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ABSTRACT

This paper describes why acquired immune deficiency syndrome (AIDS) is a global health problem and discusses special features of the virus and its infection. This disease's transmission and interaction with other diseases, along with 1986 statistics concerning AIDS, are presented in terms of selected continents and countries. The World Health Organization's (WHO) role in helping other countries develop their own educational materials and strategies for handling the disease are highlighted, along with this organization's efforts to provide technical and financial support to individual countries so that they are able to undertake national AIDS prevention programs. A question and answer section is included.

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AIDS: The Global Impact

Dr. Jonathan Mann
December 1986

Dr. Jonathan M. Mann is Director, Special Programme on AIDS, World Health Organization, Geneva. Before joining WHO, Dr. Mann was Director of Project AIDS in Zaire, a project jointly funded by CDC and NIH and the Governments of Belgium and Zaire. Dr. Mann served as state epidemiologist for the State of New Mexico from 1977 to 1984. He holds medical degrees from Washington University in St. Louis and an MPH from Harvard. This speech was given extemporaneously and has been edited to retain the flavor of spoken English. A short question-and answer period followed Dr. Mann's informal presentation.

I would like to explain today why we think AIDS is indeed a public health problem of paramount international importance. I will describe a little bit about the situation, the WHO strategy, and I would like to talk to you about the future.

THE DISEASE

There are some special features of this virus and its infection that deserve attention. It appears that people who are infected with this virus are infected for life. Of course, we do not know that that is absolutely true, and we will know only when a lifetime of experience with this virus is past. The range of disease expression is unknown. We know about AIDS, we know about the AIDS-Related Complex. We are learning about the neurological diseases that are clearly associated with AIDS virus infection, but we do not yet know to what extent neurological disease may dominate the picture of those infected with the virus. We also suspect, given the way this virus affects the immune system, that there will be other adverse consequences for people who are infected with this virus—consequences we have not yet identified. It simply may be too early in the course of the natural history of people infected with the virus to see these problems emerge. So we really do not yet know the full range of clinical expression with this virus.

We also do not yet know the natural history of infection, but what we know is extraordinarily serious and worrisome for the future. I say that because we expect to see in an infectious disease a certain risk period after exposure to a virus or to another pathogen, followed generally by a declining risk of clinical disease, perhaps to the point where real symbiosis has occurred, and no disease will result from infection. Polio, for example, occurs in 1 in 100 to 1 in 1,000 people infected with the virus. This is not at all the case with AIDS. What we have seen so far with AIDS is a rather unique situation in which the per year risk of developing AIDS among people who are infected with the virus appears to increase rather than decrease. That is, if you are infected with the AIDS virus, with Human Immune Deficiency Virus (HIV), your risk of developing AIDS in year 1 or year 2 of your infection appears to be lower than your risk of developing it during year 5 or year 6 or year 7 of your infection. There appears to be almost an *acceleration* of the rate at which people who are infected develop AIDS over time.

There are those who say that everyone who is infected with this virus will experience some serious adverse health consequences from that infection. We, of course, do not know whether that is true, and find it difficult to know what to say about this. We do not want to take away the hope of people who are infected when we do not know for certain, but speaking to a general audience, I think it is important to indicate that it may be that all of those who are infected will suffer a serious health consequence and perhaps within as short a period as 10 years after infection.

The involvement of this virus in the central nervous system has been only relatively recently described and is clearly one for major future questions. To what extent will we be facing an epidemic of neurological disease, particularly dementia, in 20- to 49-year-olds throughout the world? There have not been very many epidemics of dementia. There have been epidemics of serious neurological disease, but an epidemic of dementia affecting 20- to 49-year-olds not only would remove those people from the pool of productive people, but would impose on society and on health care systems obvious burdens that will have to be considered.

The phenomenon of healthy carriers is very important. As I mentioned before, we believe that people will be infected for life. We believe this because of the way the virus genome is integrated into

cells; and there is every reason to think that as those cells replicate themselves, they will replicate the virus and the virus will be able to live as long as the host. In this disease, people can be healthy carriers for long periods of time and can transmit the disease during that period. This makes disease control even more difficult.

TRANSMISSION

AIDS is transmitted sexually—whether homosexually or heterosexually—it is transmitted through blood, and it is transmitted mother to child. Sexual transmission transcends all national, racial, cultural, and geographic boundaries. It is a very good way for a disease to get around. AIDS also is perinatally transmitted, and that fact is extremely important. The combination of sexual and perinatal transmission allows us to identify a particular risk group, pregnant women—women of childbearing age, sexually active and pregnant. And because it is transmitted perinatally, the stage is set for a group of children to be infected from birth, children whose natural history is unknown, some of whom will develop AIDS, some of whom will not. We do not know precisely what will happen to them. If the child survives initially, AIDS infection will probably undermine other strategies aimed at protecting the child's health.

