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SEROPREVALENCE OF HIV IN AFRICA: WINTER 1990

by

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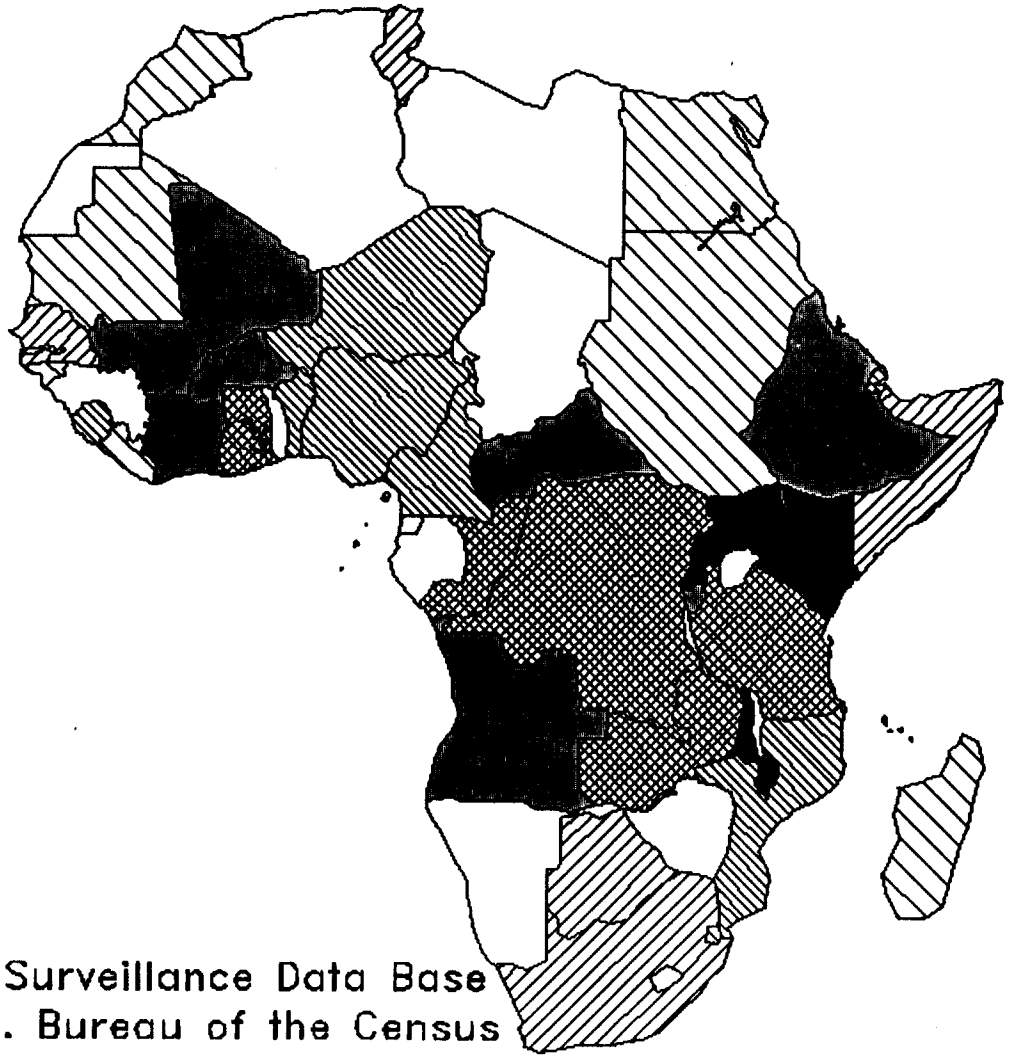
Map 1

African HIV-1 Seroprevalence for High-Risk Urban Populations



Pct. Seropositive

- 0.0 to 0.2
- 0.3 to 2.5
- 2.6 to 10.0
- 10.1 to 25.0
- 25.1 to 40.0
- Over 40.0
- No Data

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SUMMARY

New data on the seroprevalence of HIV confirm some of the original epidemiological patterns of AIDS in Africa. They also, however, suggest new exceptions:

-- The AIDS epidemic still is a predominately urban disease although the epidemic may be most severe in some rural areas in Central Africa, such as Uganda.

-- HIV-1 is predominately found in East and Central Africa. Yet the Ivory Coast now has an estimated seroprevalence of HIV-1 among the low-risk, urban population higher than Zaire, Kenya, or Tanzania (Map 1).

-- HIV-2 is predominately found in West Africa; yet Mozambique has a higher low-risk, urban seroprevalence than all but three of the West African countries for which there are data.

-- In most countries, the seroprevalence of HIV-1 and HIV-2 continues to increase; but in several select cases, such as among blood donors in Kinshasa, seroprevalence may not be increasing.

-- The rates of HIV-1 in high-risk populations, such as prostitutes, is much higher than the rates in low-risk populations; but some of the countries with high HIV-1 seroprevalence among the low-risk populations, such as Zambia and the Ivory Coast, do not have the highest seroprevalence among their high-risk populations (Map 2).

-- HIV-1 and HIV-2 seroprevalence data based on an analysis of sera collected 15 to 20 years ago illustrates the differing epidemiology of the two viruses. HIV-1 affects younger adults much more than HIV-2. Both viruses affect women more than men initially, but males over 50 years of age are disproportionally infected;

-- The national and subnational geographic distribution of the viruses shows at least three areas of concentration that cross national borders: the Kagera Triangle, the French-Speaking West African Coast, and the Congo River Basin.

Although our knowledge of the current state of the AIDS epidemic still is very fragmented, the data that are available can be used to assist policymakers and planners in developing AIDS control programs and to promote a better understanding of the scope and dynamics of the spread of HIV infection and AIDS in Africa.

Map 2
African HIV-2 Seroprevalence for High-Risk Urban Populations

Pct. Seropositive

- 0 to .5
- 0.6 to 5.0
- 5.1 to 7.5
- 7.6 to 10.0
- 10.1 to 12.5
- Over 12.5
- No Data

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PREFACE

The Center for International Research conducts economic and demographic studies, some of which are issued as Staff Papers. A complete list of these papers is included at the end of this report. However, the use of data not generated by the U.S. Bureau of the Census precludes performing the same statistical reviews the Bureau does on its own data.

The authors would like to thank Jinkie Corbin, Lisa Gist, and Lori Sidleck for their continual work in compiling the HIV/AIDS Surveillance Data Base and for preparing and checking various materials for this report; Jack Gibson for preparing the graphics used in this report; and Donna Dove for patiently preparing and editing the final report.

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in this report generally are drawn from the largest and most recent samples available. Both time and geographic place were controlled in the comparisons. All data used had at least two verification tests. Reliability of the data have been assessed; but given the quality of the original data, the patterns described below still should be considered tentative indications, rather than precise estimates of HIV seroprevalence in Africa. Detailed information on sample size and population tested for each of the seroprevalence estimates used in this paper are contained in appendix tables. For consistency, the same degree of precision (up to one decimal place as reported in the original sources) in seroprevalence percentages is maintained in this report.

The terms "high risk" and "low risk" are used throughout this report to differentiate population subgroups with known risk factors for HIV infection from those without such known risks. As a result of the various transmission modes and the prevalence of the virus in Africa, no group can be considered to have no risk of infection. Sampled populations treated as high risk in this report include prostitutes, bar girls, and so on; clients of prostitutes; and sexually-transmitted disease clinic patients. Sampled populations considered to be low risk include general population with no known risk, pregnant women, and blood donors.

HISTORICAL SEROPREVALENCE OF HIV-1 AND HIV-2 IN AFRICA

HIV has been in Africa at least 20 years. Several recent studies have tested frozen blood serum collected many years ago for scientific purposes. Table 1 shows the results of these selected tests for HIV-1 and HIV-2.

Antibodies to HIV-1 or a related virus were detected in 1 of 818 blood samples originally drawn in Zaire in 1959 [Nahmias, Weiss, Yao, et al., 1986], but not in studies conducted in several other countries in the 1960's. Low levels of HIV-1 were found in both urban and rural areas of Zaire in the 1970's. HIV-2 antibodies were found in serum collected in the Ivory Coast as far back as 1966. Serum from three countries had HIV-2 antibodies in the 1960's. This supports biomedical research findings which suggested that HIV-2 is not a recent mutation of HIV-1 but has been a distinct and separate virus for at least 40 years [Meyers, Linder, and MacInnes, 1989]. And the epidemiology of the two viruses by age and sex reenforces the possibility that they are two quite distinct viruses with their own unique natural histories.

EPIDEMIOLOGICAL DIFFERENCES BETWEEN HIV-1 AND HIV-2

The age and gender pattern for HIV-1 infection has been well-described in large samples in both Zambia and Zaire (data for Zaire shown in Figure 1, upper panel; Appendix table A-2). These data are characterized by:

INTRODUCTION

Most Africans who now have Acquired Immune Deficiency Syndrome (AIDS) became infected by the Human Immunodeficiency Virus (HIV) years ago. Because of this long latency period of the virus, the AIDS epidemic is continuing to spread in Africa despite increased efforts to contain it. AIDS cases are expected to continue increasing for several years after the peak of infection has passed. Thus, the present pattern of HIV seroprevalence in Africa forecasts the future epidemiology of AIDS in Africa.

The AIDS epidemic eludes any simple description or quantification because HIV seroprevalence varies so widely among risk groups in the same town and among towns in the same country. A further complication is that AIDS is caused by two viruses, HIV-1 and HIV-2, which have different natural histories, epidemiologies, and prognoses. This paper presents the contrast in seroprevalence among risk groups and regions. It also focuses on comparisons between the different epidemiological patterns of HIV-1 and HIV-2 both historically and presently. HIV-1 clearly is more virulent of the two viruses, but HIV-2 is insidious. And both are creating a web of disease in Africa. The comparisons and contrasts of different seroprevalence rates in this paper should caution the reader about using any single seroprevalence rate as representative of a national epidemic in any of the African countries discussed.

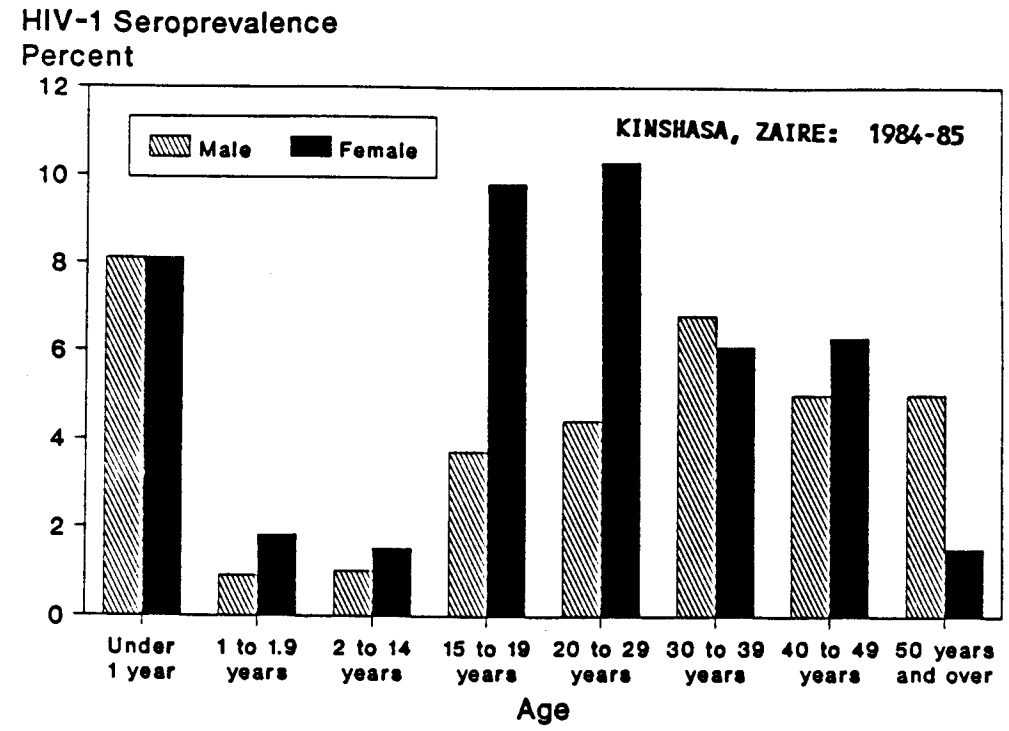
DATA QUALITY AND QUALIFICATIONS

Almost no HIV survey published in Africa is based on a statistically random sample; therefore, there is selection bias in all data. Yet when hundreds of non-random surveys are pieced together, patterns may emerge in local areas that are consistent and useful in better understanding the shifting course of this disease in Africa.

Sample sizes of the seroprevalence surveys are small by social science and epidemiological standards. Sample size is important because HIV seroprevalence in similar populations tends to decrease with increases in sample sizes [Torrey, Way, and Rowe, 1988]. Good sample surveys, however, are expensive and time consuming and most African countries have neither sufficient money nor time. Therefore, the existing, imperfect data must be used to help sort out the patterns of infection among various population groups and countries until more precise data become available.

