

Workshop on the Status and Trends of the HIV/AIDS Epidemics in Africa: Final Report

This Final Report from the IX International Conference on AIDS and STD in Africa pre-conference workshop describes conclusions reached through consensus. Cosponsored by AIDSCAP/FHI and the François-Xavier Bagnoud Center for Health and Human Rights of the Harvard School of Public Health and held on December 8-9, 1995, in Kampala, Uganda, the workshop's final report is coauthored by its participants, including epidemiologists, demographers, economists, public health experts and other international development specialists on Africa.

Cosponsored by the AIDS Control and Prevention (AIDSCAP) Project of Family Health International and the François-Xavier Bagnoud Center for Health and Human Rights of the Harvard School of Public Health

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Background

On December 8-9, 1995, the AIDS Control and Prevention (AIDSCAP) Project of

Family Health International and the François-Xavier Bagnoud Center for Health and Human Rights of the Harvard School of Public Health cosponsored a workshop in Kampala, Uganda, entitled the "Status and Trends of HIV/AIDS Epidemics in Africa," co-chaired by Dr. Peter Lamptey of AIDSCAP and Dr. Daniel Tarantola of Harvard.

The pre-conference workshop, held on site for the two days preceding the IXth International Conference on AIDS & STD in Africa from December 10-14, 1995 in Kampala, brought together some 30 epidemiologists, demographers, economists, public health and international development experts from Africa, Europe and North America to:

- Review the current state of knowledge on the status and trends of the HIV/AIDS epidemics in Africa;
- Recognize various epidemiological patterns among the HIV/AIDS epidemics affecting different populations and geographic areas in Africa;
- Examine available data from areas where the epidemics have matured and, on the basis of this knowledge, forecast possible trends for the epidemics in other parts of Africa and on the continent as a whole;
- Identify specific data needs for the monitoring and forecasting of the HIV/AIDS epidemics in Africa;
- Produce a summary of discussion to be made available to public health practitioners, the media and other interested audiences at/around the Kampala conference.

This final report was approved in draft form by the workshop's participants and distributed to media and other interested parties during the Kampala conference. A list of those who participated in the workshop is on the last page of this report.

Highlights

- While remarkable efforts are being made throughout Africa to minimize the spread of HIV and reduce its impact, the HIV/AIDS pandemic in Africa continues to spread relentlessly. It remains powerful and dynamic and is now composed of epidemics that evolve with changing speed over time in different populations.
- By the end of 1994, 11 million adults were living with HIV in Africa, representing 65 percent of the world total. The major impact of HIV/AIDS epidemics in Africa is yet to come.
- Nineteen countries, each with more than 100,000 people living with HIV/AIDS, account for about 90 percent of all current HIV infections in adolescents and adults in Africa. Seven countries are in central/eastern Africa (accounting for 37 percent of all current adult HIV infections in adults in Africa); seven countries are in southern Africa (accounting for another 37 percent of all current HIV infections in Africa); and five countries are in western Africa (contributing an additional 15 percent to the regional total).
- Demographic surveys in several countries have noted significant increases in infant and child mortality and major increases in adult mortality, with resulting significant reductions in life expectancy.
- Data from surveillance systems and studies in sub-Saharan Africa demonstrate that the HIV/AIDS epidemics are taking an increasing toll on young people, especially young women. The HIV/AIDS epidemics in Africa have become the epidemics of the young.

- Throughout Africa, the differences between urban and rural infection rates are narrowing, sometimes rapidly.
- Hope that the rate of new infections may have decreased comes from studies of the epidemic in Uganda, a country with one of the older epidemics in Africa.
- If these decreases result, at least partly, from behavior modification, it may mean that methods to reduce HIV incidence substantially are within the technical capacity of many countries in sub-Saharan Africa. However, apparent stabilization may also be due in part to saturation of older age groups and other epidemiological and population structure factors.
- Noting that new infections are still occurring at high rates in young people, these reductions in HIV prevalence should provide additional motivation for enhancing prevention efforts, particularly at a time when such hopeful signs appear on the horizon.
- Economic hardship and employment opportunities, open conflicts, environmental degradation, natural disasters and low-intensity wars lead to displacement and migration of millions of people in Africa. Away from their usual place of residence, people may turn to survival strategies that can lead to an increased practice of unsafe sex. Mobility, which facilitates the spread of STDs, including HIV, calls for enhanced surveillance and prevention programs that address the specific needs of these mobile populations.
- Surveillance of HIV prevalence in sentinel populations (sites selected for the collection of HIV information from carefully defined populations) is fundamental to monitoring the HIV epidemic within geographic areas and guiding policy and programs. AIDS cases and mortality surveillance, by age and sex, are also of great importance.