Transmission through blood is particularly troubling. Think of the practices that exist throughout the world that are capable of infecting people through the blood-borne routes, for example, the use of hypodermic needles for legitimate medical purposes and for abusive purposes, the reuse of needles. There are many opportunities for blood-borne transmissions to spread the virus, and they are ways which are often fully integrated into cultural practices that can be difficult to change. Other modes of transmission apparently do not exist. Nevertheless, we are keeping our eyes and ears open for the possibilities of other routes of transmission not yet detected. We cannot, just for the sake of clarity, close our eyes to other possibilities. I hasten to add, however, that thus far there is no evidence that other modes of transmission are occurring.

INTERACTION WITH OTHER DISEASES

The interaction of this virus with other diseases is extremely important. As we all know, this disease is different from other diseases because it creates an underlying immunodeficiency. And depending on a person's internal and external environments, this can contribute to other epidemics. The best known and best described so far is tuberculosis. In Africa, epidemics of tuberculosis are really epidemics of AIDS-associated tuberculosis. What is happening there is that people are infected with tubercle bacillus as children. Their bodies achieve a *modus vivendi* with the bacillus; but the bacillus is a virulent bacillus, and at the first evidence of immunodeficiency—it does not have to be very profound—the tubercle bacillus is capable of regaining a hold and causing clinical disease. And that is indeed what we see, and that has been seen in the United States where for the first time the steady decline in the incidence of tuberculosis has been reversed. The rate is now at least flat, if not increasing in some areas. And this is being seen in the developing world.

Now, we do not yet really know whether there also will be interactions with diseases such as malaria, trypanosomiasis, schistosomiasis, or others which obviously engage the immune system. But when there are diseases in the environment, and immunodeficiency is added, it is not really known what changes will occur—what will happen to the epidemiology of the endemic diseases of the developing world. Next year we expect, with the cooperation of the Tropical Disease Research Unit at

WHO (TDR Program), to have a meeting, probably in Africa, on the influence of HIV on the epidemiology of the TDR diseases which are *the* major parasitic diseases of the world.

There is, consequently, potential for trouble far beyond the effects on the health of the people who are infected and acquire AIDS. There is a potential for expression of other diseases and a potential for social destruction of an unprecedented nature.

THE NUMBERS

WHO collects statistics on AIDS. Countries tell us what they want to tell us, and then we repeat it, and if they do not want to tell us, they don't. I would like to tell you briefly what we know about AIDS this way, and then I would like to tell you about what we actually know.

There are roughly 36,000 reported cases of AIDS throughout the world, of which about 30,000 are from the Americas. The Americas includes mainly, but not exclusively, the United States. It also includes Canada and Mexico, Haiti, and the Caribbean region. It includes South America, particularly Brazil. From my viewpoint, Brazil is a very worrisome place, because there are nearly 1,000, reported cases of AIDS in Brazil, and we suspect there may be a problem of under-reporting. With a sexually transmitted disease in a culture where a certain amount of bisexual behavior is accepted or tolerated, there is potential for transmission of the virus to large segments of the heterosexual population. The Brazilians have expressed an interest in learning more about the epidemiology of AIDS in Africa because there may be relevance to their cultural situation.

Overall, the 36,000 reported cases come from 78 countries throughout the world representing all continents, and 78 is actually the important figure, not 36,000. That 78 countries are willing to report at least one case of AIDS to WHO (in other words, go public) means that 78 countries are willing at some level to engage constructively in dealing with AIDS.

There are about 3,700 cases of AIDS in Europe. AIDS in Europe is like AIDS in the United States. AIDS in Europe is mainly Western European AIDS. We really do not know how much AIDS there may or may not be in Eastern Europe, but it is unlikely to be nearly as important as Western European AIDS. There are 3,700 cases now, but in two to two and one-half years, we expect there will have been between 25,000 and 30,000 cases of AIDS in Europe.

Oceania does not yet know how much of an AIDS problem it does or does not have, though 350 to 370 cases were reported, all from Australia and New Zealand. We are very concerned about Oceania, partly because of the phenomenon of "sexual tourism." Sexual tourism is a global phenomenon—people travel to other places in the world to have sexual exposure or encounters with boys and girls, and men and women. And it crosses all racial and ethnic boundaries. There is a lot of sexual tourism. And AIDS is a sexually transmitted disease. So we are concerned about Oceania.