The data, from journals, articles, and public presentations, have been compiled at the Center for International Research, U.S. Bureau of the Census, with funding support from the Agency for International Development. This HIV/AIDS Surveillance Data Base contains over 4,300 data entries for Africa. In order to minimize the problems with the data, the seroprevalence data used

Figure 1
HIV-1 and HIV-2 Seroprevalence Rate Among "Low-Risk" Groups, by Age and Sex



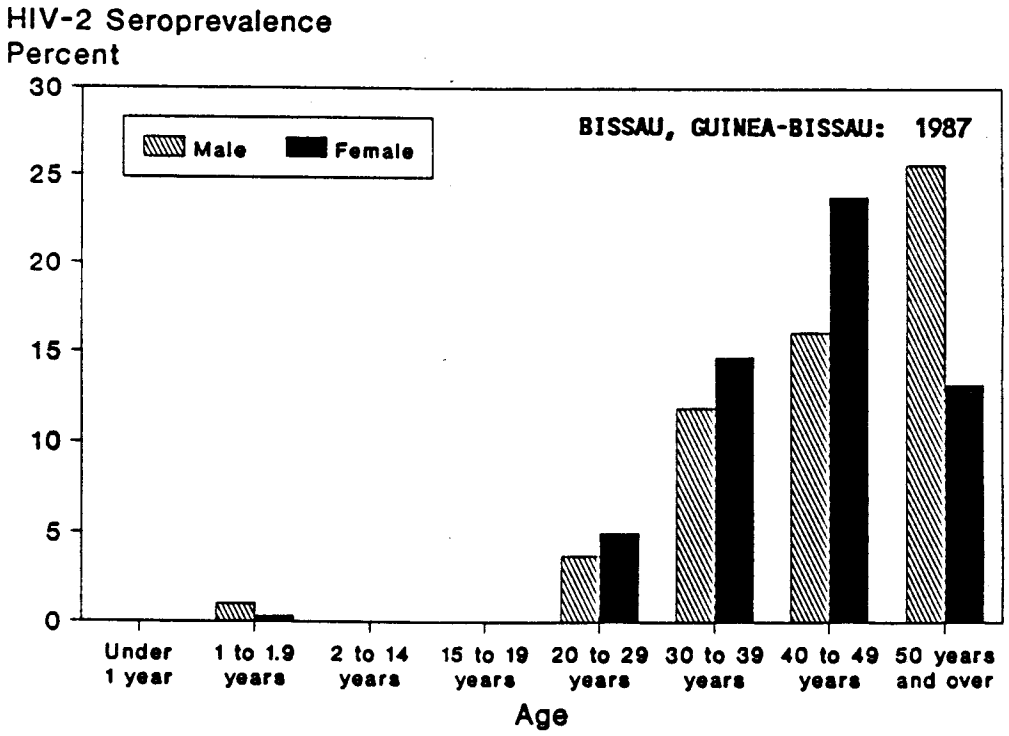


Table 1. Historical Seroprevalence Rate of HIV-1 and HIV-2 for Selected African Countries

HIV-1

Country	1960's	1970's	1980-81	Source
Ivory Coast	0.0 (1966)			K0036
Gabon	0.0 (1967)			K0036
Nigeria	0.0 (1967)			K0036
Liberia	0.0 (1968-72)			S0061
Zimbabwe	0.0 (1968-72)			S0061
Zaire		0.3 (1970)		J0001
		0.8 (1976)		N0017
Sierra Leone		0.0 (1972)		K0036
Mali		0.0 (1974)		K0036
Chad		0.0 (1974)		K0036
Ghana		0.0 (1977)		K0036
Guinea Bissau			0.0 (1980)	F0003
			1.7 (1980)	C0007
Senegal	0.0 (1967)	0.0 (1973)		K0036
Kenya	0.0 (1969-71)	0.0 (1976)	0.0 (1981)	C0085
				K0038
				W0015

HIV-2

Country	1960's	1970's	1980-81	Source
Ivory Coast	1.0 (1966)			K0036
Gabon	2.5 (1967)			K0036
Nigeria	0.1 (1967)			K0036
Liberia	0.0 (1968-72)			S0061
Zimbabwe	0.0 (1968-72)			S0061
Sierra Leone		0.0 (1972)		K0036
Mali		0.9 (1974)		K0036
Chad		0.0 (1974)		K0036
Niger		0.0 (1974)		K0036
Ghana		0.0 (1977)		K0036
Guinea-Bissau			1.1 (1980)	F0003
			2.7 (1980)	C0007
Senegal	0.0 (1967)	0.3 (1973)		K0036
Kenya	0.0 (1969-71)	0.0 (1976)		C0085
				K0038

Note: Additional details for studies shown in this table are provided in Appendix table A-1. In some areas, co-infection of HIV-1 and HIV-2 is present in the population. Figures for the dually-infected population are shown separately in the appendix, but they have been combined with the population infected with each of the viruses in the table above.

SEX RATIO OF HIV-1 AND HIV-2

Previous data suggests that young women may be more at risk of HIV-1 infection than young men. And only in the older adult ranges did the relationship reverse. More recent data suggests that women are more at risk until they reach age 40 years or over for both HIV-1 and HIV-2.

A recent report [Trebucq, Munan, and Louis, 1989] analyzed the HIV seroprevalence of a total of 2,371 respondents ages 15 to 44 years in a number of separate community studies in Gabon, Central African Republic, and Equatorial Guinea. They found the female seroprevalence to be more than twice the male seroprevalence. That is similar to previous results for this age group reported in Kinshasa in 1985 [Quinn, Mann, Curran, et al., 1986]. This suggests that women may be more at risk than men in this epidemic, and they are at most risk in their high fertility years. Such a pattern might result from an increased risk of infection for women in their childbearing years from transfusion of unscreened blood. To the extent that these surveys accurately reflect the epidemiology of HIV in Central Africa, it is likely to have considerable implications for perinatal transmission of HIV, as discussed by Valleroy, Harris, and Way [1989].

The sex ratio of AIDS cases in Kinshasa and Uganda also suggests that women may be more at risk. Piot, et al. [1990] present the male to female ratio of AIDS cases among 20 to 39 year olds as 0.8:1 in Kinshasa and 0.9:1 in Uganda. Both ratios are smaller than the male to female ratio in the general urban population. But in West Africa, Abidjan and Dakar, there are many more cases of AIDS among men than women, 4.6:1 and 2.4:1, respectively. The differences in the sex ratios between West and Central Africa is an intriguing question that may provide clues to different patterns of the epidemic that need to be investigated.

THE GEOGRAPHIC DISTRIBUTION OF HIV-1 AND HIV-2

The existence of HIV-1 in Central Africa and HIV-2 in West Africa 20 or more years ago was an augury of the present broad geographic distribution of these deadly viruses. But the viruses have spread disproportionally quickly in the local urban areas of Africa, even though they may have existed in rural areas for longer periods of time. The viruses also have been concentrated in the small percentage of individuals in each country considered high-risk individuals, such as bar girls and prostitutes and their clients. It is these high-risk individuals that are most likely to carry the virus and spread it to the low-risk population.

The discussion of geographic patterns that follows is based on data selected as the best available data on HIV seroprevalence among high- and low-risk populations in African countries. Data were selected using criteria of sample size, recency of data, presence of two diagnostic tests, and minimal evident bias in sample selection, given the target population. Since each

-- Similar overall seroprevalence among men and women;

-- Higher seroprevalence in young adult women than in men;

-- Substantial infection among infants due to perinatal transmission;

-- Higher seroprevalence in older adult men than women; and

-- Lower seroprevalence above the age of 50 years for men and women.

A detailed household sample survey in Guinea-Bissau in 1987 [Poulsen, Kvinesdal, Aaby, et al., 1989] showed a markedly different age-sex pattern for the seroprevalence of HIV-2 than has been found for HIV-1 (Figure 1, lower panel; Appendix table A-2).

-- HIV-2 seroprevalence of newborns was non-existent, despite the fact that adult women are infected; and

-- Seroprevalence of HIV-2 was much higher in people over 30 years of age than HIV-1 for the same age group. In particular, seroprevalence for HIV-2 in males increases with age. For people over 60 years, the seroprevalence was 18.2 and 17.6 percent for men and women, respectively.

The authors of the Guinea-Bissau study suggest that:

-- HIV-2 is not as easily transmitted as HIV-1, and considerable time or repeated sexual contacts may be needed to transmit the virus;

-- Since seroprevalence increases with age of adults, it is possible that the virus is not newly introduced and that it may have a very long incubation period;

-- Vertical transmission from mother to infant is much rarer for HIV-2 than HIV-1.

-- Given the higher seroprevalence in the older age groups, HIV-2 may be less virulent.

But the study also documented that HIV-2-infected people had significantly higher mortality rates than uninfected people. After one year, the authors report a relative risk of mortality for infected persons 8.3 times the level for the uninfected. Therefore, even though the HIV-2 may be less virulent than HIV-1, it still is a major health threat in Africa.

groups. One such group is the military. Results are available from seven African countries that have tested their military for HIV, and the military has a higher seroprevalence in the three countries that have data on comparable low-risk groups (see Table 2). The military, however, was lower than other defined high-risk groups. In no Sub-Saharan African country are the armed forces more than 1 percent of the population [Sivard, 1987]. But they are a critical group because they are likely to be more mobile than other groups in the country, they consist predominantly of young sexually-active males, and, therefore, they have more opportunity to spread the disease than other population subgroups.

Table 2. HIV Seroprevalence Rate of Military and "Low-Risk" Groups for Selected African Countries

			Military		"Low-Risk"	
Country and city	Year	HIV	Source	Seroprevalence rate	Seroprevalence rate	Source
Angola, Launda	1987	1	F0010	5.7	0.0	F0010
	1987	2	F0010	6.7	2.3	F0010
Cabinda	1986	1	B0039	0.0	0.0	B0039
	1986	2	B0039	0.0	0.0	B0039
Dundo City	1987	1	A0029	1.9	11.3	A0029
	1987	2	A0029	13.0	11.3	A0029
Cape Verde, Praia	1987	1	B0016	0.0	(no good comparative	
Santiago Island	1987	2	B0016	2.2	low-risk survey)	
Ethiopia (national)	1985-86	1	H0013	0.1	(no good comparative low-risk survey)	
Guinea, Conakry	1986	1	K0012	0.0	(1985-87) 0.0	K0033
	1986	2	K0012	0.0	(1985-87) 0.0	K0033
Guinea-Bissau	1986-87	1	C0008	1.7	(1987) 0.0	P0025
	1986-87	2	C0008	11.8	(1987) 4.7	P0025
Sudan, (six cities)	1987-88	1	M0072	1.7	(no good comparative low-risk survey)	
Uganda,(national)	1987	1	E0001	33.3	(no good comparative low-risk survey)	
East Alcholi	1986	1	D0032	16.5	13.8	D0009

Note: Additional details for studies shown in this table are provided in Appendix table A-6. In some areas, co-infection of HIV-1 and HIV-2 is present in the population. Figures for the dually-infected population are shown separately in the appendix, but they have been combined with the population infected with each of the viruses in the table above.

figure is based on a single study, it is not an average or composite figure. As yet, there are insufficient comparable studies to make estimates of an "average" seroprevalence meaningful. Summary tables, as well as detailed sample information for these studies, are contained in tables in the appendix.

HIGH-RISK POPULATIONS

HIV-1 seroprevalence for high-risk population, such as prostitutes, is concentrated in Central Africa, as shown in Map 1 (see Summary). Ghana is the only country in West Africa to have over 40.0 percent urban seroprevalence for this high-risk group. A number of countries in Africa have not undertaken surveys of their high-risk population. Therefore, blank spots on the map should be interpreted as the absence of data, not necessarily absence of the virus.

The geographic pattern for HIV-2 in the high-risk group is very different, as shown in Map 2 (see Summary). French West Africa has the highest levels, although the virus also has clearly spread to urban areas of the ex-Portuguese colonies of Angola and Mozambique in Southern and Central Africa.

Prostitutes

The high-risk populations in Africa have consistently higher seroprevalence rates for both HIV-1 and HIV-2 than the low-risk populations, as shown in Appendix tables A-3 and A-4 (detailed information is contained in Appendix table A-5). Studies have shown over 50 percent of urban prostitutes of Uganda, Rwanda, Malawi, and Kenya to be infected, and some of these data are several years old. But the level of seroprevalence varies widely among high-risk populations in different cities. A recent study [Larson, 1989] suggested that the seroprevalence rates in African cities may be related to the balance of population between the sexes. The higher the sex ratio (number of men to 100 women), the more likely it may be to have high levels of prostitution and sexually transmitted diseases, such as AIDS.

