

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

NATIONAL AIDS CONTROL PROGRAMME

HIV/AIDS/STD SURVEILLANCE

REPORT NO.9, December, 1994

Epidemiology Unit, NACP
Dar es Salaam
Issued in April, 1995

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1. Acknowledgements

We would like to thank all health workers, who have promptly provided us with data on HIV, AIDS and STDs and thus enabled us to compile this epidemiological report. The National AIDS Control Programme (NACP) recognizes the important role played by various health personnel in obtaining such data which are indispensable in the control of the epidemic. In order to facilitate timely production of this report in future, the programme strongly urges for continued interest and efforts in properly filling the appropriate forms, compiling routinely collected data and submitting them promptly for analysis, compilation and subsequent report writing.

Preparation of the report

This report was prepared by the Epidemiology Unit of the National AIDS Control Programme (NACP) of the Ministry of Health in Collaboration with the Department of Epidemiology/Biostatistics, Institute of Public Health, Muhimbili University College of Health Sciences.

Distribution of the report

This report is produced and distributed for use by those who helped to provide the information therein so that they can see for themselves the outcome of their efforts. In addition the report is intended for use by all service providers, social scientists, health professionals, students of the health sciences and sectors as well as individuals and agencies collaborating in AIDS work. The following are already on our mailing list for regular distribution.

- All Medical Officers in charge of hospitals
- All District Medical Officers
- All District AIDS Control Co-ordinators
- All Regional Medical Officers
- All Regional AIDS Control Co-ordinators
- All departments, Ministry of Health
- All Units, National AIDS Control Programme
- All donor agencies
- All members of the Sectoral Technical AIDS Committees
- All members of the NACP committees and sub-committees
- All members of the National AIDS Committees

Important message to readers

In the course of writing this report errors may have arisen as a result of transcription or incorrect recording of information. Please report any such errors promptly so that they can be rectified before the next report.

2. Abbreviations and acronyms

3. Acknowledgements

AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical and Research Foundation
HIV	Human Immunodeficiency Virus
M:F	Male to female ratio
MOH	Ministry of Health
NACP	National AIDS Control Programme
RPR	Rapid Plasma Reagins
STDs	Sexually Transmitted Diseases
TPHA	<i>Treponema Pallidum</i> Haemogglutination Assay
VDR	Venereal Disease Research Laboratory
WHO	World Health Organization
WHO/GPA	World Health Organization/Global Programme on AIDS

This report was developed by the National AIDS Control Programme (NACP) in collaboration with the Ministry of Health, Muhimbili University College of Health Sciences, Institute of Public Health, Muhimbili University College of

Health Sciences, and the National AIDS Control Committee. It is addressed to the Ministry of Health, Muhimbili University College of Health Sciences, and the National AIDS Control Committee. It is addressed to the Ministry of Health, Muhimbili University College of Health Sciences, and the National AIDS Control Committee. It is addressed to the Ministry of Health, Muhimbili University College of

All Medical Officers in charge of hospitals
All District Medical Officers
All District AIDS Control Co-ordinators
All Radiological Medical Officers
All Radiological AIDS Control Co-ordinators
All Radiologists, Ministry of Health
All Units, National AIDS Control Programme
All donor agencies
All members of the Sectoral Technical AIDS Committees
All members of the NACP Sectoral Committees and sub-committees

Important message to readers
In the course of writing this report many issues arise as a result of financection
or ignorance of concepts of virology. Please accept such simple errors below so that
they can be rectified before posting the next report.

3. Executive summary

AIDS Case reports

The first three AIDS cases in Tanzania were reported in 1983 in the Kagera Region. Since then, cases have continued to increase and by 1986 all regions of the country had reported the existence of AIDS cases. By the end of 1991 a cumulative total of 34,208 cases had been reported and by the end of 1992 the cumulative number of cases had reached 42,884 with a doubling time of 19 months. By December, 1994 a cumulative total of 53,247 cases had been reported to the NACP. However, these astronomical numbers of AIDS cases simply indicate the increasing trend but do not reflect the real situation in terms of the true number of cases. It has been estimated that only one out of 4-6 AIDS cases are reported in the country due to problems of AIDS diagnosis in many health care facilities. Thus, the total number of estimated cumulative AIDS cases in Tanzania is about 250,000. Late reporting by the regions to the NACP also contributes to the figures in this report not reflecting the reality in terms of accuracy. This report includes, for example, some 8,061 AIDS cases which were previously reported but had not been shown in previous reports.

Most affected regions

During 1994 the Dar es Salaam region continued to report the highest number of AIDS cases in the country even after taking into account the population size. Regions following Dar es Salaam in the number of reported cases were Mbeya and Kagera in that order. The three regions have kept the same positions in the order of reporting high numbers of AIDS cases for the last three consecutive reports.

HIV infection rates

Data on HIV infection rates have been obtained through ante-natal clinics, blood donors and surveys involving selected populations. The HIV-1 prevalence from ante-natal clinic data has been shown to range from 5.1% to 27.5% and is taken to be fairly representative of the respective catchment populations. However, due to donor selection, data from blood donors have increasingly under-estimated the prevalence of HIV infection in the general population. During 1994 blood donor data showed that 6.9% of the adult male population and 4.8% of the adult female population were HIV infected. This is the first time that HIV prevalence among female blood donors is observed to be less than that in the males. In the previous years HIV prevalence in blood donors has been higher in females. Thus, based on age-adjusted blood donor prevalence, the estimated total number of HIV infections in mainland Tanzania in 1994 is about 800,000.

Orphans

Orphans resulting from the death of one or both parents from AIDS constitute a significant social problem in the Tanzanian society today. NACP defines orphans as those children aged below 18 years who have lost one or both parents. At present the national estimate stands at 150,000 orphans. The majority of these orphans are in the Kagera region where more than 70,000 orphans have been reported..

Projections

It has been estimated that by the year 2000 there will be about 800,000 AIDS cases in Tanzania if the current rate of infection continues. At that time there will be about three times as many persons infected by the HIV as the number of AIDS cases (i.e. 2,400,000). The number of orphans will also be approaching that of AIDS cases.

4. Introduction

This report covers the status of the HIV/AIDS epidemic in mainland Tanzania until December, 31st 1994 and provides an overview of the situation with updated figures since the eighth report of June, 1994. The report therefore supersedes all previous reports of the NACP activities since its first report in 1989.

