

The Sobering Geography of AIDS

The rate at which the epidemic is spreading in North America may be slowing, but it is poised to take off in Asia and Latin America, and Africa remains hard hit

WHENEVER MOLECULAR BIOLOGISTS ARE feeling cocky about the tremendous strides they have made in unraveling the mysteries of AIDS, Michael H. Merson has a way of bringing them down to earth. Merson is the director of the global program on AIDS for the World Health Organization (WHO), and when he showed up last month at a scientific meeting* with his frequently updated slide show depicting the devastating spread of AIDS around the world, his audience of some of the top AIDS researchers in the United States listened with rapt attention. True, biologists have come a long way in a short time, but as Merson's slides show, they will have to pick up the pace if they are going to help alter the course of the AIDS pandemic.

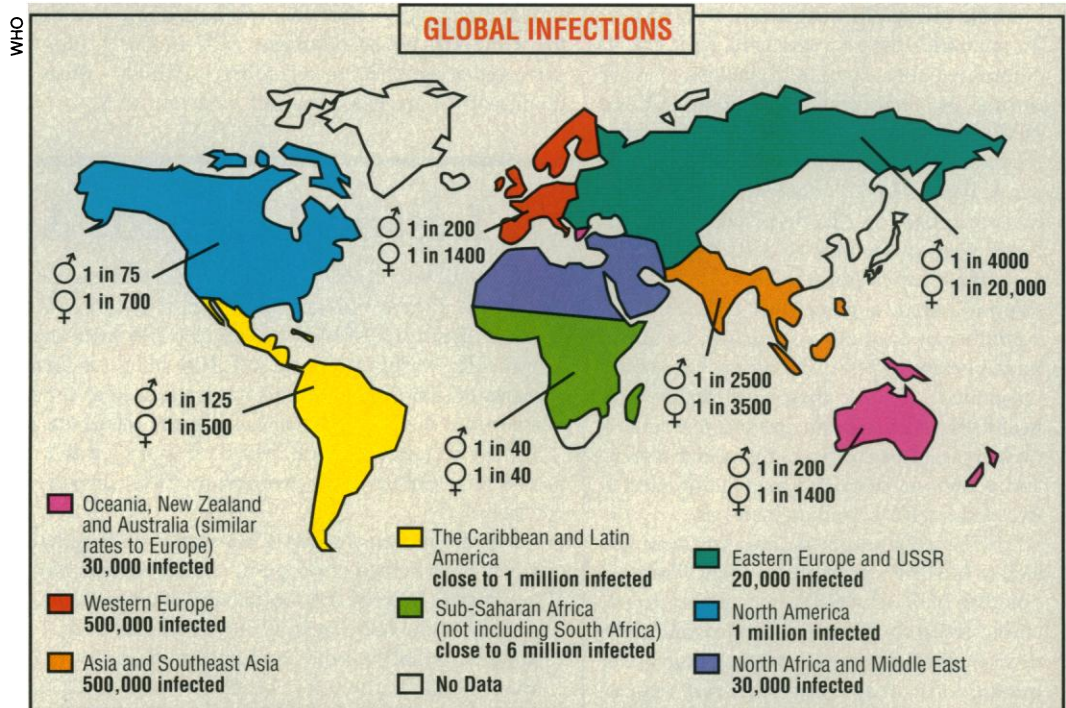
The official numbers are horrifying, and they tell only part of the story. To date, Merson's office at WHO headquarters in Geneva has recorded 340,000 cases of AIDS worldwide. But those are just the documented numbers: WHO officials know that some countries in the developing world are reporting only 5% to 10% of the actual number of AIDS cases. The true figure is closer to 1 million. And that's just for starters—another 8 to 10 million are estimated to have been infected by HIV. Until recently, it took scenes from sub-Saharan Africa, where WHO figures there are now more than 700,000 AIDS cases and another 6 million adults harboring the virus, to make front page news in the United States. Lately, though, health officials including Merson have begun to express alarm about new data from Asia and Latin America, where the population densities could quickly create an Africa-scale debacle. Indeed, if the virus takes hold in India, the experience in sub-Saharan Africa could pale by comparison. Which is why WHO officials, though bound by national sensitivities not to release infection rates for any individual country, are trumpeting the

alarm to the nations most at risk.