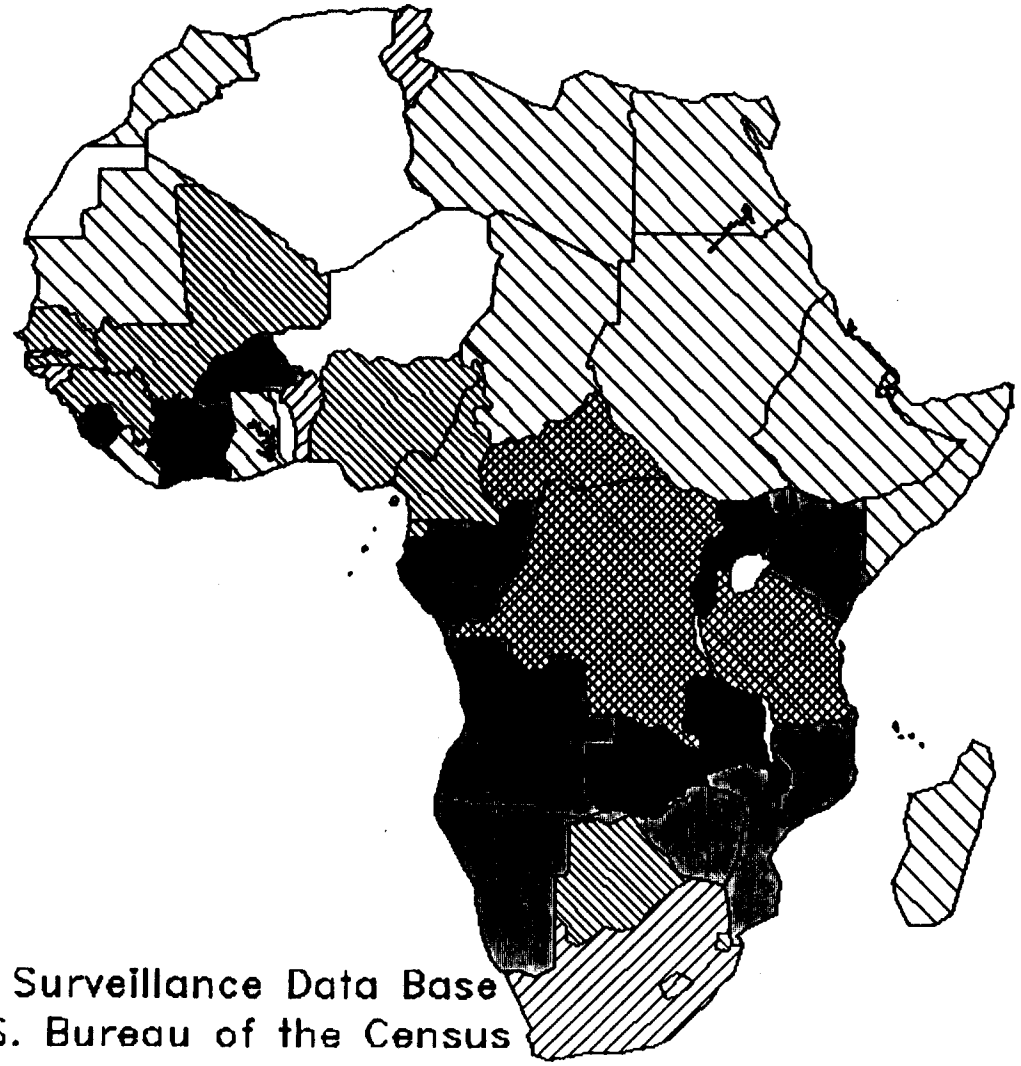
In fact, there is a direct relationship in the five countries studied by Larson [1989] between their urban sex ratio and their HIV seroprevalence among the high-risk population. There also is an inverse relationship between the sex ratio and the ratio of seroprevalence of the pregnant women to the prostitutes. This would suggest that where the sex ratio in an urban area is near unity, there is more reliance on girlfriends and wives for sexual intercourse and less on prostitutes. This appears to increase the HIV seroprevalence of the girlfriends and wives relative to the prostitutes than when high sex ratios encourage more contact with prostitutes.

Armed Forces

High- and low-risk categories are, by definition, artificial and only constructs with which to organize the data. In fact, in some societies, there is likely to be a spectrum of individuals that bridge the high- and low-risk

Map 3

African HIV-1 Seroprevalence for Low-Risk Urban Populations



Pct. Seropositive

- Less than 0.1
- 0.1
- 0.2 to 1.0
- 1.1 to 5.0
- 5.1 to 10.0
- Over 10
- No Data

HIV/AIDS Surveillance Data Base
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Two important public health issues surround HIV in the African military. In many nations, military and police personnel are called upon to donate blood, for both civilian and military uses. Public health officials may want to reconsider this policy, if the military as a group are known to be at higher risk of HIV infection.

The most important public health issue, however, concerns the military as a potential source for transmission of HIV to other groups. Evidence from Tanzania, Rwanda, and Uganda, for example, suggests that military operations in this area over the past decade may be one reason for the high incidence of AIDS in this area. The epidemic has moved along transport routes and military lines of march, bringing the infection to rural females, particularly in areas where military and police encamped or were on long-term bivouac.

Given these considerations, and despite sensitivities in discussing the health status of the military, public health officials should begin to consider the military when establishing which segments of their populations justify targeted interventions and National AIDS Control Programs because of potential high-risk behavior.

Rural High-Risk Populations

Fewer surveys have been done among high-risk populations in rural areas. But in the countries that have reasonable data on their rural populations, rural high-risk groups have higher seroprevalence of HIV-1 and/or HIV-2 than the low-risk groups in both urban and rural areas.

The high-risk groups in both urban and rural areas are, at best, a small fraction of the total national population. If the HIV virus could be confined to them, the epidemic could be quite quickly contained. But if sexual contact between high- and low-risk groups is common, the low-risk groups are vulnerable and the national epidemics will take on much larger dimensions. Therefore, the HIV seroprevalence in the low-risk populations in African countries is the most important indicator of the future magnitude of the AIDS epidemic.

LOW-RISK POPULATIONS

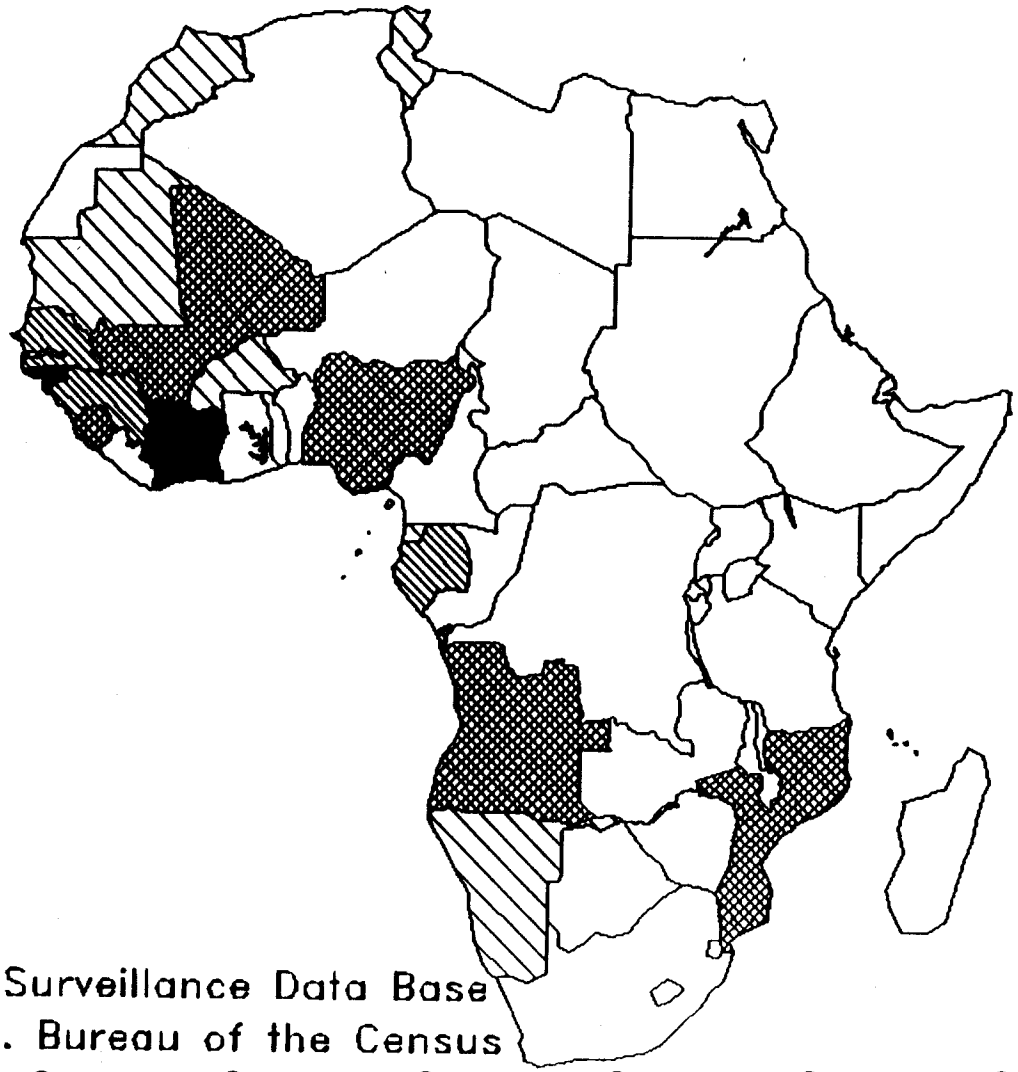
Low-risk groups usually are defined as pregnant women, healthy adults, and blood donors. They have access to the health care system for reasons other than being sick. While they are almost certainly not a random selection of the population and therefore represent somewhat a biased sample, there is no obvious reason why they would be more likely to have HIV infection than other adults in the population.

Urban Populations

HIV-1. Map 3 shows the level of seroprevalence in low-risk, urban populations by country. Some HIV-1 seroprevalence has been reported in almost every country where there have been tests. But HIV-1 seems to be concentrated

Map 4

African HIV-2 Seroprevalence for Low-Risk Urban Populations



Pct. Seropositive

- Less than 0.1
- 0.1
- 0.2 to 1.0
- 1.1 to 5.0
- Over 5.0
- No Data

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in Central and Eastern African cities. And Malawi and Central African Republic now have higher seroprevalence than some countries that received the initial publicity, such as Tanzania and Zaire.

HIV-1 also has become well-established in West Africa, with the epidemic apparently furthest advanced in the Ivory Coast. In Abidjan, 10 percent of the low-risk urban population is estimated to have HIV-1 infection. This is a higher rate than any other country in West Africa and is higher than most in the balance of Sub-Saharan Africa. The virus also appears to be spreading to the French-speaking urban neighbors of the Ivory Coast, especially Burkina Faso and Mali. Burkina Faso has a level of seroprevalence in its low-risk urban population similar to that of Kenya.

HIV-2. Fewer countries have tested their populations for the presence of HIV-2 infection. Those studies that have been done suggest that HIV-2 in low-risk urban populations is concentrated in West Africa. But the ex-Portuguese colonies of Angola and Mozambique in Southern Africa now have urban seroprevalence levels that are similar to that of Western Africa as shown in Map 4.

In general, the seroprevalence of HIV-2 is lower than that of HIV-1 in urban areas in both low- and high-risk individuals, although there are some exceptions. HIV-2 may have been in West Africa longer than HIV-1 has been in Central Africa, and both are sexually transmitted. Therefore, the lower seroprevalence of HIV-2 today may suggest, as other studies have observed, that it may be harder to transmit.