Since the first reported AIDS cases in Kagera in 1983 the HIV/AIDS epidemic has been on the increase in the country affecting mainly the sexually active populations of both sexes as well as children born of infected mothers. By 1986 all regions of the country had reported the existence of AIDS cases and by the end of 1991 a cumulative total of 34,208 cases had been reported to the NACP. The cumulative totals by the end of 1992 and 1994 were 42,884 and 53,247 respectively. This astronomical increase in the number of cases since 1983 is an indication of the increasing trend in AIDS cases but does not reflect the real situation in terms of the true number of cases. This discrepancy is due to problems of AIDS diagnosis brought about by a general lack of facilities for the diagnosis of AIDS in most rural hospitals. As a result, access to health care facilities which can establish AIDS diagnosis is limited to a small fraction of the population.

Until there is more reliable information regarding the existence of HIV-2 infection in Tanzania the NACP assumes that all AIDS cases and HIV infections are due to HIV-1 infection. This is because the existence of HIV-2 in Tanzania has not yet been confirmed. The only published report on HIV-2 in Tanzania suggested that HIV-2 infection existed in north western Tanzania in 1989. Ever since no further HIV-2 reports despite continuing surveillance for HIV-2. Although it is possible that unrecognized HIV-2 infection might be present in Tanzania its prevalence is probably too low to be easily detected. The closeness of Tanzania to neighbouring countries where there have been reports of HIV-2 detection places the country at risk of HIV-2 infections as well.

In Tanzania, like in most of the sub-Saharan Africa, transmission of HIV infection is predominantly heterosexual, accounting for over 90% of the cases. Vertical transmission, which in most cases is also a result of the mother having been infected through sexual exposure, is emerging as an important mode of transmission as more and more infected mothers become pregnant and subsequently infect their babies. Although blood, blood products and injections may have accounted for a substantial amount of HIV transmission in Tanzania, this situation is being brought under control as blood screening facilities for HIV infection become more widely available, reliable and affordable than they have been in the past.

5. The Tanzanian AIDS situation in a global context

A total of 1,025,073 cumulative AIDS cases in adults and children have been reported to WHO as of 31st December, 1994 since the onset of the pandemic in 1981. This is a 20% increase from the 851,628 cumulative cases reported until 31st December, 1993.

The distribution of the HIV/AIDS epidemic by geographical area is shown in Table 1 below:

Table 1

Global distribution of estimated HIV infections, reported and estimated adult AIDS cases

Area	Estimated HIV infections ¹	Reported AIDS Cases ¹	Estimated AIDS Cases ¹
Africa	> 11,100,000	347,713 (34%)	>3,150,000
Americas	>3,000,000	526,682 (51%)	>810,000
Asia	> 3,050,000	17,057 (2%)	>270,000
Europe	> 550,000	127,886 (12.5%)	>180,000
Australasia & Pacific	>25,000	4,828(0.5%)	>45,000
Total	18,000,000	1,025,073	>4,500,000
Tanzania	> 800,000	53,247	>250,000

1) Weekly Epidemiological Review *(Jan. 1995) vol. 70, 5-12

Note: The number of reported AIDS cases for mainland Tanzania cannot be compared directly to the other figures, as date and completeness of reporting may differ.

From Table 1 we note that so far the Americas have contributed more than 50% of the reported AIDS cases, while Africa accounts for a little more than one third of the reported cases. This is mainly because reporting of AIDS cases in Africa has generally been delayed or is incomplete.

6. AIDS case reporting

Method of case reporting

Each region in the country is issued with a pad containing sets of forms on which all cases of AIDS should be reported. The pads issued are region and hospital specific to avoid double reporting of cases. All filled forms returned and submitted to the epidemiology unit of the NACP are compiled and prepared for data entry and analysis. When this method of reporting became well established in 1990 information on various personal and demographic characteristics of AIDS patients has enriched our data base. Previous to this period, only numbers of AIDS cases were being reported and hence where analysis of personal and demographic characteristics has been presented in this report such cases have been excluded.

Time trend and spatial distribution of AIDS cases

Since the last report of June, 1994 (Report No. 8), a total of 10,825 AIDS cases have been reported to the NACP of the Ministry of Health from the regions, bringing the cumulative total to 53,247 AIDS cases as per December, 31st 1994.

The cumulative number of AIDS cases by region and year, and the cumulative case rate (Number of cases per 100,000 population) are shown in Table 2a Table 2b. The tables also show the doubling time in months, the regional population estimates and the ranking of the regions according to the AIDS case rates. The doubling time between 1992 and 1993 was 51 months, while between 1993 and 1994 the doubling time was 156 months, suggesting a slower growth of AIDS cases during the later period.

Table 2 (a) Cumulative AIDS cases by region and year, 1983-89

Region	YEAR							AIDS Rate
	1983	1984	1985	1986	1987	1988	1989	
Arusha	0	0	0	10	47	217	429	
Coast	0	0	1	4	79	224	413	
Dar es Salaam	0	0	51	471	1,470	3,093	5,203	
Dodoma	0	0	0	7	47	105	247	
Iringa	0	0	1	3	68	305	374	
Kagera	3	106	322	847	1,665	2,142	2,543	
Kigoma	0	0	0	3	50	109	243	
Kilimanjaro	0	1	8	36	207	455	570	
Lindi	0	0	0	1	9	45	111	
Mara	0	0	0	3	30	99	139	
Mbeya	0	0	0	16	208	747	1,042	
Morogoro	0	0	0	11	88	247	339	
Mtwa	0	0	1	5	23	95	173	
Mwanza	0	0	15	54	171	448	644	
Rukwa	0	0	0	1	5	90	94	
Ruvuma	0	0	0	20	45	76	187	
Shinyanga	0	0	0	8	31	144	227	
Singida	0	0	0	6	74	197	284	
Tabora	0	2	5	6	59	232	510	
Tanga	0	0	0	13	80	210	335	
TANZANIA	3	109	404	1,525	4,456	9,280	14,107	
Doubling time (in months)		2	6	6	8	11	20	