■ **Asia and Southeast Asia.** Although the number of AIDS cases in India, Thailand, and southern China is extremely small for the present, James Curran, director of the Division of HIV/AIDS at the Centers for Disease Control in Atlanta, calls estimates of the number of people infected with HIV there "very frightening." According to James Chin, Merson's deputy who tracks the AIDS numbers, there are now approximately 500,000 people infected with HIV in Asia and Southeast Asia—mostly in India and Thailand. Making matters worse, these countries have historically high rates of sexually transmitted diseases, which can accelerate the spread of AIDS.

difficulties getting comprehensive figures from India, there are clear warning signs that an epidemic is looming. In large cities such as Bombay and Madras, the virus is increasingly common among prostitutes, with some prevalence estimates as high as 20%. The fear, according to U.S. health officials who recently attended an AIDS meeting in Bombay, is that the virus will be transmitted to rural areas by migrant workers. Should this happen, it would completely overload Indian medical services.

■ **Latin America and the Caribbean.** Then there are the forgotten islands in the Western Hemisphere. Some of the highest rates of HIV infection in the world are now found in the Caribbean. In



Proliferating virus. Although sub-Saharan Africa still has the most infections, other regions appear to be catching up. Incidence by sex is for adults aged 15 to 49.

But even these WHO estimates may be conservative. Peter O. Way, chief of the health studies branch at the Center for International Research in the Bureau of the Census, has been collaborating with the Thai government on tracking the epidemic there. He says Thai health officials place the number of infections between 200,000 and 300,000 in their country alone. Despite

Haiti, one study found 1 in 10 pregnant women—not prostitutes, just ordinary citizens—infected with the AIDS virus. On a grander scale, the Pan American Health Organization, which gathers statistics for WHO in the Western Hemisphere, puts the number of people infected with the virus in all of Latin America at close to 1 million. Some may have felt relief that the rate of new infections in

*HIV Disease: Pathogenesis and Therapy. 13-17 March, Grenelle Conference Center, Grenelle, Florida.

North America has slowed—a conclusion CDC reached more than a year ago (*Science*, 22 December 1989, p. 1560)—but the rate of infection in the southern part of the hemisphere has continued its steep rise.

William Blattner, chief of the viral epidemiology branch at the National Cancer Institute, finds it especially worrisome that, despite what Blattner calls “very informed and appropriate” approaches to education and intervention, infection rates in countries like Jamaica and Trinidad are showing signs of shooting up after having been well below the average for the region. “It’s like any other intervention against a possible threat,” he says, “it’s not a threat that leads to sustained behavior change. One is faced with the reality to my mind that we can’t hold this problem in check with just prevention campaigns. There’s an urgent need for an effective vaccine, and we’re not there yet.”

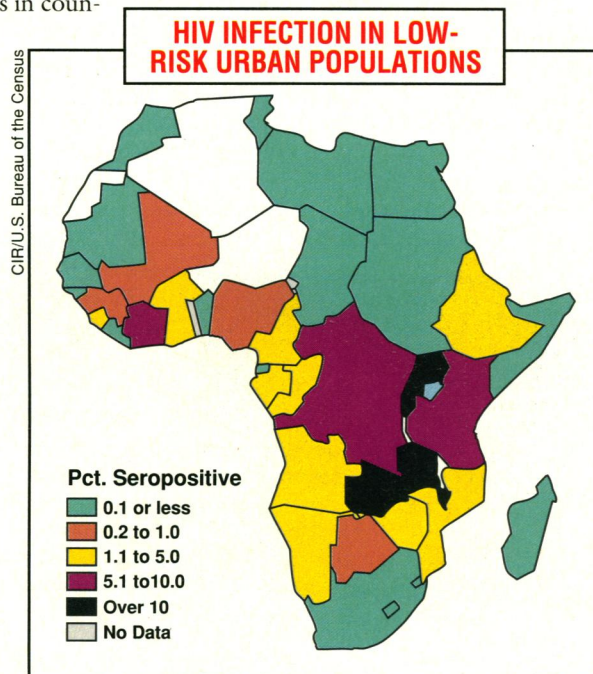
Not everyone is as discouraged about the possibility of behavioral approaches slowing the epidemic’s spread. Jeff Harris, AIDS coordinator for the U.S. Agency for International Development (AID), says the kind of behavioral interventions that could make a difference just haven’t been tried, even in the Caribbean.