Rural Populations

In at least four countries in Africa, the seroprevalence of HIV in the low-risk populations in selected areas outside the capital cities is at least 50 percent of the prevalence in the low-risk populations in the capital cities:

- -- Central African Republic, where the HIV-1 seroprevalence of the low-risk population in the capital is 7.4 percent and is 3.7 percent in a town in the interior;

- -- Tanzania, where the comparative numbers are 7.3 percent for Dar es Salaam and 5.4 percent in areas of northern Tanzania;

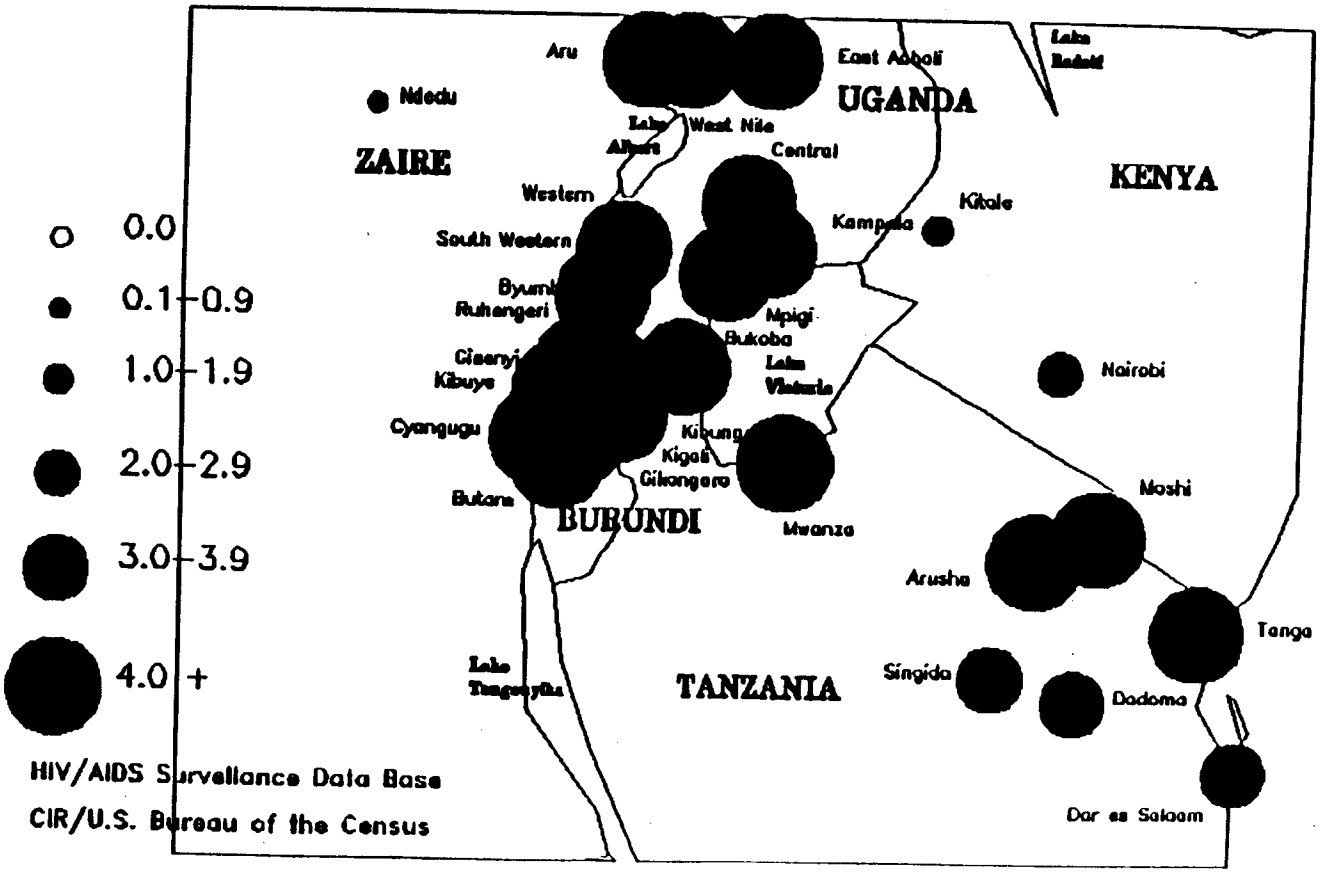
- -- Uganda, where HIV-1 seroprevalence estimates are 24.1 percent in Kampala and 12.3 percent in Mpigi district; and

- -- Ivory Coast, which has 10.5 percent HIV-1 seroprevalence in Abidjan and 6.5 percent for HIV-2, and 1.1 and 1.5 percent, respectively, in the low-risk, rural populations of Bondoukou, Bouake, Korhogo, and Man.

This suggests that the selected rural areas in these countries are at the same stage of the epidemic as the urban areas were only a few years ago.

Map 5

Seroprevalence of HIV-1 for Low-Risk Populations: Eastern Africa



Note: The lack of dots does not necessarily mean that there is no HIV in the populations; it means there are no published seroprevalence data for that area.

HIV SEROPREVALENCE BEYOND BORDERS

Viruses, of course, respect no borders. And in Africa, where colonial borders were drawn with regard for tribal groupings, borders mean even less. This section focuses on three areas that span several national borders. These areas do not show up if we only present data defined by countries or city boundaries; yet these areas have HIV seroprevalence for low-risk populations so high as to be considered HIV major foci in Africa:

-- the Kagera Triangle;

-- the French West African Coast; and

-- the Congo River Basin.

The maps referenced in the discussion that follows contain, for each of the above regions, shaded circles showing the level of seroprevalence for low-risk populations sampled in individual studies. In some areas, many such studies have been conducted, while in others, few. However, the focus of attention should not be on the number of circles, but rather on the geographic patterns the circles portray of areas of high and low seroprevalence in the region. Note that the lack of circles on the map does not necessarily mean a lack of HIV infection, but that there are no available seroprevalence data for that area.

The Kagera Triangle

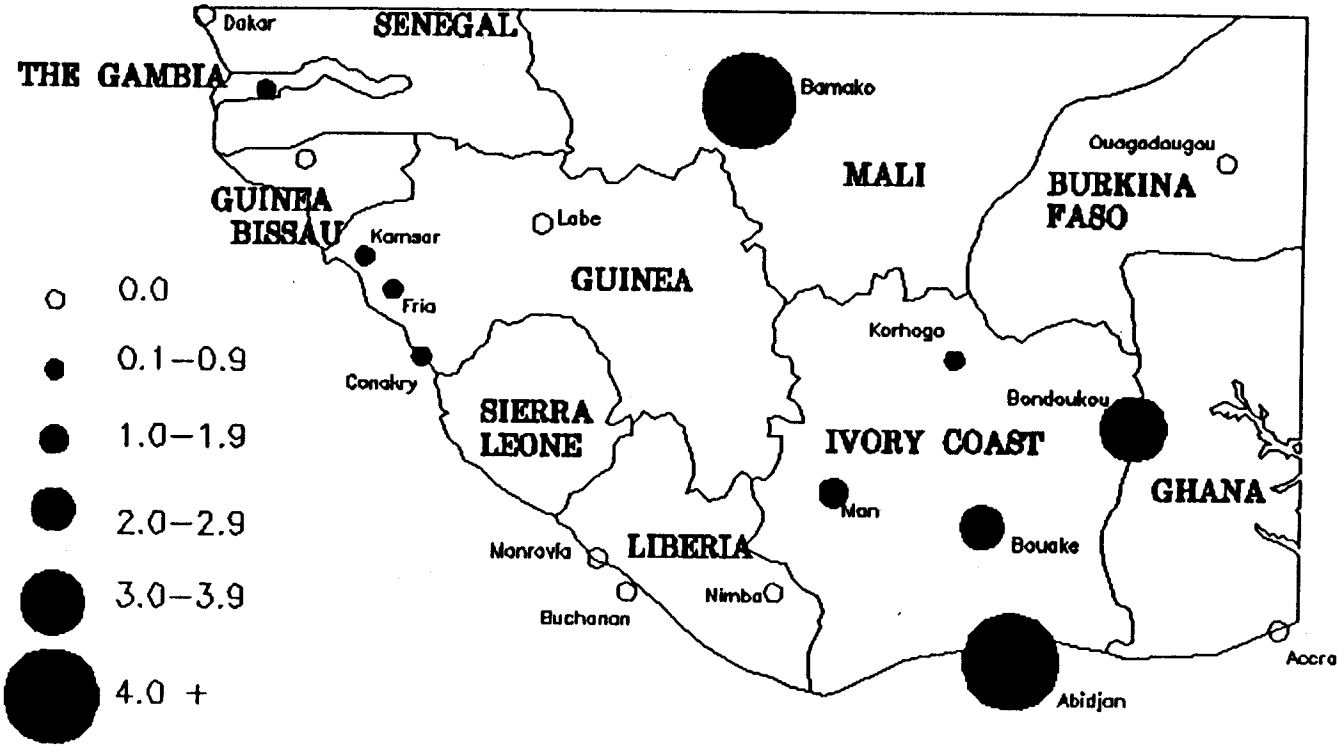
The highest concentration of HIV-1 seroprevalence in Africa is in the Kagera Triangle that covers Northwestern Tanzania, Uganda, Eastern Zaire, and Rwanda. Map 5 shows the overlapping circles of seroprevalence in this area, each one representing a separate survey and all of them estimating a rate of 4 percent or more. In some studies, the rate among the low-risk population is as high as 40 percent. The high seroprevalence clearly has spread to Northwestern Uganda and Northeastern Tanzania but is not yet showing the same level of concentration in Kenya. The small amount of information we have for east-central Zaire suggests that distance and difficulties of travel can and do limit the spread of the virus.

The French West African Coast

French West Africa not only has a high seroprevalence for HIV-2, as shown on Map 6; it also has a high seroprevalence for HIV-1, as shown on Map 7. In fact, in some places in the Ivory Coast and Mali, HIV-1 seroprevalence is higher than HIV-2. The spread of HIV-1 in French-speaking West Africa is disturbing. As yet, HIV-1 seroprevalence in English-speaking West Africa is low.

Map 7

Seroprevalence of HIV-1 for Low-Risk Populations: West Africa

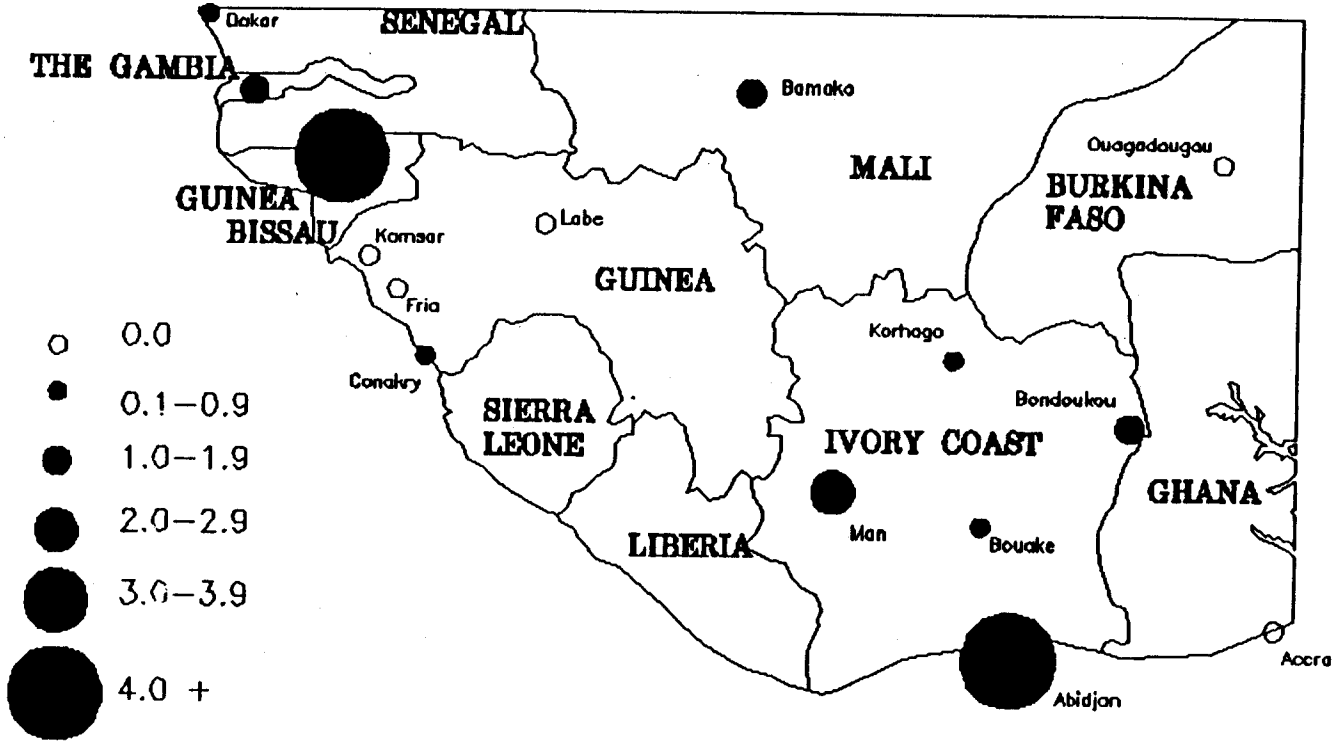


HIV/AIDS Surveillance Data Base
CIR/U.S. Bureau of the Census

Note: The lack of dots does not necessarily mean that there is no HIV in the populations; it means there are no published seroprevalence data for that area.

