Laurie Garret, Introduction, *The Coming Plague: Newly Emerging Diseases in a World Out of Balance*, New York: Penguin Books, 1994, pp. 3-12.

THE COMING PLAGUE

NEWLY EMERGING DISEASES IN A WORLD OUT OF BALANCE

LAURIE GARRETT

PENGUIN BOOKS

Introduction

■ By the time my Uncle Bernard started his medical studies at the University of Chicago in 1932 he had already witnessed the great influenza pandemic of 1918–19. He was seven years old when he counted the funeral hearses that made their way down the streets of Baltimore. Three years earlier Bernard's father had nearly died of typhoid fever, acquired in downtown Baltimore. And shortly after, his grandfather died of tuberculosis.

In his twelfth year Bernard got what was called "summer sickness," spending the long, hot Maryland days lying about the house, "acting lazy," as his mother put it. It wasn't until 1938, when he volunteered as an X-ray guinea pig during his internship at the University of California's medical school in San Francisco, that Uncle Bernard discovered that the "summer sickness" was actually tuberculosis. He had no doubt acquired consumption from his grandfather, survived the disease, but for the rest of his life had telltale scars in his lungs that were revealed by chest X rays.

It seemed that everybody had TB in those days. When young Bernard Silber was struggling his way through medical studies in Chicago, incoming nursing students were routinely tested for antibodies against TB. The women who came from rural areas always tested negative for TB when they started their studies. With equal certainty, they all tested TB-positive after a year on the urban hospital wards. Any ailment in those days could light up a latent TB infection, and tuberculosis sanitariums were overflowing. Treatment was pretty much limited to bed rest and a variety of hotly debated diets, exercise regimens, fresh air, and extraordinary pneumothorax surgical procedures.

In 1939 Uncle Bernard started a two-year residency in medicine at Los Angeles County Hospital, where he met my Aunt Bernice, a medical social worker. Bernice limped and was deaf in one ear, the results of a childhood bacterial infection. When she was nine, the bacteria grew in her ear, eventually infecting the mastoid bone. A complication of that was osteomyelitis, which left her right leg about an inch shorter than her left, forcing Bernice to walk knock-kneed to keep her balance. Shortly after they met, Bernard got a nasty pneumococcal infection and, because he was a physician, received state-of-the-art treatment: tender loving care and oxygen.

For a month he languished as a patient in Los Angeles County Hospital hoping he would be among the 60 percent of Americans who, in the days before antibiotics, survived bacterial pneumonia.

Bacterial infections were both common and very serious before 1944, when the first antibiotic drugs became available. My Uncle Bernard could diagnose scarlet fever, pneumococcal pneumonia, rheumatic fever, whooping cough, diphtheria, or tuberculosis in a matter of minutes with little or no laboratory support. Doctors had to know how to work quickly because these infections could escalate rapidly. Besides, there wasn't much the lab could tell a physician in 1940 that a well-trained, observant doctor couldn't determine independently.

Viruses were a huge black box in those days, and though Bernard had no trouble differentiating between German measles, influenza, St. Louis encephalitis, and other viral diseases, he had neither treatments nor much of an understanding of what these tiniest of microbes did to the human body.

Uncle Bernard was introduced to tropical medicine during World War II, when he served in the Army Medical Corps at Guadalcanal and other battlefields of the Pacific. That's when he learned firsthand about diseases of which he'd heard very little in medical school: malaria, dengue (breakbone fever), and a variety of parasitic diseases. Quinine did a good job of curing malaria, but there was little he could do for GIs afflicted with the other tropical organisms that were rife in the Pacific theater.

Two years into the war the Army issued its first meager supplies of penicillin, instructing physicians to use the precious drug sparingly, in doses of about 5,000 units (less than a third of what would be considered a minimal penicillin dose for minor infections in 1993). In those early days before bacteria became resistant to antibiotics, such doses were capable of performing miracles, and the Army doctors were so impressed with the powers of penicillin that they collected the urine of patients who were on the drug and crystallized excreted penicillin for reuse on other GIs.

Years later, when I was studying immunology in graduate school at UC Berkeley, Uncle Bernard would regale me with tales of what sounded like medicine in the Dark Ages. I was preoccupied with such things as fluorescence-activated laser cell sorters that could separate different types of living cells of the immune system, the new technology of genetic engineering, monoclonal antibodies, and deciphering the human genetic code.

"I always liken the production of antibiotics to the Internal Revenue Service," Uncle Bernard would say when I seemed less than interested in the pre-antibiotic plights of American physicians. "People are always looking for loopholes, but as soon as they find them, the IRS plugs them up. It's the same way with antibiotics—no sooner have you got one than the bacteria have become resistant."

During the summer of 1976 I had reason to reconsider much of my Uncle Bernard's wisdom. As I tried to make sense of my graduate research project

at Stanford University Medical Center, the news seemed overfull of infectious disease stories. The U.S. government was predicting a massive influenza epidemic that some said would surpass that of 1918—a global horror that claimed over 20 million lives. An American Legion group met in a hotel in Philadelphia on the Fourth of July, and something made 182 of them very sick, killing 29. Something else especially strange was going on in Africa, where, according to garbled press accounts of the day, people were dying from a terrifying new virus: in Zaire and the Sudan, something called Green Monkey Virus, or Marburg, or Ebola, or a mix of all three monikers was occupying the urgent attention of disease experts from all over the world.

In 1981 Dr. Richard Krause of the U.S. National Institutes of Health published a provocative book entitled *The Restless Tide: The Persistent Challenge of the Microbial World*,[1] which argued that diseases long thought to have been defeated could return to endanger the American people. In hearings a year later before the U.S. Congress, Krause was asked, "Why do we have so many new infectious diseases?"

"Nothing new has happened," Krause replied. "Plagues are as certain as death and taxes."[2]

But the shock of the AIDS epidemic prompted many more virus experts in the 1980s to ponder the possibility that something new was, indeed, happening. As the epidemic spread from one part of the world to another, scientists asked, "Where did this come from? Are there other agents out there? Will something worse emerge—something that can be spread from person to person in the air?"

The questioning grew louder as the 1980s dragged on. At a Rockefeller University cocktail party, a young virologist named Stephen Morse approached the institution's famed president, Nobel laureate Joshua Lederberg, and asked him what he thought of the mounting concern about emerging microbes. Lederberg characteristically responded in absolute terms: "The problem is serious, and it's getting worse." With a sense of shared mission, Morse and Lederberg set out to poll their colleagues on the matter, gather evidence, and build a case.

By 1988 an impressive group of American scientists, primarily virologists and tropical medicine specialists, had reached the conclusion that it was time to sound an alarm. Led by Morse and Lederberg of Rockefeller University, Tom Monath of the U.S. Army's Medical Research Institute of Infectious Diseases, and Robert Shope of the Yale University Arbovirus Research Unit, the scientists searched for a way to make tangible their shared concern. Their greatest worry was that they would be perceived as crybabies, merely out to protest shrinking research dollars. Or that they would be accused of crying wolf.

On May 1, 1989, the scientists gathered in the Hotel Washington, located across the street from the White House, and began three days of discussions aimed at providing evidence that the disease-causing microbes of the planet,

far from having been defeated, were posing ever-greater threats to humanity. Their gathering was co-sponsored by the National Institutes of Allergy and Infectious Diseases, the Fogarty International Center, and Rockefeller University.

"Nature isn't benign," Lederberg said at the meeting's opening. "The bottom lines: the units of natural selection—DNA, sometimes RNA elements—are by no means neatly packaged in discrete organisms. They all share the entire biosphere. The survival of the human species is *not* a preordained evolutionary program. Abundant sources of genetic variation exist for viruses to learn new tricks, not necessarily confined to what happens routinely, or even frequently."

University of Chicago historian William McNeill outlined the reasons *Homo sapiens* had been vulnerable to microbial assaults over the millennia. He saw each catastrophic epidemic event in human history as the ironic result of humanity's steps forward. As humans improve their lots, McNeill warned, they actually *increase* their vulnerability to disease.

"It is, I think, worthwhile being conscious of the limits upon our powers," McNeill said. "It is worth keeping in mind that the more we win, the more we drive infections to the margins of human experience, the more we clear a path for possible catastrophic infection. We'll never escape the limits of the ecosystem. We are caught in the food chain, whether we like it or not, eating and being eaten."

For three days scientists presented evidence that validated McNeill's words of foreboding: viruses were mutating at rapid rates; seals were dying in great plagues as the researchers convened; more than 90 percent of the rabbits of Australia died in a single year following the introduction of a new virus to the land; great influenza pandemics were sweeping through the animal world; the Andromeda strain nearly surfaced in Africa in the form of Ebola virus; megacities were arising in the developing world, creating niches from which "virtually anything might arise"; rain forests were being destroyed, forcing disease-carrying animals and insects into areas of human habitation and raising the very real possibility that lethal, mysterious microbes would, for the first time, infect humanity on a large scale and imperil the survival of the human race.

As a member of a younger generation trained in an era of confident, curative medicine and minimal concern for infectious diseases, I experienced such discussion as the stuff of Michael Crichton novels rather than empiric scientific discourse. Yet I and thousands of young scientists also reared in the post-antibiotic, genetic engineering era had to concede that there was an impressive list of recently emergent viruses: the human immunodeficiency virus that caused AIDS, HTLV Types I and II which were linked to blood cancers, several types of recently discovered hepatitis-causing viruses, numerous hemorrhage-producing viruses discovered in Africa and Asia.

In February 1991 the Institute of Medicine (IOM), which is part of the U.S. National Academy of Sciences, convened a special panel with the task of exploring further the questions raised by the 1989 scientific gathering and advising the federal government on two points: the severity of the microbial threat to U.S. citizens and steps that could be taken to improve American disease surveillance and monitoring capabilities. In the fall of 1992 the IOM panel released its report, *Emerging Infections: Microbial Threats to Health in the United States*,[3] which concluded that the danger of the emergence of infectious diseases in the United States was genuine, and authorities were ill equipped to anticipate or manage new epidemics.

"Our message is that the problem is serious, it's getting worse, and we need to increase our efforts to overcome it," Lederberg said on the day of the report's release.

After the release of the report, the U.S. Centers for Disease Control and Prevention in Atlanta began a soul-searching process that would, by the spring of 1994, result in a plan for heightened vigilance and rapid response to disease outbreaks. The slow response to the emergence of HIV in 1981 had allowed the epidemic to expand by 1993 to embrace 1.5 million Americans and cost the federal government more than $12 billion annually in research, drug development, education, and treatment efforts.

The CDC was determined that such a mistake would not be repeated.

But there were dissident voices in 1993 who protested both the American scientific community's often narrow emphasis on viruses and its focus on threats posed solely to U.S. citizens. Disease fighters like Joe McCormick, Peter Piot, David Heymann, Jonathan Mann, and Daniel Tarantola argued forcefully that microbes had no respect for humanity's national borders. Furthermore, they said, in much of the world the most dangerous emerging diseases were not viral, but bacterial or parasitic. A far larger view was needed, they argued.

Other critics stressed that a historical perspective on mankind's bumbling, misguided attempts to control the microbes would reveal that much of the fault lay with the very scientific community that was now calling for vigilance. What seemed to make sense as microbe control action, viewed from the academic and government offices of the world's richest country, argued the likes of Uwe Brinkmann, Andrew Spielman, and Isao Arita, could prove disastrous when executed in the planet's poorer nations.

The critics charged that Americans, by virtue of their narrow focus on the appearance of disease within the United States, were missing the real picture. It was a picture captured in the sight of a little Ndbele girl wrapped in a green *kanga*. She lay on the hardened clay floor of a health care clinic outside Bulawayo, Zimbabwe. Her mother sat beside her, casting beseeching looks at every stranger who entered the two-room clinic. The four-year-old girl cried weakly.

"That is measles," said the clinic director, pointing a stern finger at the

child. The director led an observer outside to show the local innovations in toilet hygiene and efforts to increase the protein content of village children's diets.

When he returned an hour later to the wattle-clay clinic, the mother was rocking back and forth on the balls of her feet, tears silently streaming down her face; the child's soft crying had ceased. A few hours later the mother and her husband placed across bicycle handlebars a rolled straw mat containing their little girl's body and, staring blankly at the horizon, forlornly walked the bike down the red clay road.

At a time when mothers of the world's wealthiest nations arranged to have their children "immunized" by deliberately exposing the youngsters to measles, mumps, even chicken pox, these diseases were forcing parents in some of the world's poorest nations to find ways to cope with the expected deaths of more than half their children before the age of ten.

The long list of vaccines and prescription drugs that American physicians urged their patients to take before traveling south of Tijuana was ample testimony to the health impact of the world's wide gulf in wealth and development. In the 1970s Americans and Europeans who were distressed by the poverty of the Southern Hemisphere poured money into the poorest countries for projects intended to bring their populations into "the modern age." The logic of the day was that the health status of a population would improve as the society's overall structure and economy grew to more closely resemble those of the United States, Canada, and Western Europe.

But by 1990 the world's major donor institutions would be forced to conclude that modernization efforts seemed only to have worsened the plight of the average individual in the Third World, while enhancing the power, wealth, and corruption of national elites and foreign-owned institutions. Bucolic agricultural societies were transformed in the space of a single generation into countries focused around one or more vast urban centers that grew like ghastly canker sores over the landscape, devouring the traditional lifestyles and environments of the people and thrusting young job seekers into sprawling semi-urban slums that lacked even a modicum of proper human waste disposal or public health intervention.

In the industrialized free market world of the 1970s, people at all societal strata became increasingly conscious of the link between environmental pollution and personal health. As the dangers of pesticide misuse, lead paint, asbestos fibers, air pollution, and adulterated foods became apparent, residents of the world's wealthiest countries clamored for regulations to curb contamination of the environment and the food supply.

With the discovery of Earth's ozone holes, the world's scientists initiated a debate about global responsibility for preventing further pollution destruction of the planet's protective gaseous layer. Similarly, marine biologists argued with increasing vehemence that all the nations of the world shared responsibility for the sorry state of Earth's oceans and the near-

extinction or endangerment of its fish, coral, and mammal populations. Conservationists turned their attention to global wildlife protection. And biologists like Harvard's E. O. Wilson and the Smithsonian's Thomas Lovejoy warned of a global mass flora and fauna extinction event that would rival that of the great Cretaceous period dinosaur die-off.

Citing the fossil evidence for five great extinction events in Earth's ancient history, Wilson asked how much more environmental destruction at man's hand the world could tolerate: "These figures should give pause to anyone who believes that what *Homo sapiens* destroys, Nature will redeem. Maybe so, but not within any length of time that has meaning for contemporary humanity."[4]

As humanity approached the last decade of the twentieth century, the concept of a Global Village—first elucidated in the 1960s by Canadian philosopher Marshall McLuhan as a description of the sense of worldwide interconnectedness created by mass media technology—had clearly entered mass consciousness in the context of Earth's ecology. Environmentalists were thinking on the macro level, plotting ways to change the whaling policies of places as disparate as Japan, Alaska, Russia, and Norway. The World Bank decided to include ecological concerns in its parameters for issuing loans to developing countries. The Chernobyl nuclear accident proved, in the eyes of many scientists, that it was folly to consider toxic risk control a problem whose solutions were always constrained by issues of national sovereignty.

And in 1992 the United States elected a Vice President who espoused an ambitious global Marshall Plan to protect the environment. Albert Gore warned that nothing short of a massive worldwide shift in human perspective, coupled with elaborate systems of international regulation and economic incentives, would be adequate to ensure the survival of the planet's ecology. And he adopted the rhetoric of critical environmentalists, saying, "Those who have a vested interest in the status quo will probably continue to stifle any meaningful change until enough citizens who are concerned about the ecological system are willing to speak out and urge their leaders to bring the earth back into balance."[5]

At the macro level, then, a sense of global interconnectedness was developing over such issues as economic justice and development, environmental preservation, and, in a few instances, regulation. Though there were differences in perspective and semantics, the globalization of views on some issues was already emerging across ideological lines well before the fall of the Berlin Wall. Since then it has sped up, although there is now considerable anxiety expressed outside the United States about American domination of the ideas, cultural views, technologies, and economics of globalization of such areas as environmentalism, communication, and development.

It wasn't until the emergence of the human immunodeficiency virus,

however, that the limits of, and imperatives for, globalization of health became obvious in a context larger than mass vaccination and diarrhea control programs. From the moment it was discovered in 1981 among gay men in New York and California, AIDS became a prism through which the positive lights by which societies hoped to be viewed were fractured into thousands of disparate and glaring pieces. Through the AIDS prism it was possible for the world's public health experts to witness what they considered to be the hypocrisies, cruelties, failings, and inadequacies of humanity's sacred institutions, including its medical establishment, science, organized religion, systems of justice, the United Nations, and individual government systems of all political stripes.

If HIV was our model, leading scientists concluded, humanity was in very big trouble. *Homo sapiens* greeted the emergence of the new disease first with utter nonchalance, then with disdain for those infected by the virus, followed by an almost pathologic sense of mass denial that drew upon mechanisms for rationalizing the epidemic that ranged from claiming that the virus was completely harmless to insisting that certain individuals or races of people were uniquely blessed with the ability to survive HIV infection. History, they claimed, would judge the 1980s performance of the world's political and religious leaders: would they be seen as equivalent to the seventeenth-century clerics and aristocracy of London who fled the city, leaving the poor to suffer the bubonic plague; or would history be more compassionate, merely finding them incapable of seeing the storm until it leveled their homes?

Over the last five years, scientists—particularly in the United States and France—have voiced concern that HIV, far from representing a public health aberration, may be a sign of things to come. They warn that humanity has learned little about preparedness and response to new microbes, despite the blatant tragedy of AIDS. And they call for recognition of the ways in which changes at the micro level of the environment of any nation can affect life at the global, macro level.[6]

Humanity's ancient enemies are, after all, microbes. They didn't go away just because science invented drugs, antibiotics, and vaccines (with the notable exception of smallpox). They didn't disappear from the planet when Americans and Europeans cleaned up their towns and cities in the postindustrial era. And they certainly won't become extinct simply because human beings choose to ignore their existence.

In this book I explore the recent history of disease emergence, examining in roughly chronological order examples that highlight reasons for microbial epidemics and the ways humans respond, as cultures, scientists, physicians, bureaucrats, politicians, and religious leaders.

The book also examines the biology of evolution at the microbial level, looking closely at ways in which disease agents and their vectors are adapting to counter the defensive weapons used to protect human beings.

In addition, *The Coming Plague* looks at means by which humans are actually aiding and abetting the microbes through ill-planned development schemes, misguided medicine, errant public health, and shortsighted political action/inaction.

Finally, some solutions are offered. Fear, without potential mitigating solutions, can be very volatile. It has, throughout history, prompted the lifelong imprisonment of the victims of a disease. Perhaps less onerously, it can lead to inappropriate expenditures of money and human resources aimed at staving off a real or imagined enemy.

What is required, overall, is a new paradigm in the way people think about disease. Rather than a view that sees humanity's relationship to the microbes as a historically linear one, tending over the centuries toward ever-decreasing risk to humans, a far more challenging perspective must be sought, allowing for a dynamic, nonlinear state of affairs between *Homo sapiens* and the microbial world, both inside and outside their bodies. As Harvard University's Dick Levins puts it, "we must embrace complexity, seek ways to describe and comprehend an ever-changing ecology we cannot see, but, nonetheless, by which we are constantly affected."

Now in his eighties and retired from the daily practice of medicine, my Uncle Bernard wonders how many American physicians today would recognize a case of malaria, diphtheria, rheumatic fever, tuberculosis, or typhus without needing the guiding advice provided by time-consuming laboratory diagnostic analysis. He doubts whether most physicians in the industrialized world could diagnose an old scourge, like yellow fever or dengue fever, much less spot an entirely new microbe. As he and the rest of the pre-antibiotic era physicians of the developed world retire and age, Bernard asks if doctors of the year 2000 will be better or worse equipped to treat bacterial pneumonia than were physicians in his pre-antibiotic days.

Preparedness demands understanding. To comprehend the interactions between *Homo sapiens* and the vast and diverse microbial world, perspectives must be forged that meld such disparate fields as medicine, environmentalism, public health, basic ecology, primate biology, human behavior, economic development, cultural anthropology, human rights law, entomology, parasitology, virology, bacteriology, evolutionary biology, and epidemiology.

The Coming Plague tells the stories of men and women who struggled to understand and control the microbial threats of the post-World War II era. As these disease vanquishers retire, the college laboratories and medical schools grow full of youthful scientific energy, but it is not focused on the seemingly old-fashioned, passé tasks that were invaluable in humanity's historic ecological struggles with the microbes. As we approach the millennium, few young scientists or doctors anywhere in the world can quickly

recognize a tiger mosquito, *Peromyscus maniculatus* mouse, pertussis cough, or diphtherial throat infection.

The skills needed to describe and recognize perturbations in the *Homo sapiens* microecology are disappearing with the passing of the generations, leaving humanity, lulled into a complacency born of proud discoveries and medical triumphs, unprepared for the coming plague.

1

Machupo

BOLIVIAN HEMORRHAGIC FEVER

Any attempt to shape the world and modify human personality in order to create a self-chosen pattern of life involves many unknown consequences. Human destiny is bound to remain a gamble, because at some unpredictable time and in some unforeseeable manner nature will strike back.

—*Mirage of Health*, René Dubos, 1959

■ Karl Johnson fervently hoped that if this disease didn't kill him soon somebody would shoot him and put him out of his misery. The word "agony" wasn't strong enough. He was in hell.

Every nerve ending of his skin was on full alert. He couldn't bear even the pressure of a sheet. When the nurses and doctors at Panama's Gorgas Hospital touched him or tried to draw blood samples, Johnson inwardly screamed or cried out.

He was sweating with fever, and he felt the near-paralytic exhaustion and severe pain he imagined afflicted athletes who pushed their training much too far.

When nurses on the Q ward first looked at Johnson lying beside his two colleagues they recoiled from the sight of his crimson blood-filled eyes. All over Johnson's body the tiny capillaries that acted as tributaries flowing to and from the veins' rivers of blood were leaking. Microscopic holes had appeared, out of which flowed water and blood proteins. His throat hurt so much he could barely speak or drink water, thanks to a raw and bleeding esophageal lining. Word around the hospital was that the three were victims of a strange and contagious new plague that felled them in Bolivia.

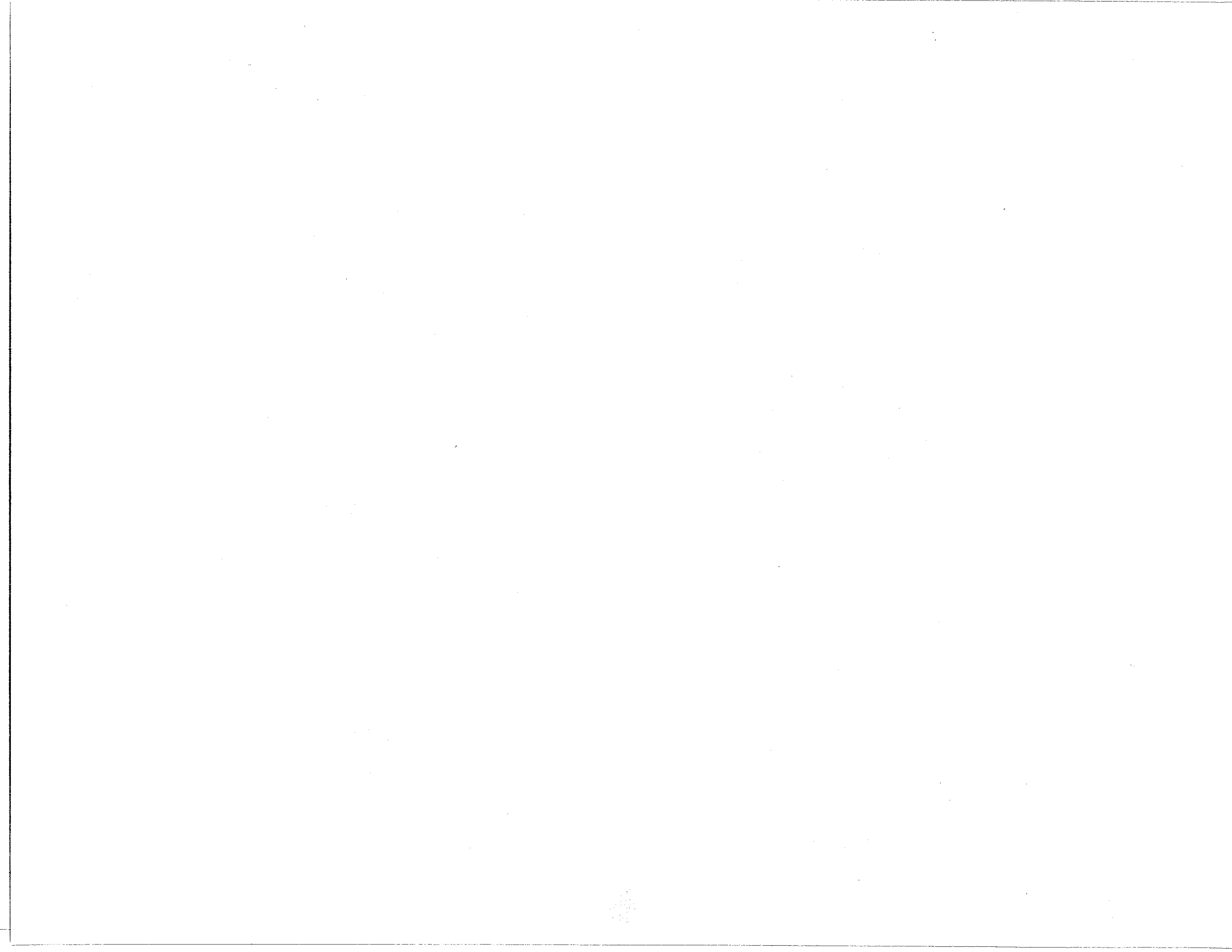
In brief moments of lucidity Johnson would ask how many days had passed. When a nurse told him it was Day Five, he groaned.