The Status and Trends of the HIV/AIDS Epidemics in Africa

While remarkable efforts are being made throughout Africa to minimize the spread of HIV and reduce its impacts on individuals, families, communities and nations, the HIV/AIDS pandemic in Africa continues to thrive relentlessly. It remains powerful and dynamic. It is composed of epidemics that evolve with changing speed in different populations, moving gradually from the silent, emerging stage still observed in north African and Indian Ocean countries to maturity and severity, as seen in several central/eastern African countries.

By the end of 1994, 11 million adults were living with HIV in Africa, representing 65 percent of the world total. As of June 1995, 418,000 AIDS cases had been reported to the World Health Organization by African countries, but these represent only a fraction of the cases that have actually occurred. Thus, this figure projects only a modest image of the heavy toll the epidemics are taking on people's health, on their social and economic well-being and on their lives. The number of people who have died from AIDS thus far in Africa represents less than one-third of the deaths expected to occur among people who, today, are infected with HIV.

The major impact of the pandemic on the African population is yet to come. Although the constantly growing HIV/AIDS care needs have already overwhelmed the coping capacity of urban health systems in hard-hit countries, demands for care will fall increasingly on poorly equipped and underfunded rural services, households and individuals. Already, 80 percent of hospital beds in an infectious disease hospital in Abidjan, Côte d'Ivoire, and 50 percent in a hospital in Kampala, Uganda, are occupied by people with HIV. The purpose of this document is to summarize the current state of knowledge of the status and trends of HIV/AIDS epidemics in Africa

so as to provide national and international policy makers, program managers and the public at large with the information they need to fulfill their responsibilities in the face of one of the most severe human crises of our time.

From Silent to Mature Epidemics

From the emerging, silent stage to maturity, the HIV epidemics have evolved with a speed that differs among countries and among population groups within geopolitical boundaries.

HIV/AIDS epidemics are still in their emerging stage in north Africa and in Indian Ocean island countries, accounting for less than 2 percent of all people living with HIV in Africa. There, the proportion of women attending urban antenatal clinics, testing positive for HIV, remains below one per thousand. The prevalent modes of HIV transmission are similar to those observed in western Europe, with HIV infection acquired through homosexual contacts and injecting drug use, combined with a slow but steady rise in heterosexual transmission. The large numbers of sexually transmitted diseases (STDs) in many of these countries give a measure of the potential for the future growth of the currently silent HIV epidemics.

In contrast, HIV epidemics have become severe in Kenya, Malawi, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe and, more recently, Botswana. In these countries, transmission of HIV occurs mainly through heterosexual contact, beginning in the early teen years and peaking before age 25. More than 10 percent of women attending antenatal clinics surveyed in urban areas are found to be HIV-infected, with rates that may exceed 30 percent in some surveillance sites. These high rates are associated with growing numbers of HIV-infected newborns. In other countries on the continent, HIV epidemics follow a similar transmission pattern but are currently passing through their intermediate stage: between 1 and 10 percent of women attending urban antenatal clinics are HIV-infected.

The rate of HIV infection in sexually active adults continues to rise. Under circumstances that are not yet fully understood, epidemics may suddenly explode with rates of infection increasing severalfold within only a few years, as has been observed recently in Botswana and South Africa. It is clear that population mobility, patterns of sexual behavior, and societal factors influence the potential for such explosions.

Three broadly defined geographic areas, which include countries with severe epidemics and others with epidemics at their intermediate stages, account for almost 90 per cent of all current HIV infections in adults and adolescents in Africa. Within these three areas, 19 countries have at least 100,000 people living with HIV. In central/eastern Africa, Cameroon, Ethiopia, Kenya, Rwanda, Sudan, Uganda and Zaire have 37 percent of all current HIV infections on the continent. A similar proportion is contributed by a second group of countries in southern Africa: Botswana, Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe. Finally, west African countries, including Burkina Faso, Côte d'Ivoire, Ghana, Nigeria and Togo, contribute about 15 percent to the total number of adults and adolescents living with HIV in Africa. These epidemics share a number of characteristics:

- Within each country, HIV epidemics have progressed with different speed in various population groups. Early in the evolution of the epidemics, urban

populations and rural communities located along highways have been more rapidly affected. Among them, young adults with multiple sexual partners have high rates of infection. Rates as high as 80 percent are found among sex workers surveyed in Nairobi and Abidjan.