Map 6

Seroprevalence of HIV-2 for Low-Risk Populations: West Africa

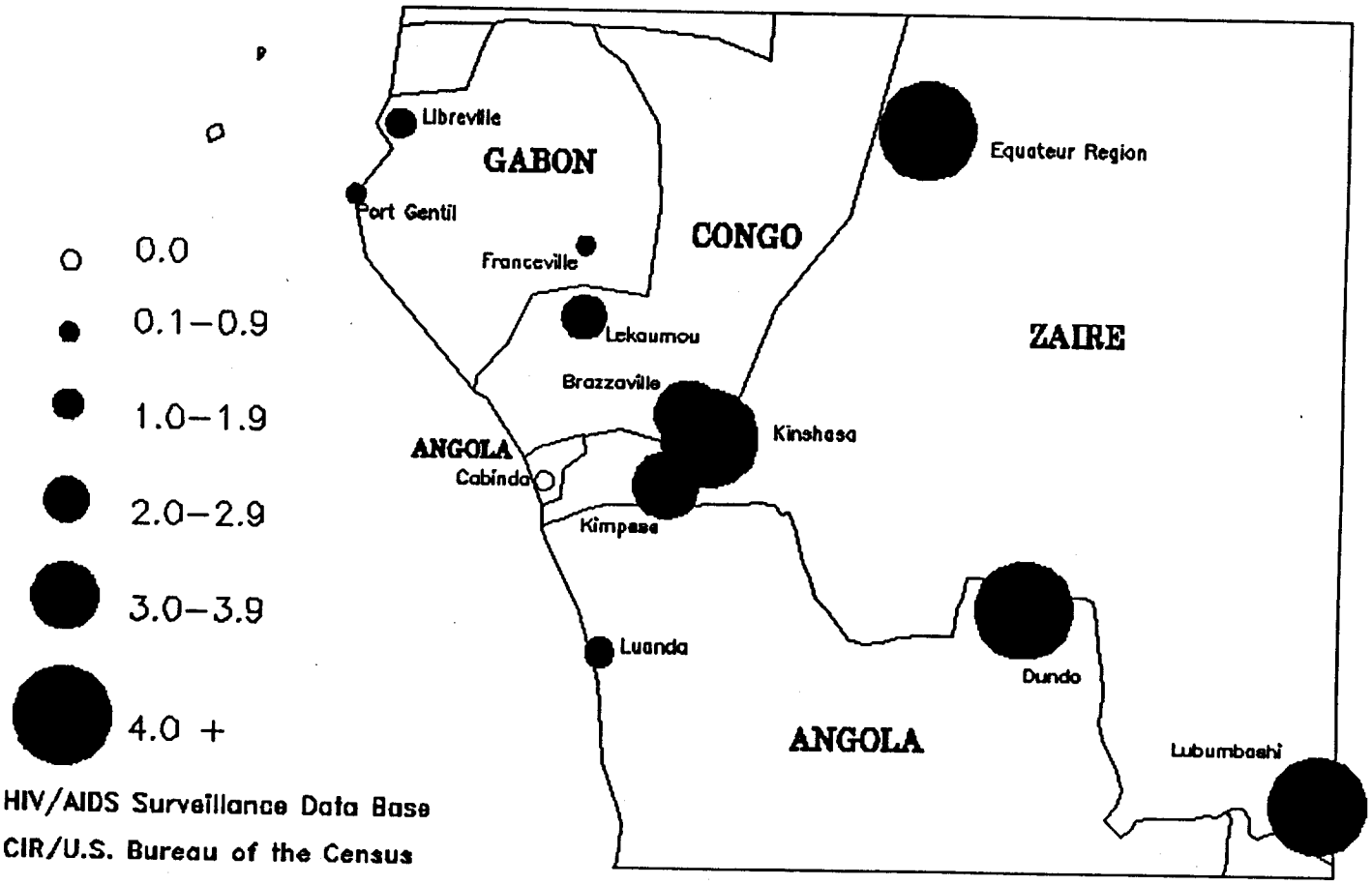


HIV/AIDS Surveillance Data Base
CIR/U.S. Bureau of the Census

Note: The lack of dots does not necessarily mean that there is no HIV in the populations; it means there are no published seroprevalence data for that area.

Map 8

Seroprevalence of HIV-1 for Low-Risk Populations: Central Africa



Note: The lack of dots does not necessarily mean that there is no HIV in the populations; it means there are no published seroprevalence data for that area.

The Congo River Basin

A third concentration of HIV-1 is in the Congo River Basin area, as shown on Map 8. Brazzaville, Kinshasa, and Kimpese all are close together and share the virus. Few surveys have been done upriver. But an obvious question Map 8 raises is whether the HIV-1 concentration in the Congo Basin will spread with the river traffic.

TRENDS IN BLOOD DONOR SEROPREVALENCE OVER TIME

There are, as yet, no long longitudinal surveys of the same people for HIV seroprevalence. Surveillance studies that would do this are just now being fielded by the World Health Organization and others. We do have surveys over time of similar groups of people, such as blood donors. No study of blood donors quoted below, in fact, has followed the same people over any length of time. Therefore, the trends are not necessarily robust, but they may provide an indication of changes that more representative and comprehensive longitudinal surveys in the future can look for.

Data are available from nine African countries that have reported data on the HIV seroprevalence of their blood donors over a span of several years. The details are summarized in Figure 2. For five of the nine countries the trend has been either decreasing or not changing. The decreasing trend may, in fact, be due to one or more factors, including:

-- the testing has improved and gives fewer false positives than it did previously;

-- the blood donors are self-selecting themselves more carefully; and

-- the sample sizes are increasing and becoming more representative of the general donor population.

But the trend also may be real and if so, it would be encouraging. However, the long incubation period for HIV (time between infection and AIDS) suggests that HIV seroprevalence will decline only slowly over time, even if no new infections were taking place.

The two countries where there had been essentially no change in the HIV seroprevalence of blood donors are Ethiopia and Guinea. They had reported little or no seroprevalence in their blood donors in the earlier date, and in 1987-88 they still had little or none.

-- In Bamako, Mali, two large surveys of blood donors were conducted in 1987 and 1988. In the year between the surveys, the HIV-1 seroprevalence increased from 1.7 to 4.1 percent.

-- In Ibadan, Nigeria, HIV-1 seroprevalence increased from 0.0 percent in 1986 to 0.6 percent in 1988.

Most African countries do not have reliable data over time and, therefore, the trends in seroprevalence are unknown. But to the extent that other countries may have undocumented trends similar to Kenya, Tanzania, Mali, and Nigeria, strong steps should be taken to protect the blood supply. Even in a country such as Zaire, where the seroprevalence of HIV in blood donors may be beginning to decline, the donors' seroprevalence is still above the level for the general population and, therefore, is a major public health hazard. [For further discussion and more details on African blood donors, see Torrey, Mulligan, Way, 1990].

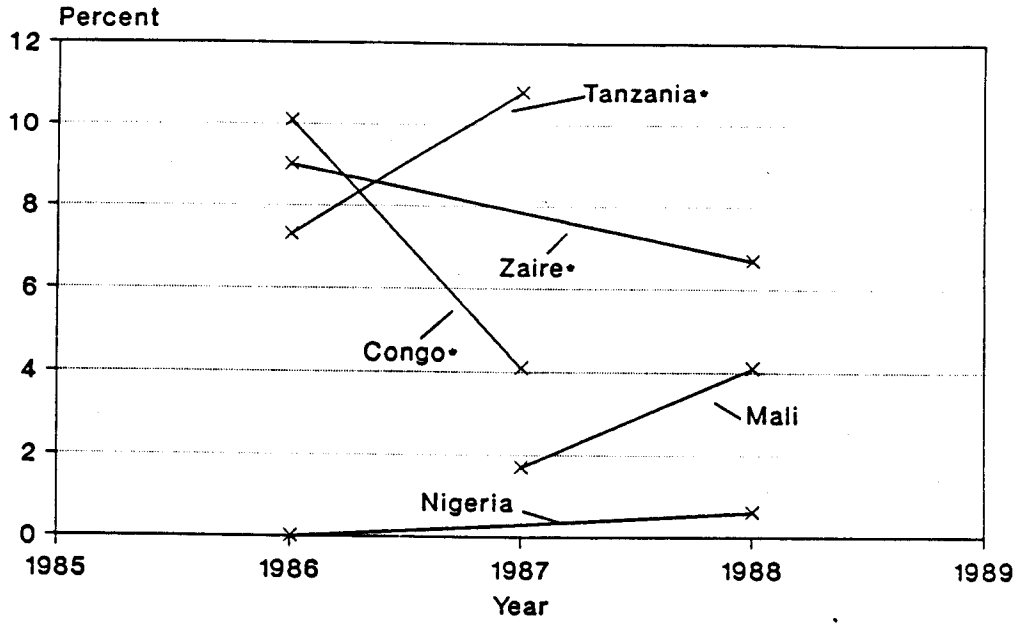
CONCLUSION

The epidemiology of HIV-1 and HIV-2 infection is shifting from a few well-known pockets of the virus to many more towns and villages in Africa. There is, however, some encouragement. The number and quality of HIV surveys now are increasing. A number of countries have tested for the virus in large surveys and have found none; in other places the levels of HIV seroprevalence may not be increasing. Other factors influencing seroprevalence rates need to be studied.

But the present HIV seroprevalence patterns suggest that the full effect of the epidemic has not yet hit the countries where the levels of seroprevalence are high. The projections of the number of people who are today infected who will have AIDS in the future will be a critical step in anticipating the course of the disease. And anticipating its future course will be one of the best ways to contain the AIDS epidemic in Africa.

Figure 2

Trends Over Time in HIV-1 Seroprevalence of Blood Donors



• Statistically significant difference ($p < .05$).

Angola showed a minor decline in the seroprevalence of its male donors. Two other countries showed more important declines:

-- In Congo, seroprevalence went from 10.1 percent in 1986 to 4.0 percent in the 1986-87 period. We have found that in several instances, the larger the sample size, the smaller the estimate of seroprevalence tends to be. But the sample size of 4,387 in 1986 was already considerable, so more than sample size is likely to be needed to explain this substantial and statistically significant decrease.

-- In Kinshasa, Zaire, the decline is less dramatic, but still statistically significant. The estimates are based on large sample sizes and, therefore, also may be signaling an important trend. In 1986, the seroprevalence of donors was 9.0 percent; by 1988, it had dropped to 6.7 percent.

Four countries have surveys of blood donors that suggest that the seroprevalence of blood donors may be continuing to increase:

-- In Tanzania, the seroprevalence rose from an estimated 7.3 percent in 1986 to 10.8 percent in 1986-87.

-- In Kenya, the level of seroprevalence was lower, but the rise from 1.6 to 3.6 percent over a 6-month period in 1987 was striking.

A P P E N D I X A

DETAILED TABLES

Table A-2. HIV-1 and HIV-2 Seroprevalence Rate Among "Low-Risk" Groups, by Age and Sex, for Kinshasa, Zaire and Bissau, Guinea-Bissau

	HIV-1		HIV-2	
	Kinshasa, Zaire--1984-85		Bissau, Guinea-Bissau--1987	
Age group	Male	Female	Male	Female
0 to 0.9 years	8.1	8.1	0.0	0.0
1 to 1.9 years	0.9	1.8	1.0	0.3
2 to 14 years	1.0	1.5		
15 to 19 years	3.7	9.8	0.0	0.0
20 to 29 years	4.4	10.3	3.7	5.0
30 to 39 years	6.8	6.1	11.9	14.7
40 to 49 years	5.0	6.3	16.1	23.8
50 years and over	5.0	1.5	25.6	13.2
Total, all ages	5.3	6.9	4.7	4.6

Sources: Kinshasa, Zaire -- Quinn, Thomas C., J. M. Mann, J. W. Curran, et al., 1986, "AIDS in Africa: An Epidemiologic Paradigm," in Science, Nov. 21, Vol. 234, pp. 955-962.

Bissau, Guinea-Bissau -- Poulsen, A. G., B. Kvinesdal, P. Aaby, et al., 1989, "Prevalence of and Mortality from Human Immunodeficiency Virus Type 2 in Bissau, West Africa," in Lancet, April 15, Vol. 1, No. 8642, pp. 827-830.

