece of propaganda, “the U.S. and its allies are running their spying networks.” There is no truth in that, but the lie got legs in 2011 when it was revealed that in the run-up to the killing of Osama bin Laden, a Pakistani doctor masqueraded as a hepatitis-vaccine worker in an attempt to collect cheek swabs from family members in bin Laden's compound to try to confirm he was living there.

Extremists have never needed such kernels of truth to sabotage vaccine efforts, however—not when rumor

mongering, much of it outlandish, can scare the public into refusing immunizations. The polio vaccine contains HIV, they are told. It's made from pig or monkey urine. It's meant to sterilize children. Whether it's because of fear of outsiders or general suspicion of anything touched by the West, the lies work.

“We are an illiterate people,” says Saiful Islam, a shopkeeper in Mohib Banda, near Peshawar, in northern Pakistan. “When one person says something, we don't ask where he learned it. We just believe it.” Islam believed, and when polio workers came in July, he refused to let them vaccinate his 6-month-old daughter. Now she wears pink braces with black Velcro straps on her little legs and squirms as he exercises her left foot to prevent it from curling in on itself. All viruses fight back against their eradication. Polio is the only one with a propaganda wing and an armed militia on its side.

At the Brink

BY ALMOST ANY MEASURE, THE REAR GUARD protecting the poliovirus is outgunned by the forces trying to eliminate it. A lot of the progress that's been made so far is due to the efforts of Rotary International, which in 1979—the year polio was declared eradicated in the U.S.—decided to make it the mission of its then 18,000 clubs and 850,000 members worldwide to wipe out the disease everywhere. UNICEF, WHO and the U.S. Centers for Disease Control have put their muscle behind the push, and in 2007, the Bill & Melinda Gates Foundation joined in as well, spending \$1 billion so far to battle the disease. “I'm very focused on impact per dollar,” Gates said at a September meeting of the U.N.'s Economic and Social Council—a meeting also attended by the Presidents of all three endemic countries and U.N. Secretary-General Ban Ki-moon. “This is one of the smartest allocations of resources the world can make.”

In terms of raw caseload, it's not easy to see how. When you're down to counting cases in the hundreds, you should be able to declare victory and go home—especially in a world where 34 million people are infected with HIV and 220 million have malaria. But those numbers can mislead. For one thing, for every 200

Prevention and cause A child is vaccinated at a toll plaza outside Karachi, top right, where field workers wait with lifesaving drops. Poor sanitation and trash dumps like this one in Karachi, bottom right, spread the poliovirus



polio infections, only one results in paralysis. The rest look like nothing more than a cold or a passing fever, though the child is still spreading the virus. What's more, polio moves fast. In 2003 the disease seemed near its end until clerics in northern Nigeria halted inoculations on the basis of rumors about sterility and HIV contamination. Two years later, polio cases—nearly all of them the Nigerian strain—were raging across 16 countries throughout Asia and down to Oceania.

Fighting these periodic outbreaks gets expensive, which is why eradication is the most cost-effective goal. Rotary and other groups calculate that \$1 billion spent per year over the next few years to extinguish the last fugitive strains of polio could save up to \$50 billion over the next 20 years, both in treatment costs for infected children and in the perpetual, hold-the-line vaccination programs that must be maintained as long as the virus is at large. Vaccinations against smallpox have not been a burden on medical balance sheets since the late 1970s.

"Once polio is gone, you eliminate those costs forever," Gates told TIME. What's more, the medical infrastructure put in place to get the polio vaccine out there—the supply chains, volunteer networks and innovations like GPS trackers on vaccine shipments to prevent them from going astray—can then be repurposed to fight other diseases. But the polio battle must first be won. And even if that battle has already led to bloodshed in the field, it's at the submicroscopic level, down where the viruses live, that the truly consequential war is being waged.

The Half-Century Fight

IT WAS IN 1955 THAT EPIDEMIOLOGIST Thomas Francis Jr., who led the massive field trial of Jonas Salk's polio vaccine the year before, stood onstage at the University of Michigan's Rackham Auditorium and announced the results. "The vaccine works," he said. "It is safe, effective and potent." That was the epidemiological trifecta scientists had been hoping for, and the six-inch headlines and global hoopla that followed were measures of the profound relief the world felt. In 1952, nearly 58,000 Americans were stricken by polio; by 1961, the figure was down to 1,312. That was the year before Albert Sabin's oral vaccine went into wide use. When it did, the U.S. numbers fell effectively to zero.

There are critical differences between the Salk and Sabin vaccines—differences

that led to ferocious arguments when the men were alive, arguments that have continued long after their deaths. The Salk vaccine uses a killed virus to trigger the critical immune reaction and requires an injection. The Sabin vaccine uses a live, weakened virus that is taken orally, multiplies in the gut and spreads to the bloodstream, where, like the Salk vaccine, it teaches the immune system to recognize polio and go on the attack if it ever sees it again. The Salk vaccine costs up to \$3 per dose today. The Sabin formulation costs less than 20¢ and can be administered with just two drops. "You could train people to do this," says Dr. John Sever, vice chair of Rotary's international antipolio drive. "If they could count to two, they could be an immunizer."

But the Sabin vaccine isn't as obvious a choice as it seems. Polio spreads via feces, and on a single passage through a single body, a live Sabin-vaccine virus can mutate from safe to deadly, infecting both the recipient of the vaccine and people close by. "These cases are rare as hen's teeth," says Dr. Bruce Aylward, WHO's chief of polio eradication, "but after you spend \$10 billion and 25 years to eradicate the disease, you don't want a vaccine-related epidemic." (Hen's teeth, in this case, are 610 cases out of 2.5 billion vaccinated children since 2000, according to WHO—rare indeed.)