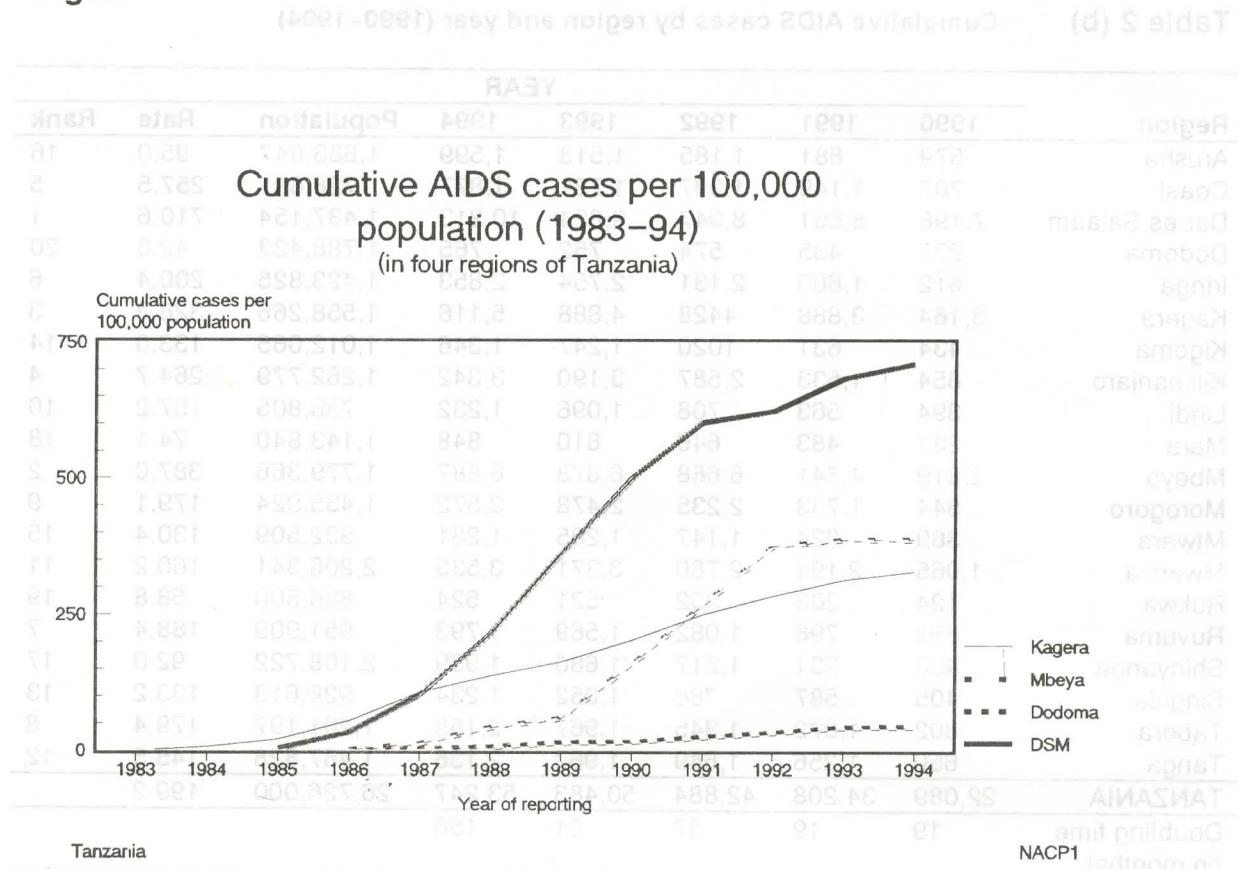
NB: Any differences in figures from previous reports may be attributed to updates resulting from late reporting of cases.

Table 2 (b) Cumulative AIDS cases by region and year (1990–1994)

Region	YEAR					Population	Rate	Rank
	1990	1991	1992	1993	1994			
Arusha	579	881	1,185	1,513	1,599	1,683,047	95.0	16
Coast	707	1,149	1,397	1,721	1,877	728,881	257.5	5
Dar es Salaam	7,196	8,651	8,947	9,824	10,213	1,437,154	710.6	1
Dodoma	277	435	574	752	765	1,788,423	42.8	20
Iringa	612	1,660	2,131	2,754	2,853	1,423,825	200.4	6
Kagera	3,164	3,888	4,428	4,888	5,116	1,558,266	328.3	3
Kigoma	434	631	1,020	1,247	1,346	1,012,065	133.0	14
Kilimanjaro	854	1,533	2,587	3,190	3,342	1,262,779	264.7	4
Lindi	394	563	708	1,096	1,232	736,805	167.2	10
Mara	237	483	646	810	848	1,143,840	74.1	18
Mbeya	2,819	4,741	6,668	6,878	6,887	1,779,366	387.0	2
Morogoro	544	1,733	2,235	2,478	2,572	1,435,924	179.1	9
Mtwara	369	824	1,147	1,205	1,281	982,509	130.4	15
Mwanza	1,065	2,191	2,780	3,371	3,535	2,206,341	160.2	11
Rukwa	124	203	352	521	524	890,500	58.8	19
Ruvuma	394	796	1,082	1,569	1,793	951,909	188.4	7
Shinyanga	463	931	1,217	1,680	1,939	2,108,722	92.0	17
Singida	405	587	786	1,052	1,234	926,613	133.2	13
Tabora	802	1,072	1,345	1,967	2,155	1,201,197	179.4	8
Tanga	650	1,256	1,649	1,967	2,136	1,467,828	145.5	12
TANZANIA	22,089	34,208	42,884	50,483	53,247	26,726,000	199.2	
Doubling time (in months)	19	19	37	51	156			

NB: The total populations by regions have been projected using a constant exponential growth model with an annual growth rate of 2.8%.

Figure 1 shows the case rate over the years for four selected regions namely, Dar es Salaam, Dodoma, Mbeya and Kagera. Dodoma has been selected on the basis of reporting the lowest numbers of cases while the other three have been reporting the highest numbers. The data are believed to reflect the real trend of AIDS cases, although the absolute numbers are assumed to be a factor of about 5 times higher, due to under-reporting, under-diagnosis and delays in reporting. Given the large pool of HIV infections already existing in the population as well as future infections that might occur in the years to come, a rapidly increasing number of AIDS cases will continue to be documented up to and beyond the year 2000.

Figure 1

Distribution of AIDS Cases by Age and Sex

Of the AIDS cases reported so far, age and sex variables were recorded for 31,247 cases between 1987 and 1994. The overall cumulative case rate was 118.3 per 100,000 population. The rate was 121.3 per 100,000 for men and 115.6 per 100,000 for women. The highest case rates of over 500 per 100,000 are seen in the age group 30–34 years among men and over 400 per 100,000 in the same age group among women. Table 3 shows that children aged 10–14 years had the lowest case rates (3.2 per 100,000 for boys and 4.2 per 100,000 for girls). The male/female ratio is 0.99. Taking into account that the general population has an excess of females, and that the age distribution is slightly different between males and females, the age adjusted M/F ratio is 1.16. The M/F ratio of AIDS cases is expected to decrease further, if the ratio of HIV infection among blood donors remains persistently below 1.