Table A-1. Detail Listing for Historical Seroprevalence Rate of HIV-1 and HIV-2 for Selected African Countries

COUNTRY	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TYPE	TYPE OF TEST	SOURCE ID NO.
CHAD	NOT SPECIFIED	1974	STORED SERA	B	ALL	.0	100	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1974	STORED SERA	B	ALL	.0	100	HIV2	ELISA, WB	K0036
GABON	NOT SPECIFIED	1967	STORED SERA	B	ALL	.0	80	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1967	STORED SERA	B	ALL	2.5	80	HIV2	ELISA, WB	K0036
GHANA	NOT SPECIFIED	1977	STORED SERA	B	ALL	.0	896	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1977	STORED SERA	B	ALL	.0	896	HIV2	ELISA, WB	K0036
GUINEA-BISSAU	RURAL AREA	1980	STORED SERA	B	ALL	.0	440	HIV1	ELISA, IFA, WB	F0003
	RURAL AREA	1980	STORED SERA	B	ALL	1.1	440	HIV2	ELISA, IFA, WB	F0003
IVORY COAST	NOT SPEICFIED	1966	STORED SERA	B	ALL	.0	207	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1966	STORED SERA	B	ALL	1.0	207	HIV2	ELISA, WB	K0036
KENYA	NOT SPECIFIED	1969-71	TURKANA TRIBE	B	ALL	.0	126	HIV1	ELISA, WB	C0085
	NOT SPECIFIED	1969-71	TURKANA TRIBE	B	ALL	.0	126	HIV2	ELISA, WB	C0085
	NAIROBI	1976	MOTHERS	F	ALL	.0	95	HIV1	ELISA, WB	K0038
	NAIROBI	1976	MOTHERS	F	ALL	.0	95	HIV2	ELISA, WB	K0038
	NOT SPECIFIED	1981	STUDENTS	B	ALL	.0	300	HIV1	ELISA, WB	W0015
LIBERIA	NOT SPECIFIED	1968-72	STORED SERA MANOTRIBE	B	ALL	.0	60	HIV1	ELISA, WB	S0061
	NOT SPECIFIED	1968-72	STORED SERA MANOTRIBE	B	ALL	.0	60	HIV2	ELISA, WB	S0061
MALI	NOT SPECIFIED	1974	STORED SERA	B	ALL	.0	230	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1974	STORED SERA	B	ALL	.9	230	HIV2	ELISA, WB	K0036
NIGER	NOT SPECIFIED	1974	STORED SERA	B	ALL	.0	95	HIV2	ELISA, WB	K0036
NIGERIA	NOT SPECIFIED	1967	STORED SERA	B	ALL	.0	197	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1967	STORED SERA	B	ALL	.1	197	HIV2	ELISA, WB	K0036
SENEGAL	NOT SPECIFIED	1967	STORED SERA	B	ALL	.0	68	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1967	STORED SERA	B	ALL	.0	68	HIV2	ELISA, WB	K0036
	NOT SPECIFIED	1973	STORED SERA	B	ALL	.0	393	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1973	STORED SERA	B	ALL	.3	393	HIV2	ELISA, WB	K0036
SIERRA LEONE	NOT SPECIFIED	1972	STORED SERA	B	ALL	.0	104	HIV1	ELISA, WB	K0036
	NOT SPECIFIED	1972	STORED SERA	B	ALL	.0	104	HIV2	ELISA, WB	K0036
ZAIRE	KINSHASA	1970	MOTHERS AT WELL-BABY CLINICS	F	ALL	.3	805	HIV	ELISA, IFA, RIPA	J0001
	YAMBUKA AREA	1976	RURAL POP. TESTED FOR EBOLA VIRUS	B	ALL	.8	659	HIV	ELISA, WB	N0017
ZIMBABWE	NOT SPECIFIED	1968-70	STORED SERA KOREKORE TRIBE	B	ALL	.0	84	HIV1	ELISA, WB	S0061
	NOT SPECIFIED	1968-70	STORED SERA	B	ALL	.0	84	HIV2	ELISA, WB	S0061

Table A-3. Estimates of HIV-1 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988-CONT'D

\- No data found
* See table A-4 for HIV-2 data
a Rate represents infection with HIV-1 only and dual infection (HIV-1 & HIV-2), therefore, addition of rates from tables A-3 and A-4 is not advised.
b Data are best available but are not necessarily reliable due to small sample size (<100)
c Data refer to prior to 1986

NOTES:
Definition: High risk -- prostitutes and clients, STD patients, or other persons with known risk factors.
Low risk -- pregnant women, blood donors, or other persons with no known risk factors.

Table A-3. Estimates of HIV-1 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988

REGION AND COUNTRY	CAPTIAL/MAJOR CITY		OUTSIDE MAJOR CITY		URBAN CITY SOURCES		OUTSIDE CITY SOURCES	
	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK
AFRICA								
Algeria	-	-	-	-				
*Angola	1.3a	14.2a	-	-	C0041	S0043		
*Benin	.1	4.5	6.7	-	L0005	Z0007	C0087	
Botswana	.8c	1.2c	.1c	-	O0008	O0008	O0008	
*Burkina Faso	1.7b	16.9a	-	-	K0033	K0033/S0010		
Burundi	16.3	18.5	-	-	S0071	G0003		
*Cameroon	.8	6.9	.4	-	P0042	K0024	K0024	
*Cape Verde	.0	.0	-	-	A0046	B0016		
Central African Rep.	7.4	20.6	3.7	7.9	S0069	G0016	J0005	G0016
Chad	.0	-	.0	-	J0005		J0005	
Comoros	-	-	-	-				
Congo	3.1	34.3b	1.0	-	L0039	M0032	M0080	
*Djibouti	.3	2.7	.0b	-	B0037	C0082	F0017	
Egypt	.0	.0	-	-	W0007	S0005		
*Equatorial Guinea	.3	-	.3	-	J0009		J0009	
Ethiopia	.0	18.2	.0	-	Z0009	Z0010	Z0009	
*Gabon	1.8	-	.8	-	D0027		D0027	
*Gambia, The	.1	1.7a	-	.0b,c	W0027	P0034		M0031
Ghana	.0	25.2	-	-	N0031	M0018		
*Guinea	.6	-	.2	-	K0059		F0018	
*Guinea-Bissau	.1	.0b	.0		A0042	K0033	P0025	
*Ivory Coast	10.5a	23.8a	1.1a	-	O0004	V0002	O0015	
Kenya	2.7	59.2	1.0	-	K0010	V0022	P0011	
Lesotho	.1	-	-	-	S0075			
Liberia	.0	.0b	.0c	-	F0007	M0060	W0015	
Libya	.0	-	-	-	G0034			
*Madagascar	.0	.0b	-	-	C0061	M0030		
Malawi	16.4	55.9	-	-	C0068	G0005		
*Mali	.4	23.0a	-	-	M0054	B0022		
*Mauritania	.0b	.0	-	-	C0093	M0015		
Mauritius	.0	-	-	-	K0026			
Mayotte	-	-	-	-				
*Morocco	.0	.2	-	-	B0009	B0009		
*Mozambique	1.1	2.6	.8	-	D0020	D0016	B0025	
*Namibia	2.5	-	-	-	L0040			
Niger	-	5.8	-	-	B0068			
*Nigeria	.5	4.3a	.0	.5	N0052	A0043	W0028	W0028
Reunion	-	-	-	-				
*Rwanda	30.3	79.8b,c	1.7	-	L0055	C0003	G0029	
St. Helena	-	-	-	-				
*Sao Tome & Principe	.0	-	-	-	L0022			
*Senegal	.4a	2.0a	.0b	-	M0089	K0047	R0002	
Seychelles	-	-	-	-				
*Sierra Leone	3.6a	2.7a	-	-	K0060	A0032		
Somalia	.0	.4	-	-	A0007	O0006		
South Africa	.1	2.5	-	-	C0045	O0020		
Sudan	.0	.0	-	-	H0038	B0021		
Swaziland	.0b,c	.0b	-	-	S0001	S0050		
Tanzania	7.3	38.7	5.4	11.8	B0011	M0050	N0024	N0029
Togo	-	-	-	-				
*Tunisia	.1	1.9	-	-	G0015	G0015		
Uganda	24.3	86.0b	12.3	76.0b	N0048	N0003	K0023	N0003
Western Sahara	-	-	-	-				
Zaire	7.1	37.8	.8	17.7	Q0006	V0022	N0017	V0022
Zambia	11.6	26.2c	-	-	H0028	M0003		
Zimbabwe	3.2c	-	1.4	6.6b	Z0002		M0105	M0105

Table A-5. Detail Listing of Estimates of HIV-1 & 2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988 in Africa

1/90

COUNTRY	RISK AREA	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TESTED	TYPE OF TEST	SOURCE ID NO.
ANGOLA	UL	LUANDA CITY	1989(?)	HEALTHY PERSONS	B	ALL	1.3a	316	HIV1	ELISA, WB	C0041
	UL2	LUANDA CITY	1989(?)	HEALTHY PERSONS	B	ALL	1.3a	316	HIV2	ELISA, WB	C0041
	UH	DUNDO CITY	1988	STD PTS.	B	ALL	14.2a	219	HIV1	ELISA, WB	S0043
	UH2	DUNDO CITY	1988	STD PTS.	B	ALL	13.7a	219	HIV2	ELISA, WB	S0043
BENIN	OL	ZOU PROVINCE	1989(?)	GEN. RURAL POP.	B	ALL	6.7	1936	HIV1	ELISA, WB	C0087
	OL2	ZOU PROVINCE	1989(?)	GEN. RURAL POP.	B	ALL	.9	1936	HIV2	ELISA, WB	C0087
	UL	COTONOU	1986-87	BLOOD DONORS	B	ALL	.1	3478	HIV1	ELISA, WB	L0005
	UH	COTONOU	1987	PROSTITUTES	F	ALL	4.5	133	HIV1	ELISA, WB	Z0007
	UH2	COTONOU	1987	PROSTITUTES	F	ALL	3.7	133	HIV2	ELISA, WB	Z0007
BOTSWANA	OL	NOT SPECIFIED	1984	RURAL POPULATION	B	ALL	.1c	1874	HIV	ELISA	00008
	UL	URBAN AREA	1984(?)	BLOOD DONORS	B	ALL	.8c	6619	HIV	ELISA	00008
	UH	URBAN AREA	1984(?)	STD PTS.	B	ALL	1.2c	500	HIV	ELISA	00008
BURKINA FASO	UL	OUAGADOUGOU	1985-87	PREGNANT WOMEN	F	ALL	1.7b	58	HIV1	WB, RIA	K0033
	UL2	OUAGADOUGOU	1985-87	PREGNANT WOMEN	F	ALL	.0b	58	HIV2	WB, RIA	K0033
	UH	OUAGADOUGOU	1987(?)	PROSTITUTES	F	ALL	16.9a	308	HIV1	WB, RIA	K0033/ S0010
	UH2	OUAGADOUGOU	1985-87	PROSTITUTES	F	ALL	22.8a	308	HIV2	WB, RIA	K0033/ S0010
BURUNDI	UL	BUJUMBURA	1986	PREGNANT WOMEN	F	ALL	16.3	925	HIV	ELISA, IFA/ RIA	S0071
	UH	BUTEZI	1986	STD PTS.	B	ALL	18.5b	65	HIV	ELISA, WB	G0003
CAMEROON	UH	YAOUNDE	1987-88	PROSTITUTES	F	ALL	6.9	523	HIV1	ELISA, WB	K0024
	UL	DOUALA	1988-89	BLOOD DONORS	B	ALL	.8	5406	HIV	ELISA, WB	P0042
	OL2	NOT SPECIFIED	1987	GENERAL POPULATION	B	ALL	.0	4037	HIV2	UNK	G0060
	OL	VARIOUS TOWNS	1988	GENERAL POPULATION	B	ALL	.4	6632	HIV1	ELISA, WB	K0024
CAPE VERDE	UH	PRAIA-SANT ISL	1987	PRISONERS	M	ALL	.0	110	HIV1	ELISA, WB	B0016
	UH2	PRAIA-SANT ISL	1987	PRISONERS	M	ALL	8.2	110	HIV2	ELISA, WB	B0016
	UL	PARIA	1988	GEN. URBAN POP.	B	ALL	.0	900	HIV1	ELISA, WB	A0046
	UL2	PARIA	1988	GEN. URBAN POP.	B	ALL	1.4	900	HIV2	ELISA, WB	A0046
C.A.R.	UL	BANGUI	1989	BLOOD DONORS	B	ALL	7.4	1048	HIV	ELISA, WB	S0069
	UH	BANGUI	1986	PROSTITUTES	F	ALL	20.6	179	HIV	ELISA, WB	G0016
	OH	BOZOUM	1987	PROMISCUOUS IND.	B	ALL	7.9	114	HIV1	ELISA, WB	G0016
	OL	BAMBARI TOWN	1987	GENERAL POPULATION	B	ALL	3.7	374	HIV1	ELISA, WB	J0005
CHAD	UL	N'DJAMENA	1985-86	GENERAL POPULATION	B	ALL	.0	331	HIV1	ELISA, WB	J0005
	OL	BONGOR CITY	1987	GENERAL POPULATION	B	ALL	.0	376	HIV1	ELISA, WB	J0005
CONGO	UL	BRAZZAVILLE	1988	PREGNANT WOMEN	F	ALL	3.1	1406	HIV1	ELISA, WB	L0039
	UH	BRAZZAVILLE	1987	PROSTITUTES	F	ALL	34.3b	67	HIV	ELISA	M0032
	OL	FIVE VILLAGES	1989(?)	GENERAL POPULATION	B	ALL	1.0	526	HIV	ELISA	M0080
DJIBOUTI	UL	DJIBOUTI	1987-88	GENERAL POPULATION	B	ALL	.3	1760	HIV1	ELISA, WB	B0037
	UH	DJIBOUTI	1988	HIGH RISK GROUPS	B	ALL	2.7	599	HIV1	ELISA, IFA, WB	C0082
	UH2	DJIBOUTI	1988	HIGH RISK GROUPS	B	ALL	.0	599	HIV2	ELISA, IFA, WB	C0082
	OL	RANDA VILLAGE	1987	CONTROL-RURAL POP.	B	ALL	.0b	69	HIV	ELISA, WB	F0017
EGYPT	UL	NOT SPECIFIED	1986-87	BLOOD DONORS	B	ALL	.0	5893	HIV	ELISA, WB	W0007
	UH	NOT SPECIFIED	1988(?)	HIGH RISK GROUPS	B	ALL	.0	15000	HIV	ELISA	S0025