The big question for the future regarding AIDS is going to be what happens in Asia. Currently the virus is present in Asia. About 78 AIDS cases have been reported to WHO from some 11 countries, so there are not too many cases from any one country. Most of the cases have been linked epidemiologically to blood products or to male homosexuals or bisexuals, usually having contact with European or American male homosexuals and bisexuals. Serological surveys done in several countries found the virus is present, but at a very low level. It is present in the high-risk groups, male prostitutes and female prostitutes, and present, but not yet penetrating, into the general population.

The only barrier that we know a society can have to AIDS is monogamous sex with single partners over long periods of time, without prostitution and intravenous drug abuse. Basically, if those conditions are met, and blood transfusion service is good, a country should have a natural barrier to AIDS. If asked, most countries will report just that kind of society. It is going to be an interesting and difficult problem to get societies that do not believe they have problems of promiscuity, prostitution, and intravenous drug abuse to deal with: AIDS.

In Africa, 1,800 cases of AIDS have been reported, but let's not talk about what is reported, let's talk about what *is*. In Africa we know that the epidemic is quite widespread. We believe that at least 2.5 million Africans are now infected with the HIV virus. These cases are clustered in Central Africa, Eastern Africa, and part of Southern Africa. Western Africa is the focus of several different newly discovered viruses—we know of at least three—some of which cause a disease clinically identical to AIDS. And then we find what looks almost like mixing, where there are people infected with multiple viruses. We do not really know yet what is happening in Africa with the retroviruses, but we do know that the classical AIDS virus appears to have infected about 2.5 million people in Africa. We expect there will be between 200,000 and 600,000 cases of AIDS developing from these 2 million people in the next five years. That is assuming no additional transmission, and that is assuming that this number, which I think is low, is correct.

The dimensions of the problem in Africa are explained sometimes best through anecdote, but I would rather present some other examples of the extent of the problem. Perinatal transmission. Several studies in parts of Central, Eastern, and Southern Africa have found that approximately 10% of pregnant women are infected with the virus. This means that probably 5% of the children—in other words, half of the children born to those women—will be born infected with the AIDS virus. Other children will acquire the virus through injection, due to nonsterile equipment, and through blood transfusions. Blood transfusions are given most commonly to children and pregnant women in Africa. Blood transfusion in Africa requires the acceptance that roughly one out of 10 or 15 units of blood will transmit the virus.

Another way of looking at AIDS is to look at who this disease affects. It affects the 20- to 49-year-olds. Which has the greatest impact on development, to lose 20- to 49-year olds, to lose babies, or to lose people over 65? My own feeling, my guess, is that AIDS is a particular threat to development, as well as a threat to health in the more narrow context. When I was in Brazzaville, we were told that the Congo's only neurosurgeon had died of AIDS. Think about the investment that is made in a developing country to create a neurosurgeon.

A GLOBAL PROBLEM

The problem is international, and I would like to summarize briefly the global consensus that has been formulated within WHO. First, AIDS is an international health concern. It is critically important that this idea be assimilated. AIDS is not "somebody else's problem." We cannot say that anymore. We are about at the point where AIDS is present virtually throughout the world. I think people will gradually accept that it really does not matter where it came from, and it really does not matter if it was someone else that brought it in, because once it is in your population, you've got it. That kind of acceptance—getting beyond that first hurdle of where it came from and who to blame and the idea that it affects *other* people but not us—is important.

We believe that the global control effort must be long-term. The awareness of AIDS is, literally, evolving. AIDS came along fast. We would love for it to go away just as fast. But even if a vaccine is available to be tested in humans tomorrow, the disease will not go away tomorrow. We still will have people developing AIDS unless a way is found to stop that, and we still will have transmission. And I ask you, has the world ever had a vaccine delivery program that has been successful in delivering vaccine to *all* the people who need it? A lot of work has gone into delivering measles vaccine throughout the world, and the results in some cases are dynamizing and stimulating, and in other cases depressing. I think today in AIDS we can do better than in any other program, but I think it must be a long-term control effort. We might as well accept the fact that we are going to be dealing with AIDS for the rest of our professional lives and others will deal with it beyond.

HIV infection by itself is an adverse health outcome of profound personal, social, and public health importance. You know the implications here in the United States for an infected person—what that person must deal with, what that person's environment must deal with, what that person's society must deal with. Insurance companies do not want to insure the AIDS victim, certain groups like the State Department will terminate employment, and so on.