"If my immune system doesn't kick in fast, I'm a dead man," he thought.

He'd seen it happen plenty of times in San Joaquín. Some of the people died in just four days, but most suffered over a week of this torture.

Over and over he reviewed what he had seen in that isolated village on Bolivia's eastern frontier. He hoped to think of something that could help him recover and solve the San Joaquín mystery.

It had all started exactly a year before—in July 1962. Johnson had just



ɔes from Bangladesh to Nepal. And so the epidemic

ures of billions of dollars by governments,[195] the UN,
ern agencies, malaria was completely out of control in

inally abandoned all hopes of eradicating malaria. In
global strategy that linked malaria *control* to primary
he absence of adequate primary health systems in most
that policy, too, failed.
as forced, reluctantly, to admit that there was no *global*
control. Rather, every individual ecology in each en-
l to develop its own environmentally and socially tai-
. What might work in an African savanna certainly
'e in a swampland or an Asian mahogany forest.
:red ecology.
ınd angry about corruption in malaria vaccine devel-
: U.S. government moved in 1993 to slash its financial
ia control efforts. Federal expenditures declined stead-
l 1990, and in the winter of 1993 two agencies of the
loggerheads over whether or not to completely cease
aria programs.[197]
ıt viewed the crisis in southern Asia he couldn't help
ɔme, Ethiopia. In 1992 Ethiopia experienced its worst
Homo sapiens history, with more than 20,000 people
s in less than six months. At least 10 percent of the
ıe-resistant, and the victims were of all ages. When
ılly surveyed households in an area of 13,000 people,

idemic was in the face of *only* chloroquine resistance.
the Cambodian multiresistant parasite gets to Africa?
ed.

Laurie Garret, "Thirdworldization: The Interactions of Poverty, Poor Housing, and Social Dispair with Disease," in *The Coming Plague: Newly Emerging Diseases in a World Out of Balance*, New York: Penguin Books, 1994, pp. 457-527.

14

Thirdworldization

THE INTERACTIONS OF POVERTY, POOR HOUSING, AND SOCIAL DESPAIR WITH DISEASE

The States Parties to this Constitution declare, in conformity with the charter of the United Nations, that the following principles are basic to the happiness, harmonious relations and security of all peoples:

—Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. . . .

—Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger.

—*Constitution of the World Health Organization,* July 22, 1946

■ Heavy, purple-tinged clouds filled the equatorial sky, blotting out the harsh noon sun. It was stifling hot, and the air was so moist that beads of condensation mixed with sweat on the skin. Three men struggled to push a bicycle uphill along a road made of thick clay mud, rutted deeply from the two or three vehicles that had passed from Bukoba, bound for Uganda, since yesterday.

Wrapped in white cloth and elephant grass, a five-foot bundle lay stretched across the handlebars. The somber trio maneuvered their way past a steady stream of pedestrians, most of whom bore enormous bundles upon their heads or carried a huge Nile perch dangling from their shoulders, the fish so massive that its mud-covered tail trailed along the road.

Each time the men hit a large rut, one of them carefully steadied the bundle, while the other two gave the bicycle a strong shove. Passersby, recognizing the nature of the bundle, carefully avoided staring and ceased their laughter or chatter. Even the wild young boys who dodged school and helped smugglers get their goods across the Ugandan border grew silent when they spotted the bicycle's burden.

The journey eased when the men reached a plateau and turned off the road onto a well-beaten footpath. Winding their way through dense, verdant banana groves, they occasionally passed a mud-and-thatch home. Residents

greeted them with nods or a quiet "*Jambo*," children scurried to their mothers' sides, staring wide-eyed at the bicycle and its load. As the trio moved on, clusters of people gathered up specially wrapped bundles, called children to their sides, and fell in line. Soon a procession of a few dozen residents of Kanyigo had formed.

In the distance could be heard the high-pitched ululating of female voices. The procession drew near to the mournful sound and a child stationed along the path spotted the bicycle and ran ahead to alert others of its approach. The keening suddenly stopped, and for a moment the only sounds were those of squawking Lake Victoria birds and human feet tromping over mud.

The villagers of Kanyigo reached a small clearing, surrounded by banana trees. To one side was a round thatched-roof house. On the opposite end of the clearing a group of men took turns shoveling out a large hole in the clay soil. In the center of the clearing stood a thirty-five-year-old man wearing a button-down shirt, dark cotton pants, and a brightly colored print sash. As the bicycle trio approached, the man drew close to him five small children, aged two to seven years, each of whom wore sashes identical to his.

Without exchanging words, the trio greeted the man and his children, silently untied their elephant grass-wrapped bundle, and carried it into the hut. As they entered the home, the women's wailing resumed inside. Its volume and pitch were at first painful to hear, and some of the gathered children, unfamiliar with social propriety, cupped their hands over their ears. Mothers quietly clucked disapproval; the children obediently dropped their hands and stared with apparent fear at their sash-adorned counterparts.

The families took turns approaching the father and children. Whispered greetings, bowed heads, proffered gifts, some tears, an occasional hug.

Some of the adults stepped into the hut, stopping for a moment until their eyes adjusted to the darkness, and then groped their way through the crowded one-room home to a seat upon the clean floor of packed dirt. They sat in concentric circles surrounding the five-foot bundle that had quietly been set in place by the bicycle trio. An older woman occasionally lost control, wailing loudly and flailing about so wildly that her friends were forced to restrain her.

AIDS had claimed another life in Kanyigo. The thirty-two-year-old woman, who now lay upon her floor, swaddled in cloth and elephant grass, left behind a husband and five children.

"She was suddenly attacked by stomach pain four months ago," the widower said. "So she went to her birth village, the next village over, to stay with her family. She had no appetite. She wasn't eating anything. We tried to force her to drink tea, eat bread. We really tried to force it on her. But it was no use. At eleven o'clock yesterday morning she collapsed and died."

The man spoke in a monotone, too overwhelmed to express emotion. He looked down at his children, who stoically stood by his side, stifling their tears. His eyes swept over them and then settled on the visiting *Mzungu.* He studied the American for an instant before speaking.

"It is a great deal of work for me to feed them, care for them, and do my work. Why don't you take the children? I give them to you."

I

Jonathan Mann was tremendously excited. True, there were any number of things that could still go awry; diplomatic noses might start bleeding, political shenanigans could well break out. But he and his highly energetic—and sly—staff of the World Health Organization's Global Programme on AIDS had for months carefully and strategically planned for this day.

"We are entering a new era," Mann had assured an international press corps. "We will make 1988 the year we turn the tide against the AIDS virus."

And here he sat, his bow tie straight, hair brushed, as usual, straight back off his forehead, wearing a natty tailored European suit, giving him the air not of a CDC epidemiologist but of a French diplomat. He looked out over the largest gathering of Ministers of Health ever assembled. Of the representatives of 148 nations who now sat before him in the vast Queen Elizabeth II Conference Center in London, 117 were Ministers of Health or their country's equivalent. Every key nation, save one, was represented by the most politically powerful health official in their land: Mann was ashamed to say that the exception was his own country. Still not wishing to give AIDS a priority status, the Reagan administration sent Dr. Robert Windom, who ranked two notches down the power ladder from the Secretary of Health and Human Services, Otis Bowen.

Never in history had the majority of the world's top health officials gathered to discuss an epidemic. No scourge—not malaria, smallpox, yellow fever, or the plague—had ever commanded such diplomatic attention. Some 700 delegates and 400 journalists were also present in the London hall on this ice-cold January morning in 1988 to witness the World Summit of Ministers of Health on Programmes for AIDS Prevention. Mann felt that it was a coup for his program, for WHO, and for millions of powerless people with AIDS.

Mann urgently hoped to drive home a message to the world's health leadership: AIDS is spreading; if it hasn't yet emerged in your country, it will, unless you plan now, follow our recommendations, educate your populations, and embrace condom-based programs as a prevention strategy.

As of January 26, 1988, some 75,392 cases of AIDS had officially been reported to the World Health Organization. But that figure was a gross

understatement of the true dimensions of the pandemic: most nations lacked genuine systems for amassing and recording such health statistics. Mann tactfully didn't mention from the podium what everyone in the audience knew to be true; namely, that many nations were deliberately covering up their epidemics for political and economic reasons. Such delicate issues would be dealt with later, in private arm-twistings and minister-to-minister preplanned strategic confrontations.

Mann differentiated the ways in which the AIDS virus was spreading from person to person. In what he called Pattern I countries, such as those of North America and Western Europe, AIDS was spreading primarily via the sharing of needles between intravenous drug users and sexually among gay men. In Pattern II countries, such as those of Africa, AIDS was a heterosexual disease.

Though he was cautious in his public choice of words, it was Pattern III nations that most concerned Mann as he spoke in London. Asia, the communist bloc, the largely Muslim Middle East, and much of the Pacific region had only very tiny outbreaks of AIDS. Some of these countries were truthfully reporting no cases of the disease, and several more were accurately stating that the handful of cases in their countries all involved foreigners or citizens who had acquired HIV while living overseas. In those Pattern III countries, the relative handfuls of cases were equally likely to have resulted from heterosexual, homosexual, needle, or blood exposure.

Pattern III, in other words, represented the potential future of the worldwide AIDS epidemic. There was still a window of opportunity for public health action that might successfully prevent HIV from emerging in the majority of the world's populations.

Many of the Pattern III political leaders had already recognized the threat of HIV importation, of course, and taken their own steps to curb such events. However, Mann and his staff, which included smallpox hero Daniel Tarantola, were appalled by many of the anti-emergence measures some countries had taken. Privately, Tarantola had already spent months flying all over the world in attempts to convince many of the same ministers who now sat in the London conference hall that AIDS wasn't anything like smallpox. There was no vaccine that one could require that immigrants and visitors receive. The virus didn't manifest itself symptomatically for years—perhaps over a decade—in ways that indicated its presence even to the infected individual. And the AIDS blood test wasn't foolproof.

"What are you going to do, test every immigrant five or six times a year, every visiting student once a week? If you think you can keep the virus out of your country with legislation and testing, you are wrong," Tarantola told public health officials.

Mann was worried that the world would become a patchwork of repressive public health regimes with laws aimed at keeping a virus, as well as its potential carriers—gays, Africans, prostitutes, drug users, poor immigrants—out. He feared that it would push populations that already existed at the margins of global society further away from the mainstream, medicine, and all hopes of disease control. Indeed, restrictions intended to control populations at greatest danger for HIV infection might actually have the reverse effect, exacerbating the social and economic conditions in their lives that drove them to adopt risky behaviors. Simply put, he felt certain that this moment in London was pivotal to deciding whether HIV's emergence in most countries would be prevented through education of local populaces or temporarily stalled by repressive laws.

"Our opportunity—brought so clearly into focus by this Summit—is truly historic," Mann told his distinguished audience. "We live in a world threatened by unlimited destructive force, yet we share a vision of creative potential—personal, national, and international. The dream is not new—but the circumstances and the opportunity are of our time alone. The global AIDS problem speaks eloquently of the need for communication, for sharing of information and experience, and for mutual support; AIDS shows us once again that silence, exclusion, and isolation—of individuals, groups, or nations—creates a danger for us all."

Though his words were received with thunderous applause and a standing ovation, Mann knew that many of those before him who were loudly slapping their hands together and politely nodding approval were, back home, promoting policies of mandatory quarantine of HIV-positive individuals, escalated repression against homosexuals, even public execution of AIDS sufferers.

As a scientist, Mann knew that the men and women now looking up at him on the dais, studying his smile and careful public modesty, were People of Politics. They might wear the titles of health officials, but their modi operandi were less those of the laboratory or hospital than those of the maneuvering, backstabbing, and power plays seen in parliaments and presidential inner circles. What the ministers said publicly here in London would be at least as much for domestic consumption as for the sake of any global effort to stop the pandemic.

Anticipating such limitations, Mann and his Global Programme on AIDS (GPA) staff had toiled for months in preparation for this moment. Lifelong WHO veterans, and occasional renegades, Tarantola and Manuel Carballo showed Mann how to maneuver around the labyrinthine and often byzantine United Nations bureaucracy. Swiss-American Tom Netter, having spent years covering the rise of Solidarity and the fall of communism in Poland for the Associated Press, plotted every step of the GPA's interactions with the international media. Spanish-born Carballo, who knew every nook and cranny of the World Health Organization even better than WHO Director-General Halfdan Mahler, helped spot the few potentially influential individuals within the bureaucracy who understood the urgency of the AIDS epidemic.

"This is a place where people put URGENT! on requests for pencil supplies," Mann said in wonder. "The concept of genuinely dire emergency has almost no meaning here."

Carballo couldn't have agreed more. One of the happiest days of his life was when he joined the GPA staff. He felt charged up, at the top of his performance and truly impassioned about his work, possibly for the first time in his life.

They all did: American epidemiologists Jim Chin and David Heymann, Venezuelan biologist José Esparza, British public health expert Roy Widdus, Tarantola, Mann, and the dozens of scientists and public education experts who came to Geneva under special contracts to advise the GPA. They shared a mission: stopping the further spread of AIDS. And as Heymann and Tarantola had done before in their efforts to stop smallpox, these men were willing to bend every UN and WHO rule as far as possible to stop the pandemic. They were believers. Between them they shared the ability to write and converse in at least fifteen languages. And they had a camaraderie that was quite uncharacteristic of the usually opportunistic careerist atmosphere pervading most United Nations programs.

When Mann had originally left Kinshasa to take the reins of power in Geneva in November 1986, he had a total working budget of $5 million, a part-time secretary, and three epidemiologists who were borrowed from other programs. Mann's own salary was still paid by the U.S. Centers for Disease Control.

By the time he reached London for the January 1988 Summit, less than two years later, forty-year-old Mann commanded a far-flung AIDS program, a considerable staff, and a budget of over $50 million, with $92 million promised for 1989. It was, by WHO bureaucratic standards, a meteoric rise.

And none of it went unremarked by Mann's WHO peers, who headed other disease programs. With the envy of Cinderella's stepsisters, they watched as the cinder maid grabbed all the attention and the Prince's love at the ball.

That Mann had unique access to Director-General Mahler and could enter the chief's office without first passing through the usual rungs of intermediary power was noticed. That Mahler increasingly mentioned AIDS in his speeches, placing it with each oration higher on the WHO totem pole of priorities, was noticed. That U.S., Canadian, and Western European currency poured into Geneva specifically earmarked for the GPA was noticed. That Dr. Jonathan Mann, this Johnny-come-lately international bureaucrat, was almost daily gracing the front pages of leading newspapers and magazines from Tokyo to Casablanca was inescapable.

While Mann, Tarantola, Heymann, Carballo, and the rest of the AIDS staff did their best to create a highly publicized sense of worldwide emergency and mobilization, jealousy simmered in the hallways of the vast Geneva complex. In the enormous vaulted lobby of WHO headquarters,

experts on cholera, malaria, diarrheal diseases, schistosomiasis, health economics, polio, and vaccine development gathered in discreet clusters by the three-story-high glass wall that afforded a view of Lake Geneva and Mont Blanc. And they whispered. They cited the Programme's own statistics on AIDS—those modest numbers of underreported cases—and asked why the new disease should command such resources and attention when other microbes were killing tens of millions of people. They noted that Mann and some other Programme staffers were Americans, and assured one another that all the concern was *only* in place because AIDS was killing homosexuals in New York and San Francisco.

And even that increased their envy: they admired the skills and energy of the American and European gay activists who relentlessly lobbied WHO, knowing that cholera victims in Bangladesh or Cambodian malaria patients would never be able to mount similar campaigns on their behalf.

Mann and his team either were oblivious to the talk behind their backs or chose to ignore it. In either case, when questioned directly about comparisons between WHO commitments to, for example, malaria versus AIDS, the Programme group would say that all global health programs were underfunded and not one dollar or yen of AIDS monies should be gathered at the expense of other health efforts.

And they would politely remind critics that AIDS was a newly emerging epidemic which, by definition, would swell to claim tens of millions of lives if not stopped immediately. On that point Mann enjoyed the full support of the director-general.[1]

The staff of the Global Programme on AIDS discussed quite consciously among themselves the inherent contradictions in the need for a state of emergency to halt a newly emerging disease versus the essential nature of WHO and the United Nations system. Though Ebola, Marburg, Lassa, and other emergencies had received the quick attention of WHO, they couldn't serve as models for action against AIDS. First of all, each had surfaced as seemingly confined local emergencies. Second, they, at least in part, burned out on their own. Third, the microbes caused almost immediate disease in those who were infected, with an alarming level of mortality; there could be no doubt to the populaces or their governments that a state of emergency was warranted. Fourth, fairly simple measures, such as provision of sterile syringes, could stop the primary spread of the diseases.

In contrast, HIV surfaced almost simultaneously on three continents and was quickly a feature on the health horizons of at least twenty different nations. Not only was there no sign that AIDS might burn out on its own; scientists could see no evidence of the famous bell-shaped curve of infection and disease.[2] Far from causing immediate disease and death, HIV was a slow burner that hid deep inside people's lymph nodes, often for over a decade, before producing detectable infections. As a result, a society could already have thousands of infected citizens before any sound of alarm was rung, and even when the first AIDS cases appeared, their numbers were

small enough to allow governments to feel comfortable about ignoring the seemingly trifling problem. Denial was all too easy a response to AIDS.

Furthermore, no facile measures could be taken by a government to bring AIDS to a halt. Unlike Ebola, Marburg, drug-resistant cerebral malaria, or Lassa, HIV hit specific social targets. It was a sexual disease. It was associated with homosexuality, promiscuity, and drug abuse. It pitted public health against organized religion and the moral pillars of society.

It was, in short, easy to ignore and uncomfortable to confront.

The World Health Organization, acutely aware of the unsettling aspects of AIDS, initially chose the first route—ignoring the emerging disease.[3] From 1981 to late 1986 barely a whisper about AIDS emanated from Geneva. By the time Mann and his crew started sounding every alarm they could get their hands on, HIV had successfully emerged and reached full-fledged epidemic status in all the major cities of North America and Western Europe, as well as most of the urban centers of sub-Saharan Africa.

The GPA group felt justified in, figuratively speaking, yelling about AIDS at the top of their lungs.

But yelling, figuratively or literally, simply wasn't done inside the World Health Organization. Mahler might approve, but his underlings, and officials elsewhere in the UN system, did not. Indeed, in the entire United Nations system, "yelling" was the exclusive right of the General Assembly and the Security Council. The peripheral UN agencies were *intended* to plod.[4]

Rubbing against the bureaucratic grain, the Programme staff group moved with both haste and deliberation. They decided on a strategy for control of AIDS in which vaccine and drug research efforts, already underway in key wealthy nations, received the Programme's encouragement but not significant emphasis. With no cure in sight, the Programme's best focus, they felt, was on prevention of further spread of HIV. Though details would come much later, during 1987 the GPA outlined the need for national AIDS programs in every country—programs that would coordinate mass education campaigns about the disease. Societal awareness was the first step—that was Tarantola's job. To prevent further spread of HIV it was crucial that every nation's blood banks be free of HIV, sterile syringes had to be available to health providers, and people who were infected with HIV had to be counseled carefully so that they wouldn't pass their virus on to others. Counseling was Carballo's job. Anti-AIDS programs had to be coordinated not only within countries but worldwide.

And perhaps most important in Mann's mind was the need to eliminate the atmosphere of discrimination and prejudice that surrounded every aspect of AIDS.

"Discrimination simply drives AIDS underground," Mann repeatedly asserted. "The epidemic doesn't go away, it simply becomes harder to see, more alienated from public health. If you drive it underground, you guarantee its spread."

With those vague principles in mind, the Programme targeted sequentially each of the international bodies whose support the GPA staff felt was crucial. On May 15, 1987, the Fortieth World Health Assembly, the legislative body of WHO, passed the Global Strategy for the Prevention and Control of AIDS,[5] endorsing the strategy of the Global Programme on AIDS.[6] That gave the Programme its mandate, power, and seal of approval. In subsequent months Mann and his team sewed up further political support by gaining formal endorsements at the Venice Summit of the European Economic Community and the Economic Council of the UN. And on October 26, 1987, Jonathan Mann did something no WHO functionary at his level had ever done: he addressed the General Assembly of the United Nations. For the first time in its history the UN passed a resolution on a specific disease, formally endorsing WHO's leadership in the war against AIDS.[7]

Over the next three months the Programme staff carefully prepared for the London Summit, further detailing its strategy for control of the emerging pandemic, collecting data on the epidemic's scope, and carefully monitoring the AIDS-related activities of governments around the world. Though they loudly decried all attempts to keep AIDS at bay through legislation against HIV-positive individuals or members of social groups considered at greatest risk for exposure to the virus, the GPA members watched helplessly as eighty-one nations passed such laws.[8] As the New Year and the London Summit approached, at least ten more governments were debating passage of similar legislation and the international mood was growing ugly.[9]

In the Middle East tough laws in some Islamic countries passed in 1986–87 made failure to submit to HIV tests and "promiscuous" behavior punishable by imprisonment.

In Western Europe the EEC repeatedly condemned all efforts to legislatively restrict the travels, employment, or reasonable freedoms of people infected with HIV. Nevertheless, laws and condemnations were forthcoming.

Just four days before the opening of the London Summit of Ministers of Health, on January 22, 1988, American Gene Meyer was forcibly detained by British authorities when he attempted to enter the U.K. It was the second time Meyer had faced such problems with British authorities: in September 1987 immigration officers at London's Gatwick Airport, surmising that Meyer was a homosexual, read his diaries, saw references to medical tests, assumed he had AIDS, and designated the man "medically undesirable." Meyer was eventually permitted entry on January 22, 1988, when a very embarrassed Ministry of Health intervened, countermanding immigration officials.

There were contradictions to EEC cries of openness in other Western European government efforts, particularly directed against Africans. Belgium, West Germany, Greece, Finland, and Spain all passed new legislation, or interpreted preexisting public health law, to permit expulsion or visa denial to HIV-positive foreigners who were seeking work permits or

student credentials. In practice, these regulations were primarily directed against Africans and, in the case of Germany, Turks.

Germany offered a unique set of challenges to the Global Programme on AIDS and the rest of the European Community. On the one hand, Germany was one of the first countries to respond to AIDS with a national education campaign, distributing 27 million leaflets on the disease during 1985 and promoting condom use.

But a gay, retired U.S. Army sergeant living in Nuremberg was arrested by German authorities in February 1987 and charged with knowingly spreading the disease to his sexual partners. He was ultimately convicted and sentenced to four years' imprisonment. A German homosexual was shortly thereafter brought up on similar charges. As AIDS panic in Bavaria increased, and public support for the arrests was loud and clear, Bavaria's Interior Minister, August Lang, announced that all prostitutes, civil service job applicants, drug addicts, immigrants, prisoners, and foreigners applying for extended residency permits would be required to undergo HIV blood tests. Days later the Bavarian city of Munich announced plans to dismiss all HIV-positive civil servants.