- As epidemics evolve, they tend to affect younger people with increasing severity, especially young women who acquire infection from older men, and women who assumed they were in a monogamous relationship but have become infected by their spouse or regular partner.
- Over 90 percent of all HIV-infected infants in the world are born in Africa. These children will develop AIDS and die within a few years.
- Demographic surveys in several countries have already noted significant increases in infant and child mortality. Projections for Zambia and Zimbabwe indicate that AIDS may increase child mortality rates nearly threefold by the year 2010. Other estimates point to a more modest impact. In either case, due to high levels of fertility, populations will generally continue to grow but critical deficits will occur in the economically active ages.
- Studies in areas where 8 percent of the adult population is HIV-infected have measured a doubling of mortality due to HIV and a decrease of 5 years in life expectancy.
- The HIV epidemics will have severe effects on the population age structure, indenting the population pyramid in young adults, the main contributors to social and economic development.

The HIV Epidemics of the Young

Data obtained from surveillance systems and studies in sub-Saharan Africa demonstrate that HIV/AIDS epidemics are taking an increasing toll on young people, particularly young women.

- The rates of newly acquired HIV infections are highest in the 15-29 age group among both females and males.
- The peak of new infections occurs five to ten years earlier in young women than in young men.
- Most of the infections in 15- to 19-year-olds are in females. In Masaka, Uganda, for example, HIV prevalence in 13- to 19-year-old females is over 20 times higher than in males of the same age. Apart from possible biological factors, there are at least two reasons for the disproportionate risk of young women of acquiring HIV infection early, including: (1) an earlier age of sexual debut for girls, (in Masaka, the median age at first sexual intercourse is 15 for females and 17 for males); and (2) the patterns of sexual mixing, where young women tend to have sex with older men in the context of marriage or in exchange for money or advantages, whereas young men tend to have sex with young women.
- The high rates of HIV infection in young women and men under 20 years of age (even under 15) call for strong prevention programs in youth and children, prior to--not only after--the onset of sexual activity.
- Even though more HIV infections are found in young women than in young men, women and men are equally likely to acquire HIV infection in their lifetime. When all age groups are considered, as many women as men are HIV-infected, which gives a sex ratio of approximately one woman for one man in the HIV-infected adult population. In Africa, the sex ratio can, however, vary considerably with the stage of progression of some of the epidemics. In Abidjan, for example, the sex ratio of reported AIDS cases changed from 4.8

men for every woman in 1988 to a ratio of 1.9:1 in 1993. The sex ratio of the general population in this city-greatly influenced by migration-combined with sexual mixing patterns, accounts for the initial disparity which, as the epidemic matured, moved gradually toward a more balanced ratio.

- For many women, the major risk factor for HIV is the behavior of their spouses or regular sexual partners. Women in monogamous relationships cannot protect themselves against HIV infection if their spouses are not similarly monogamous. This highlights the need for enhancing prevention programs targeted at adult men and for developing effective and safe female-controlled HIV prevention methods such as microbicides.

Continued Spread in Urban Areas and Rising Infection Rates in Rural Areas

Urban centers generally have substantially higher prevalence of HIV infection than rural areas. This pattern is by no means universal: population displacement, armed conflicts, proximity to highways or intense migration and population mobility for economic reasons strongly influence the spread of HIV. As a result of a combination of these factors, some rural communities in Kenya, Tanzania and Uganda have higher infection rates in neighboring urban populations. In countries where HIV epidemics were initially the attribute of urban areas, rates of HIV infection in rural populations have increased steadily over recent years.

Variations in rates of HIV infection have also been documented within rural areas themselves. In largely rural Rakai District, Uganda, rates of infection are higher in trading centers along the highway than in trading communities on secondary roads, where, in turn, rates are higher than in rural agrarian populations. A similar pattern has been observed in Mwanza, Tanzania.

- The differential between levels of HIV infection in urban populations and in rural population is narrowing, sometimes rapidly.
- Two out of every three Africans live in rural areas. Thus, although the rate of infection is still lower in most rural populations than in neighboring urban populations, the absolute numbers of HIV-infected persons in rural areas may be expected to equal or surpass the number in urban areas. This projected trend demands renewed attention and resource allocation to rural prevention programs and health care systems, including home-based approaches.
- The soaring growth of the population of major urban centers through internal migration and the sex imbalance within migrant populations have played a key role in increasing the vulnerability of city dwellers and migrants to HIV/AIDS. As the process of urbanization continues through the next century, both the spread of HIV and the unmet demand for care in urban areas will rise further. Unless the response to HIV/AIDS is considerably enhanced and integrated in broader health, social and economic development policies, the effort to control the epidemics and mitigate their impact will not be successful.