The victim must deal with sexual partners, with friends, and with the stigma. If you know AIDS patients or have cared for AIDS patients or had to deal with AIDS patients, it is a challenge to remind yourself that you will not catch this disease through casual contact. It worries you, and its going to continue to worry you.

And then think about the implications for the individual who is infected but asymptomatic. Studies in the United States have shown exactly what would be expected. The AIDS patient probably has a lower stress level than the HIV-infected asymptomatic person, because the AIDS victim has a valid social, personal, and medical diagnosis, even though it is fatal. Apparently that is easier to tolerate than the uncertainty of whether that little lesion or that little bump or that cough means the beginning of AIDS. And so these HIV-infected people are the majority and they have to live with the infection they have.

What about sexual partners? An interesting experience has taken place in Norway. It is not quotable as data. It is quotable as anecdote. Six couples, in which the males were hemophiliac and infected, were counseled regarding safer sex. On follow-up, of the six couples, two had given up sex completely (not what was recommended, but that is what they did), two were behaving as if AIDS did not exist; and two had adopted a safer sex method. The moral of this anecdote is to "keep working." People are going to respond to this disease in every possible way. We have heard stories of people committing suicide—undersustainable in a certain context, we have heard of societies which have ostracized people who have HIV infection.

HIV infection threatens the health gains which have been achieved in the developing world. For all the reasons mentioned before, the epidemic of HIV can literally undo all the progress that has been made in health in many areas of the developing world. Consequently, HIV control must be part of primary health care and must be seen in primary health care terms, because HIV control—AIDS control—must be long term and meaningful. It must be anchored in the context of primary health care.

There are many, many aspects of health care and health care delivery which many people have been working on for a long time. Creating awareness of a problem can be difficult. A very simple

example is hospital infection control. It has really been necessary to convince many, many hospitals that they have a problem with infection control. Until the studies were done, many people did not think that infections in hospitals were a big problem. Then it was documented, and people had to pay more attention.

Hospital infection control in the developing world is rudimentary in many areas, but because of AIDS, people are now paying attention to issues of sanitation in the hospitals. In the area of Africa I am familiar with, mothers now want their children injected with sterile needles and syringes. Before, mothers just wanted the shots for their kids. Now they have another demand. They want a shot with a clean needle.

And so you see exactly where we are. Very few areas of the developing world have adequate blood transfusion services, let alone quality or organized services. Because of AIDS, we will be seeing the development of national blood transfusion programs in the developing world, never before implemented despite the major incidences of Hepatitis B, syphilis, or malaria. (I would actually, in parentheses, encourage you to see AIDS not only as a major global threat which it is, but also, in terms of what could be done for public health, as, strangely, an opportunity.)

HIV infection represents an unprecedented challenge that will require unprecedented solutions. "Business as usual" will not work. This is first time, I think, in the history of public health when we have had the tools and the knowledge that a pandemic is occurring of a disease the proportions of AIDS. We have the tools to understand it. We do not have the vaccine and we do not have the treatment. We are documenting the progression of the epidemic worldwide, placing all public health people at a very special historic moment. It is the only time during our lives that we are likely to have the opportunity to make such a big impact on a problem—to influence the shape, if you will, of the epidemic curve, of the pandemic curve. What we do now will probably have more effect on what happens in that curve than things that are done in five or 10 years. And what we do not do will, and should be, held against us.

THE WHO STRATEGY

The WHO strategy is based on all the concepts mentioned thus far. The strategy has two basic components—what WHO can do for everybody and what WHO can do to help individual countries. I state it this way because it is striking how much of a need there is both by developed and developing countries for coordination and exchange of information and for certain kinds of activities that an organization such as WHO can perform that individual countries cannot.

Let me give an example. In the near future we are having a meeting, the first meeting that will have been held on vaccine field trials for humans. The reason there has never been a meeting about that is pretty simple. There is no vaccine. But for once we would like to see an international approach to the epidemiological, ethical, legal, and logistic thinking about vaccine field trials to determine the efficacy of a vaccine in humans, not to find out if they get lumps in their arms when you give them the shot, or whether they develop an antibody response (phase 1, phase 2) but field trials of efficacy. We want to see the pace of technology matched by the pace of international collaboration. In other words, we want to be ready. It has to be done in the international arena.