The Bavarian actions received a surprising amount of support from German residents of other, typically more liberal states. Federal Interior Minister Friedrich Zimmermann was prompted to order the nation's border patrol to deny entry to all foreigners who carried the AIDS virus.[10] The European Community was outraged. Officials denounced the German actions as clear violations of Community principles of freedom of movement on the continent.

In November 1987 the president of the German Federal Court of Justice, Gerd Pfeiffer, announced that in the absence of an HIV vaccine it might soon prove necessary to tattoo and quarantine people who were infected with the virus. The last time Germany had carried out tattoo-and-quarantine measures on its residents was during World War II, when "misfits," Jews, and other "undesirables" were placed in concentration camps and exterminated. Not surprisingly, Judge Pfeiffer's pronouncement sent shock waves throughout the world.[11]

The Eastern bloc and the Soviet Union posed special difficulties for Mann and his colleagues, because, in general, the communist states claimed not to have much—or any—AIDS, and they wanted to keep it that way.

The Soviet Union, after long denying that it had any indigenous AIDS cases, issued fiats in late 1987 requiring testing of most foreigners and giving the KGB and the police powers to order HIV tests—refusal punishable by imprisonment—on its citizens.[12]

Elsewhere in the communist world two nations clearly stood out: Cuba and China.

No nation on earth had ordered as broad a sweep of AIDS regulations as had Cuba. Between March 1986 and January 1988 the government

conducted 1,534,993 HIV tests, according to the Ministry of Health, and the intention was to test every citizen and nontourist visitor to the country, or 10.4 million people.[13]

By January 1988 the Cuban government had identified 174 HIV-positive individuals and placed them under lifetime quarantine. Several of the infected people were recently returned veterans of the Angolan civil war, in which Cuban military advisers played a pivotal role in defense of the Luanda government. More than 300,000 Cubans returned from Angola between 1975 and 1987; HIV-1 was clearly present and causing AIDS in Angola at least as early as 1983.

In the People's Republic of China there were also practices underway that troubled the GPA. Beginning in December 1986, the Chinese government instituted mandatory testing for all foreign students: in reality, the edict was carried out with greatest vigor on Americans and Africans.[14] Students who failed to comply with the tests were barred entry or deported. The mandatory testing list had expanded by 1987 to include all foreigners who wished to stay in China for more than a year and all Chinese citizens returning from overseas.

By the time the world's Health Ministers gathered in London for their AIDS Summit, China had already tested more than 10,000 foreign students, 20,000 returning Chinese students, and thousands of foreign businessmen: all in a period of less than four months. In addition, the Chinese government issued strict laws against "illicit sexual contacts with foreigners," which included all forms of nonmarital sex. All foreigners caught having such relations with Chinese citizens could be deported, and the government stipulated that entertaining local citizens in one's hotel room—regardless of what actually transpired in the room—would be considered in violation of the law.

Asia was a very special concern for the World Health Organization; though AIDS hadn't yet emerged in most of the area, those familiar with social and medical practices in much of the region felt sure that the virus could easily overwhelm the continent. WHO Director-General Mahler was so worried that in mid-1987 he broke with the usual diplomatic UN niceties that precluded mentioning countries by name when sounding an alarm. He predicted that a "major catastrophe" loomed for Asia if the continent failed to come to grips with AIDS, and specifically named India, Bangladesh, Thailand, Indonesia, and the Philippines as countries at greatest risk. Mahler did not break with UN decorum far enough to enunciate the reasons for naming those particular countries, but WHO officials privately voiced deep concerns about rapidly rising heroin and prostitution markets in urban centers of those countries.

Some of the countries in question seemed to recognize the veracity of Mahler's comments and responded aggressively. The nature of their responses, however, troubled WHO.

Thailand, for example, had a thriving sex and prostitution trade. Long

a major source of foreign exchange for the nation, the prostitution and "entertainment services" industry swelled radically during the Vietnam War, as Thailand was designated an official R&R (rest and recreation) site for U.S. military personnel. By the end of the war Thailand's revenues from the sex trade equaled a quarter of all rice trade income.[15] Not wishing to call attention to potential problems in so lucrative an industry, the Thai government ignored all WHO pleas to institute nationwide AIDS education campaigns and promote condom use. Instead, Thailand alternately tried to repress or ignore the virus, imprisoning some HIV-positive foreigners while issuing so-called AIDS-free certificates to male and female prostitutes who serviced tourists.

India also perceived AIDS as a foreign problem and declined to conduct any form of domestic AIDS education. By the end of 1986 India had in place laws requiring HIV tests of all foreign students. As was the case in so many other countries, these laws were almost exclusively—and often brutally—enforced against African students.

Despite such measures, by mid-1987 scattered surveys of female prostitutes in India were already revealing that AIDS was emerging in the country. As the numbers of documented AIDS cases in India rose during 1987, the Ministry of Health declared that foreign students and tourists were chiefly responsible, as were "foreign priests attending Christian conventions."

By the end of 1987 fear of foreigners with AIDS had reached such heights that villagers in Goa fell upon a group of German tourists, smearing them with dung because of their allegedly filthy foreign ways.

Other Asian countries responded with similar anti-foreigner laws and actions, notably Japan, South Korea, Indonesia, Malaysia, and Singapore.

The Global Programme on AIDS staff scrambled to convince Asian leaders that such policies would only hinder efforts to prevent the emergence of an enormous AIDS epidemic on the continent. But the Asian nations correctly pointed out that their policies were modeled after those of the most powerful nation on earth, the home of Jonathan Mann, the country leading the world's AIDS research effort, the nation with the greatest number of officially reported AIDS cases: namely, the United States of America.

The Reagan administration's decision to follow an overall policy of trying to control AIDS through the use of legal instruments was a huge thorn in Jonathan Mann's side. At a time when the GPA was stressing public education as the primary tool for preventing the spread of HIV, the U.S. government was torn asunder by sentiments that *no* form of tax-funded AIDS education should be permitted. And tensions at the White House mirrored a severely dichotomous response toward the AIDS epidemic at the level of grass-roots America. All across the country by 1986 the populace was deeply divided between those who favored a nonjudgmental education-driven approach to the epidemic and those who wanted HIV-

positive people and members of identified high-risk groups segregated by some means from the rest of society.

During 1987 more than 350 items of AIDS-related legislation were debated by politicians in U.S. states, most of them aimed at restricting the activities of HIV-positive individuals or at mandating testing of various population groups.

In June 1987, Howard Phillips, who had influence at the White House because he chaired a powerful right-wing group dubbed the Conservative Caucus, called for passage of a federal law giving "every hospital, every private business, every property owner, every school . . . the right to [HIV] test people who seek to use its facilities." And he said that "quarantining is something that we have to consider."

The foci of attack were homosexuals, "immoral lifestyles," drug users, and sinners—the purported purveyors of viral ruin. Like their Islamic counterparts in the Middle East, many Christian political leaders in the United States were convinced that there was a religious message to be derived from AIDS, an epidemic that would best be stopped through moral virtue.

The year 1987 was unique in recent American history in that Christian moralists ran against one another in national elections, and a disease rose to the dubious status of a pivotal issue in state, federal, even presidential elections.

Ronald Reagan's second term in the White House wasn't scheduled to end until January 1989, but campaigning for the November 1988 election began extraordinarily early. His Vice President wanted to be next in line for the job, but George Bush was no shoo-in. Sensing that the national mood was volatile, and no single issue or candidate had yet captured widespread support, more than a dozen men were already stumping for office in the spring of 1987, a full year before the first round of scheduled primary elections. And right up until election day in November 1988, AIDS would figure prominently in their campaigns.

Pat Robertson, a Baptist minister and founder of television's Christian Broadcasting Network, ran against Vice President George Bush in the Republican Party primaries. Robertson maintained that scientists were "frankly lying" when they claimed that HIV could be transmitted heterosexually, and asserted that condoms were useless to prevent infection. He supported the right of employers to fire and landlords to evict people who were infected with the virus. And he told his Christian followers that they were engaged in "a holy war" against the debauchery and decadence that he said were at the root of AIDS.[16]

The Moral Majority, a Christian fundamentalist political body led by the Reverend Jerry Falwell, had long proclaimed that AIDS was the wrath of God against homosexuals. By 1987 the organization, which had backed the previous presidential election of Ronald Reagan, was nervous about

supporting Reagan's heir apparent. AIDS was one reason for that nervousness, as the organization felt that George Bush might cave in to the "AIDS Lobby," as patient advocates were called, and allow sexually explicit education about the disease. Even federally funded basic research on AIDS was opposed by the group.

"What I see is a commitment to spend our tax dollars on research to allow these diseased homosexuals to go back to their perverted practices without any standards of accountability," declared Moral Majority director Ronald S. Godwin.

In his first major speech addressing the AIDS epidemic, delivered before the College of Physicians in Philadelphia on April 2, 1987, President Reagan assured the nation—for the first time—that he was concerned about AIDS and considered it "Public Enemy Number One."

"The federal role must be to give educators accurate information about the disease. How that information is used must be up to schools and parents, not government," Reagan said. "But let's be honest with ourselves. AIDS information cannot be what some call 'value neutral.' After all, when it comes to preventing AIDS, don't medicine and morality teach the same lessons? . . . I think that abstinence has been lacking in much of the education."

The President's comments reflected an ongoing dispute within his administration over the proper tactics for control of AIDS and prevention of the emergence of HIV in geographic and demographic parts of the country not yet touched by the virus. Reagan's Surgeon General, Dr. C. Everett Koop, wanted frank discussion of abstention, the AIDS epidemic, and safe sex to be conducted in the nation's schools. But Reagan's Secretary of Education, William Bennett, adamantly opposed such plans, favoring instead efforts to identify and control HIV carriers through compulsory HIV testing of all hospital patients, marriage license applicants, prison inmates, and foreigners applying for immigration visas.[17]

Vice President Bush was straddling his roles as adviser to Reagan and candidate for the presidency. He played to voters on the right, calling for mandatory marriage license HIV tests and public identification of people who were infected.

It all came to a head in Washington, D.C., June 1–5, 1987. More than 10,000 scientists, physicians, and reporters descended upon the nation's capital for the Third International Conference on AIDS.

In the vast expanse of the Hilton Hotel's conference room, scientists searched for seats, shielding their squinting eyes from the glare of television lights that created, alternately, bright areas and deep, eerie shadows. Around the periphery milled clusters of activists, dressed in black jeans and black-and-white T-shirts emblazoned with Act Up slogans. The hall was filled with nervous energy that confused most of the foreign scientists: for four days they would witness a uniquely American exercise in democracy and confrontation that some would find distasteful, others inspiring.

The keynote speaker, U.S. Surgeon General C. Everett Koop, dressed in his starched white Public Health Service uniform, looked at the sea of enthusiastic scientists and activists with genuine surprise. What began as a polite reception swelled into nearly hysterical cheering, chanting, shouting, and foot-stomping as thousands of activists and American scientists signaled their support for Koop's dissident position within the Reagan administration. Koop was stunned. Just two years earlier most of the people in the room would have booed him off the stage because of his staunch, often radical opposition to abortion. But now they gave him a hero's welcome unlike any the seventy-one-year-old Brooklyn-born physician had experienced.

"Stop it! You're embarrassing me!" he shouted, and like obedient schoolchildren, the crowd fell silent, took their seats, and behaved themselves.

In contrast, when presidential candidate George Bush took to the podium, activists stood silently, their backs turned to the Vice President, many holding placards aloft condemning Reagan administration policies. Cameras rolled, photographers' bulbs flashed, and hundreds of scientists stood one by one to join the activists in turning their backs on the Vice President of the United States.

On the final day of the gathering, American and French scientists took the podium together to denounce not only the Reagan administration's policies but those of governments all over the world that, they said, were "based on irrational fears rather than science." They urged scientists to sign a petition calling for an end to discriminatory HIV-testing policies, an end to immigration and travel restrictions for people with HIV, and all other forms of what they considered repressive approaches to AIDS control.

"AIDS is a touchstone of politics, of racism, of bigotry," Mann told the conferees. "We see a rising wave of stigmatism around the world. AIDS has become a threat to free travel and global movement. People all over the world are seeking answers—simple answers—as the pandemic spreads. People are promoting sex cards, tattoos, quarantines, police lists, deportations, home burnings, incarcerations of select population groups.

"How our societies treat HIV-positive individuals will test our collective moral strength. This test will present itself with increasing challenge in the coming years."

Though Mann's remarks received thunderous applause that day in Washington, and were carried by the media worldwide, the message many powerful politicians derived from the Third International Conference on AIDS was quite the opposite. They saw shouting homosexuals showing disrespect for national leaders, and upstart scientists daring to tell them how to govern. And they didn't like it.

Two weeks after the close of the AIDS conference the U.S. Senate voted unanimously—96 to 0—to mandate HIV tests for all applicants for legal immigration to the United States.[18] The same week governors of three states—Minnesota, Texas, and Colorado—signed laws permitting local

authorities to quarantine indefinitely HIV-positive individuals who seemed by virtue of their sexual activities to pose a threat to society.

Throughout the summer of 1987 debates raged in state and federal legislative assemblies over restrictive versus educative approaches to controlling the spread of AIDS. And with the autumn came both more action inside the U.S. Congress and an escalation of presidential electioneering. In October the U.S. Senate voted nearly unanimously—94 to 2—to cut off all federal funds for AIDS education efforts targeted at homosexuals. At issue was a comic book designed by a New York men's group that depicted graphically how men could safely have sex with one another in the midst of the AIDS epidemic.

"Christian ethics cry out for me to do something," Republican Senator Jesse Helms said, claiming the comic books would promote sodomy in America. "I call a spade a spade, a perverted human being a perverted human being. This subject matter is so obscene, so revolting, it is difficult for me to stand here and talk about it. I may throw up."

By the time the world's Ministers of Health gathered two months later in London, the United States had federal laws requiring HIV tests of foreign students, immigrants, long-time visitors, all military personnel and applicants for military service, U.S. overseas foreign service personnel, and applicants for the domestic youth employment service called the Job Corps. Entry to the United States could be barred to any noncitizen known to be HIV-positive, and though Bush had in oratory opposed discrimination against people with AIDS, HIV-positive applicants for foreign service, military, or Job Corps positions were, by law, denied employment.

Before the London meeting the GPA staff had reviewed all the legal and political activities surrounding AIDS and concluded that they were witnessing, in slow motion, many of the same social responses that had followed the arrival of the plague in fourteenth-century Europe. In both cases there were actually three different social epidemics within the larger biological epidemic.

First, with the initial emergence of the microbe—plague bacteria or HIV—came denial in all tiers of society. The tendency was to ignore the microbial threat, or assume only "they"—some distinct subpopulation of society—were at risk. The microbes exploited such denial, spreading rapidly while humans made no attempts, through their personal or collective behaviors, to block any of the avenues of transmission of the organisms.

The second social epidemic was fear. Some event in the biological epidemic would suddenly shock a society out of its state of denial, propelling people into a state of group terror. In fourteenth-century Europe it was often the plague death of a popular cleric or a local lord or the sudden public expiration of a child that prompted panic. The timescale was quick: plague-infested rats might arrive in a town on Tuesday, local human deaths might begin in the harbor area by Thursday or Friday, and a riveting event could spark widespread panic by the middle of the following week.

But AIDS was a slow killer, and the biological epidemic unfolded in each country over a span of many months or years. So the first social denial stage might persist for over a decade. Fear might also linger for years, giving rise to all sorts of panic responses and inappropriate actions, such as setting fire to the home of two HIV-positive children with hemophilia in Florida.

Eventually, the Programme staff knew, the social epidemic of fear usually yielded to a wake of repression. Fear-driven government response was usually irrational, prompting attacks on the victims of disease, rather than the microbes. During the plague such fear-driven repression led to the wholesale slaughter of Jews and of women accused of witchcraft. Though outright genocide certainly hadn't surfaced in response to AIDS, Mann's staff felt certain that in the absence of strong political leadership guiding populaces toward rationality, the epidemic could have violent consequences in some societies.

As HIV emerged in new areas of the world, Mann hoped to find a way to break this chain of social epidemics; to push governments out of denial before they had an epidemic on their hands; or failing that, to move a society out of fear to effective action, rather than panic-driven repression. The GPA group knew that they were breaking new ground, that few societies had ever in history responded wisely or rationally to major epidemics, and that lessons learned with AIDS could be applied to combating future emergences of all sorts of microbes. They searched for answers.

In Nigeria, Dr. F. Soyinka studied his society's response to AIDS in 1987. Nigeria had very few cases of the disease, as it was located far from Africa's AIDS epicenter. Nevertheless, Soyinka and other physicians knew it was only a matter of time before HIV took its toll in Nigeria, so they waged a massive monthlong television, radio, and newspaper campaign to warn the public. At the campaign's end, Soyinka surveyed residents of Lagos.

He was sadly surprised to discover that "85 percent believe AIDS is a disease of the white man. They believe it can only be gotten if you have sex with a white man."

A 1987 Gallup poll conducted in thirty-five nations showed that 96.5 percent of the people questioned had heard of AIDS, but most respondents were deeply confused about how dangerous the virus might be, how one got infected, and which activities put a person at risk. Similarly, U.S. CDC surveys year after year revealed that nearly every adult American had heard of AIDS and knew that it was caused by a virus. But about half thought one could become infected by donating blood, by being bitten by an insect, and/or by sitting on a public toilet.

Throughout the world there was an alarming confusion between the myths and the realities of AIDS, producing either continued denial or highly exaggerated fear.

A complicating factor unique to AIDS and other sexually transmitted diseases was the nearly universal dislike of condoms. All over the world,

men felt that condoms diminished their pleasure and women had little or no control over their use. Nobody enjoyed talking about condoms during lovemaking, and it could be dangerous for a woman to request that her lover or husband use one: there were widespread reports of men beating their wives or partners in response to such requests.

Studies of gay male behavior in San Francisco showed that crucial to individual protective action, such as consistent use of condoms, was a high level of fear, brought about by witnessing the deterioration and AIDS death of a close friend, relative, or lover. Similarly, on a societal scale it was apparent that few cultures were able to confront AIDS until the death toll had become sufficiently high to have given more than 10 percent of all adults a firsthand view of the horrendous disease.

But that was unacceptable. How could Jonathan Mann, the GPA staff, the World Health Organization, or the planet's citizenry sit back and wait for a massive death toll before taking effective action? How could they allow the microbes to emerge in one geographic or cultural place after another, infect tens of thousands of people, slowly—over a period of years—cause visible disease and deaths, and be utterly *endemic* to the societies before action was then taken to stave off an *epidemic*?[19]

Studies all over the world were revealing the scale of the problem. For example, by 1987 more than 5 percent of the adult population of Brazzaville, Congo, were infected with HIV, and the visible AIDS death toll was already obvious to even the casual observer. Yet researcher Marc Lallemont found that pregnant women in the city were in "an almost complete state of denial, perhaps the most complete I've ever seen." Lallemont surveyed hundreds of women who were making prenatal visits to local clinics and discovered that more than half of them insisted AIDS was caused by mosquito bites, despite numerous government educational campaigns stating just the opposite and warning about sexual transmission of the disease.[20]

In 1986 the U.K. government launched one of the highest-profile AIDS education campaigns seen anywhere in the world. It was a case where most of the elements for success appeared to be in place: top-level political will, resources, national television accessibility, and a heightened media interest. Yet the campaign was eventually judged a failure, as it succeeded in raising AIDS awareness and fear but failed to put a dent in public misperceptions about how the virus was transmitted or general disdain for those who carried HIV.[21]

In no country, it seemed, had a government found the secret to preventing further spread of HIV once the epidemic became endemic.[22]

At the Global Programme on AIDS, Manuel Carballo said that the epidemic was forcing researchers all over the world to evaluate—and reevaluate—the effectiveness of a whole battery of standard public health weapons, in hopes that something besides a chilling death toll could motivate individuals and governments to take rational steps to protect themselves from the virus.

"What makes the AIDS effort especially difficult," Carballo said one afternoon shortly before the London Summit, "is that those who are at greatest risk are those who are divorced from traditional values and culture. They have had to innovate new cultures. They find friends in bars and clubs. And nothing in the relationships is stable."

Without social stability, people were hard to reach, whether they were gay men frequenting bars in San Francisco, migrant workers in Mexico, newly urbanized young women in Kinshasa, Burmese prostitutes in Bangkok, or injecting drug users in the Bronx. Such people were deeply separated from the traditional mores of their respective societies, often cut off from their families and mainstream workplaces.

In the 1960s, René Dubos wrote extensively about the special vulnerability to the microbes among people who lived lives of poverty. History demonstrated repeatedly that, with rare exceptions, the microbes exploited the weak points of economically bereft lives: chronic malnutrition, prostitution, alcoholism, dense housing, poor hygiene, and egregious working conditions.

Carballo and his colleagues recognized that there was more to microbial vulnerability than the social-class arguments put forward by Dubos. When information was the key to self-protection, there were gradations of *Homo sapiens* vulnerability that, yes, could be rooted in economic class, but could also stem from social alienation. People who were treated as outcasts from the dominant culture in which they lived could be denied vital life-protecting information or public health tools. If the larger society reviled a particular subgroup, its marginalization could be a risk factor, Carballo argued, every bit as crucial as a contaminated syringe.

Carballo saw a confluence of social factors at play in the emergence of HIV in societies: marginalization, social alienation, poverty, and discrimination. In his mind, they united to form a social bridge across which HIV traveled into one society after another.

As Panos Institute AIDS researcher Renée Sabatier put it: "I think there is a very real danger that we're going to end up as a [world] society divided between those who were able to inform themselves first and those who were informed late. Those who have access to information and health care, and those who don't. Those who are able to change, and those who aren't. I think there is a real danger of half of us turning into AIDS voyeurs, standing around watching others die."

On January 28, 1988, the London Summit endorsed the GPA's fifteen-point declaration that called for openness and candor between governments and scientists, opposed AIDS-related discrimination, gave primacy to national education programs as means to limit the spread of AIDS, and reaffirmed the GPA's role in international leadership. Mann and Mahler viewed it as a triumph.[23]

But even as they smiled for the cameras and signed the declaration, seeds of failure were being sown. The declaration said nothing directly

about quarantines, immigration policies, or forced deportations, delegates to the Summit having concluded that no agreement on those pivotal issues could be reached between the 149 nations. Worse yet, representatives of critically important countries—like China and the U.S.S.R.—openly scoffed at the GPA's attempts to promote educative efforts over restrictive measures. China's delegate denied the existence of homosexuals, drug users, and prostitutes in his country, thus insisting AIDS couldn't threaten the People's Republic. And Soviet Minister of Health Yevgeny Chazov insisted that Slavic genetic superiority had rendered the populace immune to the virus.

Despite the efforts of the GPA, the pandemic spread relentlessly, always emerging first in communities that were on the outer periphery of societies' margins. Mann, Tarantola, Carballo, and the rest of the GPA staff zigzagged madly about the planet, living in a perpetual state of jet lag, as they frantically tried to squelch the tandem fears of HIV emergence and social denial, fear, or repression.

With each passing day in 1988, Mann became more strongly convinced that disease emergence was a human rights issue, in the strictest legal sense of the phrase. Though the physician/scientist had never before been exposed to international human rights law, some of those working around him had—particularly Katarina Tomasevski, an attorney and public health expert who served as a consultant to the GPA. Tomasevski introduced Mann to the body of international human rights law. And Mann, in turn, increasingly framed GPA policy pronouncements on such issues as international freedom to travel, HIV screening of refugees, access to health care for prostitutes, and discrimination against homosexuals in the context of the major instruments of human rights law.[24] Tomasevski demonstrated that most of the government actions the GPA found repugnant, such as deportation of HIV-positive Africans from Asian countries following enforced testing and detention, were violations of international legal pacts to which the offending nations had previously agreed.

In the United States, attorney Larry Gostin, of the Boston-based American Society of Law and Medicine, was carefully documenting the astonishing growth in AIDS-related legislation and precedent-setting legal decisions. He, too, felt that basic tenets of international human rights and national civil rights law were being violated or eroded.[25]

While the staff of the Global Programme on AIDS became more outspoken about the connection they perceived between human rights and the spread of HIV, anger and jealousy were building all around them. Some critics began dropping hints to the international press corps about "left-wingers in Geneva." Among Mahler's top aides were men who made no bones about their feelings that the GPA was reflecting "homosexual politics." Human rights, though a topic of serious discussion within most other UN agencies, had never received much attention at the World Health Organization.