Table 3
Distribution of cumulative AIDS cases by age and sex, 1987 – 1994

Age	Number	Male			Female			Total				
		%	Population	Rate	Number	%	Population	Rate	Number	%	Population	Rate
0–4	787	5.1	220,003	35.7	681	4.3	223,4175	30.5	1468	4.7	443,6178	33.1
5–9	85	0.5	206,580	4.1	118	0.8	206,089	5.7	203	0.6	412,7890	4.9
10–14	56	0.4	176,0477	3.2	73	0.5	175,3289	4.2	129	0.4	351,3766	3.7
15–19	251	1.6	140,8735	17.8	946	6.0	148,9779	63.5	1197	3.8	289,8514	41.3
20–24	1322	8.5	94,6579	139.7	3378	21.5	120,3534	280.7	4700	15.0	215,0113	218.6
25–29	3255	20.9	91,7685	354.7	4280	27.3	109,2613	391.7	7535	24.1	201,0298	374.8
30–34	3614	23.3	66,7393	541.5	3079	19.6	75,0724	410.1	6693	21.4	141,8117	472.0
35–39	2564	16.5	59,5867	430.3	1697	10.8	64,7049	262.3	4261	13.6	124,2916	342.8
40–44	1674	10.8	42,3536	395.2	766	4.9	48,3323	158.5	2440	7.8	90,6859	269.1
45–49	975	6.3	40,8215	238.8	382	2.4	42,1928	90.5	1357	4.3	83,0143	163.5
50–54	510	3.3	32,9083	155.0	175	1.1	37,7173	46.4	685	2.2	70,6256	97.0
55–59	239	1.5	27,5305	86.8	70	0.4	26,0509	26.9	309	1.0	53,5814	57.7
60–64	133	0.9	23,3280	57.0	41	0.3	26,6727	15.4	174	0.6	50,0007	34.8
65+	79	0.5	58,5727	13.5	17	0.1	54,3095	3.1	96	0.3	112,8822	8.5
Total	15,544	100.0	12,819,690	121.3	15,703	100.0	13,586,010	115.6	31,247	100.0	26,405,690	118.3
Unknown	461	3.0 % of the total			458	2.9 % of the total			919	2.9 % of the total		
Total	16,005		124,8	16,161			119,0		32,166		121.8	

M:F case ratio

M:F rate ratio

M:F rate ratio (age-adjusted)

16,005/16,161

124,8/119,0

0.99

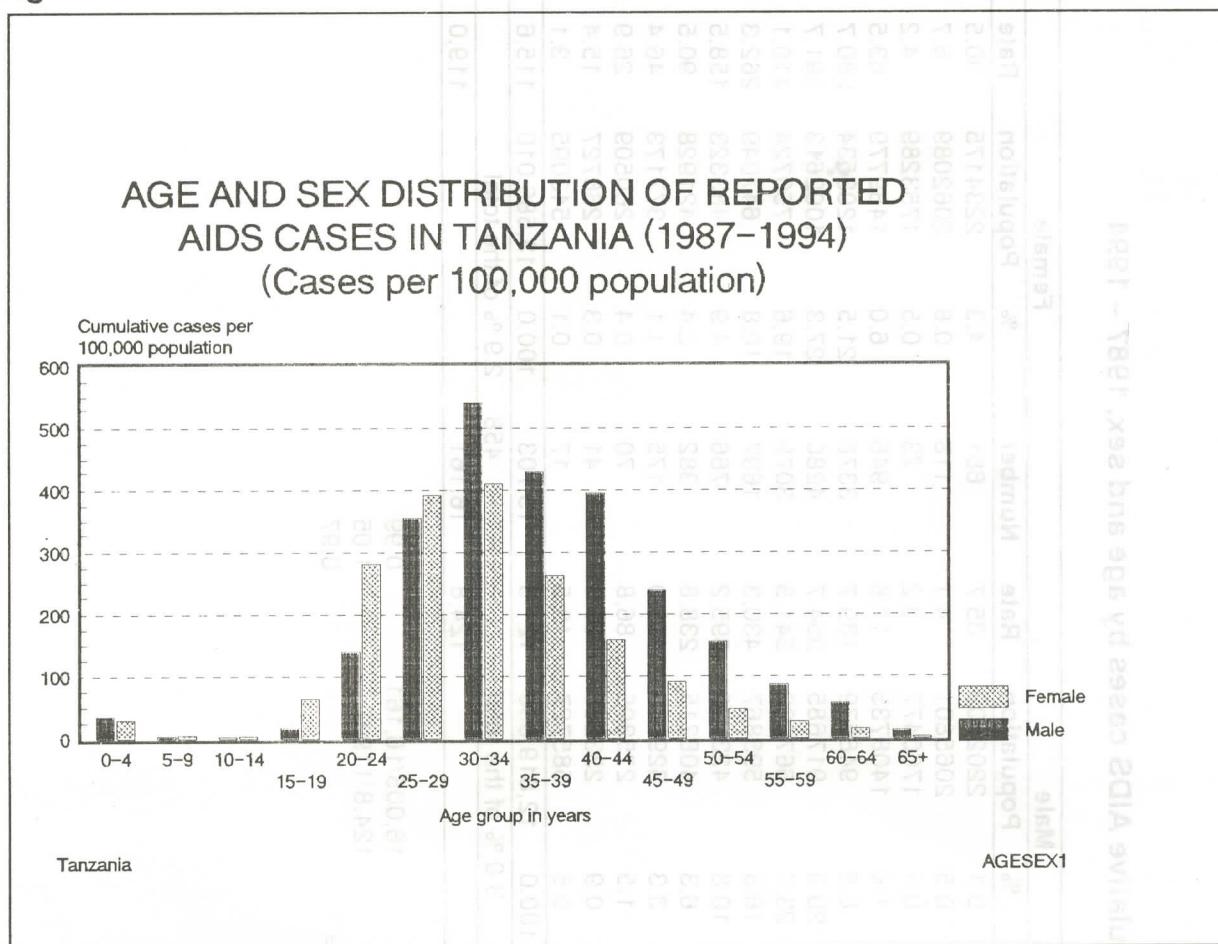
1.05

0.97

Figure 2 shows the age and sex cumulative AIDS case rate for Tanzania (1997–1994). The figure suggests that the AIDS epidemic affects women at an earlier age than males. However, case rates tend to clear off in females at an earlier age than in males.

Many factors are responsible for this age-sex difference in HIV infection such as the earlier sexual maturity of females, and the tendency for older and probably infected men to seek sexual relations with young girls in attempts to avoid infection thereby further spreading it. Furthermore, it is possible that economic considerations have lured these young girls into giving sexual favours to older well to do men. Studies have also shown that on the average women marry 5–10 years earlier than men. All these are possible explanations for the observation in Figure 2.