Studies are going to have to be done in the developing world, probably in Africa. Vaccine field trials probably will be necessary, and the issues here are too volatile and the stakes too high to leave

it to individual bilateral relationships. International coordination is required. When I say the stakes are high, I mean that if we do not conduct the vaccine trials correctly the first time, we will be doing an enormous disservice. When drug trials are not conducted correctly, confusion reigns forever and you can never figure out what really works.

There is another example of what we are doing. There is an LAV-II virus discovered in West Africa by the French, there is an HTLV-IV virus discovered in West Africa by the Americans. Unfortunately, the French group and American group are not sharing information. There's a real problem. How do we address that problem? Call people to a meeting, and ask them to share their information. So, in early February, we will be having a meeting that will allow the kind of information exchange that moves things along. Guidelines, prototype materials, prototype strategies. All these things are useful for everyone, and WHO is in a position to coordinate. Not to dictate. To coordinate, to bring together.

One more thing about exchange of information. We are a relatively information-rich society. Would you think that the African physician, the Asian physician or public health worker who hears about AZT has yet read anything scientific about AZT? Do you think they can read an article in *JAMA* that talks about the latest discovery of whatever? It would be almost a miracle if they got a copy of *JAMA*. It just does not happen that way.

So we are going to do the most aggressive job of information exchange on AIDS that I think has ever been done. We believe that it is important that people know and that the information—not just about science, but also about experience in prevention and control—be exchanged in a meaningful way. This will be a very big job. It must be active, it cannot be passive. We must find out what people need and get it to them; it will be expensive.

What do we do for countries? We help countries organize their own national AIDS prevention and control programs. Every country in the world now needs an AIDS prevention and control program, and that is just as true of China or Nepal, which has reported no cases of AIDS as it is of countries that already have major problems. The reason that every country needs a program and a strategy is that no country can consider itself immune to the introduction and transmission of the virus.

A specific, global strategy has been validated through meetings at the international, national, and regional levels. We have the generic components of a prevention strategy. Very briefly, the first component is formation of a national AIDS committee with the right kind of broad representation. This is not a health problem, this is a societal problem. Then, you have to find out where you are. How much AIDS do you have? How much infection do you have? If you look at the number of AIDS cases, you are looking at the wrong measure. You are looking at what was happening with transmission of the virus five years ago. You need to look at infection, not disease. You need to look, and that requires support.

You need to set up a surveillance system because your program has to be driven by data. You need laboratory capability. That is not a problem in the United States, but it is an important problem in the developing world. You need laboratory support at the appropriate level, with appropriate technology. You need education of health workers at all levels. And you need prevention programs, you need prevention of sexual transmission.

I really think that AIDS is going to make us or break us as far as education is concerned. This is the first time we have all our eggs in one basket, and that basket is education. It is not a matter of

education as a supplemental strategy, as a complementary approach, as an alternative. Education is all we have, and we must make it work. That will require making soft science as hard as it can be, and it will require as much clarity as possible, working as hard as we can, and being as creative as we can.

We cannot wait for the vaccine. The U.S. Public Health Service estimates that it will take five to seven years. There are those who wonder if a vaccine is even going to be possible. Possible, yes, but will it work? So, we cannot wait for treatment. For prevention of sexual transmission, education is our only tool, and it's got to work.

Where prevention of transmission by blood transfusions is concerned, we will need to put a lot of money into creating and maintaining blood transfusion services in developing countries. That is very expensive but it must be done. Currently, in Africa, roughly 10% of the HIV infections are caused by blood transfusions, and in Africa, transfusions are infecting particularly children and pregnant women of childbearing years. Safe transfusion services must be created, because a 10% risk or a 15% risk of contracting AIDS through a blood transfusion is unacceptable.

I know it will be difficult, but it will be done. We will need technological help, and technological development. We need the easy test, the simple test. It can be done. It is just a matter of whether we are willing to do it. The test must be simple, easy to perform. It must be highly sensitive without too much loss of specificity. It must be quick. It must be something you can leave out at room temperature. It must be a very good test in every way and it must be cheap. This is the ideal test. It can be developed. We already have three prototype tests. We have challenged the companies. We said we need this, the world needs this, and three companies have come forward with tests that we are evaluating. I do not know if any of them will be the answer, but with that kind of energy, if you can bring it together, these problems are solvable.

Now, when you talk about HIV transmission through injections, you're talking about a very complicated problem—how to make sure all injections are given with sterile equipment, how to make sure that circumcisions are given with sterile equipment. It is going to be difficult. Also, in societies where procreation is a major measure of value, perinatal transmission is particularly complicated because it deals with issues of interruption of pregnancy, or prevention of pregnancy.