"WHO human rights policies were characterized as incoherent, fragmented, inconsistent. We really didn't get moving on human rights until it was thrust upon us," WHO rights expert Sev Fluss said. What thrust human rights up to WHO's front burner was AIDS, and specifically references in the London declaration to abolishing discrimination and inequity.

"Medical people think of human rights as torture and so on. They don't think of it as what they do. And they certainly don't think of a constitutional right to health care," Fluss explained.

"When AIDS first emerged, our response was disastrous," Fluss conceded. "People thought it was like Ebola and Marburg, which went away without creating a global epidemic. A flash in the pan, that's what they thought."

But as early as 1983 ten countries passed legislation specifically targeting AIDS, and Fluss thought it rather intriguing that a new disease was prompting so many laws. By the time the GPA was established, twenty-one more countries had passed major AIDS legislation, and Fluss had an office designated as the WHO Health Legislation Unit. But the HIV pandemic kept spreading, right past all those laws, national border patrols, HIV-testing centers, and alleged human genetic superiority. Within nations it spread to new population groups, made its way from urban centers to rural areas, crossed class boundaries. Between nations it surmounted virtually every obstacle, save condoms, that humans placed in its way—and certainly each legislative barrier.

II

By 1988 Western economists and African leaders were asking out loud, "Will this epidemic slow, or even destroy, African development? Is it possible that AIDS will destroy all the development programs we have spent the last three decades building?"

The disease, which so recently had been added to the agenda of international human rights, was also becoming a bona fide macroeconomics issue, threatening both fiscal and social development in the world's poorest nations. It seemed too horrible to contemplate, yet inescapably apparent, that the global AIDS pandemic might well make the world's poorest nations much, much poorer. After years of struggling to rise above Third World status, these nations might be slipping backward on a wave of Thirdworldization.

The World Bank's Mead Over pioneered much of the research on the economic impact of AIDS in Africa, which between 1988 and 1993 was supplemented greatly by the research of economists, mathematical modelers, and epidemiologists in the United States, U.K., France, and at WHO.

They began their calculations with several key assumptions: first, that African nations entered the AIDS era already severely impoverished. For

example, the 1987 GNP per capita in the United States was $16,690. In Tanzania it was $290, in Zaire a mere $170.

Second, no African nation faced a single epidemic crisis. Since the 1970s a host of new microbes had successfully emerged and swept across the continent: drug-resistant malaria, drug-resistant tuberculosis, urbanized yellow fever, Rift Valley fever, and waves of measles epidemics, to name a few. That meant that the health care systems of African nations were already stretched to their limits. Given scarce resources for health care—averaging $1.00 to $10 per capita annually—any additional burden seriously endangered the viability of entire national medical systems.

Compounding the problem was the seeming synergy between microbial epidemics. Wherever AIDS became endemic, tuberculosis followed closely. One epidemic sparked another: malaria and HIV fed upon one another, as did cytomegalovirus, Epstein-Barr virus, syphilis, gonorrhea, chancroid, and a host of others. Though no one had a detailed empirical grasp of the relationship, it was clear throughout Africa that wave upon wave of infectious diseases influenced one another, and further taxed the health care systems and economies of afflicted nations.

A third assumption was that AIDS would have a uniquely harsh impact because of who in Africa were the microbe's primary targets. Studies all over the continent showed that among the hardest-hit social groups was the well-educated urban elite. These were the young adults who had attended universities in Boston, Oxford, Moscow, and Paris, acquiring skills that could be used to navigate their countries out of postcolonial stagnation into prosperity and infrastructural order. But they were also among the few Africans who possessed disposable incomes and could afford to indulge in the carefree nightlife of cities like Kinshasa, Nairobi, Harare, and Yaoundé. Long before anyone had heard of AIDS, the continent's educated elite was unknowingly becoming infected in the discos, brothels, and nightclubs of Africa's glittering nocturnal ambience. To economists, who placed productivity values on human lives, that meant that AIDS was taking a particularly sharp toll on Africa's future.

A fourth consideration was the familial nature of the epidemic. In Africa, whole families seemed to die off, each survivor's burden increased by the need to care for the sick and compensate for the decline in family income brought about by the deaths of adult providers. In some devastated areas, such as the Lake Victoria region, familial destruction led to the economic collapse of whole villages. And, with time, that could have a ripple effect through all tiers of the regional economy.

All economic forecasts had to begin with estimates of the size and forecasted scope of a country's current epidemic. Nobody, however, including those who reported countries' AIDS statistics, believed that the officially reported numbers came close to reflecting the true scope of the HIV/AIDS epidemics in developing countries. But what was the reality?[26]

Some African countries were still holding back accurate information

about the scope of their epidemics as late as 1990, particularly when sensitive groups—such as the military—evidenced high infection rates. Still other countries were overwhelmed by famines, civil wars, and political instabilities that rendered the business of disease record keeping all but impossible. And all African countries were hampered by severe infrastructural problems that hindered diagnosis, treatment, and reporting of AIDS.[27]

HIV infection rates in some groups were already staggering by 1988, and would reach positively horrendous proportions by 1993, when some studies would find, for example, that upward of 40 percent of women of reproductive age in key African cities carried the virus.[28]

Even without solid epidemic estimates economists who were paying attention to Africa's pandemic were, as early as January 1988, predicting financial hard times for the continent: patchworks of small-scale famines;[29] "an economic disaster" based on the direct costs of AIDS care, HIV-testing costs,[30] a year's supply of condoms,[31] AZT and other drugs for opportunistic infections (where such pharmaceuticals were at all available); and loss of net industrial and agricultural productivity due to deceased workforce. They warned that AIDS was creating "a global underclass," over and above the previously existent world community of impoverished individuals.[32]

Direct AIDS costs—drugs, hospitalization, health care personnel—were very low in the African countries when compared with the United States, simply because of the differences in availability of such resources and lower labor costs, according to studies by the World Bank's Over and collaborators in Tanzania and Zaire. They estimated that direct HIV-positive lifetime costs for the United Kingdom topped $20,000; under the U.S. health care system it averaged more than $50,000.[33] In contrast, Zaire spent less than $600 in direct AIDS costs per average patient, Tanzania about $800.[34]

But when the researchers compared various African diseases in terms of years of productive life lost—economically significant life for society as a whole—HIV infection ranked roughly equal to the other top scourges, sickle-cell anemia, birth injury, and neonatal tetanus. And what were the monetary values of those lost productive lives? In 1985 dollars, the group estimated the average Zairian life lost to AIDS had a top value of $3,230; the equivalent Tanzanian loss was valued at $5,316.

When those values were compared with national GNPs per capita, that meant that a typical Zairian AIDS death equaled about 19 years of per capita GNP, a Tanzanian about 18.3 years. If such numbers were multiplied by thousands or tens of thousands of losses in the two nations' epidemic futures, it was clear that the result could be financial ruin for the already desperately poor countries.[35]

But such an analysis had its limits because it assumed that costs and values would be stagnant over time. In an expanding epidemic, however, costs were compounded over time as family and workplace burdens in-

creased due to multiple deaths: their combined impact was more than additive. For example, a farming family might be able to compensate for the loss of productivity due to the death of one adult, but after two or three deaths it would no longer be possible to till the soil or harvest a crop, particularly in areas lacking all forms of agricultural machinery.

From Mead Over's point of view, the real compounding crisis was loss of skilled and professional labor. A national bank in a country like Zaire would typically be operated by a handful of well-educated men, with no surplus labor pool upon which to draw for replacements. For many professions Africa's generation of twenty-five- to forty-year-olds was the first in the continent's history to achieve expertise. With colonialism so recently defeated, this was not surprising, but it did place most sub-Saharan economies in extraordinarily vulnerable positions in the face of an expanding epidemic.

"Indirect costs are twenty times as important as direct costs, because AIDS is striking people in their productive years. That is the real problem. I think the impact of the indirect costs on a typical East African country over the next twenty years could be to reduce the growth rates of the national economies from two or three percent, where they are now, to close to zero percent," Over said. "That means a zero GNP growth. That's a worst-case scenario. So what we've got is a menace on the horizon."

The real question was whether the AIDS epidemic might destroy the Third World's arduous efforts to pull itself out of perpetual poverty and disease into political stability and economic growth. After the expenditures of billions of dollars of foreign aid and loans from wealthy nations—and after accruing massive debts—some of the world's poorest nations were just beginning to turn the tide.

Jonathan Mann felt it essential to get a handle on the development issue, not only because it was intrinsically important but also because solid empirical answers to the economic question would most likely affect investments in AIDS prevention programs at the international, national, and local levels.

The task fell to the GPA's Jim Chin. A year earlier Chin had been running infectious disease programs for the state of California, living a comfortable, albeit generally routine, life in Berkeley. There, he had commanded a staff of about 400 people and oversaw an annual $65 million budget. In 1989, however, the cautious American found himself facing the formidable task of forecasting the fate of a continent. With a total staff of five people and a tiny piece of the GPA's $90 million budget, Chin toiled in a cramped Geneva office. Though by nature an affable social animal, Chin approached his new job with introspection and conservatism, consciously lowballing his estimates lest he later be accused of playing Chicken Little.

Chin collaborated with Tanzanian scientist S. K. Lwangwa to develop models that, first, could determine how many unreported AIDS cases were currently occurring in Africa; second, how large the current pre-AIDS HIV epidemic might be; and, finally, what might be the epidemic's growth rate and future toll.

In 1989 the pair published a study that predicted that a typical East or Central African country already in the grips of a severe AIDS epidemic could expect by 1991 to have HIV infection in one out every five of its citizens.[36]

"That's lowball," Chin said. "It's the high-end estimate based on an overall conservative set of assumptions. It could be a lot worse. Our most conservative estimate is that there will be 575,000 new AIDS cases in Africa in 1991, for a cumulative total of more than 800,000."

Sitting at Chin's side, Mann listened attentively, then said with a heavy voice that the 1990s would be far worse.

"I would like to be optimistic," Mann said, "but I think we must be realistic. Not until 1985 did the message really come home that AIDS was a global problem. In retrospect, probably historians will say it took too long. We are consistently faced with situations where the reality far exceeds our grasp. It's legitimate to ask, 'Are we able to see clearly enough? Or, when we look into the future, is the horror of it all simply too much even for us to confront?' "[37]

But by 1990 Chin's estimates were even grimmer. He was saying that 8 to 10 million were infected, perhaps 5 million of them in Africa. It would prove the first of many upward revisions.[38]

By the time WHO's July 1990 revised forecast was released, Jonathan Mann and much of his GPA staff were gone. They had lost a power struggle within the Geneva-based organization, and Mann had developed a contentious relationship with the new WHO director-general, Hiroshi Nakajima. Mann's enemies within WHO were legion: all those months of greening with envy over the upstart American's meteoric rise finally paid off.

Japanese physician Nakajima, who had headed WHO's Asian regional office during the period when multidrug-resistant malaria spread across the southern region, was clearly uncomfortable with Mann's very public persona and high-profile AIDS program. He shared the views of those who had long whispered derisive comments about the GPA in the WHO hallways. Nakajima felt that disease programs should be managed in accordance with established WHO protocol. It was a reasonable expectation, except for one key point: established protocol did not provide for the contingencies presented by a rapidly expanding worldwide epidemic.

In Mann's stead Nakajima placed another American physician, Michael Merson. For most of his professional life Merson had worked for WHO in Geneva, managing programs for respiratory and diarrheal diseases. Merson understood WHO protocol.

An unfortunate political battle ensued, with leaders in the world's AIDS control effort taking sides for or against Mann, Merson, Nakajima, and the professional positions each took on approaches to the pandemic.

In Merson's first six months heading GPA, the program upwardly revised its estimates of the size of the global pandemic three times. By September 1990 the official WHO estimate of the cumulative number of AIDS cases was 1.2 million, 400,000 of which were infants and small children—90 percent of whom were in sub-Saharan Africa. And the new WHO year 2000 projection was for 25 to 30 million HIV infections worldwide.

With concern mounting about the Thirdworldization that AIDS might bring upon Africa, Peter Piot teamed up with Mead Over to do a systematic analysis of the relative cost of HIV compared to other, better-understood diseases. After carefully computing the per capita burden in terms of productive healthy years of life lost, Piot and Over concluded that the direct costs of treating HIV disease, even in the absence of AZT and other expensive drugs widely available in North America and Western Europe, far outstripped those of any other common ailment in Africa.[39]

The impact was already being felt keenly in some sub-Saharan countries. Malawi's entire health care system, for example, was in genuine peril of collapse under the burden of HIV, and the nation's public health leadership in 1990 issued desperate pleas to WHO, the World Bank, U.S. AID, and other Western organizations for funds.[40]

Even as Africa's leaders began to absorb the dire economic implications of the WHO and World Bank AIDS studies, critics were emerging who charged that the well-intended analyses grossly underestimated the epidemic's impact. For example, nurse Eunice Muringo Kiereini, a Kenyan woman who chaired the WHO Regional Nursing/Midwifery Task Force, claimed that the studies failed to consider the special economic roles women and children played in African economies. Ever since the beginning of Africa's mass urbanization it was the continent's young men who left the farms and villages in favor of jobs in the cities. Few village women had the option of abandoning their traditional lifestyles. As a result, in many parts of Africa villages were populated by females of all ages, male children, and elderly men, many of whom were too feeble to work. Young men would return to their wives and children periodically, but their lives were elsewhere.

So it was the women and children of Africa who maintained the continent's agricultural economies, Kiereini said.

"Women are hit the hardest by the international structural injustices prevailing in the Third World," Kiereini explained.[41] "The majority of countries in Africa are dependent for foreign earnings on the export of one or two agricultural products such as cocoa, tea, coffee, etc. Trade in these products is grossly imbalanced in the favour of the rich countries. Prices are so low and unstable and the market is controlled by foreign interests. A country in this situation sinks even deeper into poverty.

"It is true to say that women and children who provide 80%–90% of the labour force earn extremely low income at the end of the day. The little money they are paid is controlled fully by men. Consequently, women and children are trapped in the vicious cycle of structural poverty. In this kind of situation there is little or no money available to meet the basic needs of the family."

Though in some parts of Africa women were less valuable than local livestock—as evidenced by prevailing bride-prices and dowries—it was they who raised the continent's futures: its crops and children. When husbands contracted HIV in the cities and passed the virus on to their wives during periodic return visits to the villages, AIDS appeared in rural areas that were completely lacking in health care and social support systems. The affected women continued to plow the soil with their hand hoes, lugging babies on their backs, until their AIDS-devastated bodies collapsed. And with each female death Africa's agricultural productivity declined another, barely perceptible notch. The cumulative burden of these declines, Kiereini warned, could, by the year 2000, be more desperate for some countries than their losses of professional elites. The demise of Africa's female agricultural workers could, she warned, lead to acute food shortages.

Even uninfected, healthy African women were being forced out of productive roles in agricultural sectors by the AIDS epidemic. In most African societies, both traditionally and under modern codified law, women had virtually no basic rights. They were, legally, their husband's property, as surely as were his cows or goats.

If the husband died, his property reverted not to the wife but to his relatives. The crops that the widow had tilled became a new source of prosperity for the in-laws. The widow and children, now landless, often lacking even changes of clothing, had to find a means of survival.

In the short run the village and overall societal economies experienced little if any impact from this process because the in-laws continued to harvest crops. But as the epidemic expanded, and even those in-laws were infected, Africa faced the creation of an unprecedented rural underclass of desperately impoverished, often starving women and children. Further, it was obvious that eventually the cumulative load of deprived widows would exceed the available labor force of in-law inheritors, causing declines in crop production.

Worse yet, one of the few survival options left to widows—perhaps the only way they could feed their children—was prostitution. So, impoverished by AIDS, the woman would be forced into a life that virtually guaranteed that she, too, would die of the disease.[42]

By 1991 the gender ratio of AIDS in Africa was shifting, reflecting higher infection rates among women. For example, researchers from the University of California at San Francisco studied nineteen- to thirty-seven-year-old women in Kigali, Rwanda. A third of the randomly sampled women were HIV-positive. Even among women previously thought to be at very low risk for HIV because they were monogamous throughout their lives, the infection rate was 20 percent. The same group also showed that many women in Rwanda were dying of AIDS but not being counted in national statistics

because their symptoms didn't fit with the male-based WHO definition of the disease. The researchers suggested that the true extent of AIDS in African women might be two to three times the diagnosed numbers.[43]

Josef Decosas, of Canada's International Development Agency, argued that the continent's women were caught in "an epidemiologic and demographic trap" from which they could not be freed without greater social equity. Decosas contended that any hope of slowing Africa's devastating epidemic before it brought financial ruin to much of the continent was inextricably tied to improvement in the status of Africa's women.[44]

Researchers at the UN's Food and Agriculture Organization, based in Rome, tried to calculate the impact AIDS would have on African agricultural production. Their best estimate was that Africa's overall labor force—predominantly women—would be reduced by 25 percent by 2010.[45]

Another factor compounding estimates of the socioeconomic costs of AIDS was the epidemic's continuing geographic expansion. Though every political leader on the continent knew by 1989–90 what caused the disease and which social measures might prevent its spread, agonizingly few took steps to warn their populaces prior to HIV's full-scale emergence in their midst. South Africa, for example, was spared significant HIV emergence until the late 1980s. There is no evidence that the virus existed in the country prior to 1986, and for the first three years it was almost exclusively a disease of gay white men who had traveled in Europe and North America.

By 1989, however, HIV was emerging in South Africa's black population. The microbe found advantages in apartheid policies regarding migrant labor: men from throughout the country, as well as nearby Swaziland, Mozambique, and Malawi, were granted work permits for jobs in the gold and diamond mines, but were not allowed to bring their wives and children. Living in squalid barracks, the men frequented brothels in the mining towns whenever possible. Each prostitute became an AIDS amplifier.

By 1991 local experts were estimating that as many as 400,000 black South Africans, mostly men, might be HIV-positive. Given that black infection rates were thought to be near zero two years earlier, this represented explosive growth.[46]

Similarly, Ethiopia, which had long been spared the AIDS scourge, witnessed a phenomenal explosion of cases in 1991–93. As late as 1986 the country had no evidence that HIV had emerged within its borders. In February of that year the first AIDS case was diagnosed in Addis Ababa. By 1992 local experts estimated that more than 800,000 Ethiopians were infected, with the highest rates of infection—nearly 15 percent—seen among military personnel.[47]

Roy Anderson and his team at Imperial College in London predicted that AIDS in fifty-three African nations—including several north of the Sahara—"would reverse the size of population growth rates over timescales of a few to many decades."[48]

In other words, even though African countries had some of the highest population growth rates in the world, the epidemic was likely to outstrip that explosion and some countries might eventually experience negative population growth.

The World Bank predicted two immediate consequences of AIDS in hard-hit African areas: a radical slowdown of national GDPs and tremendous competition for scarce health care resources.

The latter was already occurring, prompting fears that secondary and tertiary disease epidemics would emerge in the wake of AIDS because countries would no longer have the resources to control other bacterial, viral, and parasitic microbes. Given that HIV/AIDS monopolized less than 1 percent of the continent's meager health budgets prior to 1984, the trend toward resource absorption by the AIDS epidemic was disturbing.

The World Bank estimated in 1991 that HIV/AIDS commanded more than 4 percent of Tanzania's health budget, even with fewer than 10 percent of all AIDS cases receiving hospital attention. But the situation was worse elsewhere: AIDS was eating up 7 percent of Malawi's health budget, 9 percent of Rwanda's, 10 percent of Burundi's, and an astonishing 55 percent of the Ugandan health budget.[49]

In early 1991 physicians in Zambia predicted that HIV/AIDS would soon overtake malaria, becoming the number one illness requiring hospitalization in the country.[50] A month later physicians in Lusaka reported that HIV/AIDS had, indeed, overtaken malaria and accounted for the use of 80 percent of the city's hospital beds. Barclays Bank complained of radically increased rates of absenteeism due to employee attendance at AIDS funerals and personal sick days. By 1992 in Lusaka, bus companies were requiring several days' advance notice for booking transport to funerals, due to backlogs. And copper production, Zambia's and Zaire's primary sources of foreign exchange, was slowly declining due to lost labor and AIDS illnesses. In 1990 the countries produced 800,000 tons of copper for export; by 1993 that was down to 600,000. Life insurance companies in Zimbabwe and South Africa faced bankruptcy as AIDS-related claims mounted. Coffee production declined by 5 percent in Uganda's hard-hit Rakai District between 1991 and 1993. Large-scale tobacco farmers in Zimbabwe took to distributing condoms to their workers in hopes of preventing a labor crisis.

The U.S. Census Bureau assisted counterpart African agencies in trying to count the population impact of AIDS. In early 1994 the agency announced that infant and child mortality was 15 percent higher in Zambia than had been the case in 1984. Since infant mortality rates were used worldwide as a gauge of development, the finding meant that Zambia's overall status represented a reversion to pre-1980 levels of development. Similar findings were made for Malawi and Uganda.

Following his dispute with WHO Director-General Nakajima, Mann joined the faculty of the Harvard School of Public Health in Boston and founded the Global AIDS Policy Coalition. Together with former GPA colleagues Tom Netter and Daniel Tarantola, Mann organized yet another

analysis of the scope and future of the AIDS pandemic. The Coalition's estimates, which were based on the Delphi Survey technique,[51] were far grimmer than those promulgated by WHO.

By 1992, they estimated, 12.9 million people worldwide had been infected with HIV, 2.7 million of whom had already developed AIDS.

By the year 2000 a minimum of 38 million people would have been infected with HIV, according to the Global AIDS Policy Coalition, but "a more realistic projection is that this figure will be higher, perhaps up to 110 million."

In that scenario, 25 million people would have died of AIDS between 1980 and 2000.[52]

Anderson's group in London predicted a terrifying future for those African societies in which HIV had already, by 1990, become endemic to the general population. Barring development of a vaccine or effective means of controlling further spread of the microbe, HIV infection rates would exceed 80 percent of the sexually active population within forty-five years of the emergence of the virus in a given African society. Following that model, if HIV emerged around the Lake Victoria region, for example, during the period of hostilities between Uganda and Tanzania (1977–79), eight out of every ten adults living in the area in 2020 would either have AIDS, have already succumbed to the disease, or be HIV-positive.

In 1993 the United Nations Development Program estimated that Africa's HIV/AIDS epidemic had already cost the continent (in combined direct and indirect effects) some $30 billion.[53] And the World Bank said that many African countries faced "catastrophically costly consequences."[54]

In the spring of 1994 the U.S. Census Bureau delivered the most horrible prognosis to date. Based on up-to-the-minute seroprevalence data, the Bureau predicted that by 2010 there would be *121 million fewer human beings* in sixteen countries than would have been the case in the absence of AIDS. The countries—Brazil, Burkina Faso, Burundi, Central African Republic, Congo, Côte d'Ivoire, Haiti, Kenya, Malawi, Rwanda, Tanzania, Thailand, Uganda, Zaire, Zambia, and Zimbabwe—were expected to experience radical reductions in overall population growth rates and increases in infant mortality, child mortality, and premature death rates.[55]

Life expectancies for several countries were expected to plummet: Uganda, without AIDS, would have had an average life expectancy of 59 years by 2010. With AIDS, that was forecast to drop to a mere 32 years. Haiti's life expectancy would decline from a projected 59 years to 44. Meanwhile, premature death rates, already climbing in the early 1990s because of AIDS, were expected to have doubled, compared with 1985 levels.

Hope had to rest with the children of Africa, the continent's next generation of potential bankers, lawyers, economists, farmers, business financiers, and planners. But studies in Zambia, Zaire, and Malawi revealed

that many AIDS orphans died shortly after their mothers' demises, even though the children were not themselves infected. The causes of death were numerous, usually falling under the pediatric catchall "failure to thrive." Many of the children hadn't been fully vaccinated against measles, polio, and other common diseases. Most were malnourished. And many languished without their mothers, lacking the love and attention of any alternative adult.