Table A-4. Estimates of HIV-2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988

REGION AND COUNTRY	CAPTIAL/MAJOR CITY		OUTSIDE MAJOR CITY		URBAN CITY SOURCES		OUTSIDE CITY SOURCES	
	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK	LOW RISK	HIGH RISK
AFRICA								
*Angola	1.3a	13.7a	-	-	C0041	S0043		
*Benin	-	3.7	.9	-		K0007	C0087	
*Burkina Faso	.0b	22.8a	-	-	K0033	K0033/S0010		
*Burundi	-	-	-	-				
*Cameroon	-	-	.0	-			G0060	
*Cape Verde	1.4	8.2	-	-	A0046	B0016		
*Djibouti	-	.0	-	-		C0082		
*Equatorial Guinea	.0	-	.0	-	J0009		J0009	
*Gabon	.3	-	.0	-	D0027		D0027	
*Gambia, The	1.7	25.6a	-	3.2b,c	W0027	P0034		M0031
*Guinea	.2	-	.0	-	K0059		F0018	
*Guinea-Bissau	6.5	64.1b	4.7	-	A0042	K0033	P0025	
*Ivory Coast	6.5a	17.2a	1.5a	-	O0004	V0002	O0015	
*Madagascar	.0	-	-	-	C0061			
*Mali	1.4	27.4a	-	-	M0054	B0022		
*Mauritania	.0b	.0	-	-	C0093	M0015		
*Morocco	.0	.0b	-	-	B0009	B0009		
*Mozambique	2.2	1.1	-	-	D0020	D0016		
*Namibia	.0	-	-	-	L0040			
*Nigeria	1.2	3.5a	.1	.7	N0052	A0043	W0028	W0028
*Rwanda	.0	-	.0	-	G0029		G0029	
*Sao Tome & Principe	.0	-	-	-	L0022			
*Senegal	.5a	10.5a	.0b	-	M0089	K0047	R0002	
*Sierra Leone	5.0a	1.8a	-	-	K0060	A0032		
*Tunisia	.0	.0	-	-	G0015	G0015		

- No data found
* See table A-3 for HIV-1 data
a Rate represents infection with HIV-2 only and dual infection (HIV-1 & HIV-2), therefore, addition of rates from tables A-3 and A-4 is not advised.
b Data are best available but are not necessarily reliable due to small sample size (<100)
c Data refer to prior to 1986

NOTES:
Definition: High risk -- prostitutes and clients, STD patients, or other persons with known risk factors.
Low risk -- pregnant women, blood donors, or other persons with no known risk factors.

Table A-5. Detail Listing of Estimates of HIV-1 & 2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988 in Africa - cont'd

COUNTRY	RISK AREA	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TESTED	TYPE OF TEST	SOURCE ID NO.
MADAGASCAR	UH	NOT SPECIFIED	1985-86	PROSTITUTES	F	ALL	.0b	58	HIV	UNK	M0030
	UL	TANANARIVE R.	1988	GENERAL POPULATION	B	ALL	.0	448	HIV1	ELISA, WB	C0061
	UL2	TANANARIVE R.	1988	GENERAL POPULATION	B	ALL	.0	448	HIV2	ELISA, WB	C0061
MALAWI	UL	BLANTYRE	1989	PREGNANT WOMEN	F	ALL	16.4	214	HIV	ELISA, WB	C0068
	UH	BLANTYRE	1986	PROSTITUTES	F	ALL	55.9	265	HIV1	ELISA, IFA, WB	G0005
MALI	UL	BAMAKO	1987	PREGNANT WOMEN	F	ALL	.4	573	HIV1	ELISA, IFA	M0054
	UL2	BAMAKO	1987	PREGNANT WOMEN	F	ALL	1.4	573	HIV2	ELISA, IFA	M0054
	UH	BAMAKO	1987	PROSTITUTES	F	ALL	23.0a	230	HIV1	ELISA, RIPA, WB	B0022
	UH2	BAMAKO	1987	PROSTITUTES	F	ALL	27.4a	230	HIV2	ELISA, RIPA WB	B0022
MAURITANIA	UL	NOUAKCHOTT	1987-88	PREGNANT WOMEN	F	ALL	.0b	56	HIV1	ELISA, WB	C0093
	UL2	NOUAKCHOTT	1987-88	PREGNANT WOMEN	F	ALL	.0b	56	HIV2	ELISA, WB	C0093
	UH	NOUAKCHOTT	1986(?)	STD PTS.	B	ALL	.0	149	HIV1	ELISA, WB	M0015
	UH2	NOUAKCHOTT	1986(?)	STD PTS.	B	ALL	.0	149	HIV2	ELISA, WB	M0015
MAURITIUS	UL	NATIONAL	1985-88	GENERAL POPULATION	B	ALL	.0	13487	HIV	WB	K0026
MOROCCO	UL	CASABLANCA	1984-87	BLOOD DONORS	B	ALL	.0	3577	HIV1	ELISA, WB	B0009
	UL2	CASABLANCA	1984-87	BLOOD DONORS	B	ALL	.0	115	HIV2	ELISA, WB	B0009
	UH	CASABLANCA	1984-87	PRISONERS	B	ALL	.2	1312	HIV1	ELISA, WB	B0009
	UH2	CASABLANCA	1984-87	PRISONERS	B	ALL	.0b	42	HIV2	ELISA, WB	B0009
MOZAMBIQUE	UL	MAPUTO CITY	1987	HEALTHY PERSONS	B	ALL	1.1	536	HIV1	ELISA, WB	D0020
	UL2	MAPUTO CITY	1987	HEALTHY PERSONS	B	ALL	2.2	536	HIV2	ELISA, WB	D0020
	UH	MAPUTO CITY	1987	STD PTS.	B	ALL	2.6	190	HIV1	ELISA, WB	D0016
	UH2	MAPUTO CITY	1987	STD PTS.	B	ALL	1.1	190	HIV2	ELISA, WB	D0016
	OL	9 PROVINCES	1987	BLOOD DONORS	B	ALL	.8	2370	HIV1	ELISA, WB	B0025
NAMIBIA	UL	EAST CAPRIVIA	1988(?)	BLACK PERSONS	B	ALL	2.5	708	HIV1	ELISA, WB	L0040
	UL2	EAST CAPRIVIA	1988(?)	BLACK PERSONS	B	ALL	.0	704	HIV2	ELISA, WB	L0040
NIGER	UH	NOT SPECIFIED	1989(?)	PROSTITUTES	F	ALL	5.8	604	HIV	ELISA, WB	B0068
NIGERIA	UH	LAGOS	1988-89	PROSTITUTES	F	ALL	4.3a	117	HIV1	ELISA, WB	A0043
	UH2	LAGOS	1988-89	PROSTITUTES	F	ALL	3.5a	117	HIV2	ELISA, WB	A0043
	OL	BOR/CRO. R. S.	1987-88	BLOOD DONORS	B	ALL	.0	870	HIV1	ELISA, RIPA	W0028
	OL2	BOR/CRO. R. S.	1987-88	BLOOD DONORS	B	ALL	.1	870	HIV2	ELISA, RIPA	W0028
	OH	BOR/CRO. R. S.	1987-88	PROSTITUTES	F	ALL	.5	616	HIV1	ELISA, RIPA	W0028
	OH2	BOR/CRO. R. S.	1987-88	PROSTITUTES	F	ALL	.7	616	HIV2	ELISA, RIPA	W0028
	UL	NOT SPECIFIED	1987-89	GENERAL POPULATION	B	ALL	.5	8000	HIV1	UNK	N0052
	UL2	NOT SPECIFIED	1987-89	GENERAL POPULATION	B	ALL	1.2	8000	HIV2	UNK	N0052
RWANDA	UL	KIGALI	1989	PREGNANT WOMEN	F	ALL	30.3	900	HIV1	ELISA, WB	L0055
	UL2	NATIONAL	1986	GEN. URBAN POP.	B	ALL	.0	1859	HIV2	ELISA, WB	G0029
	OL	NATIONAL	1986	GEN. RURAL POP.	B	ALL	1.7	746	HIV1	ELISA, WB	G0029
	OL2	NATIONAL	1986	GEN. RURAL POP.	B	ALL	.0	746	HIV2	ELISA, WB	G0029
	UH	BUTARE	1983-84	PROSTITUTES	F	ALL	79.8b,c	84	HIV1	ELISA, WB	C0003
SAO TOME & PRIN.	UL	SAO TOME	1988	GENERAL POPULATION	B	ALL	.0	100	HIV1	ELISA, WB	L0022
	UL2	SAO TOME	1988	GENERAL POPULATION	B	ALL	.0	100	HIV2	ELISA, WB	L0022

Table A-5. Detail Listing of Estimates of HIV-1 & 2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988 in Africa - cont'd

COUNTRY	RISK AREA	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TESTED	TYPE OF TEST	SOURCE ID NO.
EQU. GUINEA	OL	NSORK	1986	GEN. RURAL POP.	B	ALL	.3	403	HIV1	ELISA, WB	J0009
	OL2	NSORK	1986	GEN. RURAL POP.	B	ALL	.0	403	HIV2	ELISA, WB	J0009
	UL	BATA	1988	GEN. URBAN POP.	B	ALL	.3	389	HIV1	ELISA, WB	J0009
	UL2	BATA	1988	GEN. URBAN POP.	B	ALL	.0	389	HIV2	ELISA, WB	J0009
ETHIOPIA	UH	ADDIS ABABA	1989(?)	PROSTITUTES	F	ALL	18.2	330	HIV1	ELISA, WB	Z0010
	OL	NOT SPECIFIED	1988(?)	RURAL POPULATION	B	ALL	.0	1000	HIV1	ELISA, WB	Z0009
	UL	NOT SPECIFIED	1989(?)	BLOOD DONORS	B	ALL	.0	3000	HIV1	ELISA, WB	Z0009
GABON	UL	LIBREVILLE	1986	GENERAL POPULATION	B	ALL	1.8	383	HIV1	ELISA, WB	D0027
	UL2	LIBREVILLE	1986	GENERAL POPULATION	B	ALL	.3	383	HIV2	ELISA, WB	D0027
	OL	NGOUNIE PRO.	1986-87	ADULTS RURAL POP.	B	ALL	.8	371	HIV1	ELISA, WB	D0027
	OL2	NGOUNIE PRO.	1986-87	ADULTS RURAL POP.	B	ALL	.0	371	HIV2	ELISA, WB	D0027
GAMBIA	UL	NOT SPECIFIED	1989(?)	ADULTS	B	ALL	.1	4228	HIV1	ELISA, WB	W0027
	UL2	NOT SPECIFIED	1989(?)	ADULTS	B	ALL	1.7	4228	HIV2	ELISA, WB	W0027
	OH	BASSE TOWN	1985	PROSTITUTES	F	ALL	.0b,c	31	HIV1	ELISA, WB	M0031
	OH2	BASSE TOWN	1985	PROSTITUTES	F	ALL	3.2b,c	31	HIV2	ELISA, WB	M0031
	UH	3 UBRAN AREAS	1988-89	PROSTITUTES	F	ALL	1.7a	355	HIV1	ELISA, WB	P0034
	UH2	3 UBRAN AREAS	1988-89	PROSTITUTES	F	ALL	25.6	355	HIV2	ELISA, WB	P0034
GHANA	UL	ACCRA AREAS	1986	BLOOD DONORS	B	ALL	.0	247	HIV	UNK	N0031
	UH	NOT SPECIFIED	1987(?)	PROSTITUTES	F	ALL	25.2	226	HIV	ELISA, IFA, WB	M0018
GUINEA	UL	CONAKRY	1988-89	BLOOD DONORS	B	ALL	.6	1750	HIV1	ELISA, WB	K0059
	UL2	CONAKRY	1988-89	BLOOD DONORS	B	ALL	.2	1750	HIV2	ELISA, WB	K0059
	OL	FRIA	1987-88	BLOOD DONORS	B	ALL	.2	480	HIV1	ELISA, WB	F0018
	OL2	FRIA	1987-88	BLOOD DONORS	B	ALL	.0	480	HIV2	ELISA, WB	F0018
GUINEA-BISSAU	UL	BISSAU	1987-88	PREGNANT WOMEN	F	ALL	.1	3246	HIV1	ELISA, WB	A0042
	UL2	BISSAU	1987-88	PREGNANT WOMEN	F	ALL	6.5	3246	HIV2	ELISA, WB	A0042
	UH	BISSAU	1985-87	PROSTITUTES	F	ALL	.0b	39	HIV1	RIPA, WB	K0033
	UH2	BISSAU	1985-87	PROSTITUTES	F	ALL	64.1a	39	HIV2	RIPA, WB	K0033
	OL	RUR/URB AREAS	1987	GENERAL POPULATION	B	ALL	.0	1329	HIV1	ELISA, WB	P0025
	OL2	RUR/URB AREAS	1987	GENERAL POPULATION	B	ALL	4.7	1329	HIV2	ELISA, WB	P0025
IVORY COAST	UL	ABIDJAN	1987	BLOOD DONORS	B	ALL	10.5a	200	HIV1	ELISA, WB	O0004
	UL2	ABIDJAN	1987	BLOOD DONORS	B	ALL	6.5a	200	HIV2	ELISA, WB	O0004
	UH	ABIDJAN	1987(?)	PROSTITUTES	F	ALL	23.8a	105	HIV1	ELISA, WB	V0002
	UH2	ABIDJAN	1987(?)	PROSTITUTES	F	ALL	17.2a	105	HIV2	ELISA, WB	V0002
	OL	RURAL AREAS	1987	HEALTHY POPULATION	B	ALL	1.1a	458	HIV1	ELISA, WB	O0015
	OL2	RURAL AREAS	1987	HEALTHY POPULATION	B	ALL	1.5a	458	HIV2	ELISA, WB	O0015
KENYA	UL	NAIROBI	1987	PREGNANT WOMEN	F	ALL	2.7	2910	HIV	ELISA, WB	K0010
	UH	NAIROBI	1989(?)	PROSTITUTES	F	ALL	59.2	125	HIV1	ELISA, IFA, WB	V0022
	OL	KITALE AREA	1986	ADULTS	B	ALL	1.0	101	HIV	ELISA, WB	P0011
LESOTHO	UL	NOT SPECIFIED	1988	GENERAL POPULATION	B	ALL	.1	3000	HIV1	UNK	S0075
LIBERIA	UH	MONROVIA	1987	PROSTITUTES	F	ALL	.0b	30	HIV	ELISA, WB	M0060
	UL	NIMBA	1987	BLD DONORS - VOL	B	ALL	.0	326	HIV1	ELISA	F0007
	OL	RURAL AREA	1976-84	VILLAGES	B	ALL	.0c	935	HIV1	IFA	W0015
LIBYA	UL	BENGHAZI CITY	1986-87	BLOOD DONORS	M	ALL	.0	1890	HIV1	ELISA	G0034