Recent Trends in HIV Prevalence

Surveillance data show regional variations in patterns of HIV prevalence (proportion of people infected with HIV at a particular time), with respect to the timing and the magnitude of HIV spread.

- Reasons for varying levels of HIV prevalence in different populations are not well understood but are likely to be related to a combination of different sexual mixing patterns, timing of virus introduction and the presence of other

facilitating factors such as STDs.

- A common feature of the HIV epidemics is the rapidity of the spread, once the virus finds a foothold in a vulnerable population.
- Explosive increases in new infections, as measured in rapidly rising levels of infection over a short period of time, appear to be a predictable pattern of HIV spread for many areas in sub-Saharan Africa. For example, the geographical extension of the epidemics from eastern and central Africa to southern Africa and west Africa during the 1980s and early 1990s resulted in infection levels of 40 to 60 percent in such high-risk behavior populations as STD clinic attendees. This has been followed by increases of HIV infection among antenatal clinic attendees to levels of 15 to 30 percent.
- The epidemics have recently expanded in Botswana, Lesotho, South Africa and Swaziland, with patterns of spread similar to those observed in nearby Malawi, Zambia and Zimbabwe.
- A few countries in west and central Africa still have relatively low levels of HIV prevalence, but these have begun to rise in such countries as Cameroon and Nigeria, which earlier had been somewhat spared.
- Although the apparent slow growth of HIV epidemics in areas where low prevalence of HIV infection persists has been credited to social and cultural factors influencing sexual behavior, it may merely reflect a delay in the seeding of the virus.
- The manner in which HIV spreads in a community is now better understood. Explosive growth in new infections occurs over a relatively brief period, with a natural falloff in new infections. This is referred to as "saturation," which is the stage reached when most of the people at highest risk of acquiring infection have already been infected. This period is then followed by a concentration of infections in younger age groups, as young people move into ages of increased sexual activity. Thus, the risk of new infections shifts rapidly to youth.
- While stabilization of infection levels has been observed in an increasing number of mature epidemics, it is important to appreciate that such stabilization can occur as a natural result of a dynamic balance between new infections and deaths. New infections in populations may be balanced, or offset, by deaths occurring in people already infected. An underlying high incidence of HIV infection in younger age groups may therefore be masked by high numbers of deaths removing people who have died of AIDS or with HIV infection from the sample population. To conclude from stabilizing or even declining prevalence rates either that the epidemic will wane by itself in the absence of prevention, or that prevention efforts are no longer necessary, would have tragic consequences for future generations.
- Nevertheless, hope that the number of new infections occurring may have decreased comes from studies of the epidemic in Uganda, a country with one of the older epidemics in Africa. A study of recent trends in HIV infection in women attending several antenatal clinics in Uganda reveals significant declines in HIV prevalence. Analyses of HIV infection levels by age over time found a consistent decline in levels of infection among the younger age group (aged 15 to 19), when levels in the early 1990s were compared to levels in late 1994 and in 1995. Since infection levels (prevalence) in this young age group reflect more recent patterns in new infections (incidence), these data suggest a substantial reduction in the incidence of HIV infection in young people over time.
- Modeling of HIV incidence scenarios to study such findings in 15- to 19-year-olds supports these findings. Similar declines in HIV prevalence in young adults are reported from another study in the Masaka district in Uganda. These

findings could indicate that the growth of the epidemic has been blunted, perhaps temporarily, by behavioral changes resulting in decreased spread of HIV in younger age groups. Behavioral surveys of such populations will assess to what extent behavior change could have led to these apparent declines.

- It has also been suggested that HIV infection might reduce the level of fertility, resulting in fewer HIV-infected women attending antenatal clinics where seroprevalence surveys are conducted.
- If these findings result from behavior modification, it may mean that methods to decrease HIV incidence substantially are within the technical capacity of many countries in sub-Saharan Africa.
- The hope generated by the observed reductions in levels of infection (prevalence) combined with the continuing evidence of new infections (incidence), particularly high in young people, should provide additional impetus for enhancing prevention efforts.