"There is no doubt, AIDS threatens to alter the economic and social fabric of many societies, which may affect the development process," Uganda's United Nations representative James Baba said in December 1991. "The major problem AIDS presents today is the factor of creating an increasing number of orphans which traditional societies are beginning to fail to cope with. The traditional extended family systems that once absorbed and catered for such orphans are being stretched to the limit by the sheer enormity of the problem. As a result, the extended traditional family system is breaking down. The social and economic cost it imposes is simply too demanding."[56]

The U.S. Agency for International Development used mathematical models to estimate the impact of orphans in East Africa. In the year 2015 alone, the agency scientists predicted, 2.4 million mothers would die of AIDS, each leaving an average of three orphans. Thus, it was possible that in a *single year* in East Africa 7.2 million AIDS orphans would be generated.[57] Other studies forecast 355 million AIDS orphans in Central and East Africa by the year 2000, or up to 11 percent of the region's entire population of children up to the age of fifteen.[58]

Meanwhile, the U.S. Census Bureau predicted dire upturns in infant and child mortality in several African nations, due both to direct AIDS deaths and to neglect of children orphaned by the deaths of parents who succumbed to the disease. Hard-won improvements in those two key measures of national development were expected to evaporate. By 1994, the Bureau said, Zambia had already experienced a staggering 15 percent increase in infant mortality, compared with 1984, and Malawi, Uganda, and Zaire had suffered nearly comparable increases.[59]

"The concept of a war on AIDS with its goal to stop HIV is seriously flawed and should be discarded," Decosas wrote.[60] "Most regions in the world have a well-established epidemic of HIV. This epidemic requires a social response ranging from a review of legislation to a rethinking of the national industrial development plans. It also urgently requires new programmes, new approaches, and some radical reforms in health care and public health."

For the exhausted few adults of Kanyigo all the forecast and debated numbers for Africa's future AIDS toll, loss of productivity, and abandoned orphans were just so much hand-waving by abstract people living in even more ephemerally imagined places, like Washington, London, and Geneva. But there was nothing surreal about AIDS or the tragedy it had created.

What was harder to imagine every day, Kanyigo elder Cosmos Bilasho said, was the future: How could there be a future if no one was here today to raise the children?

III

As the train pulled out of the Rome station Subhash Hira made another quick scan about the floor, making certain that he and his Indian colleagues were still in possession of all the suitcases, valises, shopping bags, and carryalls they had already toted over so many thousands of miles. It was the natural reflex of an experienced Third World traveler.

Physically, Hira had changed little over the years. He sported the same—or identical—round wire-rimmed glasses that had been perched upon his nose thirteen years earlier in 1978 when he had first arrived in Lusaka to head up Zambia's sexually transmitted disease program. Aside from some gray hairs, Hira hadn't aged much; he still possessed boundless energy.

But inwardly Subhash Hira was a very different man. Keeping track of Zambia's horrific AIDS epidemic had taken away a bit of his soul, left scars on his spirit. He sighed a lot and didn't seem to notice it until someone asked, "Hira, what's wrong?"

"People born in the post-plague era never could imagine what it had been like then," Hira said, speaking above the chugging train's din. "People said to me when AIDS started in Zambia, 'You are looking at the bubonic plague in the Middle Ages, and ten years down the line you will see the same kinds of mass deaths.' And I thought it was exaggeration. How could we even be thinking of thirty to forty percent HIV seropositivity? Six years ago, in 1985, it was only three percent in pregnant women in Lusaka."

Hira looked out the window at the spectacular countryside of Tuscany, but seemed not to see anything. His mind's eye was on the wards of Lusaka's University Teaching Hospital. As he spoke, Hira's Indian colleagues eavesdropped, worried expressions filling their faces. They were all on their way to the Seventh International Conference on AIDS in Florence, where they hoped to spark discussion of HIV's emergence in Asia.

"I am moving home soon, to Bombay," Hira said with a hedged smile. There was no escaping the homesickness he had felt all those years in Lusaka. The circumstances of his return were less than ideal. But when he glanced at his four colleagues, two sari-adorned women and two men wearing Western-style suits, Hira's face lightened up. Obviously, he was content with the notion of working with his own people.

But his smile soon evaporated and his voice was muted when he explained, "AIDS has come to India. I must do everything in my power to ensure that what I have witnessed this last decade in Lusaka does not occur in Bombay or Calcutta or Delhi or Madras. HIV is emerging all over India. It may even be too late already. It may even be too late."

It was. By 1991 HIV had already appeared in several Asian populations. Dr. I. S. Gilada, secretary-general of the Bombay-based Indian Health Organization, estimated that 100,000 female prostitutes in his city were infected, 2 million nationwide, with the highest rates—up to 70 percent—seen among India's Tamil women who worked as prostitutes in Bombay. Dr. Jacob John, of Christian Medical College in Vellore, reckoned that a third of the female prostitutes in that Indian city were HIV-positive, as were 6 percent of the men tested in sexually transmitted disease clinics.

WHO's Jim Chin estimated in 1991 that about 250,000 Indians were infected in toto, but characteristically added, "That's a lowball guesstimate."

In Asia's most prosperous countries AIDS remained a stranger. A nationwide 1991 survey of blood donors in Japan, for example, found that the infection rate was less than 0.002 percent; Japan seemed virtually free of HIV. Similarly, Singapore had by mid-1991 seen only eighty HIV infections, according to Dr. Roy Chan of the Singapore AIDS Commission.

But wherever poverty was high, HIV seemed to have made its entry into Asia well before 1991.

Shortly before the opening of the Seventh International Conference on AIDS in Florence, during June 1991, Representative Jim McDermott, a physician and Democrat from the state of Washington, released the results of an AIDS investigation he conducted for the House of Representatives. The report drew appalling conclusions about the Asian pandemic, prompting many fellow politicians to discreetly voice concerns that McDermott was deliberately exaggerating the situation to skew foreign aid commitments. As time would show, however, McDermott's report underestimated the scope of the Asian pandemic.[61]

After touring India, Thailand, and the Philippines at the request of Speaker Tom Foley, McDermott reached the conclusion that "Asia is the sleeping giant of a worldwide AIDS epidemic." He estimated that as of June 1991 some 1 million Indians were already infected with HIV and in the year 2000 India and Thailand combined would have 12 million infected citizens. McDermott predicted that Asia's epidemic would, within perhaps just five years' time, outstrip that of Africa.

With all the prior warnings, prognostications, and clear evidence of the devastation AIDS was inflicting upon Africa, how could the microbe have so overwhelmed Asia? Why hadn't humanity succeeded in preventing HIV's emergence on the continent? As late as the fall of 1989 valid surveys of Thai drug users and prostitutes revealed infection rates below 0.04 percent—seemingly negligible. Yet within a mere twenty months that 0.04 percent infection rate among Chiang Mai prostitutes had soared to more than 70 percent. In just twenty months the virus emerged, spread in an epidemic fashion, and became endemic among key population groups in

Thailand. That constituted the most rapid HIV emergence in the history of the global epidemic.

How could this have happened? In retracing the virus's pathway across Asia, scientists and public health experts gained greater evidence supporting the GPA's earlier theories that human rights violations, poverty, and the behavior of *Homo sapiens* played crucial roles in the emergence of disease. Indeed, the *only* way to comprehend Thailand's astonishingly rapid HIV emergence was to recognize the intimate coupling of social, political, biological, and economic factors.

African history, tragically, repeated itself in Asia. Lessons went unlearned. As had many African societies, most Asian countries initially tried to legislate away the virus by restricting the activities and movement of potential carriers. When that appeared to fail, governments simply refused to acknowledge the virus in their midst, penalizing physicians and experts who raised public alarm about AIDS. Official AIDS figures reported to the World Health Organization reflected attempts by most governments to downplay the impact of AIDS.[62]

During the last weeks of 1987 a meeting on AIDS in Asia was convened in Manila, under the partial sponsorship of WHO. Few cases of the disease had, at that point, surfaced in any Asian nation except one, and that country was populated predominantly by Caucasians: Australia. Though Australia was geographically in the Pacific Rim, most Asians considered the country, and its epidemic, European. But Dr. John Dwyer, the avuncular director of AIDS research at the University of South Wales in Sydney, did his best to convince those in attendance at the Manila conference that the pandemic was coming, and it would hit Asia not in the manner of its attack upon Europe but as it had Africa.

Dwyer pointedly reminded his colleagues that incidences of syphilis, gonorrhea, and other sexually transmitted diseases were rapidly rising throughout Asia; that female prostitution was rampant in almost all of the continent's sprawling centers, and male prostitution in several cities; that opium smokers were abandoning that drug and their pipes in favor of heroin and syringes; and that many parts of Asia were suffering levels of poverty and malnutrition comparable to those seen in Africa.

India's first AIDS cases included recipients of contaminated U.S. blood products manufactured by Cutter Biological, a California-based company, and of anti-RhD vaccines made by Bharat Serums and Vaccine, Ltd., an Indian firm.[63]

During 1985–89 the Indian Council of Medical Research tested more than 2 million people, finding 764 who carried the virus; half of them were female prostitutes. By the end of 1989 the infection rate was soaring. A Bombay survey revealed that 4.9 percent of the city's female prostitutes were infected.[64] As evidence of HIV's presence in India mounted, proposed legislation outlawing sexual intercourse with foreigners was introduced into the Maharashtra state legislature. Though it was defeated, the proposed law reflected a strong mood at that time in Indian society.

So poor were educational efforts that a 1989 survey of a sampling of India's AIDS patients revealed that even they hadn't heard of the disease. Only 4 percent professed to have heard of AIDS before contracting it; most, long after their diagnosis, still had no idea what the disease was. An important factor contributing to ignorance was illiteracy—94 percent of those who were interviewed were unable to read the few AIDS brochures or news articles that were published in India.[65]

By mid-1990 the infection rate among Bombay's prostitutes had risen to 10 percent and 5.6 of every 1,000 blood donors in the city carried the virus. The director of the Indian Medical Research Council, Dr. A. S. Paintal, estimated that Bombay's infection rates had reached such proportions that every day 100,000 sexual acts were performed with HIV-positive female prostitutes.[66] One Bombay STD clinic was finding infection rates among prostitutes of 40 percent.

At the same time, blood donor infection rates rose to 1 percent, and India saw its first cases of HIV involving injecting drug users. Sixty-two heroin users in Manipur were cited in government notices in April 1990. Concern about the blood supply grew when a government survey uncovered 510 HIV-positive blood donors in the state of Gujerat. Among them, 430 were "professional donors," individuals so poor that they subsisted off the meager funds earned by regularly selling their blood. Despite such clear evidence of the microbe's presence in the national blood supply, by the Indian government's admission less than 5 percent of all commercial blood was screened for HIV in 1991. That figure wouldn't budge much in 1992.

Data on HIV infection rates grossly underestimated India's crisis because most high-risk individuals were by 1991 actively avoiding testing. Their reluctance stemmed from widespread knowledge that in Manipur some 100 HIV-positive people were placed in permanent seclusion, chained to their beds, and barred from further social interaction.[67] That drove other potentially infected people underground, away from the public health system.

One group that was able to penetrate the mistrust was the government's cholera program, which enjoyed widespread respect among India's poor. Their 1991 survey in Manipur revealed that an astonishing 80 percent of heroin injectors were HIV-positive.

The microbe had been handed another bit of good fortune. Beginning around 1987, when Burma, once the richest nation in Southeast Asia, was given the World Bank's least developed country status, the traditional opium trade was transformed into a heroin market. It was no longer necessary to ship raw opium paste to Marseilles or other European locales for processing into heroin, thus reducing Burmese profits. But with the shift in opiate processing, heroin was suddenly available for local consumption. Within the so-called Golden Triangle—Burma, southern China, and Laos—opium,

and now heroin, production outstripped the 1960s market share held by Turkey and Afghanistan.

In Manipur, which bordered Burma, the sudden availability of the far more powerful heroin drew opium users like bees to honey. Needles, however, were in short supply.

HIV appeared in Manipur riding the crest of the heroin wave. Former opium smokers clumsily experimented with tourniquets, cookers, and syringes, clustering in groups to share not only the knowledge of how to get high but the equipment with which to do so. In less than sixteen months opiate users went from less than 10 percent heroin injectors with under 1 percent HIV seroprevalence to more than 95 percent heroin addicts, mainlining the purest and most powerful smack in the world. And 80 percent of them had within that time also mainlined HIV.[68]

Stunned by the rapidity of HIV's march across India, the World Health Organization mustered $20 million and the World Bank $100 million for the most aggressively funded AIDS education campaign ever planned. But from the start the effort seemed doomed, as political leaders throughout India failed to lend their support, some states refused to participate, and allegations of impropriety, even embezzlement, buzzed about the health system. For example, reluctant to face the political flak that would shower down from all over India's business community if the foreign aid millions were spent outside the country, the government purchased more than a billion defective condoms from a local manufacturer and raised prices on quality imported products.

"We're sitting on a volcano. We won't be able to cope," Maharashtra AIDS researcher Geeta Bhave declared. When all the hundreds of thousands of HIV cases progress to AIDS, she predicted, India's health care system would collapse.

Even HIV-2, previously found almost exclusively in West Africa, emerged in India. By June 1993, STD clinics in Tamil Nadu, Bombay, and Goa reported that 2 to 3 percent of their clients carried the second species of AIDS virus.

German researchers studied the genetics of HIV-1 and HIV-2 viral strains found in various parts of India, finding further evidence for quite recent emergence of the viruses in the country and extraordinarily rapid spread. No matter where they looked, they found infected Indians, and there was no sign that the viruses' spreads were concentrated geographically, as they were in North America and Europe.

The HIV-1 strains were all quite similar and matched closely to a strain of the virus found in South Africa. Given the large number of Indian-descended people living in South Africa and their frequent travels back to India, this was not surprising. But it was astonishing, the researchers said, to discover so little genetic difference between HIV-1 strains in Bombay, Goa, Manipur, and other locations separated by thousands of miles.

"We conclude that these [HIV-1] strains must have been introduced into India very recently and are spreading *very* rapidly," the German research team said.[69]

HIV-2 also showed little genetic diversity in India, again indicating that the virus had arrived in the country very recently. Further, all HIV-2 strains appeared to be descended from a common ancestor, indicating that a single infected individual brought the virus from West Africa; its emergence and spread within Indian society occurred with extraordinary speed.

By comparing HIV-1 and HIV-2 incidence rates throughout India in early 1993 with the amount of genetic diversity seen in the various viral strains, the Frankfurt research team estimated that India's epidemic was growing by 1 million new infections a year. If Congressman McDermott's estimate of 1 million infected Indians was correct for 1991, and the Frankfurt growth rate held true, the world's oldest continuous civilization would be confronting about 10 million HIV cases in 2000.

But, of course, epidemics couldn't be expected to grow at a stagnant rate over time because the more people infected in a society, the greater the potential for additional infections. Thus, growth rates themselves grew with time. When officials at WHO plotted India's AIDS forecast they were reluctant to put precise figures on the nation's future epidemic. But they were able to compare its growth rate with Africa's: while the slope of Africa's pandemic arched upward at a gentle angle for the 1990s, India's forecast was a sharp line soaring up at a 60-degree angle.

"This is threatening to clear the world," Kenyan AIDS physician Mboya Okeyo said. "Africa first. Then India, then Southeast Asia. Then, who knows?"

In 1993 Subhash Hira moved back to Bombay. Having witnessed the emergence of AIDS in Zambia he was now determined to do all in his power to slow the deadly virus's race across his homeland.

If India's epidemic was racing, Thailand's was moving at supersonic speed. Thai Ministry of Health studies showed that HIV-1 infection rates in nearly every sector of society were well below 2.5 percent in 1989. Eighteen months later double-digit infection rates were the norm all over the country.[70]

Something particularly strange and troublesome happened in Thailand: two separate lineages of HIV-1 emerged, each exploiting entirely different population groups. Among Bangkok's heroin injectors there appeared a B-class virus that looked genetically like a typical American HIV. But a very different HIV emerged in Thailand's prostitute and heterosexual populations, one that closely resembled a virulent virus seen in Uganda. The two strains moved on separate paths in Thailand, and as of 1993 there was no evidence of cross-mixing of their genetic material.[71]

So Thailand, biologically speaking, had two separate epidemics, both of which grew at unprecedented rates.

The Thai situation demonstrated the folly of dismissing the threat of an emerging microbe merely on the basis of initially small numbers of cases.

And it showed, once again, the links between human rights and the emergence of microbes new to a particular society. In the beginning of its epidemic the Thai government took many of the toughest steps advocated by hard-liners elsewhere in the world. A special HIV quarantine unit was established in Lard Yao Prison in Bangkok. When, by June 1989, tests indicated that up to 44 percent of the female prostitutes in Chiang Mai were HIV-positive, the government issued decrees in an attempt to crack down on the brothels. As rates of infection soared among heroin addicts, the government ordered Thai police to come down hard on the drug trade and narcotics injectors. Infected foreigners were deported.

Thailand also took positive steps that drew praise from WHO, including establishing the first national HIV sentinel surveillance program in the developing world. By carefully and continuously monitoring levels of HIV infection in key subpopulations of Thai society, the Ministry of Health kept close tabs on the nation's burgeoning epidemic.[72] It may well have been the best-documented HIV emergence in any society in the world.

Despite these efforts the virus spread at record speed throughout the Southeast Asian nation, primarily via its enormous sex industry. As word of the new plague spread, few Thais took steps to protect themselves. Denial, Thai health official Dr. Chai Podhista said in 1992, was the number one problem.

"We have an expression in Thailand," Podhista explained. "It goes, 'If you don't see the body in the coffin, you don't shed a tear.' Rapid spread of the virus is possible—is ignored—because there hasn't yet been mass death. And there won't be for a few years. Hundreds of thousands of people are all getting infected at once, in a clandestine epidemic. Years from now when they all get AIDS the entire Thai society will go into a state of shock."

In early 1990 a variety of nongovernmental organizations waged impressive AIDS education campaigns, particularly among female prostitutes, and by late 1990 more than 90 percent of the prostitutes working in Chiang Mai were using condoms. But for the majority of the women it was too late: they were already infected.[73]

At the most crucial moment in its emergence into Thai society, HIV was handed a social gift: human chaos. In February 1991 there was a coup in Thailand, bringing a military junta to power.[74] AIDS programs came to a grinding halt; the flow of nearly all foreign aid, including monies earmarked for HIV control, stopped abruptly. AIDS programs generally fell apart, and the military regime responded to the HIV threat with the sorts of repressive actions that typify juntas: conducting raids on brothels, shutting down those that failed to provide adequate bribes, and rounding up children, alleged slaves, and foreign men and women working in the houses of prostitution.[75]

During this time there was little apparent change in the sexual appetite of male customers. Foreign sex tourists continued to flock into Thailand from all over the world, particularly Japan[76] and Germany. And local Thai

men showed no signs of slackening their demand. A 1989–90 survey showed that more than a quarter of randomly queried Thai men had sex outside their marriage that year, most of them with male or female prostitutes.[77] A year later no apparent change was observed, and upon compulsory entry to the Thai military more than 97 percent of the twenty-one-year-old recruits admitted to having frequented brothels.

As more and more of Thailand's prostitutes became infected, and concern about AIDS rose, brothel owners began actively recruiting virgins and young girls. This allowed them to market safety for their male clientele, though, of course, it remained extremely risky for the women/girls. Various studies indicated that between 1991 and 1993 the demographics of Thailand's female prostitute population shifted dramatically, particularly in the northern Chiang Mai area, which bordered on Burma. The average ages of the prostitutes plummeted (to include nine- to twelve-year-olds), and the number of Burmese women working in the brothels soared, topping 40 percent by 1993.

According to Amnesty International and Human Rights Watch, nearly all the Burmese female prostitutes were slaves, either sold outright by their parents to brothel brokers or signed on to indentured servant contracts from which they couldn't extricate themselves once they reached Thailand. Few of the girls, most of whom were under eighteen years of age at the time of their sales/recruitments, understood that they were to be prostitutes. The vast majority were illiterate, spoke no Thai, and were virgins when they reached their new brothel homes.

Periodically, Thai police would raid the brothels, round up Burmese nationals, and march them off to the border. Some women, fearing what lay in store for them on the other side, gave sexual favors to the police in exchange for allowing them to return to lives of prostitution.

But what could possibly be more horrible than the lives of sex slavery to which they had been subjected in Thailand?

In September 1988 the Burmese government was overthrown in a coup that brought the most corrupt elements of the country's business and military communities to power. Ne Win took the reins of control, running an authoritarian state that cracked down mercilessly on its citizenry while assiduously protecting the nation's opium/heroin producers. The country, which was renamed Myanmar,[78] sank into chaos. Amid reports of torture and mass executions, as well as economic despair, demonstrations broke out all over Burma in 1990, led by supporters of Aung San Suu Kyi. Though she won the national presidential elections in May 1990 and subsequently received the Nobel Peace Prize, Aung was placed under house arrest. As of mid-1994 she remained a homebound prisoner of the military state.

The government's actions after the 1990 elections only worsened, and the nation became dangerous for all vocal advocates of human rights. Small wonder, then, that Burmese poured illegally across the Thai border by the hundreds every day, and some 300,000 were estimated to have immigrated

by 1993. It was perhaps less than surprising also that impoverished parents were willing to sell their daughters to brothel brokers.

In April 1992, Commander Bancha Jarujareet of the Thai Crime Suppression Division announced that twenty-five HIV-positive Burmese brothel girls that had been rounded up by his officers and deported back to Burma were dead. According to the Thai policeman, Burmese officials injected cyanide into the women and set their bodies afloat in a border stream as a warning that Burma would take whatever steps necessary to keep AIDS out of the country.

In Burma, heroin was locally produced and could therefore be purchased cheaply with the internationally worthless Burmese currency. But syringes required foreign exchange, and the abusive Burmese state had become an international pariah, cut off economically from the rest of the world.[79] By 1992, WHO estimates put HIV infection rates among Rangoon's heroin injectors at over 76 percent, but that was a conservative guess. Even if these people knew about HIV, understood how the virus was spread, and were motivated to protect themselves, they couldn't do so.[80]

Fortunately for the Thai people, their nation had, in contrast, a courageous local hero who was willing to take politically dangerous steps to slow the country's skyrocketing epidemic. Mechai Viravaidhya worked within the Ministry of Health and outside the government (depending on who was in power) tirelessly promoting condom use. Equally comfortable arguing with a brothel owner in a Bangkok red-light slum or twisting the arm of a member of the Thai cabinet during a celebrity golf match, Mechai forcefully pushed a "100 percent condom use" policy.[81] But even Mechai knew that the real battle had been lost. AIDS was endemic in Thailand, and in 1993 the government predicted that 3 million adults (out of a population of 25 million over the age of fourteen) would be HIV-positive by the year 2000.

As was the case in Burma and India, the Golden Triangle heroin connection was having an effect on promoting HIV emergence in southern China. Though the government denied it, China had serious heroin, prostitution, and sexually transmitted disease incidences that were readily apparent to even casual observers as early as 1987.[82] The most severe problem was in China's southern Yunnan province, which shared borders with Laos and Burma and had long been an opium center. Yunnan narcotics traffickers, like their counterparts in Burma, had learned how to process opium into heroin. By 1991 heroin was in ready supply in Yunnan; syringes were not. The pattern there mirrored what had occurred with HIV among heroin injectors in Manipur and Rangoon, and by 1993 the World Health Organization was estimating that up to a third of Yunnan heroin users were infected.[83]

Less than a year later WHO announced that heroin was driving a terrible HIV epidemic in Ho Chi Minh City, Vietnam. Among heroin users the

HIV rate climbed from less than 2 percent to more than 30 percent in about nine months' time.[84]

As had been the case with Africa's AIDS epidemic, Asia watchers wondered aloud whether the pandemic might reverse the region's famed "Economic Miracle," causing a Thirdworldization effect. If local epidemics continued to expand at their breathtaking 1989–93 rates, Asia could be expected to overtake Africa in HIV numbers before the turn of the century. And ironically, the fiscal cost to Asia would be greater precisely because the continent's economy had boomed so impressively during the 1980s. With greater prosperity came higher costs. The dollar value of productive capacity lost due to worker illness and death was greater in Asia (compared with Africa) simply because there was a larger highly skilled labor force and incomes across the board were higher. Direct medical costs were higher as well, because of the availability of more sophisticated—and costly—health care systems.

Still, it seemed at first glance unimaginable that AIDS could make a dent in Asia's economic boom. Only a handful of countries (the Philippines, Papua New Guinea, Burma, and Cambodia) experienced negative GNP growth during the 1980s, and many Asian countries had growth rates that were two to five times greater than those of the United States and Switzerland.[85]

Like Africa, however, much of Asia was simultaneously undergoing other disease emergences that could be expected to compound or synergize with HIV/AIDS. These included dengue, hepatitis (A, B, C, D, and E), multiply drug-resistant malaria, tuberculosis, drug-resistant cholera, and virtually every known sexually transmissible microbe. Though no one knew how to calculate the additive or multiplicative economic impacts the interlocking epidemics might have, it was clear, biologically and epidemiologically speaking, that interconnections existed.