In the three endemic countries, a two-pronged strategy is thus being used: stay with the Sabin vaccine to wipe out naturally occurring polio, then use Salk

to take care of any vaccine-related cases that remain. In the U.S., where cost and the greater difficulty of administering an injection are not issues, Salk is used almost exclusively. "The Salk vaccine never causes symptoms and never causes transmissible polio," says Gates. "It is a perfect vaccine."

Another complicating factor: polio is not just one disease; it's actually three. The virus comes in a trio of genetically distinct types, known prosaically enough as Type 1, Type 2 and Type 3, and each reacts differently to vaccines. The way to attack them all at once is to administer what's known as a trivalent vaccine, with three formulations in each drop or shot. That usually works, but not always. In Egypt, Types 2 and 3 were eradicated as early as 2004, but Type 1 refused to die.

"We worked with the Egyptian government to tighten up the whole operation," says Aylward. "We had them make sure their vaccination teams actually went to the top floors of all of the apartment buildings." Even that wasn't sufficient, however, and WHO decided that what was needed was a highly potent, monovalent vaccine to hit Type 1 alone. Pharma giant Sanofi Pasteur said it could develop it within 12 months. Aylward gave them four, and they settled on five. The Gates Foundation donated \$10 million to the effort—enough to buy 50 million doses—and by 2006, polio was expelled from Egypt for good. In the three endemic countries, Type 1 is again causing headaches, with Type 2 eradicated and Type 3 getting close. But if you don't stay on top of the virus until the very last case of the very last strain is wiped out, polio will break free again.

All Medicine Is Local

THERE'S NO ONE WAY TO FLUSH THOSE LAST cases out, and the right strategy depends on the country in question. Despite the shootings in Pakistan, the most worrisome place in terms of caseload is Nigeria. It's the only country whose polio rates actually went up in 2012, to 118 cases compared with 62 in 2011. (In Pakistan, there were 57 cases in 2012 and 198 in 2011.) Nigeria's problem area continues to be the north, with anti-vaccine propaganda again leading to refusals. In 2012, WHO dramatically increased its presence in the country, from 744 workers to 2,948. It is also using satellite mapping to reach children in villages that, says John Hewko, general secretary of Rotary International, "we didn't even know existed."

Afghanistan, so often a source of trouble in the region, is moving comparatively

THE MOST WORRISOME PLACE IN TERMS OF CASELOAD IS NIGERIA, WHERE POLIO RATES WENT UP IN 2012



smoothly toward eradication, with just 35 cases in 2012, down from 80 in 2011. The Islamic Development Bank has made a \$3 million grant to Afghanistan to help antipolio efforts. That's just a small fraction of the \$227 million the bank made available to Pakistan, also for polio vaccinations, but the disparity in funding partly reflects the disparity in need. What's more, the fact that the bank is involved at all suggests a regional buy-in that was lacking before.

It's also a hopeful sign that the leaders of all three endemic countries have put their prestige on the line. Nigerian President Goodluck Jonathan pledges that polio will be wiped out in his country by 2015. Afghanistan's Hamid Karzai signed a polio-eradication plan in September and made a show of personally administering drops to children. But it's Pakistani President Asif Ali Zardari who has the most to gain—and lose—in the polio campaign. His daughter Asifa Bhutto Zardari is a leading spokeswoman for the eradication effort, recalling in speeches that her mother—the late Prime Minister Benazir Bhutto, who was assassinated in 2007—administered the vaccine to her when she was a child. President Zardari speaks of “my martyred wife,” who dreamed of a world free of disease.

Mobile care Workers at a Karachi toll plaza can find and immunize as many as 800 unvaccinated children in a single eight-hour shift

Pakistan is putting institutional power behind the sentimental appeals. After the December shootings, the government temporarily suspended the inoculation program, but Prime Minister Raja Pervez Ashraf quickly issued a statement confirming the country's commitment to the campaign. He called for an inquiry into the attacks, promised the safety of polio workers and pledged to proceed with plans to deploy 250,000 health workers to vaccinate 34 million children in 2013. Polio teams will continue to work at toll plazas, boarding buses and looking for children who don't have blue ink staining a finger—a mark applied by field workers after a vaccine has been administered. When they find an unmarked child, they vaccinate on the spot.

Appeals to religion and reason are being deployed as well. Health workers in tribal areas cite Koran verses that encourage the care of children and reach out to local religious leaders for support. If the mullah in Mohib Banda had endorsed the vaccine, says Saiful Islam, father of the paralyzed 6-month-old girl, “100% of the village would have accepted it.” And how

to answer those rumors of vaccine-related sterility? Tahira Yasmin, a polio worker for UNICEF, has a way: “I tell them I am married and young. If I were worried, I would not take it,” she says. Then she downs a few drops. “They laugh and they let their children take it.”

Rotary, WHO and the other groups had hoped to have halted transmission in all three endemic countries by the end of 2012. Now they acknowledge they will have to continue intensively vaccinating in 2013, especially during the comparatively cool months when the virus is at its weakest. “You pound the disease through the low season,” says Aylward. “Then you need 12 months of no cases before you could say that we did it. You're not going to open the champagne at least until 2014.”

When that does happen—when polio joins smallpox in the supermax lockdown of the lab—it will be an existential as much as a medical victory. Viruses and bacteria have had their way with humans since the dawn of history—a species-vs.-species war we have too often lost. We are on the brink of wiping out a virus that richly deserves extinction. The war may be slow, but there is no tonic like a big victory over a disease to ensure there will be more victories to come. —WITH REPORTING BY ARYN BAKER/PAKISTAN ■