Figure 2



7. HIV Sentinel surveillance using ante-natal clinics

Methodology of Sentinel Surveillance

In order to standardize the method of obtaining sentinel surveillance data on HIV/Syphilis infections across countries, the NACP has adopted the WHO/GPA recommendations for sentinel surveillance since 1990. To date, sentinel surveillance

services in Tanzania have been initiated in 11 out of the 20 regions of the country. The main purpose of sentinel surveillance is to monitor changes in the level of HIV infection in the community with the assumption that the sentinel populations (ante-natal women in this case) are representative of the general population in the reproductive age groups.

All pregnant women attending a clinic for the first time during any pregnancy constitute the sentinel surveillance population. The women are provided with routine ante-natal care, and venous blood (5–10 mls), which is routinely taken for ante-natal investigations, is utilized in testing and guiding treatment for syphilis infection and anaemia. In addition, the same blood sample is tested for HIV infection in such a way that results cannot be traced back to the individual women, i.e. the testing is anonymous and the data are permanently unlinked.

The sampling technique of the blood specimens is sequential in nature, whereby the first 300 specimens are selected for HIV testing. The NACP considers it unnecessary to inform individuals that blood remaining after routine testing for ante-natal care will be tested anonymously for HIV infection. However, guidelines indicate that, if a woman wishes to know her HIV serological status she must be referred for separate counselling and testing.

HIV and syphilis testing results are then recorded in special books in triplicate and the top copy is sent to the NACP for compilation, further analysis and inclusion in the NACP report.

HIV serology in sentinel sites

A total of more than twenty sentinel sites was expected to be operational during 1994. However, reports were received from only four out of the 11 regions in which sentinel sites have been established. The prevalence of HIV infection among women attending the various ante natal clinics by year is shown in Table 4(a). The prevalence of HIV-1 infection ranged between 5.1% and 27.5% during 1994. Note that only eleven out of the twenty or so clinic sites, representing four regions, submitted their reports in time for inclusion in this report. The Mbeya region with its many sites, has been the most consistent in providing timely reports. During the previous NACP report 15 sites had submitted their reports in time.

Computer simulations show that, at a constant rate of 5% of susceptibles becoming HIV infected each year, the prevalence will rise and ultimately stabilize at approximately 35%. This is consistent with data reported by Killewo *et al.* from Bukoba town in 1987. In the same series of studies in 1989 the incidence was reported as 48/1,000 per year (approximately 5% per year) in Bukoba town, while the prevalence reported for 1987 was about 24% indicating that it was nearly reaching stability in the general urban adult population.

Table 4 (a)

**Prevalence of HIV-1 infection (in %) using Sentinel Surveillance data
from ante-natal clinics 1988-1994**

Site of ANC Clinic	1988	1989	1990	1991	1992	1993	1994
	%	%	%	%	%	%	%
KAGERA							
Bukoba			22.2	20.0	27.7		17.3
MWANZA URBAN	8.0	12.0	12.3	11.2	10.3	11.7	11.7*
Mkula (Magu)				3.7	4.6	5.4	
MBEYA RURAL	2.9	11.6			14.1	13.9	
Chimala	4.2	6.3	8.8	9.5	8.0	10.8	16.0
Isoko	2.9	2.0	2.4	6.6	18.0	8.5	8.0
Itete	1.7	9.1	6.4	3.9	5.3	15.5	5.1
Mwambani		12.0	8.5	12.9	8.0	10.7	13.0
Kyela	21.2	14.6	17.5	30.4	27.2	27.5	
Mbozi							15.0
MBEYA URBAN	9.4	13.0	12.2	15.3	17.7	19.6	
Kiwanjampaka	7.0	10.6			17.0	22.3	19.5
Mwanjelwa	11.0	7.3			11.0	23.2	19.6
Meta	10.3	16.9			25.0	13.7	16.0
DAR ES SALAAM				10.3			
KILIMANJARO						15.3	
Umbwe			2.3		6.4		
					25.0		
IRINGA				21.0			
MTWARA							
Nanguruwe					4.4		
MARA (MUSOMA)						5.9	6.5
						7.7	
RUKWA						11.7	23.2
Namanyere						11.3	
Sumbawanga						12.0	23.2
RUWUMA						6.6	12.9
Songea						9.7	16.1
Namtumbo						3.5	6.7
SHINYANGA							10.9

*Prevalence refers to the 1st quarter of the year only

NB: Clinics which are currently operating but not listed have not submitted their reports to the NACP. Clinics with blanks during 1994 did not submit reports in time during the year.

Table 4 (b)

Prevalence of Syphilis infection (in %) using Sentinel Surveillance data from ante-natal clinics, 1988-1994

Site of ANC Clinic	1990 %	1991 %	1992 %	1993 %	1994 %
KAGERA					
Bukoba	2.7	3.6			
MWANZA URBAN	7.0	8.7	6.5		
Mkula (Magu)		10.4	10.5		
MBEYA RURAL		13.3			
Chimala	4.4	10.0	14.0		
Isoko	7.5	7.3	22.0	5.5	
Itete			8.0	10.1	
Mwambani	6.6	-8.0	17.5		
Kyela	4.8	17.9	7.5		
Mbozi			8.0		
MBEYA URBAN	9.1	8.6			
Kiwanjampaka	26.6	10.0	13.5		
Mwanjelwa	20.0	14.0	10.6		
Meta	11.9	5.0	13.0		
DAR ES SALAAM	4.2	7.6			
Temeke		4.1			
Mwananyamala		1.6			
Aga Khan Clinic		13.6			
COAST		10.8			
Bagamoyo		12.0			
Kisarawe		6.8			
Kibaha		11.2			
KILIMANJARO					
Umbwe	1.7	3.6	0.9		
IRINGA					
Mafinga	19.9	21.7	28.3		
MTWARA		4.2			
Nanguruwe		8.3			
MARA (MUSOMA)		1.2	7.0	3.9	
Nyasho					
RUKWA		16.8			
Namanyere		18.0			
Sumbawanga		15.7			
RUUVUMA	51.9	3.6			
Songea		3.3			
Namtumbo		7.1			
SHINYANGA		5.1			

NB. Clinics which are currently operating but not listed have not submitted their reports to the NACP. Clinics with blanks during 1994 did not submit reports in time during the year.

Syphilis serology in sentinel sites

Together with HIV surveillance among pregnant women in selected sentinel sites, RPR testing for syphilis has been going on for all pregnant women during their first attendance to ante-natal clinics in various parts of the country (see Table 4b). During 1994 the prevalence of RPR or VDRL positivity ranged between 5.5% and 17.5%. These percentages include various degrees of false positivity to the screening tests used. However, all women found to be serologically positive are given treatment.