In mid-1993 the GPA estimated that 1.5 million residents of South Asia were HIV-positive, most of them Indian or Thai citizens. For Thailand, specifically, WHO estimated that 450,000 people were infected by late 1992.[86]

But WHO's numbers were surely overly conservative. Newer data demonstrated that the rate of expansion of the country's epidemic, far from slowing as many hoped, was accelerating alarmingly.[87] The only hopeful slowdown in Thailand's plague was seen among injecting drug users in Bangkok, who readily snapped up sterile syringes when they were made available.[88]

Mechai Viravaidhya estimated that Thailand's cumulative AIDS death burden by the year 2000 would be 470,000 to 560,000 adults. Based on an average productivity loss of $22,000 per dead worker, that could inflict an indirect loss of $7.3–$8.5 billion on the Thai economy. Direct treatment costs for those people would be between $61 and $167 million out of a total annual Ministry of Health budget of just over $40 million.[89] In 1992 a single day of AIDS hospitalization in Bangkok cost an average of $298.73;

Thailand was in the unfortunate position of having reached Western standards of curative medicine and hospitalization while its populace still earned Third World wages. By 1992 Thai officials were predicting that the epidemic would push the nation's health and medical advances backward, as an overwhelmed system collapsed under the economic costs and the sheer load of AIDS cases.[90]

Drawing on slightly different estimates of both the forecast epidemic size and indirect costs, WHO predicted a total economic burden from AIDS of $9 billion for Thailand by the year 2000.[91] And the GPA told World Bank officials as early as October 1991 to expect a possible economic downturn in South Asia during the latter half of the decade: it was a view shared by the Thailand Development Research Institute in Bangkok.[92]

The U.S. Census Bureau issued dire forecasts for Thailand, based on HIV-prevalence rates as of early 1994. The Bureau predicted that by 2010 Thailand would have experienced such severe devastation due to AIDS that the country's population growth rate would have plummeted to −0.8 percent (from a pre-AIDS predicted +0.9 percent); there would be 25 million fewer people in the country than would have been the case in the absence of AIDS; life expectancy would take a nosedive from what would have been 75 years to a mere 45 years; child mortality rates would more than triple (reaching some 110 per 1,000 children born); and the nation's crude death rate would soar from about 6 deaths per 1,000 to more than 22 per 1,000.[93]

Though few analogous economic analyses had been done for India, Burma, the Philippines, or other Asian countries in the grips of HIV, there was a clear consensus in international public health circles by 1993 that the pandemic would, at the very least, exert a Thirdworldization effect upon the health care systems, tourist industries, and government-funded social service sectors of hard-hit countries. Worst-case scenarios forecast sharp declines in both agricultural and industrial productivity with resultant declines in GDPs.[94] The United Nations Development Program and the Asian Development Bank predicted in late 1993 that the HIV epidemic would increase general levels of poverty and, by the year 2000, cause local famines in key areas.

Such dire economic forecasts, whether they concerned the projected impact of AIDS on Africa, Asia, or Latin America,[95] were always intended to draw the attention of wealthy donor states. The nations of North America, Western Europe, and, to a lesser degree, Japan and the Soviet Union had always been forthcoming with cash when a crisis struck, even if the quantities were more symbolic than substantial. If the cash was offered at interest, Africa and Latin America might cringe, but Asia had an excellent debt-repayment record.

Throughout the world hope for a global AIDS bailout rose as Berliners clawed away at the wall that had physically divided their city for three decades. What began with dockworkers in Gdansk in the early 1980s built slowly for years in pockets of antiauthoritarian resistance that spanned from Prague to Riga, from Vladivostok to Berlin. Once the Berlin Wall fell there was no turning back: the ideal and reality of communism were dead. And with the end of communism came capitalist dominance and Western victory in the Cold War. Threat of global thermonuclear annihilation suddenly seemed quite remote. Politicians all over the world spoke of a Peace Dividend. And suddenly the world had surplus cash, they claimed, and long-neglected social programs could now be subsidized. For a few moments in history, it seemed, people around the world were remarkably optimistic.

But no Peace Dividend appeared. People craned their necks looking for it, soon spotting a shadow emerging on the horizon. Excitement yielded to despair and frustration as they recognized the shadowy Dividend for what it was: international recession.

After all the celebrations and dancing in the streets of Prague and Berlin settled down, the West got a good, hard look at what lay behind the Wall, inside the long-sequestered world of communism. And they discovered that Stalinists from Uzbekistan to the Baltics had been juggling the books for decades. The East was broke.

Worse yet, its populations, which had long had nearly every aspect of their lives controlled by the state, were ill prepared to build strong civic societies. With their economies in a shambles, cynicism quickly overcame the brief sensation of elation for most Europeans.

Reunification of the two Germanys was concretized on October 3, 1990, amid fetes and fireworks, but by the end of that year official unemployment in the former GDR had soared from zero to more than 350,000 adults.

Overnight the former Cold War multitrillion-dollar spending became a latter-day Marshall Plan for reconstruction of the ex-communist world. Ten billion dollars shifted from coffers in Bonn to national bank vaults in Moscow in a single day. And that was just one of many West-to-East transfers.

Not only was there no Peace Dividend, there was newfound, long-term structural agony. Even the booming Asian economies felt the pain as demand for autos, electronics, and consumer goods dropped in Europe and North America.

While much of the world watched the demolition of the Berlin Wall during the fall of 1989 with astonishment and elation, Hans Seyfarth-Hermann dashed about Checkpoint Charlie tossing condoms at the crowds of East Germans as they poured through. The bewildered East Germans snapped the packets out of the air and examined what looked like matchbook covers. They read this brightly colored inscription: "You will see many tantalizing things during your visit to West Berlin. Enjoy yourself, but remember, we have AIDS."

Inside each putative matchbook was a latex condom. Political openness, it appeared, could carry a price tag. If it was true, as the old Stalinist

leaders claimed,[96] that AIDS hadn't made its way yet into most of Eastern Europe, the fall of the Wall would surely put an end to the political barriers that had allegedly kept the microbe at bay.

Seyfarth-Hermann and fellow AIDS activist Julian Eaves were in a Berlin gay bar called the Dark Cellar the night of November 9, 1989, when they overheard Germans speaking in a startling accent. The two of them realized that the men were from Saxony, part of East Germany, and that they were filled with excitement that night, Eaves later recalled, "trying to enjoy the wild life in the big city." Eaves and Seyfarth-Hermann recognized that their Saxon gay counterparts knew nothing about AIDS and safe sex. They also were sadly aware that some West Berlin gays, sick and tired of "latex sex," might take advantage of the Easterners' ignorance.

The two activists spent the following day making hundreds of the special packets which they later tossed at the hordes of Saxons and other Easterners crossing through Checkpoint Charlie.

"Everything that is new is welcome now in East Germany," Eaves explained. "The old stigmas have been thrown away, and everything is possible. We hope East Germany will achieve a world level in everything, except AIDS deaths."

No one could imagine that just four months later prostitutes in West Berlin would be on the verge of staging a protest strike over the thousands of competitors that flooded in from the East every Friday night to earn valuable deutsche marks over the weekend. Hungry for hard currency, young women, most of whom didn't really consider themselves prostitutes, would pour into Berlin to turn a few quick tricks, often for as little as five deutsche marks. The regular hookers would be outraged because the newcomers would charge far less than the former going rate, and they wouldn't require that their customers wear condoms.[97]

Within three years the Eastern prostitutes would be a regular feature of red-light districts all over the wealthier West.

HIV would also ride Europe's new heroin trail. Opening up the formerly secluded states rang bells of opportunity for organized criminal elements on both sides of the former Wall. Poland, in particular, would become both a center for a locally produced opiate called *kompot* and a transfer point for pure heroin imported from other parts of the world and destined for distribution in Central Europe.

The first serious emergences of HIV in Eastern Europe were not via either prostitution or heroin injection, however. Rather, they came by means that reflected the tragic state of medicine in much of the communist bloc.

Though there had been isolated AIDS cases in Russia for at least four years, HIV really emerged during the early spring of 1988 in Elista, capital of the Kalmyk Republic, located on the Caspian Sea. A baby languished on the pediatric ward of the town's hospital, suffering every imaginable ailment. Doctors were stumped, unable to reach a diagnosis, until one

suggested sending blood samples from the infant to Valentin Pokrovsky, a virologist doing AIDS research in Moscow. Pokrovsky confirmed that the child was infected with HIV.

The child's father, it turned out, had visited the Congo in 1981, where he apparently was exposed to HIV. He passed the virus sexually to his wife, who, in turn, transmitted HIV to the child.

It was tantamount to treason to publicly acknowledge shortages of vital goods during the regime of Joseph Stalin, and forty years after the dictator's death many Soviet citizens remained reluctant to step outside normal bureaucratic channels in order to draw attention to production deficiencies. In 1988, however, prior to news from Elista, U.S.S.R. Minister of Health Alexander Kondrusev publicly decried the country's sorry state of medical supplies. In particular, he warned that the nation needed to use 3 billion syringes per year, but was only manufacturing 30 million annually, and importing none. Simple mathematics indicated, then, that the average syringe was being used 100 times. Kondrusev warned that this syringe shortage could spell disaster.

He would soon prove remarkably prescient.

The AIDS baby at the Elista hospital was treated by staff who used the same syringes to withdraw blood samples from and administer drugs to all the babies on the neonatal ward. For more than three months the nurses unknowingly injected HIV into all of the babies and, in a few cases, their mothers.

As the numbers of AIDS babies mounted, the overwhelmed Elista doctors ordered some of the infants shipped to a hospital in Volgograd. And again, the medical staff reused syringes over and over, soon having infected nearly every child on the Volgograd baby ward.

The incidents were kept quiet until early 1989 when a Russian trade union newspaper, *Trud*, broke the story. According to *Trud*, Health Minister Kondrusev had grossly underestimated the enormity of the gap in the Soviet Union between the number of injection procedures of one kind or another that were performed by health providers and the annual production rate of sterile syringes.[98] While leaders in Moscow received single-use sterile injections, the masses living in outlying areas relied on hospitals that suffered permanent supply shortages. So in Elista and Volgograd, for example, health care workers had little choice but to reuse syringes 400 or 500 times, occasionally honing the needles on a whetstone so that they would still pierce skin.

It was horribly reminiscent of the events in Yambuku Hospital in 1976, where Belgian nuns used a handful of syringes hundreds of times per week, unwittingly spreading the deadly Ebola virus. That, however, occurred in a remote, impoverished region of Central Africa; the Soviet Union was, allegedly, part of the advanced industrialized world.

For three years Soviet health leaders counted the numbers as similar

hospital outbreaks of HIV surfaced in Rostov, Astrakhan, and Stavropol.

By June 1990, Vadim Pokrovsky was telling the world that 260 children had become infected with HIV as a result of unsterile needles.[99]

Moscow's Second City Hospital for Infectious Diseases was designated the nation's AIDS treatment center and half the patients on its wards were children under five years of age. As fear of AIDS mounted in the Soviet medical community, widespread shortages were reported not only of syringes but of latex gloves, sterile catheters, surgical gowns, transfusion equipment, dental drills and probes, and other essential supplies. In the new atmosphere of *perestroika*, young physicians for the first time spoke frankly about the inadequacies of the Soviet medical system.

The result was widespread public panic and a sharp decline in willingness to undergo invasive medical procedures. Dentists, vaccinators, physicians—all health providers noted a drop in attendance, particularly in large cities where the media gave serious attention to the young physicians' disclosures.

Dr. Mikhail Narkevich, newly appointed head of AIDS education in the Ministry of Health, was forced to concede that the nation's economic difficulties were so grave that adequate medical supplies could not possibly be available until 1992–93. By 1994 Russian physicians would be crying out even more loudly for supplies that still hadn't materialized.

In the absence of supplies sufficient to limit the spread of HIV within medical facilities, panic further increased. There were anecdotal reports of people beating AIDS patients and of health care workers refusing to go near people who carried the virus. The Ministry of Health was forced in 1991 to offer higher salaries to doctors and nurses who worked with HIV/AIDS patients as compensation for the perceived risks involved.

But Soviet leaders were preoccupied with far more pressing issues than supplies of syringes. The country was literally falling apart. Food shortages, riots, separatist uprisings, political instability, and a face-off between the hero of *glasnost*, Mikhail Gorbachev, and upstart leader Boris Yeltsin monopolized national attention. By 1991 the Soviet Union no longer existed. By 1993 two major coup attempts had threatened the stability of the Russian Republic, and insurrections had occurred inside most of the former Soviet socialist states.

AIDS was overshadowed by history. And the microbe spread, unfettered by any serious efforts on the part of human beings to limit its modes of transmission. Prostitution and drug abuse stepped into the economic vacuum of social restructuring. Criminal elements gained control of many foreign trade sectors, and syringes remained in short supply.

By late 1993 the microbial situation was clearly out of control. Before the Berlin Wall fell, Russia's syphilis rate was 4.3 cases per 100,000 people annually. Amid the national chaos, health officials said they were witnessing a syphilis epidemic. In St. Petersburg, for example, the incidence of syphilis increased eightfold between 1989 and 1993, with most of the newly infected individuals young, destitute female prostitutes. In the same city the incidence of gonorrhea among teenagers had soared 150 percent by 1993, as compared with 1976 levels. And in the same subpopulation syphilis incidence was up 400 percent.

Dr. Nikolai Chaika, of the St. Petersburg Pasteur Institute, announced that all Russian disease data, including numbers of HIV/AIDS cases, were unreliable due to the "complete collapse of Russian medicine." The social fabric of Russian society was unraveling, he said, and people were turning to behaviors that virtually guaranteed the spread of disease.

Thirdworldization had set in. Russia, as well as nearly all of the other former Soviet states, was rolling backward on the development scale. Epidemics of all sorts of diseases were reported anecdotally, though most were impossible to verify given the collapse of epidemiological systems. In the summer of 1992 cholera outbreaks were reported in Makhachkala, Nizhny Novgorod, Krasnodar, Naberezhnye Nizhny, and Moscow. The Tass news agency reported an outbreak of anthrax among peasants in the Altai region and typhoid fever in Volgodonsk. Even a case of bubonic plague was reported from Kazakhstan.[100]

In March 1993 special counsel to President Boris Yeltsin, Dr. A. V. Yablokov, addressed the grave state of the Russian people's health in a speech before the nation's Security Council.[101] He revealed that in 1991 Russia's "total losses due to premature mortality amounted [to] 2.23 million person-years of labour activity. . . . It is obvious *that prevention of population health losses due to premature mortality from socio-economically conditioned causes is the most important strategic direction in improving safety and security of life of peoples of Russia* [his emphasis]."

The primary cause of Russia's massive excess death burden was suicide, which rose by 20 percent between 1991 and 1992. Alcoholic self-destruction, drunk-driving accidents, and homicides ranked as the remaining top causes of the excess death rates.

Meanwhile, he said, the nation's medical and public health system had deteriorated to the point where in 1991, 70 percent of all pregnancies involved serious complications, "only half of deliveries were considered normal," anemia rates among pregnant women had increased by 61 percent in just three years, and maternal mortality rates were five times those in Western Europe. And preventable deaths—those ascribed directly to drug shortages or medical and public health failures—had risen sharply since 1990.

"Among these are all forms of tuberculosis, some infectious diseases (measles, whooping cough, tetanus, typhoid fever) . . . respiratory diseases, pregnancy complications, diseases of the perinatal period," Yablokov said.

Life expectancy in Russia was lower in 1990 than in 1964 (70.1 years versus 70.4) and real life-span measurements for some areas of the country were as low as 44 years.

Separate EC studies of Russian health revealed that tuberculosis rates

were climbing sharply. In Siberia in 1990 there was a TB incidence of 43 cases per 100,000 people (as measured by positive sputum). By 1993 that ratio had more than doubled, to 94:100,000. Over the same period Moscow's TB rate jumped from 27:100,000 to 50:100,000. The principal cause of the escalation was said to be the lack of foreign exchange with which to purchase European- and American-made antituberculosis drugs; without treatment an ever-expanding pool of contagious individuals was spreading the disease to others.[102]

Perhaps the most striking example of Russian Thirdworldization was the 1993 outbreaks of diphtheria in St. Petersburg and Moscow.

A hallmark of the old Soviet Union had been its tremendous success in universal vaccination and resultant declines in the incidence of former scourges such as measles, whooping cough, polio, and diphtheria. By 1976 the numbers of diphtheria cases diagnosed in the U.S.S.R. approached zero.

But in 1990 diphtheria reemerged in Russia, with 1,211 cases reported from St. Petersburg, Kaliningrad, Orlovskaya, and Moscow. The epidemic took off, with reported cases and geographic spread increasing steadily well into 1994. In 1991 nearly 1,900 diphtheria cases and 80 deaths were reported in Russia. Though the bacterial disease could be treated with antibiotics, deaths occurred due to the sorry state of the nation's health care systems.

During the summer of 1993, when nearly 1,000 cases were reported in a single month in Moscow and St. Petersburg, the British government issued travel advisories recommending that its citizens be revaccinated prior to traveling in the former U.S.S.R. And the numbers kept rising: between January and August 1993, nearly 6,000 Russians came down with diphtheria, 106 died.[103]

There had been massive waves of migration from outlying rural and rust-belt areas of Russia into Moscow, St. Petersburg, and, to a lesser degree, Kaliningrad and Orlovskaya. Most of the migrants were economic refugees, hoping to find work in the country's largest cities. But they soon discovered quite the opposite, according to Russian authorities, and many thousands ended up living inside public transport stations—train depots, airports—in squalid conditions. Over 40 percent of the diphtheria cases occurred among these homeless.

Diphtheria had been virtually eradicated from the United States because of strict rules about preschool vaccination of children with the so-called DTP shots. But DTP shots had also been meticulously administered in Russia since the early 1960s. Nearly every new diphtheria case in the country had involved individuals who were previously vaccinated.

Officials concluded that the vaccine didn't, as previously thought, work for a lifetime. It might offer less than five years' protection against the disease. The reason, they said, was not a failure of the vaccine, but its success.

It seemed that thirty years of worldwide vaccination had drastically reduced the numbers of diphtheria microbes in the world, and most people lived their lives never being naturally exposed to the bacteria. Natural exposure in the 1960s, however, acted like booster shots, constantly rejuvenating lagging immunity: that explained why health officials had then mistakenly concluded that the vaccine provided lifetime protection. But by the 1980s most people's immune systems never saw diphtheria, and the natural booster effect didn't take place.

In response to global concern that the Russian epidemic might spread to other parts of the former Soviet Union, the Baltic States, or Scandinavia, the Russian Ministry of Health announced in 1993 a five-year plan to revaccinate up to 90 percent of all the nation's citizens. Some UN officials privately questioned whether the Russians were responding with the proper amount of urgency and haste: a handful of diphtheria cases were reported during the summer of 1993 in Finland and the Baltic States.[104] Still other skeptics questioned the wisdom of a mass adult vaccination campaign in Russia, given the country's acute shortage of syringes. Considering the lesson of Elista, they asked, might such an effort only hasten emergence of blood-borne microbes, such as hepatitis B and HIV?

The Elista tragedy was closely mirrored by events in Romania, where the government of communist dictator Nicolae Ceausescu covered up the existence of thousands of institutionalized orphans who were the legacy of decades of strict bans on all forms of contraception. Further, the Ceausescu regime hid evidence that many of these children were infected with HIV,[105] the tragic outcome of common use of contaminated syringes[106] and the primitive belief that injecting adult blood into children gave them strength.[107]

When the Iron Curtain was lifted, it revealed the Third World status of the old communist regimes, and conditions which only worsened amid the infrastructural chaos. And with that revelation came recognition of countless opportunities for the further emergence of not only HIV but all manner of microbes.

But there was no need to search behind the Iron Curtain, the Bamboo Curtain, or below the Sahara to witness microbial exploitation of Thirdworldization. The process was occurring during the 1980s and the early 1990s inside the wealthy nations of North America and Western Europe.

Despite the AIDS epidemic, most of the public health community, which was not involved in infectious diseases work, remained optimistic during the 1980s. So much so that health became a matter of personal responsibility. Health economists tallied up the costs of diseases that were preventable through diet, exercise, cessation of tobacco or illicit drug use, elimination of alcoholism, and the like, reaching the conclusion that personal health decisions were no longer the exclusive purview of individual choice. Smokers, they concluded, cost the rest of society billions of dollars. So did alcoholics. And fat people.

"The cost of sloth, gluttony, alcoholic intemperance, reckless driving, sexual frenzy, and smoking is now a national and not an individual responsibility," wrote Dr. John Knowles, president of the Rockefeller Foundation. "This is justified as individual freedom—but one man's freedom in health is another man's shackle in taxes and insurance premiums. I believe that a right to health should be replaced by the idea of an individual moral obligation to preserve one's own health—a public duty if you will."[108]

Public health advocates warned, however, that it was exceedingly unfair, and unrealistic, to hold poor Americans responsible for their health—to condemn them, as it seemed Knowles did, for their inability to afford ideal foods, membership in exercise clubs, and temperance in all sexual and intoxicant affairs. Further, they warned that the medical triumphs that had sparked such rosy calls for personal responsibility were fleeting. In the face of rising poverty, they said, the old scourges would return.[109]

It wasn't necessary to go to Africa to see AIDS orphans or whole families buried side by side. New York City alone would have more than 30,000 AIDS orphans by the end of 1994, Newark over 10,000. The U.S. Department of Health and Human Services predicted that there would be 60,000 AIDS orphans in the country by the year 2000.[110] Just as AIDS was exhausting the extended-family networks in much of Africa, so it was taxing the social support systems in America's poorest communities.

With every passing year in America's AIDS epidemic the impact upon the nation's poorest urban areas grew more severe. It compounded the effects of other plights—homelessness, drug abuse, alcoholism, high infant mortality, syphilis, gonorrhea, violence—all of which conspired to increase levels of desperation where dreams of urban renewal had once existed.

As the virus found its way into communities of poverty, the burden on urban public hospitals was critical. Unlike Canada and most of Western Europe, the United States had no system of national health care. By 1990 an estimated 37 million Americans were without any form of either public or private health insurance. Too rich to qualify for government-supported health care, which was intended only for the elderly and the indigent, but too poor to purchase private insurance, millions of Americans simply prayed that they wouldn't fall ill. Another 43 million Americans were either chronically uninsured or underinsured, possessing such minimal coverage that the family could be bankrupted by the required deductible and co-payments in the event of serious illness.[111]

Any disease that hit poor urban Americans disproportionately would tax the public hospital system. But AIDS, which was particularly costly and labor-intensive to treat, threatened to be the straw that broke the already weakened back of the system.[112]

"We are fighting a war here," declared Dr. Emilio Carrillo, president of the New York City Health and Hospitals Corporation, which ran the city's network of public medical facilities. "People are sick and dying from AIDS, tuberculosis is rampant, malnutrition, drug addiction, and other

diseases resulting from poverty are also at epidemic levels, while at every level of government, city, state, and federal, the health care system is facing cutbacks. Only the number of sick people and people in need of basic health care is not being cut back. Among them there have been no reductions, no downsizing. They are still coming in to us for treatment."

A 1990 survey of 100 of the nation's largest public hospitals (conducted by the National Association of Public Hospitals) revealed worsening situations in all American cities and predicted collapse of the "public safety net" offered by the system. A microbe that had emerged in America only a decade earlier was threatening to topple the system.