Sexually Transmitted Diseases

The presence of sexually transmitted diseases (STDs) implies a marked risk of concurrent HIV infection for at least two reasons: (1) the modes of transmission of HIV and other STDs are similar; and (2) the role of STDs in facilitating the transmission of HIV has been clearly established.

- The majority of STDs are treatable. The World Health Organization estimates that 65 million new cases of curable STDs occurred in Africa in 1995.
- STDs are affecting young adults, especially women, with serious consequences. For women, these consequences include pelvic inflammatory disease, cervical cancer, infertility and postpartum endometritis. For infants, maternal STDs may lead to low birth weight, neonatal syphilis and gonococcal ophthalmia.
- STD control programs, through early diagnosis, treatment and promotion of safer sexual behavior, have been shown to reduce significantly the rates of STD infections. Successful programs have been documented in Zambia and Zimbabwe and, outside Africa, in Thailand.
- In Mwanza, Tanzania, early treatment of STDs in a rural population has been associated with a 42 percent decline in the rate of newly acquired HIV infections. This important finding supports the revitalization of STD control programs benefiting from new approaches that have already been initiated in several sub-Saharan countries.
- The surveillance of some STDs (syphilis in women and gonorrhea in men) can be used to monitor the risk of HIV infection and to evaluate the effect of HIV/STD prevention programs. As prevention programs for HIV and for other STDs move toward integration in most countries, the collection and analysis of STD surveillance data should be conducted concurrently with HIV surveillance.
- STD surveillance data originate mostly from STD and antenatal clinics. However, social and cultural barriers inhibit most women from visiting STD clinics. While antenatal clinics offer STD diagnostic and treatment services to women who are pregnant, existing STD services fail to provide continual and culturally acceptable access to the majority of women. In turn, surveillance of STDs and analysis of their epidemiological patterns remain incomplete. Better understanding of the dynamics of the epidemics of HIV and other STDs and improved prevention and control programs necessitate the creation of integrated services that suit the needs of women.

- Most young women and men do not have access to friendly, effective and comprehensive STD services. These need to be built within the context of health services targeted to young people's overall health needs. The information generated from such services will be crucial to understanding and responding to the increased STD/HIV rates now being observed in young people.

HIV/AIDS and Mobility

Major political, social and demographic changes occurred in Africa over the last few decades and have resulted in significant population displacement, migration and rapid urbanization. The improvement of transportation and communication networks, the increased exchange of goods, and the creation of large-scale development programs have stimulated the movement of young men and women within and across national boundaries. Open conflicts, environmental degradation, natural disasters and low-intensity wars have also led millions of Africans to leave their homes and, in some situations, to turn to survival strategies that increase the practice of unsafe sex. Population mobility facilitates the spread of STDs, including HIV.

- Cross-border migration-of men to South Africa and Côte d'Ivoire from neighboring countries for employment purposes, for example-has been associated with high risk of HIV infection in the migrant population as well as in their spouses or regular sexual partners upon their return home (e.g., in Burkina Faso, Lesotho, Malawi, Mali and Swaziland).
- Migration within countries and urbanization (e.g., from rural areas to urban centers or industrial sites) have led to high concentrations of predominantly male communities and increased participation in commercial sex.
- Professional groups characterized by mobility, such as truck drivers, traders and military personnel, have also been associated with a higher risk of HIV infection.
- Consequences of political and civil unrest and subsequent population displacement have led to an increased spread in HIV transmission; populations displaced from Ethiopia, Liberia, Mozambique and Rwanda are examples. The movement of troops from west Africa to Angola and Mozambique has been linked to the spread of HIV2 to these countries.
- Every year, mobility-whether for economic reasons or for survival in conflict situations-affects millions of people throughout Africa, particularly sexually active adolescents and young adults. Separated from their families and supportive social environments, they become more exposed to behaviors that put them at increased risk for HIV and other STDs.
- Intercountry programs targeted at cross-border mobility and national programs aimed at mobile professions and internal migrants should be designed and implemented on the basis of information linking epidemiology and behavioral and social determinants of these populations to HIV and other STDs.
- The design of nationally and internationally funded economic development programs (for example, the construction of highways and the creation of new industries or agriculture projects) needs to include an initial appraisal of the potential impact of these projects on the vulnerability of the labor force and the local population to HIV infection and other STDs. Measures to minimize this impact, such as reducing gender imbalance in the labor force, enabling workers to be joined by their families, allowing for regular contacts with distant spouses, and incorporating HIV/STD programs in development schemes need to be built into the project design.
- Even with such initiatives, the sheer dynamic of transition toward increasingly

urbanized society brings with it changing behavioral mores that create new needs and present new opportunities for HIV transmission. These changes need to be anticipated and properly addressed through urban-based programs.