Therefore, the solution will be a blend of technological needs and social needs, and the cutting edge is education. WHO will be helping countries by developing prototype strategies and materials for education and by providing countries with technical and financial resources to carry out their own national AIDS prevention program.

We will help countries develop their own materials or adapt the materials or strategies. Countries have an enormous reservoir of creativity and interest, and AIDS is on their agenda. Because it is on their agenda, we are answering their needs with resources and with technical assistance, and that is why we'll be able to help.

WHO projects that \$200 million will be needed next year, and \$1.5 billion a year by 1990 to conduct the WHO component of this global strategy. That does not include the bilateral monies that are needed, the nongovernmental monies that are needed, as well as all the other monies. It is a lot of money. If we are successful, it also will be the biggest program that WHO has ever had. It would be larger than smallpox in terms of financial resources needed, but also in terms of the urgency, the complexity, and the overall difficulty in carrying out the strategy.

I cannot say we will be successful, but we are not going to fail because we did not try. By laying out a strategy for global AIDS prevention to help over 100 countries to develop their national AIDS programs, and by providing the global coordination and, when appropriate, the global leadership, WHO will be assuming, in my opinion and in the opinion of the Director General of WHO, its appropriate role.

Now, it is estimated that in 1990, \$1.5 billion a year will be spent in the United States for drugs to treat AIDS patients. So \$1.5 billion is not a lot of money for a global pandemic. Think about it.

QUESTIONS AND ANSWERS

Q: Would you say a little more about infection by prostitutes and how the disease is transmitted?

A: The virus is present in cervical and vaginal secretions. The virus is also present in lymphocytes, and that is why the virus can be found in the cervical and vaginal secretions of infected women who are not menstruating and who do not have vaginal lesions. But, if you add a vaginal lesion, a vaginal ulcer, a cervical ulcer, then you have the natural collection of inflammatory cells, some of which are lymphocytes, and some of which can contain the virus. The other major route may be through the urethra. The urethra of the male is exposed to the bacterial and microbiologic environment of the vagina. If the male has a penile lesion, that could obviously increase the likelihood of exposure, but exposure can occur as exposure occurs with gonorrhea without a penile lesion. Whether this is precisely what happens, we do not yet know, but the route of transmission—that it is transmitted from women to men through sexual intercourse—is clear.

Does kissing play a role? It may, but it is unlikely to play much of a role. Studies of prostitutes in Central Africa have shown that prostitutes' kissing behavior seems unrelated to their infection status. That is important because some prostitutes in Africa do not kiss at all. You can actually compare those that do not kiss at all with those who kiss a lot. I think transmission is genital; I do not think it is due to exchange of saliva. I wish I could say more about the role of prostitutes. I wish I could answer that question better. There is an impression that prostitutes play an important amplifying role in transmission. I can tell you that in Kinshasa, 27% of the prostitutes were infected, but only 6 to 8% of the general adult population was infected.

Q: Could it be that it's easier for women to contract and transmit this disease?

A: Sure. The point about prostitution is an important one. The issue of differential rates of transmission has not yet been clarified. But it is interesting that everybody seems to want to believe that transmission is less efficient from women to men than from men to women. I mean, there is a certain sort of fantasy world that operates. It is true that most sexually transmitted diseases do work that way. But nevertheless, it's curious.

- Q:** That could make a major difference in how you educate, what you teach people.
- A:** The facts are critical. In the absence of facts, it is interesting the way the question generally is posed. What we are trying to do is get some epidemiological modeling in some African countries in order to look at the role of prostitutes. Try to define that more clearly. How much of an amplification role do they play? We don't know.
- Q:** Some people believe the African continent is taking more than its share of blame for AIDS, and also maybe some islands in the Caribbean, like Haiti. You mentioned certain areas in Africa. What about incidence rates in other parts of the continent—sub-Saharan Africa and elsewhere? Also, why would you suggest that the vaccination trials take place in Africa?
- A:** With regard to stigmatization, nobody has asked in recent memory where measles came from. But the origin of AIDS has been the subject of extraordinary interest in the international community. Part of that is due to the fact that it is new. And that's understandable. It is a little bit analogous to hearing that somebody you did not know very well died, and asking, of what? Does it matter? But somehow it is the question to ask. There is sort of a reflex there. Where did it come from seems to be the important question to ask. And I think that Africa and Haiti have both been unfairly stigmatized. The data does not exist for us to yet know where the virus originated. As to countries in sub-Saharan Africa reporting AIDS cases; if you look at official reports (we have official reports from only 11 countries) but if you look at the exchange of information such as occurred at Brazzaville in November, 37 African countries met and talked openly with each other about AIDS. Virtually all the countries in sub-Saharan Africa have AIDS cases.