Table A-5. Detail Listing of Estimates of HIV-1 & 2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988 in Africa - cont'd

a Figure shown includes co-infection of HIV1 & HIV2 and should not therefore be combined with other figures.
b Data are best available but are not necessarily reliable due to small sample size (<100).
c Data refer to prior to 1986.

Risk Area Codes:
UL -- Urban low risk
UH -- Urban high risk
OL -- Outside city low risk
OH -- Outside city high risk
2 -- Data for HIV2

Table A-5. Detail Listing of Estimates of HIV-1 & 2 Seroprevalence by Residence and Risk Factor, for Developing Countries: Circa 1988 in Africa - cont'd

COUNTRY	RISK AREA	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TESTED	TYPE OF TEST	SOURCE ID NO.
SENEGAL	UH	DAKAR	1989	PROSTITUTES	F	ALL	2.0a	1394	HIV1	UNK	K0047
	UH2	DAKAR	1989	PROSTITUTES	F	ALL	10.5a	1394	HIV2	UNK	K0047
	UL	NOT SPECIFIED	1989(?)	BLOOD DONORS	B	ALL	.4a	1359	HIV1	WB	M0089
	UL2	NOT SPECIFIED	1989(?)	BLOOD DONORS	B	ALL	.5a	1359	HIV2	WB	M0089
	OL	CASAMANCE AREA	1986-87	RURAL POPULATION	B	ALL	.0b	73	HIV1	WB	R0002
	OL2	CASAMANCE AREA	1986-87	RURAL POPULATION	B	ALL	.0b	73	HIV2	WB	R0002
SIERRA LEONE	UL	FREETOWN	1987-89	BLOOD DONORS	B	ALL	3.6a	285	HIV1	ELISA, WB	K0060
	UL2	FREETOWN	1987-89	BLOOD DONORS	B	ALL	5.0a	285	HIV2	ELISA, WB	K0060
	UH	FREETOWN	1988	STD CLINIC PTS.	B	ALL	2.7a	332	HIV1	ELISA, WB	A0032
	UH2	FREETOWN	1988	STD CLINIC PTS.	B	ALL	1.8a	332	HIV2	ELISA, WB	A0032
SOMALIA	UL	MOGADISHU	1986-87	BLOOD DONORS	B	ALL	.0	745	HIV	ELISA, WB	A0007
	UH	URBAN AREAS	1986-87	PROSTITUTES	F	ALL	.4	287	HIV	ELISA, WB	O0006
SOUTH AFRICA	UL	NOT SPECIFIED	1987(?)	PREGNANT WOMEN	F	ALL	.1	37920	HIV	UNK	C0045
	UH	DURBAN	1988-89	STD CLINIC PTS.	B	ALL	2.5	2461	HIV	UNK	O0020
SUDAN	UL	NOT SPECIFIED	1989(?)	BLOOD DONORS	B	ALL	.0	20000	HIV	UNK	H0038
	UH	PORT SUDAN CIT.	1988(?)	PROSTITUTES	F	ALL	.0	176	HIV	ELISA, WB	B0021
SWAZILAND	UL	NOT SPECIFIED	1985(?)	VARIOUS GROUPS	B	ALL	.0b,c	22	HIV1	ELISA, IFA	S0001
	UH	NOT SPECIFIED	1986-87	PROSTITUTES	F	ALL	.0b	87	HIV	ELISA, WB	S0050
TANZANIA	UL	DAR ES SALAAM	1986	BLOOD DONORS	B	ALL	7.3	535	HIV1	ELISA, WB	S0011
	UH	DAR ES SALAAM	1988	BARMAIDS	F	ALL	38.7	222	HIV	UNK	M0050
	OH	ARUSHA REGION	1988	BARMAIDS	F	ALL	11.8	532	HIV	UNK	N0029
	OL	NORTHERN ZONE	1987(?)	HEALTHY PERSONS	B	ALL	5.4	1861	HIV1	ELISA, WB	N0024
TUNISIA	UL	NOT SPECIFIED	1986-87	BLOOD DONORS	B	ALL	.1	1472	HIV1	ELISA, WB	G0015
	UL2	NOT SPECIFIED	1986-87	BLOOD DONORS	B	ALL	.0	1472	HIV2	ELISA, WB	G0015
	UH	NOT SPECIFIED	1985-87	PROSTITUTES	F	ALL	1.9	373	HIV1	ELISA, WB	G0015
	UH2	NOT SPECIFIED	1985-87	PROSTITUTES	F	ALL	.0	373	HIV2	ELISA, WB	G0015
UGANDA	UL	KAMPALA	1989	PREGNANT WOMEN	F	ALL	24.3	497	HIV	ELISA	N0048
	OH	LYANTONDE	1987(?)	PROSTITUTES	F	ALL	76.0	N/A	HIV	UNK	N0003
	UH	RAKAI DISTRICT	1987(?)	PROSTITUTES	F	ALL	86.0	N/A	HIV	UNK	N0003
	OL	MPIGI DISTRICT	1987	ADULTS	B	ALL	12.3	4000	HIV	UNK	K0023
ZAIRE	UL	KINSHASA	1988(?)	BLOOD DONORS	B	ALL	7.1	1600	HIV	ELISA, WB	Q0006
	UH	KINSHASA	1989(?)	PROSTITUTES	F	ALL	37.8	500	HIV	ELISA, IFA/ WB	V0022
	OH	EQUATEUR REG.	1989(?)	PROSTITUTES	F	ALL	17.7	124	HIV1	ELISA, IFA/ WB	V0022
	OL	YAMBUKU AREA	1986	HEALTHY PERSONS	B	ALL	.8	388	HIV	UNK	N0017
ZAMBIA	UL	LUSAKA	1987	PREGNANT WOMEN	F	ALL	11.6	1954	HIV1	ELISA, WB	H0028
	UH	LUSAKA	1985	STD CLINIC PTS.	M	ALL	26.2c	122	HIV	ELISA, WB	M0003
ZIMBABWE	UL	HARARE	1985	BLOOD DONORS	B	ALL	3.2c	711	HIV	ELISA	Z0002
	OL	RURAL AREA	1987	PREGNANT WOMEN	F	ALL	1.4	139	HIV1	ELISA, IFA WB	M0105
	OH	RURAL AREA	1987	STD PTS.	M	ALL	6.6b	61	HIV1	ELISA, IFA, WB	M0105

Table A-6. Detail Listing for HIV Seroprevalence Rate of Military and "Low-Risk" Groups for Selected African Countries

COUNTRY	GEOGRAPHIC AREA	YEAR	SUBGROUP POPULATION	SEX	AGE	PREV. RATE	SIZE OF SAMPLE	VIRUS TESTED	TYPE OF TEST	SOURCE ID NO.
ANGOLA	LAUNDA CITY	1987(?)	ARMY PERSONNEL	M	ALL	3.8	105	HIV1	ELISA, WB	F0010
	LAUNDA CITY	1987(?)	ARMY PERSONNEL	M	ALL	1.9	105	HIV1&2	ELISA, WB	F0010
	LAUNDA CITY	1987(?)	ARMY PERSONNEL	M	ALL	4.8	105	HIV2	ELISA, WB	F0010
	LAUNDA CITY	1987(?)	HEALTHY PERSONS	M	ALL	0.0	86	HIV1	ELISA, WB	F0010
	LAUNDA CITY	1987(?)	HEALTHY PERSONS	M	ALL	2.3	86	HIV2	ELISA, WB	F0010
	CABINDA DIST.	1986	SOLDIERS AT FRONTIER STATION	B	ALL	0.0	19	HIV1	ELISA, WB	B0039
	CABINDA DIST.	1986	SOLDIERS AT FRONTIER STATION	B	ALL	0.0	19	HIV2	ELISA, WB	B0039
	CABINDA DIST.	1986	HEALTHY VILLAGERS	B	ALL	0.0	40	HIV1	ELISA, WB	B0039
	CABINDA DIST.	1986	HEALTHY VILLAGERS	B	ALL	0.0	40	HIV2	ELISA, WB	B0039
	DUNDO TOWN	1987	MILITARY PERSONNEL	M	ALL	1.9	54	HIV1	ELISA, WB	A0029
	DUNDO TOWN	1987	MILITARY PERSONNEL	M	ALL	13.0	54	HIV2	ELISA, WB	A0029
	DUNDO TOWN	1987	PREGNANT WOMEN	F	ALL	6.8	44	HIV1	ELISA, WB	A0029
	DUNDO TOWN	1987	PREGNANT WOMEN	F	ALL	4.5	44	HIV1&2	ELISA, WB	A0029
	DUNDO TOWN	1987	PREGNANT WOMEN	F	ALL	6.8	44	HIV2	ELISA, WB	A0029
CAPE VERDE	PRAIA-SANTIAGO ISL.	1987(?)	SOLDIERS	F	ALL	0.0	93	HIV1	ELISA, WB	B0016
	PRAIA-SANTIAGO ISL.	1987(?)	SOLDIERS	F	ALL	2.2	93	HIV2	ELISA, WB	B0016
ETHIOPIA	ALL REGIONS	1985-86	MILITARY RECRUITS	B	ALL	0.1	5270	HIV	ELISA, WB	H0013
GUINEA	CONAKRY	1986	MILITARY RECRUITS	M	ALL	0.0	110	HIV1	ELISA, WB	K0012
	CONAKRY	1986	MILITARY RECRUITS	M	ALL	0.0	110	HIV2	ELISA, WB	K0012
	CONAKRY	1985-87	HEALTHY POPULATION	B	ALL	0.0	90	HIV1	RIPA, WB	K0033
	CONAKRY	1985-87	HEALTHY POPULATION	B	ALL	0.0	90	HIV2	RIPA, WB	K0033
GUINEA-BISSAU	NATIONAL	1986-87	MILITARY PERSONNEL	M	ALL	0.0	238	HIV1	ELISA, WB	C0008
	NATIONAL	1986-87	MILITARY PERSONNEL	M	ALL	1.7	238	HIV1&2	ELISA, WB	C0008
	NATIONAL	1986-87	MILITARY PERSONNEL	M	ALL	10.1	238	HIV2	ELISA, WB	C0008
	RURAL/URBAN AREAS	1987	GENERAL POPULATION	B	ALL	0.0	1329	HIV1	ELISA, WB	P0025
	RURAL/URBAN AREAS	1987	GENERAL POPULATION	B	ALL	4.7	1329	HIV2	ELISA, WB	P0025
SUDAN	SIX CITIES	1987-88	SOLDIERS	M	ALL	1.7	773	HIV1	UNK	M0072
UGANDA	NATIONAL	1987	UGANDA ARMY	M	ALL	33.3	N/A	HIV	UNK	E0001
	EAST ACHOLI DIST.	1986	SOLDIERS	B	ALL	16.5	79	HIV	ELISA, WB	D0032
	EAST ACHOLI DIST.	1986	VILLAGE POPULATION	B	ALL	13.8	246	HIV	ELISA, WB	D0009

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