Vertical Transmission of HIV infection

Vertical transmission of HIV infection is emerging as an important mode of transmission as more and more HIV infected mothers become pregnant and subsequently deliver babies who carry a high risk of infection either pre-natally or post-natally. Assuming a 30% HIV transmission rate from pregnant women to their offspring (vertical transmission), the percentage of new-borns expected to be infected therefore ranges from 1.7% to 8.3% in the various sentinel sites (if the HIV prevalence range of 5.1% to 27.5% among pregnant women applies).

Various studies are going on or are being planned in Tanzania on the prevention of mother-to-child transmission of HIV infection. Zidovudine and lamivudine (specific anti-viral agents) and vitamin A are among the agents being tried in the various studies. It is hoped that useful results will emanate from these studies.

8. HIV Sentinel surveillance using blood donors

Reporting on HIV serostatus of potential blood donors has been taking place since 1987. Initially, screening for HIV infection took place in regional hospitals only. However, since 1990 all the 182 hospitals in the country have been screening blood from donors to ensure safe transfusion. About 55% of the hospitals reported results of their HIV screening to the NACP in 1993 while this was only 23% in 1994.

Table 5. Distribution of reported blood donors by year of donation

Year	Total reported blood donors		Reported blood donors with known age and sex		Reporting hospitals	
	Number	% of total transfusions	Number	% (c4/c2)	Number	% (in C6)
C1	C2	C3	C4	C5	C6	C7
1987	4,285	3	555	13	6/182	3
1988	13,807	10	3,680	27	14/182	8
1989	35,049	24	12,251	35	103/182	57
1990	27,514	19	24,035	87	123/182	68
1991	80,444	56	77,677	97	158/182	87
1992	62,185	43	60,429	97	140/182	77
1993	21,717	15	21,370	98	100/182	55
1994	5,614	4	4,818	86	42/182	23

C1 = 1st column; C2 = 2nd column etc.

Table 5 shows the time trend in the number of reported blood donors. It also shows what proportion was formed by the reported number of blood donors during a given year out of the total estimated transfusions during the same year given that the number of blood transfusions taking place in the country is estimated at 6 per 1,000 per year, i.e. a total of approximately 144,000 transfusions in the country. The proportion of hospitals reporting during each year is also shown in the table.

It has been reported from other countries, that HIV sero-prevalence among blood donors might decrease with time due to improved selection of blood donors, while prevalence in the general population continues to rise. As most blood donors in Tanzania are relatives of blood recipients, blood donor data are believed to be only moderately biased. This was confirmed by a study from the Mwanza region by Borgdorff *et al.* As all regions and most hospitals do report on the HIV sero-status of donors, these data give the most reliable estimates available for sero-prevalence in the population at large. However, HIV sero-prevalence and its trend over time differ markedly in various regions, and between age and sex groups. During 1994 the proportion of hospitals reporting HIV sero-status dropped drastically and this will certainly affect the estimates of HIV infection in the general population.

Regional Differences in HIV infection using blood donor data

Overall time trends in HIV infection by region before 1989 are difficult to assess using blood donor data, as data were available from only a few regions. However, as the number of reporting regions increased, blood donor data became more reliable as a surveillance tool. Data from the different regions are assumed to be equally biased as problems related to donor selection are probably uniform in all the regions. Hence regional differences in HIV prevalence are likely to be real. Table 6 shows the prevalence of HIV-1 infection among blood donors by region and sex between 1987 and 1994. The table shows that in some regions the prevalence was unusually high during the earlier years when very few regions reported. This may have been due to the inclusion of blood samples of other categories like suspected AIDS patients in the data for blood donors. However, after 1990 separate blood transfusion service registers were available in all reporting centres. The highest HIV prevalences (7% and over) were found in the following regions during 1994: Iringa, Kagera, Shinyanga, Mtwara, Mara and Cost.

The addition of the 1994 data to the cumulative data did not change the rank in prevalence by region for the males in the first six regions since they maintained the same positions in the rank as last year. However, for females the situation was different since Rukwa became No. 1 when it occupied position 11 last year. Shinyanga was the second while Dar es Salaam was the third. It should be noted that lack of data for 1993 and 1994 for some of the regions (especially Rukwa) may have influenced their true positions in the ranking.

Table 6 (a)
Prevalence of HIV-1 infection (in %) among blood donors by region for males, 1987–1994

Region	1987	1988	1989	1990	1991	1992	1993	1994	'87-'94	Rank
Arusha		0.0	1.9	2.3	2.6	2.6	2.7	2.4	19	
Coast	0.0	5.0	4.6	4.5	4.4	4.1	5.9	6.6	4.9	12
Dodoma		1.9	5.6	3.5	2.8	1.7	0.0	3.1	15	
DSM	1.5	7.5	2.5	7.7	6.9	8.5	—	—	6.9	5
Iringa		11.1	11.4	10.6	11.1	13.2	7.7	11.2	1	
Kagera		10.5	10.2	10.3	10.9	5.8	7.9	9.6	2	
Kigoma	7.5	1.2	1.2	2.5	1.9	7.0	3.4	2.3	20	
Kili'jaro		1.3	5.2	2.7	2.4	3.4	1.5	2.7	17	
Lindi	0.6	5.6	4.8	3.7	2.5	—	—	3.9	14	
Mara	4.6	4.5	4.5	6.9	5.0	3.7	4.8	13		
Mbeya	4.8	5.0	5.2	7.8	11.6	15.1	0.0	—	9.0	3
Morogoro	10.9	6.8	3.1	5.4	4.6	5.7	—	—	5.2	11
Mtwara	4.9	2.1	4.2	5.2	9.5	15.2	6.1	8		
Mwanza	15.3	5.5	6.2	5.1	4.0	2.9	5.6	10		
Rukwa	11.6		8.1	6.7	—	—	—	8.0	4	
Ruvuma	3.5	4.9	4.4	7.1	6.2	7.3	2.0	5.9	9	
Shinyanga	13.0	4.4	6.0	6.1	6.4	14.7	6.2	8		
Singida	3.1	2.3	2.2	2.7	2.8	0.0	—	2.5	18	
Tabora	2.4	2.5	2.9	2.8	4.4	2.5	3.0	16		
Tanga	6.6	6.2	6.9	7.1	4.4	—	—	6.7	6	
TANZANIA	3.3	7.4	5.0	5.8	5.3	5.9	6.9	5.5		

Table 6 (b)
Prevalence of HIV-1 infection (in %) among blood donors by region for females, 1987 – 1994