The issue of where the vaccine should be tested is strictly an epidemiological question. Where can you identify a group of people who are exposed at a sufficient rate, or are sufficiently likely to develop the disease over a sufficiently short period of time, despite your educational intervention—because you don't just let people go on and get exposed just to be part of a vaccine trial. In concert with educational strategies, where are you going to have populations that are likely enough to be exposed that when you vaccinate some of them with the vaccine and some of them with something that isn't a vaccine, a placebo, you'll actually be able to measure a response in a reasonable period of time. And there are vital legal and ethical issues, because wherever this is done, it must be done according to the same legal and ethical standards as anywhere else. The female prostitute population presents one possibility. In some parts of Central Africa, the incidence rate—the number of people who, at the beginning of the year are negative and at the end of the year are positive, in terms of being infected with AIDS virus—exceeds 50% a year. For some women entering the prostitute population, there is at least a 50% chance that by the end of the year they will be infected.

Consider if, in the United States, you took male homosexuals who have just declared themselves to be homosexuals and, therefore, have not had homosexual experiences in the past—what is the rate per year now of their being infected? Before control, before education started, that rate was up to 20% a year in that group. It is now clearly less than 10% and maybe even less than 5%. So in a sense, it may be difficult to find a group in the United States or Europe that has a sufficient exposure risk. We need to identify, as a world, the

appropriate places, under global and open observation and supervision, to conduct the kind of field trial that will answer the world's most important question about vaccine when that vaccine becomes available—"will it work?" That's what we want to know.

- Q:** You are almost implying that if education programs are successful, really applied in a rigorous way across the board, it won't be possible to test the vaccine.
- A:** Well, it all depends. It depends when a vaccine becomes available. If a vaccine becomes available in the next couple of years, there certainly will be no difficulty, we'll be able to find groups to do it. But wouldn't that be nice if we didn't need a vaccine. I think that's a little unlikely. I suspect that it will not reach the point where insufficient transmission is occurring to prevent vaccine tests, unfortunately.
- Q:** What about the routes of transmission among the homosexual population of the United States and the African heterosexual population. Is there anything in common or is there not?
- A:** I think that's a real important question. My own view is that as we become more mature, and I mean by that, 10 years from now or whatever, look back at this epidemic, we are going to spend a lot less time talking about anal sex and a lot more time just talking about sex with infected people. I think it is much more important. That is the issue, I think—sexual intercourse with infected people. And what we know from prostitute studies in Africa is that you do not need anal sex to transmit this disease and anal sex does not come close to explaining what is going on in Africa. Nor does oral sex, or any other specific sexual practice. The measure that seems to matter most is the number of sexual partners. Now that is not to say that there are not sexual practices that might not be more efficient in transmitting the virus than others. It is a little less clear-cut than I thought it was two to three years ago when I accepted that anal intercourse was the issue. When we look for anal intercourse in Zaire—and we talked with a lot of people and we did the kind of studies that allowed us to have relative confidence that we were getting answers that were meaningful—it occurs. Yes, of course, there is anal intercourse in Zaire. But anal intercourse does not explain what is going on. I am beginning to believe now that people seem to want to identify a "bizarre" sexual practice to explain it all away. I think that is just not possible. I think it mainly boils down to the question of numbers of sexual partners or frequency of intercourse with infected people.
- Q:** Do you know if there is any sexual practice among the heterosexual populations in Africa that causes lesions, for example, that would permit the same kind of blood transfer that occurs in homosexuals? Maybe not anal intercourse, but something else? Is that possible?
- A:** I think that is possible. With AIDS, the intercourse that caused infection could have occurred three months, four months, six months, a year, two years before the time that you identified the infected person. And so it is difficult to identify those practices. We have looked at some of those things, and actually have some data from Zaire in a study in Kinshasa that suggest that when women insert various products into their vagina on a regular basis, products that could interfere with the normal integrity of the vaginal mucosa, they may be at increased risk.

Now the reason I hesitate to make too much of this is that it was the first study to look at this issue and we are waiting for other studies. You cannot make too much of any one study, but we did find this to be true. In other words, those prostitutes who used internal menstrual care products, who douched with various products designed to prevent sexually transmitted disease, who put astringents into the vagina, for example, were more likely to be infected. Taking into account at the same time the numbers of partners, sexual practices, etc., they were more likely to be infected than the ones who did not do those things. So we may be onto something. At our current level of knowledge we can only hypothesize.