Harris is encouraged by campaigns like the one in Kinshasa, Zaire, where condom use has now reached 8% to 10% of the adult male population—the kind of usage figures that models of the epidemic suggest will slow its spread. But he readily admits that the \$80 million AID will spend on prevention campaigns this year is only a drop in the bucket compared to what would be needed to have a major impact on the way HIV infection is spreading.

■ **Sub-Saharan Africa.** In Africa, AIDS has reached tragic proportions. WHO’s Merson says of the AIDS problem, “There is no other disease on the African continent with anywhere near this impact.” In addition to the nearly 6 million infected adults there are an estimated 500,000 infected infants. The social and cultural impact of the disease is staggering. Merson reckons as much as 15% to 20% of the workforce in Africa could die from AIDS, and there could be as many as 10 million orphans in the next decade.

And even these estimates may be low because AIDS deaths may be masked by another disease that is paralleling HIV infection rates: tuberculosis. “We have seen in

sub-Saharan Africa in general tuberculosis rates shooting up, starting around the mid-1980s,” says Chin. Nearly half of AIDS patients in Africa also have active tuberculosis infections, which can be the direct cause of death. This has caused a morbid statistical question: “You can’t kill a person twice,” says Chin. “That’s been the problem—whether to count this as a TB death or an HIV death with tuberculosis or a TB



Urban blight. *Even among city-dwellers not involved in high-risk behaviors, the prevalence of the AIDS virus in Eastern Africa is reaching alarming dimensions.*

death with HIV. My recommendation is we keep double books.”

Some of the most alarming numbers for Africa come from a computer model of the epidemic developed for the U.S. State Department’s interagency working group (IWG) on AIDS. Designed by a team from the Census Bureau, Los Alamos National Laboratory, and the University of Illinois, the model uses demographic, behavioral, and epidemiologic data to project infection rates in the future. Using this model, overall infection rates in urban areas could be as high as 16% by the year 2015, and infection rates could be as high as 40% for adults in their 30s. Expected population for the whole of sub-Saharan Africa by 2015 could be reduced by as much as 50 million by the AIDS epidemic, compared with estimates without AIDS.

Like all AIDS models, IWG’s rests on some risky assumptions. Population mobility, sexual activity, rates of sexually transmitted disease, prevalence of use of condoms, the prevalence of HIV infection in the population, and the likelihood of transmitting the infection from a single sexual con-

tact are all variables that are often not well known but can affect the accuracy of the model. “It’s a little bit like holding a fishing pole at the thin end,” says Way. “If you have a very new epidemic, or no epidemic like China, it would be like holding the fishing pole at the tip and trying to tell where the handle is going.” For Africa, Way says, researchers are still at the thin end of the pole, but now they have a better grip.

WHO makes no predictions about how infection rates will change. Chin says that with all the uncertainties about the way the virus is transmitted, predicting more than 5 years into the future is an extremely risky business. Still, the IWG AIDS model is serving a useful social function: it is providing a tool for countries that are interested in using it for making predictions about what intervention campaigns might work in slowing the epidemic. Last November, U.S. health officials and Ugandan scientists using the model created a scenario that convinced Ugandan President Yoweri Museveni to reverse his policy on condoms and start encouraging their use.

■ **The rest of the world.** There are a few shreds of good news in WHO’s numbers. So far the virus does not appear to have taken hold in any significant way in Eastern Europe, and the patterns of infection for North Africa and the Middle East also indicate that those areas should be relatively unaffected, for now. In Western Europe and the United States the epidemic seems to be spreading primarily in certain sub-populations. But even in developed countries the absolute numbers of AIDS cases will severely tax health care systems.

For the foreseeable future Merson will continue updating his slides and bringing his gloomy message to scientists and politicians. Today the critical problem is to alert health officials in Asia and Southeast Asia that a major epidemic is looming, but “it’s important not just for the Indians and the Thais and the Chinese to know this,” says CDC’s Curran. “It’s important for the whole world to know this.”

Just 3 years ago, WHO asked epidemiologists studying AIDS to make predictions about where the epidemic would be by the year 2000. These expert guesstimates, which WHO dubbed the Delphi projections, indicated that there would be 15 million to 20 million infected individuals by the end of this century. “The Delphi projections may be too conservative,” says Chin. “We think that the Delphi numbers may be reached by mid- to slightly after mid-1990s.” Whether or not Chin is right, there’s no arguing with Curran’s conclusion: “Things are going to get much, much worse before they get better.”

■ **JOSEPH PALCA**