Region	1987	1988	1989	1990	1991	1992	1993	1994	'87-'94	Rank
Arusha	0.0	0.0	0.9	5.5	2.2	3.9	—	—	3.6	16
Coast		6.9	6.1	6.1	5.0	10.2	11.8	7.5	8	
Dodoma	0.0	5.9	3.3	4.8	—	—	—	4.0	14	
DSM	0.0	14.3	0.0	14.1	7.7	—	—	12.5	3	
Iringa		16.7	15.8	8.7	8.1	17.6	20.0	10.8	5	
Kagera	9.7	12.6	12.9	11.0	8.6	8.3	8.3	11.8	4	
Kigoma	29.6	9.47	1.8	4.7	4.1	5.8	5.1	4.8	13	
Kili'jaro	3.8	6.7	3.2	2.2	1.8	2.9	—	2.8	19	
Lindi	11.8	10.9	4.4	2.3	1.9	—	—	3.3	17	
Mara	13.8	7.6	5.4	8.2	2.9	10.0	6.8	9		
Mbeya	9.5	2.0	10.2	11.8	20.3	—	—	12.5	3	
Morogoro	12.5	1.8	4.6	5.1	5.7	10.8	—	5.4	12	
Mtwara	0.0	1.6	3.5	10.5	5.7	0.0	—	5.5	11	
Mwanza	7.5	5.3	6.2	5.7	8.0	5.0	6.3	10		
Rukwa	24.0	—	21.4	0.0	—	—	—	19.4	1	
Ruvuma	6.3	14.0	8.7	7.0	6.4	6.7	2.1	7.8	6	
Shinyanga	33.3	17.4	18.1	10.0	21.6	33.3	15.8	2		
Singida	10.5	2.1	2.2	4.5	4.6	0.0	—	3.7	15	
Tabora	2.5	2.0	2.8	2.7	5.8	0.0	—	3.4	18	
Tanga	23.5	2.1	7.9	7.0	5.9	—	—	7.6	7	
TANZANIA	7.1	8.0	11.2	7.9	7.2	5.9	6.2	4.8	7.0	

Age and sex differences in HIV infection (Blood donors)

Table 7a and 7b show that the overall female HIV prevalence among blood donors is higher than that of males in all age groups.

Since 1989 prevalence rates seem to be declining slowly among women, and increasing in men. It also seems improbable that increased donor selection would lead to opposite trends among the sexes. Even taking into account that female donors differ from males their in average age (females being younger), the prevalence among female donors is considerably higher than that in males. The M:F ratio of the prevalences has been ranging between 0.4 and 1.0.

Table 7(a)
Age-specific prevalence of HIV-1 infection (in %) among Male blood donors (1987-1994)

Age	1987	1988	1989	1990	1991	1992	1993	1994	1987-94
15-19	0.0	1.6	1.8	3.3	3.2	3.7	3.9	2.4	3.4
20-24	3.4	6.8	4.5	4.7	5.0	4.9	5.8	2.4	5.0
25-29	1.8	8.3	6.0	5.0	6.7	6.0	6.1	5.8	6.2
30-34	2.1	9.3	5.3	5.5	6.4	5.8	6.2	5.4	6.0
35-39	7.8	8.7	5.5	4.3	6.1	5.6	6.5	9.8	5.8
40-44	7.1	10.1	3.8	3.8	4.8	3.9	5.1	0.0	4.4
45-49	10.0	5.6	2.2	5.0	4.5	4.2	4.9	7.4	4.5
50-54	0.0	4.2	3.0	3.8	4.4	2.6	4.3	0.0	3.8
55+	0.0	15.4	3.6	5.0	4.0	2.3	5.2	12.5	3.8
Unknown			5.1	9.8	8.5	3.9	12.3	14.3	6.7
Total	3.3	7.7	5.0	5.0	5.8	5.3	5.9	4.8	5.5

The HIV prevalence among blood donors by age for both sexes (Table 7a and 7b) differs to some extent from the AIDS case rates by age and sex (Table 3). In previous years the cumulative peak case rate for females occurred earlier than that of males. However, in 1994 the cumulative peak case rates for both sexes were the same at age 30-34 years although the rate for males was higher.

Table 7(b)
Age-specific prevalence of HIV-1 infection (in %) among Female blood donors (1987-1994)

Age	1987	1988	1989	1990	1991	1992	1993	1994	1987-1994
15-19	0.0	0.0	7.9	7.5	4.9	4.2	2.9	5.6	4.8
20-24	0.0	4.6	13.5	9.5	7.7	7.2	7.5	5.4	7.8
25-29	14.3	11.8	8.2	9.0	8.7	6.6	7.2	7.1	7.8
30-34	16.7	14.3	8.9	6.2	6.5	5.7	6.6	6.9	6.3
35-39	0.0	21.1	8.0	6.2	4.8	5.7	6.7	10.1	5.7
40-44	0.0	16.7	9.6	2.9	6.3	3.6	1.7	5.4	7.5
45-49	0.0	0.0	7.7	1.2	3.4	4.4	3.7	7.5	4.6
50-54	0.0	0.0	0.0	0.0	5.6	5.4	5.9	6.2	3.9
55+	0.0	0.0	0.0	10.0	6.7	4.2	5.3	3.3	4.3
Unknown		13.6	11.4	13.0	2.8	7.7	12.5	6.3	
Total	7.1	7.5	11.7	7.9	7.2	5.9	6.3	6.9	11.3
M:F ratio	0.5	1.0	0.4	0.6	0.8	0.9	0.9	0.7	0.5

HIV Infection in Adolescents

When blood donor data are broken down by age groups, it becomes apparent that the HIV prevalence among young adults (20–24 and 25–30 year olds) is the highest (Table 7a–b). This suggests considerable rates of HIV transmission at earlier ages. This is in line with behavioural data which indicate that 50% of adolescents have made their sexual debut by age 15 (Source: Institute for Curriculum Development, 1992). Additional data on adolescents are available from a population based survey in 1990/91 in Mwanza region. These data show a marked difference between rural, roadside and urban sites. At age 15, the prevalence of HIV-1 infection was found to be 3.7% for urban sites, 3.4% for roadside villages and 0.6% for rural villages.

9. Surveys in high STD transmission areas

Since 1989 AMREF has been implementing an AIDS prevention programme in the different truck stops along the Dar es Salaam to Songea highway. The project targets long distance truck drivers, their assistants and sexual partners and provides behaviour change education, promotes condom use and provides STD services to the target population through peer health educators. During 1993/94 AMREF extended its STD services to those living in the truck stops especially the women. Among other things the project determined the prevalence of STDs including HIV infection in the study population. Table 8 summarizes the findings on the prevalence of STDs in the various truck stops.