Q: Are any data beginning to accumulate on the issue of differing responses to initial exposure to the AIDS virus such as are sometimes found with other infections—data on things like psychological variables that could affect risk of infection after exposure?

A: You realize how hard it is to study that. I mean, it really is an important methodologic problem because you have this long latency period, and even if you just look at the first appearance of antibody—antibody is not going to appear before several weeks at a minimum after the initial exposure. In that kind of a context, you've really got a tough epidemiologic nut to crack. Given current methodology, it's hard to study this problem.

Q: Can you project what percentage of child mortality may be caused by AIDS in Africa over the next five to 10 years?

A: I have not actually done that projection yet, but it gives me the excuse to give you our global estimates, which I have forgotten to do. We estimate five to ten million infected people in the world today. Using the figures of what happens to people who are infected, we would therefore predict that there would be half a million to three million new cases of AIDS worldwide during the next five years, assuming no transmission beyond the pool of people already infected. We've "guesstimated", and this is a real guesstimate, that there may be 50 to 100 million infected people in the world in five years. And it all depends on what happens in Asia. If AIDS really enters the Indian subcontinent, this number would be too small. If AIDS extends itself widely in South America, this number could be too small, and we don't know how it will move in Africa.

So, these are the kinds of numbers we're looking at, and each one of these HIV-infected people must be thought of as the center of a rather large ring in which the ramifications of their infection spread wider and wider in this society. Look at all that has happened in the United States and Europe. In the United States, over 28,000, maybe 29,000 by now, cases of AIDS have occurred. The Public Health Service has estimated that within five years there will have been 270,000 cases of AIDS in the United States, involving an annual direct medical cost of \$8.16 billion in the United States. When you think about that, you're back in touch with the dimensions.

We really must confront directly the issue of denial. I think we would all like to think that we are enlightened about this, and indeed somewhere in this audience there are the people who wrote the *Population Reports*, Series L, No. 6, "AIDS—A Public Health Crisis," which is fabulous. Thank you, you've done us all a tremendous service. I distribute more copies of that

document than probably anything else. It is a wonderful summary of what is known, at least what was known then. (You cannot be up-to-date in a summary article on AIDS.) So, we read those articles, we know that information, and then we may quietly sink back into a little bit of complacency. Complacency that we know what is happening, we are on top of it, that we know what is going on.

I think the problem in society is that we are indeed facing a potential disaster. And there's a classic disaster psychology that includes a great deal of denial and a great deal of anger. Every country in the world, at least every country that I have visited and all those that I know about, is at some point or another in the evolution from initial denial to some recognition of reality that leads to action.

We must continue that effort to move our own society, whatever our own society is, further toward closing the gap between reality and what the public wants to hear, what our politicians want to say or want to believe. We have to force them to look at what *is* and what you can reasonably expect. In Australia, which has one of the best national AIDS programs in the world, they had, as of a few months ago, a small number of hospice beds, and they were going to enlarge that number a bit. When we look at the number of cases that they know they will have in Australia during the next few years, somebody is kidding somebody. The same thing is true in the United States and throughout the world.

I have two pleas. The first is to continue and not to be complacent. Try to understand, help us all understand, what is happening and what is likely to happen, and help keep the public and help keep our institutions at the point where they see what is happening and not what they would like to have happen or blaming it on somebody else or diffusing the debate away from the issues that are important into issues that are not constructive to the social discussion about AIDS. The other plea is one that I am getting very used to giving because WHO, in its global strategy, really needs two things. I am not going to talk to you about money. It is people I want to talk to you about, because the real bottleneck, the real difference between successfully carrying out the WHO global strategy in the next few years and not being successful is going to be a matter of people, not of money.

I say that because I firmly believe that the money will be found. It may not be \$1.5 billion a year or maybe it will be more, and we are going to try to tap not only the traditional donors to WHO, but the foundations, maybe even the general public. World AIDS is a cause to which we believe a lot of people will respond. The problem is not money, the problem is people. Good people who are devoted to a particular effort and who have something to contribute are not common; in fact, they are unusual. Finding people who have something to contribute to a program like this can be the real difference between success and something much less than success. Individuals can make a difference.

So I would like to issue a plea that you think about yourselves and that you think about people that you know who might be willing to put a year or two into what I honestly think could be the most challenging and exciting contribution to international health that any of us will have the opportunity to make.

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