By 1987, 3 percent of the women giving birth in hospitals in New York City were HIV-positive, as were some 25 percent of their babies, according to the U.S. Public Health Service. Nearly two-thirds of those mothers and babies were born in public hospitals located in largely African-American or Hispanic neighborhoods of Brooklyn and the Bronx. The following year the state of New York concluded that one out of every 61 babies born in the state was infected with the virus. But that rate varied radically by neighborhood: in posh, semi-rural communities located far from New York City fewer than one out of every 749 babies was born HIV-positive in 1988. But in desperately poor neighborhoods of the South Bronx one out of every 43 newborns, or 2.34 percent, was infected—and every one of them was born in a public hospital.[113] Those numbers could only be expected to worsen as the epidemic's demographics shifted into younger, predominantly heterosexual population groups.[114]

A significant percentage of the nation's HIV-positive population was also homeless, living on the streets of American cities. A 1991 study, led by Andrew Moss, of homeless men and women in San Francisco found that 3 percent of those who had no identifiable risk factors for HIV exposure were infected. Another 8 percent of the homeless were HIV-positive due to injecting drug use, prostitution, or sex with an infected individual. Overall, more than one out of every ten homeless adults in San Francisco carried the virus.[115]

HIV wasn't the only microbe that was exploiting opportunities in America's urban poor population: hepatitis B (which by 1992 was responsible for 30 percent of all sexually transmitted disease in America), syphilis, gonorrhea, and chancroid were all appearing less commonly in Caucasian gay men and with alarming, escalating frequency in the heterosexual urban poor, particularly those who used crack cocaine or heroin. By 1990 two-thirds of New York State's syphilis cases, for example, were African-Americans residing in key areas of poverty, and within that population male and female infection rates were equal.

In 1993 the New York City Health Department announced that life expectancy for men in the city had *declined*, for the first time since World War II, from a 1981 level of 68.9 years to a 1991 level of 68.6 years. This occurred even though outside New York City life expectancies for men in

the state *had risen* during that time from 71.5 years to 73.4 years. Though rising homicide rates played a role, city officials credited AIDS with the bulk of that downward shift. By 1987 AIDS was already the leading cause of premature death for New York City men of all races and classes; by 1988 it was the number one cause for African-American women as well.

Well before AIDS was claiming significant numbers of Americans, Harlem Hospital chief of surgery Dr. Harold Freeman calculated that men growing up in Bangladesh had a better chance of surviving to their sixty-fifth birthday than did African-American men in Harlem, the Bronx, or Brooklyn. Again, violence played a significant role in the equation, but it was not critical to why a population of hundreds of thousands of men living in the wealthiest nation on earth were living shorter lives than their counterparts in one of the planet's poorest Third World nations. Average life expectancy for Harlem's African-American men born between 1950 and 1970 was just 49 years. Freeman indicted disease, poverty, and inequitable access to medical care as the primary factors responsible for the alarming death rate among African-American men.[116]

Well before a new tuberculosis epidemic struck several U.S. cities, the warning signs were there for all to see: rising homelessness, fiscal reductions in social services, complacency in the public health sector, rampant drug abuse, and increases in a number of other infectious diseases. The emergence of novel strains of multiply drug-resistant TB came amid a host of clangs, whistles, and bells that should have served as ample warning to humanity. But the warning fell on unhearing ears.

During the Ronald Reagan presidency American fiscal policies favored expansion of the investment and monetary sectors of society and simultaneous contraction of social service sectors. Economist Paul Krugman of the Massachusetts Institute of Technology estimated that 44 percent of all income growth in America between 1979 and 1989 went to the wealthiest 1 percent of the nation's families, or about 800,000 men, women, and children. On the basis of Federal Reserve Board data, Krugman calculated that total wealth (which included far more than the cash income measured above) was more concentrated in the hands of the nation's super-rich than at any time since the 1920s. By 1989, the top 1 percent richest Americans controlled 39 percent of the nation's wealth.

Several studies showed that by the end of 1993 more than 25 million Americans were hungry, consuming inadequate amounts of food. In 1993 one in ten Americans was compelled to stand at least once a week on a breadline, eat in a soup kitchen, or find food through a charitable agency. And the numbers of people living below the federally defined poverty line increased three times faster between 1982 and 1992 than the overall population size. In 1992 some 14.5 percent of all American citizens lived in conditions of legally defined poverty. Most were single mothers and their children.[117]

Though difficult to measure precisely, the numbers of homeless people

in America rose steadily between 1975 and 1993,[118] and the demographics of the population shifted from the traditional hard-core group of older male vagrants and alcoholics to a younger, more heterogeneous contingent that included large numbers of military service veterans, chronically institutionalized mental patients, individuals with severe cocaine or heroin habits, and newly unemployed families and individuals. Estimates of the size of the nation's homeless population ranged from about 200,000 to 2,200,000, based on head counts in emergency shelters and a variety of statistical approaches to the problem.[119]

Even more difficult to calculate was the rise in housing density in urban areas. As individuals and whole families faced hardships that could lead to homelessness, they moved in with friends and relatives. One estimate for New York City during the 1980s suggested that 35,000 households were doubled up in public housing, along with 73,000 double-density private households. Assuming each family averaged four members, that could mean that more than 400,000 men, women, and children were packed into double-density housing.[120]

Finally, a large percentage of the urban poor population cycled annually in and out of the criminal justice system. Young men, in particular, were frequently incarcerated in overcrowded jails and prisons. In 1982 President Ronald Reagan called for a war on drugs: by 1990 more men were in federal prisons on drug charges alone than had comprised the entire 1980 federal prison population for all crimes combined. The pace of federal, state, and county jail construction never came close to matching the needs created by the high arrest rates. As a result, jail cells were overcrowded, and judges often released prisoners after shortened terms, allowing them to return to the community. This, too, would prove advantageous to the microbes.

Some of the microbial impact of this urban Thirdworldization might have been controllable had the U.S. public health system been vigilant. But at all tiers, from the grass roots to the federal level, the system was by the mid-1980s in a very sorry state. Complacent after decades of perceived victories over the microbes, positioned as the runt sibling to curative medicine and fiscally pared to the bone by successive rounds of budget cuts in all layers of government, public health in 1990 was a mere shadow of its former self.

An Institute of Medicine investigation determined that public health and disease control efforts in the United States were in a shambles. Key problems included "a lack of agreement about the public health mission" between various sectors of government and research; a clear failure of public health advocates to participate in "the dynamics of American politics"; lack of cooperation between medicine and public health; inadequate training and leadership; and severe funding deficiencies at all levels.

"In the committee's view," they wrote, "we have let down our public health guard as a nation and the health of the public is unnecessarily threatened as a result."[121]

An example of public health's disarray that proved painfully embarrassing to officials during the 1980s was provided by measles. In 1963 a safe, effective measles vaccine became widely available in the United States and childhood cases of the sometimes lethal disease plummeted steadily thereafter. In 1962 half a million children in the United States contracted measles; by 1977 fewer than 35,000 cases were reported annually and many experts forecast that virtual eradication of the disease would soon be achieved.

But problems were already apparent in 1977: many children who were vaccinated before the age of fourteen or fifteen months later developed measles, and researchers soon understood that timing was crucial to achievement of effective immunization. Vaccination schedules were adjusted accordingly, executed nationwide with vigor, and the number of measles cases in the country continued to decline. The only serious emergences of the microbe took place in communities where a significant number of parents refused, for religious reasons, to have their children vaccinated.[122]

By the early 1980s the United States had achieved 99 percent primary measles vaccination coverage for young children and fewer than 1,497 measles cases occurred in the country in 1983.

In 1985, however, a fifteen-year-old girl returned from a trip to England to her Corpus Christi, Texas, home and promptly developed the rash that was characteristic of measles. The virus quickly spread through her high school and the local junior high school. Ninety-nine percent of the students had, during infancy, received their primary live-measles immunizations; 88 percent had also had their recommended boosters. Nevertheless, fourteen students developed measles.[123]

Blood tests performed during the outbreak on more than 1,800 students revealed that 4.1 percent of the children, despite vaccination, weren't making antibodies against the virus, and the lowest levels of antibody production were among those who hadn't had boosters. All the ailing teens fit that category. The clear message was: (1) primary immunization, in the absence of a booster, was inadequate to guarantee protection against measles; and (2) having even a handful of vulnerable individuals in a group setting was enough to produce a serious outbreak.[124]

The crucial importance of proper timing of vaccination and booster follow-up was further supported by other measles outbreaks among groups of youngsters whose primary vaccination rates exceeded 97 percent.[125] In 1989 the measles rate in the United States climbed considerably. More than 18,000 cases of measles occurred, producing 41 deaths: a tenfold increase since 1983. Forty percent of the cases involved young people who had received their primary, but not booster, vaccinations; the remainder had had no shots, or their vaccinations were administered at improper times.

Though some pediatricians and policy makers found the 1989 numbers

worrisome, nobody forecast an epidemic. Measles epidemics were considered Third World problems by 1989.

But an epidemic did occur. The incidence of measles in the United States leapt by 50 percent between 1989 and 1990. More than 27,000 U.S. children, half of them under four years of age, contracted measles during 1990; 100 died of the disease.

Hardest hit was New York City, with 2,479 reported measles cases.

CDC investigators were baffled by the severity of illnesses in the 1990–91 epidemic.

"These kids are much sicker, and death rates are definitely higher," the CDC's Bill Atkinson said. "We don't know whether it's because the strain of measles out there is more virulent, or the kids are more susceptible."

Many of the ailing children, particularly in New York City, had never been vaccinated. They hadn't even received their primary shots, much less boosters.

"Now the majority of cases are in unvaccinated children," Dr. Georges Peter, chair of the American Academy of Pediatrics, said. "Measles is the most contagious of all the vaccine-preventable diseases. The nature of the problem has clearly changed—it is undoubtedly a failure to vaccinate. And what this really is, is indication of a collapse in the public health system, of lack of access to health care."

What was going on? Were parents deliberately keeping their children away from doctors? Were Americans suddenly phobic about immunizations?

The answers, it turned out, could be found in the demographics of the population of children with measles. The vast majority lived in large cities—New York, Chicago, Houston, Los Angeles—and were nine times more likely to be African-American or Hispanic.

As the epidemic persisted in 1991, worsening in New York City's African-American and Hispanic populations, it was evident that the microbe had successfully emerged in populations of poor urban people with little or no access to health care. This underlying social weakness also facilitated surges in whooping cough and rubella cases during 1990–93.[126]

In 1978 the U.S. Surgeon General had declared that measles would be eradicated from the country by 1982, and an ambitious immunization campaign was mounted. By 1988, however, conditions of poverty, health care collapse, and public health disarray had grown so acute that the United States had a poorer track record on *all* childhood vaccination efforts than did war-torn El Salvador and many other Third World countries.[127]

In some inner-city areas—notably in New York City—only half of all school-age children had been vaccinated. For much of the urban poor in America the only point of access to the health care system was the public hospital emergency room. Families spent anxious, tedious hours queued up in urban ERs because they felt that they had no choice: there were no clinics or private physicians practicing in the ghettos, few alternative sources of basic care. But few poor families were willing to put up with a

daylong line in the ER simply to get their children immunized, particularly if it meant loss of a day's pay.[128]

Further study of the measles crisis revealed that some deaths and many cases—indeed, most at the key hospitals—went unreported. The city of New York uncovered up to 50 percent underreporting in the region's largest inner-city hospitals during the 1991 epidemic. It was possible that up to 5,000 cases of the disease occurred in New York City, though only half that number were officially reported.[129]

In 1993, World Health Organization adviser Dr. Barry Bloom, of the Albert Einstein School of Medicine in the Bronx, announced that the United States had fallen behind Albania, Mexico, and China in childhood vaccination rates.[130]

At the World Summit on Children convened by the United Nations in September 1990, the Bush administration was in the dubious position of having, on the one hand, to pledge sweeping concern for the health and survival of the world's children while hoping no one would publicly note that the health status of America's impoverished kids rivaled that of children in much of Africa and South Asia.

"This society is so wealthy, obviously this country is better off than the Third World. But this country should be ashamed of the child mortality rates and health," decried Jim Weill, of the Children's Defense Fund, at the Summit. "The U.S. ranks 19th in the world on infant mortality, 29th in low birthweight babies, 22nd on child mortality for children under five, and, perhaps most amazing, 49th in the world on child immunization, for our non-white children. We kill our children.

"Let's face it, when it comes to America's children we live in the Third World."

Not only had America's cities sunk to Third World levels of childhood vaccination and access to health care, but its surveillance and public health systems had reached states of inaccuracy and chaos that rivaled those in some of the world's poorest countries.[131]

Weill's words had barely been uttered when officials at the CDC acknowledged that America's public health system was also doing a worse job of handling tuberculosis than did many African nations.

Multiply drug-resistant TB had arrived. Microbes had emerged that were so broadly resistant to antibiotics that, in practical terms, they were invulnerable.

Tuberculosis didn't reemerge overnight in the United States. On the contrary, the new mutant microbes made numerous tentative incursions into the *Homo sapiens* population over a period of years. It wasn't a surprise attack.

It almost seemed as if human beings were deliberately ignoring the plentiful warning signs.

Though tuberculosis had never disappeared, its incidence had declined steadily in the United States since the 1880s, and hit record lows following the introduction of antibiotic treatment. The robust *Mycobacterium tuberculosis* was impossible to eradicate, as half the world's population at any given time was infected with the bacteria. For most people *M. tuberculosis* infection was a benign event: the microbe was kept in check by the immune system and the individual never, throughout his or her life, fell ill.

On average, infected people had a 10 percent chance of developing active disease sometime during their lives, and a 1 percent chance of coming down with a lethal TB illness. Thus, statistics would indicate that about 2 billion human beings were infected with the microbe in 1988; 200 million would during their lives suffer tuberculosis and 2 million would die of the disease.

But those neatly averaged numbers belied the true nature of the risks of TB and the disease's extremely unequal distribution worldwide.

From the earliest days of Western tuberculosis research, scientists and physicians had recognized that the microbe moved hand in hand with poverty. Though there were famous cases of TB among more affluent individuals, most of the world's tuberculosis victims had always been the poorest citizens.

The nature of the association between TB and poverty was hotly debated throughout the nineteenth and twentieth centuries,[132] but the salient points were clear. The *M. tuberculosis* bacterium was, like its close cousin the *M. leprae*, which caused Hansen's disease, an extremely slow-growing microbe that under most circumstances spent its life either under attack from the human immune system or lying low, causing no disease. Its best hopes of vigorously reproducing, developing a large microbial colony within a human being, and causing disease lay with either a diminished host immune capacity or continuous reinfection of the human being.

Diminished immune systems were plentiful wherever *Homo sapiens* lived in squalor and poverty. Malnutrition played an important role, though chronic infections with other microbes, such as tropical parasites, influenza, and amoebas, were also factors. Any ailment that taxed the immune system could create opportunities for *M. tuberculosis*.

M. tuberculosis exploited vulnerabilities. It was an opportunist. For decades it might silently lurk inside a *Homo sapiens* awaiting a moment when defenses were down, and then, when the victim's immune system was preoccupied with malaria or cancer, famine or pneumonia, it would strike.

It was also possible for people living in densely crowded situations to be continuously reexposed to the *M. tuberculosis* exhaled by others, which greatly increased their risk for developing an active case of the disease. That was why TB had historically been so strongly linked with urbanization and, in particular, slum housing and institutionalization.

Certainly it could have been predicted that the arrival of a new disease that produced severe immune deficiency and struck particularly hard in communities of poverty would spawn a reemergence of tuberculosis. If such communities had already been witnessing a slow, steady rise in TB cases, well before the new wave of immunodeficiency arrived, a resurgence of

tuberculosis seemed a virtual certainty, unless public health mitigating actions were taken.

In 1947, when antibiotic therapy for TB was still considered a novel treatment and disease prevention technique, 134,946 cases of tuberculosis were reported in the United States. By 1985 the uses of streptomycin, rifampin, isoniazid, and other antibiotics, coupled with an aggressive public health effort to identify and treat TB cases, had brought the U.S. caseload down to 22,201. Fewer than 30,000 Americans had actually contracted tuberculosis each year since 1977, and the majority were elderly individuals of European descent who had carried the *M. tuberculosis* microbes in their bodies for decades, only falling ill as their aging immune systems failed to keep the bacteria in check.

Well before the actual numbers of TB cases began to swell, the demographics of the disease shifted. Between 1961 and 1969 more than 80 percent of all active TB cases in the United States were among people over sixty-two years of age, most of them readily treated without hospitalization through basic long-term antibiotic therapy. During that time the U.S. federal government spent $69,287,996 on TB control.[133]

Between 1975 and 1984, however, the numbers of active TB cases reported among elderly Americans and Caucasians of all ages declined sharply. White male cases dropped 41 percent, white female cases 39 percent. In contrast, though TB was declining across the board, its downturn among non-whites was far slower: only 25 percent for males and 26 percent for females. And the age distribution of cases had shifted: by 1984 only 29 percent were over sixty-two years of age. In the non-white population less than one out of every five active TB cases that year involved a person over sixty-two and fully 20 percent were between the ages of twenty-five and thirty-four.[134]

As early as the mid-1970s, Lee Reichman, then head of tuberculosis control for New York City, was seeing a marked increase in active cases among injecting drug users and vagrants living in Harlem, most of them young men. Reichman's attempts to sound alarms about the new trend were muffled by a medical establishment that had already written TB off as a historical artifact.[135]

There were other clear warning signs. Between 1980 and 1986 five different surveys documented a relationship between the rise of homelessness in America and surges of TB in young adult populations. The spread of tuberculosis within emergency homeless shelters was demonstrated, and it was even clear to the CDC by 1984 that new mutant strains of drug-resistant TB were spreading among the urban indigent.[136] A striking 1980 study of young adult men living in subsidized single-room occupancy housing for the otherwise homeless in New York City found that 98 of 101 came up positive in skin tests for TB infection, and 13, or 6 percent, had active disease as measured by laboratory analysis of their sputum. The 13 were carrying contagious pulmonary disease, meaning they could exhale the microbes onto others.[137]

By 1986 nearly half of all active TB cases reported in the United States were among nonwhites, most of them African-American. There could be no doubt that dramatic changes were underway by the mid-1980s. Tuberculosis had clearly shifted to younger, predominantly African-American and urban populations. Geographically, it had shifted from areas such as Virginia to New York City, Miami, and scattered urban sites. The CDC itself noted the shift in 1986, which coincided with the first upward trend in TB cases reported in the United States since 1953. The agency also believed that "HIV infection may be largely responsible for the increase in tuberculosis in New York City and Florida."[138]

From the beginning of the AIDS epidemic, researchers in both the United States and Haiti had noted that HIV-positive Haitians had a high rate of tuberculosis. Indeed, published reports stated as early as 1982 that Haitians suffering from AIDS in Port-au-Prince were more likely to die of tuberculosis than of any other opportunistic infection. But American officials took little notice of this observation. Like their counterparts throughout the Western world, U.S. physicians tended to view the TB risk for people with HIV as a Third World problem.

They were partly right; tuberculosis was an enormous, and escalating, problem in the developing world.

In 1990 Africa's most famous contemporary hero, Nelson Mandela, developed acute tuberculosis during his twenty-sixth year of imprisonment. Spitting up blood during the bitter Cape Town winter, Mandela was gravely ill. At the age of seventy at the time, Mandela fit three classic risk groups for active tuberculosis: elderly, living in cramped, densely populated quarters, and black. In South Africa, 15 percent of infected blacks went on to develop active TB, compared with only 3 percent of whites, largely because of inequities in housing and health care.

As early as 1984, Project SIDA researchers in Zaire had seen a direct link between rising TB rates in that country and the HIV epidemic. Five years later, the World Health Organization's TB and AIDS programs issued a joint statement calling attention to the linkage and warning of growing parallel pandemics. In particular, the WHO report noted that 60 percent of all AIDS patients in Haiti had active TB, as did 20 to 60 percent of all African AIDS patients (rates varying geographically across the continent).[139]

Though many developing countries quickly took steps to follow the WHO recommendations, the United States and most of Western Europe were unmoved.

There were several disturbing facets to Africa's new TB epidemic—again, offering clues that should have served as warnings to officials in the wealthy nations. Some HIV-positive patients seemed to suffer not only activated disease from long-dormant *M. tuberculosis* infection but also new infection. That meant the disease was spreading and could be posing an increased risk for general populations, not just those who were infected with HIV.[140] Where endemic tuberculosis rates were high, TB was "the

single most important opportunistic disease related to HIV infection in the developing world," according to researchers based in Côte d'Ivoire.[141] HIV-positive patients did not respond well to the two cheapest antituberculosis drugs, thiacetazone and streptomycin; the drugs were four times more toxic in people with HIV, even lethal. This posed enormous problems in terms of the cost of tuberculosis treatment.[142] And the relative severity of tuberculosis in HIV-positive people did not vary appreciably with the stage of HIV disease. Indeed, for many Africans tuberculosis was the first ailment that tipped off physicians that they might have AIDS. Thus, hundreds of thousands—perhaps millions—of people in developing countries, who didn't yet realize that they were infected with HIV, were at tremendous risk for tuberculosis.[143]

By 1990 public health experts in some African countries were predicting not only utter defeat in their decades-old tuberculosis control efforts, but also potentially dire economic impacts that would further compound the grim damage the AIDS epidemic was expected to cause.[144] On the wall of the Geneva headquarters of the Global Programme on AIDS hung a graph tracking the AIDS and TB epidemics of Burundi, Malawi, Zambia, and Tanzania. The two epidemics tracked in clear tandem, each growing at exactly the same rates.

Despite all these observations the CDC concluded in early 1989 that the goal of eliminating tuberculosis from the United States by the year 2010 remained attainable and the nation's TB control efforts were essentially on track.[145]

The following year, however, the CDC's tone changed to one of alarm as fuller assessment of American TB reports revealed that the decade of the 1980s had witnessed a 28,000-person excess caseload of tuberculosis. Indeed, the downward slope TB had been following since 1953 plateaued in 1984–85 and climbed steadily, so that by the end of the decade the United States had almost as many cases of the disease as had been seen in 1980. The biggest increase was among inner-city African-Americans—TB cases in that group skyrocketed by 1,596 percent between 1985 and 1990.[146] Between 1985 and 1991 there was an overall 18.4 percent increase in tuberculosis cases in the United States,[147] most of it attributable to the HIV epidemic.[148]

When the crisis hit, Dr. Karen Brudney was one of those who could say, "I told you so." Not that it gave her much satisfaction. She was far too overwhelmed with her huge tuberculosis caseload to spend a lot of time wagging her finger at public health bureaucrats. The street-savvy, tough-talking physician made up in spades with attitude for what respect her thin, wiry female frame might otherwise fail to muster from the kinds of clients she served every day in the city's Lincoln Hospital, located in the Bronx. Equally comfortable conversing in English, Spanish, French, or Haitian

Creole, Brudney barked her commands and castigations just as freely to the drug dealers, alcoholics, thieves, and ex-convicts as she did to New York's model citizens. If any of them took this thirty-something white lady for a pushover, they were in for a big surprise.

On an icy late-winter day in 1992, Brudney paced the hospital's out-patient TB clinic, clearly agitated. The waiting room was packed with people of all ages who chattered loudly, mostly in Spanish, or watched the Puerto Rican soap opera flickering from the television that was secured to the wall by two separate sets of locks and chains. Unfortunately, none of the men, women, and children crammed into the Health Stat 10 waiting room were Brudney's patients.

As she angrily moved up and down the clinic hallway, avoiding the crowds and gurneys with the skill of an experienced rush-hour driver, Brudney grumbled.

"Clinic's been open an hour and not one single client is here. We'll be lucky if two out of the twelve clients that are supposed to be here actually show up for their TB checkups. We're only open once a week, they can't get their meds without coming to clinic, but we never get a better than fifty percent turnout," Brudney said, taking yet another look at her client list. "If they don't show up, it means they're not taking their meds. And if they're not taking their medication, they're contagious."

Her eye caught sight of a particular name—"Joanne"—and Brudney's aquiline face screwed up into an expression of disgust.

"This one! Ugh!" Brudney exclaimed. "This one is somebody they should lock up. She's out there infecting everybody. She's already been responsible for one outbreak, one where people died. And the strain she's carrying is multiply drug-resistant. If she showed up right now I wouldn't even want her in clinic, exposing everyone.

"What the hell would I do with Joanne if she did show up—which, of course, she won't. If I ordered a mandatory detention on her I'd need a bed here in the hospital. That's a whole day's work, a mountain of paper-work, a real nightmare. Then suppose I succeed in getting a bed, who's going to pay for the twenty-four-hour guard on her? And she's not going to stay, guard or no guard. What's security going to do, shoot her? Chain her in shackles in her bed?

"That woman is carrying a mutant TB strain that is virtually untreatable, 50 percent fatal. She's spreading it all over New York City. And there's nothing—*nothing*—I can do about it," Brudney exclaimed as she snapped Joanne's chart shut.