Surveillance Must Improve

Surveillance of HIV prevalence in sentinel populations, whereby sites are selected for the collection of HIV information from carefully selected populations, is fundamental to monitoring the HIV epidemics and guiding policy and programs. HIV prevalence trends in selected populations such as STD and antenatal clinic attendees serve as the standard for measuring the magnitude, growth and geographic extension of HIV epidemics over time.

The evaluation of trends and of their underlying determinants may improve the understanding of changing patterns in HIV incidence (occurrence of new HIV infections) and the impact of interventions while providing better insight into the future course of epidemics in the region.

In sub-Saharan Africa, the quality of HIV surveillance varies widely, from weak attempts to collect data at clinical facilities to overextended sentinel surveillance programs that demand excessive resources and manpower. The establishment of low-cost, well-focused surveillance systems based on anonymous, unlinked HIV testing performed on blood samples collected during service delivery can provide most of the data needed for surveillance purposes.

- At the early stages of HIV epidemics, surveillance at STD clinics has a higher likelihood of detecting HIV infection when prevalence is low in the general population.
- Once HIV prevalence has reached a measurable level among STD clinic attendees, women attending antenatal clinics, whose blood is collected for routine pregnancy monitoring, constitute the most practical and representative population sample to assess the status and trends of HIV infection in the sexually active population.
- The surveillance of AIDS cases has not been used extensively to understand the dynamics of the pandemic, since surveillance is constrained by difficulties inherent to the case definition of AIDS and the general weakness of reporting systems. In mature epidemics, however, the analysis of reported AIDS cases, particularly if reports include information on age and sex, may become increasingly useful. This analysis can provide information relevant to the assessment of trends over time, even if the delay between HIV infection and the onset of AIDS-defining conditions is several years.
- The establishment of these surveillance programs will succeed only if capacity building through institutional strengthening and skill building is an integral part of the program. Surveillance will further improve if regular analysis, feedback and the use of surveillance information for policy development, program monitoring and evaluation occur.
- Epidemiological surveillance should be linked to the periodic collection and analysis of behavioral and social data to provide additional clues about the possible association between HIV infection and individual or collective factors influencing the risk of infection.
- National commitments must be made to generate, analyze and disseminate information on the HIV epidemics and international guidance on methods to ensure both the reliability and comparability of the information collected. Such

methods should rely on standard procedures, minimum sample sizes and a limited number of surveillance sites.

Research

Many issues critical to the understanding of the HIV epidemics have been incompletely addressed or omitted in ongoing research efforts. Priority research needs include:

- Analyzing and interpreting existing epidemiological data in and among countries;
- Validating declines or stabilization of HIV prevalence in some countries. If these declines are real, possible causes should be investigated, including:
 - A reduction in incidence due to the natural evolution of the epidemics or the effects of prevention interventions,
 - An increase in AIDS mortality,
 - A reduction in fertility in women infected with HIV who are therefore less likely to be included in antenatal clinic surveillance schemes, and
 - The relative contribution of any of the above factors.
- Determining, through behavioral surveys, the status and trends of sexual behaviors, linked to epidemiological findings;
- Using geographical techniques to study and devise patterns of current and potential spread of HIV;
- Studying the evolutionary history of HIV/AIDS from the onset of HIV infection to death;
- Exploring the influence of HIV genetic variability on HIV transmission; and
- Assessing the effect of viral load and clinical stage of infection on the transmission of HIV.

At a second level of priority, other research needs include:

- Evaluating the "predictive value" of HIV prevalence in antenatal women for estimating HIV prevalence in the general adult population;
- Discovering the type and role of factors responsible for the relatively low prevalence in north African and Indian Ocean countries;
- Assessing the validity of STD incidence as a surrogate for HIV incidence;
- Linking the epidemiology of HIV to the sexual behavior and societal context of young people; and
- Comparing and analyzing the biological susceptibility of adult and younger women to HIV infection.

Participants

Participants at the pre-conference Workshop on the Status and Trends of the HIV/AIDS Epidemics in Africa, cosponsored by AIDSCAP/Family Health International and the François-Xavier Bagnoud Center for Health and Human Rights of the Harvard School of Public Health, included:

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