Minutes later Vernon, a thirty-three-year-old African-American male, strolled in unannounced. He didn't have an appointment, but so what—nobody else had shown up. Even an amateur could tell that Vernon had tuberculosis: his six-foot-one frame was down to 149 pounds, his movements were slow, from deep in his lungs came periodic painful coughing fits, and

his eyes had that ghostly look that comes with acute illness. Characteristically, Vernon compensated for his illness with a forced kinetic energy that could be mistaken for an amphetamine high.

"You've lost more weight, Vernon. You taking your pills?" Brudney asked.

Vernon launched into an earnest, lengthy description of his daily medication routine, insisting that, despite all their side effects and the painful injections involved with one of his four medications, he was taking all fifteen pills and one shot a day, just as instructed. Brudney rolled her eyes, grunted a smirking sound, and let it be known that she'd heard all this before from Vernon.

"I'm not ashamed," Vernon insisted. "I'm dealing with it. I really am. This time."

"Yeah, *this time*," Brudney responded. The physician called in a social worker and, in front of Vernon, told the patient's story. Vernon enthusiastically added details along the way, seemingly proud of his dubious battle with tuberculosis. In early 1989 Vernon had been hospitalized with what appeared to be pneumonia. Three weeks later the hospital lab returned a different verdict: tuberculosis. There was nothing special at the time about Vernon's strain of *M. tuberculosis*; it was garden-variety TB.

So Vernon was released from the hospital and ordered to take two relatively inexpensive, extremely effective drugs every day for six months: isoniazid and rifampin.

"But you screwed up, didn't you, Vernon?" Brudney said.

Shrugging his shoulders, Vernon said, "I figured anytime I felt bad, I'd just go to the emergency room and get more pills."

After a year of sporadic, improper use of the drugs, Vernon's tuberculosis bacteria mutated, becoming resistant to both drugs. Since he had long disappeared off the City Health Department's radar screen, investigators were sent out in search of Vernon.

But he had disappeared.

"I move around a lot," Vernon said, vaguely referring to several emergency homeless shelters and the apartments of friends and relatives.

Then he had suffered a major tuberculosis relapse and in November 1991 ended up back in Lincoln Hospital, spitting up blood. For ninety-four days Vernon struggled at death's doorstep in Lincoln, his lung mucus coming up clear.

"That's bad," Vernon said, though he deferred to Brudney for an explanation. The TB colonies in his lungs had formed a hard, calcified cavity inside of which they thrived, protected from his immune system and from the four powerful drugs that dripped via an intravenous line into his bloodstream all day, every day, for three months.

Since his discharge from Lincoln Hospital in January 1992, Vernon had been having night sweats and felt fatigued. "But I'm alive, and I'm gonna stay that way."

"You are, if you take all of your medication," Brudney scolded.

Vernon swore that every morning he was swallowing eleven pills, comprising three different antibiotics. And he insisted that he was always home after breakfast when the public health nurse came to inject amikacin into his shoulder.

"Man, that hurts," he said. "Stings, man. Burns going in, and takes its time getting there."

Brudney, for the first time since he arrived, fully agreed with something Vernon said.

"It's a four-cc injection, and it's excruciating. And you wouldn't have to be putting up with it if you had taken your pills in the first place," she said.

Vernon was now living at home in the South Bronx with his mother and older siblings. He had a girlfriend and a fifteen-month-old daughter, both of whom, so far, were free of TB. Until he got well, Vernon would live on welfare and social security funds, but, he said, "I'm gettin' a job working on a movie that's shooting in Harlem, just as soon as I lick this TB."

Brudney made a few notes on Vernon's chart, handed the patient his prescriptions, and shook her head as he exited.

"Everything that man says is a lie. It's amazing. Every single word," Brudney insisted. "For months he's been checking in and out of homeless shelters, using false names so the Health Department couldn't find him. And why? So he could deal drugs. I don't know, he may even be selling his TB meds on the street. Some of the patients do."

Brudney noted that since 1989 Vernon had missed more than 75 percent of his appointments, was hospitalized four times, and was found hiding under an alias on two occasions.

"That's what we're up against."

Two years earlier, Brudney and Columbia College of Physicians and Surgeons colleague Dr. Jay Dobkin had warned government officials that men like Vernon were breeding drug-resistant tuberculosis. The pair studied TB treatment records for Harlem Hospital, a public facility located in the middle of one of New York's poorest neighborhoods, which, more than a decade earlier, Lee Reichman had identified as one of the communities with the highest incidence of TB in the United States.[149] By 1985 it was also a neighborhood ranked in the top ten nationally for homelessness and narcotics use.

Brudney and Dobkin examined the records of all patients hospitalized for tuberculosis between January 1, 1988, and September 30, 1988. Eight out of ten of the patients were men twenty-five to forty-five years of age, half of them were homeless, the remainder were listed as "unsteadily housed." More than 80 percent of the patients were unemployed, 79 percent were alcoholic, and 40 percent were HIV-positive.

More than a quarter of the patients—26 percent—were hospitalized for tuberculosis relapses, meaning that they had failed to properly take their

medications. And a startling 89 percent of the patients disappeared sometime after hospital discharge, never returning for their mandated checkups and drug prescriptions. A subgroup of the patients—women who were addicted to crack cocaine—were 97 percent noncompliant with tuberculosis medication.

"Within 12 months of discharge, 48 of 178 (27%) patients were readmitted with confirmed active tuberculosis at least once," Brudney and Dobkin wrote.[150] "Almost all of those discharged were again lost to follow-up, with 20 percent admitted a third time as of April 1989."

The two physicians noted that New York City spending for tuberculosis control stood at $40 million in 1968, more than 80 percent of which was spent on outpatient services, tracking patients, and ensuring their compliance with medication orders. In addition, the federal government added $1.4 million annually to New York's TB effort during the 1970s.

By 1988 that federal commitment had fallen below the $200,000 mark and New York City officials had dropped their fiscal expenditures for tuberculosis control to less than $2 million a year. In addition, at a time when the patient population was largely homeless and extremely difficult to follow, nearly all resources were directed to hospitalization costs rather than outpatient services and patient compliance issues.

Meanwhile, the CDC had been monitoring laboratory tests on tuberculosis antibiotic resistance, finding a clear correlation between the number of times an individual had been treated for TB and the levels of resistance in the patient's tuberculosis bacterial population. For example, based on lab data amassed between 1982 and 1986 on patients with resistant TB strains, the individuals were four times more likely to have isoniazid resistance if they had been previously treated for TB, more than three times more likely to be resistant to streptomycin if previously treated, and so on for all available drugs.

In 1986, just as tuberculosis was making its reemergence in America, the federal government pulled the plug on the CDC's drug-resistance tracking program. That explained, in part, why the new TB epidemic blindsided the watchdog agency.

If significant numbers of TB patients in New York City were, as Brudney and Dobkin demonstrated, failing to adhere to proper medication schedules, the CDC's findings indicated that widespread drug resistance was a virtually guaranteed outcome.

When multiply drug-resistant strains of tuberculosis spread from the largely impoverished homeless population of New York City to their doctors, jail guards, and fellow patients inside hospitals, panic broke out. Though the first incidents occurred as early as 1989, word of the full extent of the problem and the number of health providers and patients so afflicted didn't get out until early 1992.[151] When the statistics were released by the CDC and the New York City Department of Health, nurses, physicians, people infected with HIV, and the general population were briefly shaken out of their complacency.

During the first quarter of 1991, it turned out, 42.5 percent of all new tuberculosis cases diagnosed in New York City were caused by mutant strains that were resistant to the primary treatment drugs, isoniazid and rifampin. Worse yet, 60 percent of the relapse cases seen during the first twelve weeks of 1991 were multiply drug-resistant. Nowhere else in the nation were *M. tuberculosis* resistance levels that extreme. New Jersey and Florida ranked second and third nationally with 6.3 and 5.3 percent MDR (multiply drug-resistant) TB rates, respectively. Averaged nationally, 21.5 percent of all relapse TB cases were MDR, as were 8.2 percent of new cases.

By 1989, New York had become the nation's epicenter of four epidemics, each of which fed upon the other: HIV/AIDS, MDR tuberculosis, heroin addiction, and crack cocaine use.

Three dreadful hospital tuberculosis outbreaks in New York and a fourth in Miami drew sharp attention to the interconnection between MDR-TB and HIV. In each instance a patient with active drug-resistant tuberculosis was in the same clinic or ward with HIV patients, and the immunodeficient individuals were terribly susceptible to both infection and death. Death rates among the newly infected HIV-positive patients ranged from 91 to 100 percent, most dying less than sixteen weeks after infection.[152]

So grim were the prospects for the newly infected HIV-positive patients that officials referred to them as individuals who posed no direct public health threat: they didn't survive to leave the hospital. They could, however, pose a risk for those who cared for them in the hospital.[153]

When scientists with the CDC, various New York-based institutions, and research centers around the United States worked their way backward to understand why and how drug-resistant tuberculosis had emerged in the United States more than forty years after the invention of curative drugs, they were forced to conclude that the nation's public health system had failed on every front.

Twenty-six people caught TB in three Boston homeless shelters between February 1984 and February 1985; two died. Laboratory analysis revealed that fourteen of the individuals were newly infected with a strain of TB that was resistant to isoniazid and streptomycin. Searching for the source of the outbreak, researchers found two candidates, both of whom had MDR-TB. The first was a thirty-three-year-old alcoholic who had been in and out of TB treatment for ten years. The other was a fifty-seven-year-old diagnosed schizophrenic who had suffered two bouts of TB since 1980.[154] The outbreak demonstrated both that tuberculosis readily spread inside homeless shelters and that individuals who failed therapy could become carriers of chronically active MDR-TB.

The most important points of vulnerability in the public health system were made apparent when a thirty-two-year-old man died of multidrug-resistant tuberculosis in Davidson County, North Carolina, on April 20, 1984. The cause of death was not confirmed as TB until over three months after his funeral; it took the North Carolina State Laboratory more than five

months to determine the drug-resistance characteristics of the man's TB strain. By then the individual had been six feet under for four months, his doctors having treated him with drugs rendered useless by a strain that proved resistant to isoniazid, rifampin, ethambutol, and streptomycin.[155]

The system failures proved even more embarrassing when investigators from the CDC tested the North Carolina victim's close friends, discovering that the dead man's next-door neighbor had suffered chronic tuberculosis since 1978, passed it on to his live-in girlfriend, her brother living in Washington, D.C., and a drinking partner. All the cases had escaped the public health safety net, though they had been seen by physicians. And all were infected with powerfully drug-resistant mutant bacteria. All male members of the cluster died of the disease—only the female survived. The man who appeared to have been the first TB case was an alcoholic, and the group spent hours drinking together in a local bar. Because the anti-tuberculosis drugs could not be tolerated with alcohol, the individuals failed to follow medication instructions.

And nobody from the city, county, or state public health systems took steps at any time between 1978 and 1985 to track the recalcitrant patients or force medication compliance.

The 1990s witnessed dangerous epidemics of MDR-TB first in Miami, San Juan (Puerto Rico), and New York City, later scattered all over the nation. Retrospective analysis of the New York City outbreak showed it began in September 1989 and continued well into 1994. In every case laboratory analysis of patient sputum and tissue samples was so slow that many victims were long dead by the time physicians knew which drugs might kill the particular TB strains in the victims' bodies. Median time for laboratory diagnosis of tuberculosis was nine weeks, and median additional lab time for determining the bacteria's drug-resistance patterns was six weeks. In other words, half of all New York City medical laboratories took nearly four months to reach a definitive diagnosis, and many required five to six months' lab time. New York's lab times were considered typical for the nation as a whole.[156] Though HIV-positive people were the most vulnerable victims in the epidemic, health care workers, prison guards, homeless shelter employees, fellow HIV-negative patients, and relatives were also infected as the airborne mycobacteria spread.[157]

To save money in the mid-1980s federal and state politicians had slashed TB control and surveillance budgets. By the time officials realized what had hit them, TB was draining financial resources at an astonishing rate. In 1991 direct tuberculosis treatment costs in the United States topped $700 million,[158] and the costly cases kept coming well into 1994. In the state of New York, in 1991 direct hospital expenditures for TB ran to more than $50 million.[159] In response to the MDR-TB epidemic the city of New York had to build a special 140-bed tuberculosis unit in the Rikers Island jail, at a total cost over three years of $115 million. The city's public hospitals spent $4 million to construct air-flow-controlled isolation rooms for TB patients that, for the first time, guaranteed that no other hospital employees or patients would be compelled to breathe air that was contaminated by an individual with tuberculosis.

In addition, the federal government had to increase TB spending from $17 million in 1991 to $54.9 million in 1992, much of which went to New York City.[160] When all the costs of the 1989–94 MDR-TB epidemic were totaled it was clear that more than $1 billion was spent to rein in the mutant mycobacteria. Saving perhaps $200 million in budget cuts during the 1980s eventually cost America an enormous sum, not only in direct funds but also in lost productivity and, of course, human lives.

Amazingly, even as federal concern escalated, and TB reports from all over the country demonstrated a national upward trend in tuberculosis, cities and states, other than New York, continued to slash their TB budgets. A survey of 25 large-city health departments revealed that between 1988 and 1992 sixteen of them slashed their TB budgets.[161] Though TB caseloads rose during that period in twenty-three of the cities, MDR-TB appeared in virtually all urban centers, expensive hospitalization was required in nearly twice as many cases, and the length of average treatment time increased by two months, cuts were the order of the day in most municipalities.

By 1993 the MDR-TB epidemic had made its way to the suburbs, such as New York's Long Island and Westchester County.[162] Jails and prisons all over the country reported MDR-TB outbreaks similar to that seen in Rikers in 1990–91. And Los Angeles, Chicago, Dallas, Detroit, and Miami all reported surges in the incidence of tuberculosis generally and MDR-TB in particular. Though New York City succeeded in bringing its TB incidence down that year, it remained fifty times greater than the national average—which itself was pretty bad. The CDC determined that 14.2 percent of the nation's tuberculosis cases in 1993 involved MDR-TB.

Further, studies showed that any diminution in the number of reported tuberculosis cases could only be considered a brief respite so long as the underlying conditions responsible for the emergence of MDR-TB remained unchanged. For example, Dr. Fred Gordin led a seventeen-center federal study in 1991–92 for the National Institute of Allergy and Infectious Diseases, looking at 4,314 indigent individuals around the country who were infected with the human immunodeficiency virus. About a quarter of the individuals came from poor communities of New York City, notably Harlem, the South Bronx, and eastern Brooklyn.

Skin tests of New York individuals were 28 percent positive for TB infection, compared with a national infection rate among HIV-positive poor people of less than 8 percent. Because it had long been known that HIV-positive people failed to respond to the TB skin test due to the beleaguered state of their immune systems, Gordin went a step further. He conducted anergy tests on the individuals aimed at determining whether they could give skin-test responses to *anything*, and then used a mathematical model to estimate what percentage of the anergic patients were infected with tuberculosis.

The result, Gordin said, was alarming: 51 percent of the New York area individuals were TB-infected.

"It is really very scary in New York," Gordin said. "We have found 10.2 percent of the New York cohort have actually had TB already, which is mind-boggling. It's what you'd expect in a Third World country."

Another disturbing finding came out of the National Jewish Center for Immunology and Respiratory Medicine in Denver, Colorado. Established at the turn of the century when physicians believed that fresh mountain air held curative powers for people with tuberculosis, National Jewish was, by 1990, the last fully operational TB sanitarium and research center left in the United States. Its chief TB physician, Dr. Michael Iseman, was widely considered the preeminent expert in the United States on diagnosis and treatment of the disease, and doctors all over the country typically sent their most desperately ill tuberculosis patients to National Jewish.

It came as grim news, indeed, when Iseman announced that even in his hands, in the best TB treatment center in the entire world, MDR-TB was extremely lethal. Of 171 patients (all HIV-negative) suffering from *M. tuberculosis* strains that were resistant to isoniazid and rifampin—as well as other drugs, in most cases—35 percent showed no response whatsoever to treatment with remaining, theoretically effective, drugs. And among those who did initially improve under Iseman's care, many suffered relapses. Despite radical treatments, including surgical removal of TB-filled lungs, more than half the patients never recovered from the disease; either they fell into the sort of lifelong tubercular state that Edgar Allan Poe and Charles Dickens had described eloquently more than a century earlier, or they died. Most of Iseman's patients were *not* HIV-positive, and the Denver physician blamed the poor efficacy of the second- and third-string anti-tuberculosis drugs for the dismal treatment outcome.[163]

When MDR-TB struck the United States in 1991, the CDC was swamped with requests for assistance from state agencies that were searching for second- and third-string drugs. The agency identified twenty-nine regions of the United States (of fifty-nine questioned) that were experiencing extreme shortages in anti-TB drug supplies. The U.S. government scrambled to persuade multinational drug companies to rapidly increase their production capacities.[164]

A confluence of events had played key roles in the emergence of New York's MDR-TB epidemic. First, President Ronald Reagan's declaration of a war on drugs and call for mandatory imprisonment for a range of drug-associated crimes coincided with an enormous surge in heroin and crack cocaine use in New York. Studies showed that some 80 percent of all MDR-TB index cases in 1989–90 (not including the secondary HIV-positive cases) were injecting drug and crack users, many of whom, as a result of federal and local crackdowns, drifted in and out of the jail and prison system. In 1991 some 295,000 arrests were made in New York City, 120,000 of which resulted in some period (days to years) of incarceration.

Most city inmates were incarcerated for only short periods while they awaited arraignment or trial, so the situation from a microbial point of view, between the densely crowded jail ecology and the general community, was quite fluid. On any given day, 26 percent of the female inmates and 16 percent of the males were HIV-positive, providing the microbes with an enormous pool of unusually vulnerable *Homo sapiens*.

Thus, what may have begun as isolated cases of MDR-TB among handfuls of scattered recalcitrant tuberculosis patients—men and women like Vernon—was amplified inside the city's jails into a full-scale epidemic.[165]

The social revolutions that would be necessary to reverse years of heroin and cocaine infiltration into the very fabric of the lives of hundreds of thousands of Americans staggered the imagination, as did the scale of what would be required to properly house all the homeless, employ the jobless, end the cycle of mass incarcerations, and stem all the other social tides that doomed most of America's urban poor to lives of tremendous microbial vulnerability. The public health community, overwhelmed by the social dimensions of the crisis, turned to Science and beseeched researchers to find simpler solutions in their laboratories.

Perhaps Thirdworldization of American cities couldn't be stopped; TB's reemergence might, however, be aborted with the proper magic bullets.

But the scientific community was woefully ill prepared to meet the challenge. Having long since switched most medical research priorities to chronic diseases, and only recently having developed an infrastructure for AIDS research, the NIH was caught with its pants down.

Impressed by the urgency of pleas for assistance emanating from both the public health community and a terrified HIV-positive population, National Institute for Allergy and Infectious Diseases (NIAID) director Dr. Anthony Fauci convened an emergency meeting on tuberculosis in Bethesda on February 10, 1992. All of America's leading tuberculosis experts were invited—all forty or fifty of them.

Looking around the sparsely attended room, Barry Bloom, a TB expert for WHO and researcher at the Albert Einstein School of Medicine in the Bronx, addressed Fauci directly, saying, "If I were you, I'd ask myself how there could possibly be scientific expertise in this country on tuberculosis if you're only handing out twenty-three research grants a year."

Acknowledging that total NIH expenditures on TB research had amounted to just $3.5 million a year, Fauci asked, "Yes, but if we throw $50 million at it next year would there be expertise, would we be able to seduce new investigators into this area of research on an urgent basis?"

Bloom sighed.

"It's true, we can't get rolling fast. There's a generation gap of people who know something about this disease," Bloom, himself in his fifties, said. "Essentially everything that is known about tuberculosis was figured out before 1948, when antibiotics came into use. And virtually all research stopped after that. Dead stop."[166]

The situation was no better overseas. Though TB claimed 3 million lives a year, newly infected 8 million people annually, and was the single largest cause of infectious disease deaths during the 1980s, it drew little scientific attention in the wealthy world. Until the U.S. MDR-TB epidemic began there was virtually no scientific interest in pursuing the developing world's big killer. The cries of years of neglect voiced at the NIAID meeting in 1992 were echoed in the halls of science in London, Tokyo, Paris, Geneva, Amsterdam, Stockholm, indeed worldwide.

Once money was thrown their way, scientists did succeed in 1992–94 in discovering the genetic basis of at least one type of *M. tuberculosis* antibiotic resistance,[167] identifying 500 genetically distinct tuberculosis strains in twenty-nine U.S. outbreaks occurring in 1991–92,[168] developing an ingenious way to "see" drug-resistant strains in the laboratory using the luciferase chemical found in fireflies to light up resistance genes,[169] and figuring out how the bacteria managed to hide inside CD4 cells of the immune system.[170]

But these were just first shots out of a scientific cannon that was in for a long siege. Everybody knew that. If the emerging MDR-TB epidemic was to be stopped, public health would have to use methods immediately at hand.

When U.S. and European experts cast their eyes about in search of successful tuberculosis control programs that had managed to prevent significant emergence of drug resistance, they were a bit embarrassed to see that the best efforts were carried out in the poorest nations.[171] In Tanzania, war-torn Nicaragua, the Zululand province of South Africa, China, even Mozambique in the midst of a civil war, tuberculosis was better managed than it was in the wealthy world.

Brudney and Dobkin compared the dismal 11 percent patient compliance rate they saw in Harlem Hospital with treatment successes in Nicaragua during the same period (late 1980s) and reached the startling conclusion that the tiny Central American country, with per capita incomes of less than $585 per year, had achieved a far better level of TB control than had New York. Using a basic strategy of finding active tuberculosis cases and putting the individuals on two months of carefully monitored daily medication (isoniazid, streptomycin, or thiacetazone), followed by ten months of lower-dose continued daily treatment, the Nicaraguan Ministry of Health achieved an almost 75 percent cure rate during a civil war. In contrast, New York's cure rate was below 50 percent.[172]

In Zululand, South Africa, between mid-1991 and the close of 1992, health care workers managed to successfully treat 83 percent of all tuberculosis patients, lost track of only 13 percent, and had a mere 7 percent mortality rate. This level of success was achieved despite a large local HIV epidemic and major tribal conflicts that often disrupted local social services. As had been the case in Nicaragua, the key to success was careful monitoring of patient medication.[173]

Tanzania and Mozambique employed similar methods of community-monitored medication to keep their incidences of tuberculosis down, and at very low cost. Before the East African nations were overwhelmed by HIV, their TB rates were extremely well controlled and treatment compliance exceeded 80 percent. As the HIV epidemics exploded, however, the incidence of TB also climbed. Still, both countries managed to prevent significant TB spread in the HIV-negative community.[174]

Harvard medical economist Christopher Murray did a cost-effectiveness analysis of the East African TB control efforts, and concluded that they made far more fiscal sense than any programs in the United States. He then teamed up with Karel Styblo, who had designed the East African programs, and Annik Rouillon of the International Union Against Tuberculosis and Lung Diseases to assess the success rates and costs of TB control programs all over the world. The team's conclusions, submitted to the World Bank in mid-1991, were striking.[175]

"There is no country in the developing world that has a treatment compliance rate as bad as New York City," Murray said. "New York has around 10 percent compliance. While India, which is very bad, has 25 percent compliance. China has 80 to 90 percent. Mozambique in a civil war attained 80 percent."

Treatment success rates of 80 percent or better were the norm in many of the world's poorest nations.[176] No nation's TB control system did a poorer job than did the United States in identifying tuberculosis cases,[177] successfully treating those cases, and keeping track of their outcome and possible contacts for spread of the disease.

In 1992, the CDC and the New York City Department of Health adopted what amounted to a Third World tuberculosis control strategy. Millions of dollars were spent to train nonprofessionals to work as Directly Observed Therapy (DOT)[178] officers, monitoring patient compliance with medication. When patients continued to refuse their treatments, incarceration in designated medical facilities was used as a last resort.[179]

The plan went into action too late to spare Dr. Frantz Medard from acquiring MDR-TB from one of his patients in Metropolitan Hospital in Harlem. Too late to prevent his suffering a year of undiagnosed illness followed by twenty-seven months of multidrug therapy that included injections of amikacin—"so painful that I used to cry," Medard said. But once he was cured, in late 1992 Medard eagerly jumped at the chance to run the Harlem Hospital DOT program. Within ten months he had cut the hospital's dismal noncompliance record, losing track of only 8 percent of his TB patients and getting 18 percent successfully through their entire medication program.

"We're still worse than most of the Third World," Medard said in late 1993, "but I'm determined. I tell the patients, 'Look, I went through it. So can you.' "