Table 8

The prevalence of various STDs in truck-stops along DSM-Songea highway

Truck stop	N. Gonorrhoea % (N)	C. Trachomatis % (N)	T. Vaginalis % (N)	Syphilis % (N)	HIV % (N)
1. Mlandizi	15.2 (92)	16.0 (94)	26.3 (99)	21.4 (112)	42.1(107)
2. Chalinze	4.1 (98)	21.2 (99)	36.4 (107)	14.6(123)	38.7(119)
3. Msamvu	7.1 (84)	34.1 (85)	17.6 (91)	11.7(111)	33.3(111)
4. Ilula	16.9 (124)	13.6 (125)	33.7 (172)	28.6(161)	36.7(158)
5. Ndiuka	15 (127)	27.8 (126)	31 (174)	22.5(160)	44.7(159)
6. Makambako	16.7 (102)	43.4 (99)	36.0(211)	25.7(1202)	68.0(200)
7. Njombe	8.7 (126)	52.0 (125)	22.0(173)	32.1(209)	66.7(210)
Overall	12.2 (753)	29.9 (753)	29.9(1027)	23.7(1076)	50.1(1064)

10. HIV/AIDS and tuberculosis

HIV prevalence among tuberculosis patients

The prevalence of HIV infection among 128 newly detected tuberculosis patients in Mbeya region during the last quarter of 1990 was 52%, while the sero-prevalence among blood donors during the same period was about 10% (Table 9).

In 1992 a hospital survey was conducted in Bukoba hospital involving newly hospitalized patients in all categories of admission. The overall prevalence of HIV-infection was 32.9% with high prevalences observed for clinical AIDS (86.9%) and

tuberculosis (57.4%) diagnostic categories (Table 10). The prevalence by ward of admission is shown in Table 11. The Table also shows that the prevalence is slightly higher among females than males (Kwesigabo *et al* 1993).

Table 9 Prevalence of HIV infection among tuberculosis patients.

Category	Number	HIV + %
All TB patients	128	52
Sex distribution		
Male TB patients	88	51
Female TB patients	40	53
Distribution by area		
Urban TB patients	70	54
Rural TB patients	58	45
Age group		
15–24 years	22	41
25–34 years	51	73
35–44 years	31	45
45+ years	24	25
Type of TB		
Sputum positive	49	43
Sputum negative	39	64
Extra-pulmonary	31	48
Relapses	9	56
Blood donors (Mbeya region, 1990)	148/1558	10

Table 10 Prevalence of HIV infection in various clinical diagnostic categories (Bukoba Hospital)

Diagnostic category	Number	%
Clinical AIDS	23	86.9
Tuberculosis	47	57.4
Clinical malaria	77	33.8
Pneumonia	36	47.2
Other	1306	28.7

Table 11
Prevalence of HIV infection by Ward of Admission and sex (Bukoba Hospital)

Ward	Total		Males		Females	
	Number	%	Number	%	Number	%
Medical	776	40.5	432	39.4	344	41.8
Surgical	299	26.4	204	24.5	95	30.5
Paediatrics	237	17.7	121	16.5	116	18.9
Obstetrics	117	28.2	—	—	117	28.2
Gynaecology	47	40.4	—	—	47	40.4
Total	1476	32.9	757	31.7	719	34.4

NB 4 individuals ward variable missing

11. HIV and other STDs among family planning clients

Results of a survey conducted among women attending family planning clinics in Dar es Salaam between March 1991 and January, 1992 indicate that the prevalence of laboratory confirmed STDs ranged between 2.5% for syphilis and 12.5% for HIV-1 infection. The prevalence of vaginal discharge was 11.7%, while that of trichomoniasis was 11.7%. The prevalence of candidiasis and gonorrhoea were 11.5% and 4.5% respectively. The age specific prevalence of HIV infection was highest in the age group 25–30 years (14.7%) while it was lowest in the 15–20 year age group (6.5%) (Kapiga *et al.*, 1991).

12. Sero-prevalence in the general population

Population-Based Surveys

To-date there have been four major population-based surveys on HIV infection in Tanzania utilising random samples of the general population. Results of two of these surveys (see Table 12) have been reported earlier (for Kagera in 1987 by Killewo J. Z. J. *et al* and for Mwanza in 1991 by Barongo L. R. *et al*). A population-based survey on HIV infection in Arusha in 1992 indicates that the prevalence was 10.7% in the low socio-economic status urban area, 5.2% in the high socio-economic status urban area, 2.2% in the semi-urban and 1.6 in the rural areas. The prevalence was significantly higher among women (6.5%) than men (1.7%). The study also showed that significantly more individuals with multiple sexual partners reported regular condom use (19.3%) than those with one sexual partner (6.4%) (Mnyika *et al*, 1994).

Another population-based study in the North Mara district of Tanzania in 1989/90 showed an overall prevalence of 7.3% with a gradient of seropositivity from 13.0% among high risk individuals, 8.8% among urban individuals, 6.5% among peri-urban residents and 2.6% among rural populations. The study also showed that recent treponemal infection, measured by the rapid plasma reagin test (RPR), was not associated with HIV infection (Shao J. *et al* 1994).

Unfortunately most of the above studies have concentrated on the northern zones of the country and rendered the rest of the country deficient of equally reliable data. However it is expected that cheaper and accurate methods of estimating the HIV prevalence in the general population such as those of sentinel surveillance will become more widespread and hence regularly avail the NACP with accurate data from all parts of the country.

Estimated HIV sero-prevalence in the General Population

Table 13 shows the distribution of blood donors by category of donor and relationship to blood recipient for 1993 and 1994. Since the majority of blood donors are relatives of blood transfusion recipients (97%), the HIV sero-prevalence among blood donors can reasonably be said to be representative of the sero-prevalence in the general population.

HIV sero-prevalence in the General Population

Category	Year	Prevalence Rates (%)			
		Blood Bank	Transfusions	Exchange	Donor
1993	Blood Bank	0.00	0.00	0.00	0.00
	Transfusions	0.00	0.00	0.00	0.00
1994	Blood Bank	0.00	0.00	0.00	0.00
	Transfusions	0.00	0.00	0.00	0.00

Table 12
Population-based HIV sero-surveys by age and sex

Area	Category	15-24	25-34	35-44	45+	All
KAGERA (1) (1988)	Total	68/859	7.9	101/746	13.5	39/435
	Urban	45/217	20.7	65/210	31.0	18.0
	Rural	23/642	3.6	36/536	6.7	21/335
Male Female	Male	3/268	1.1	14/194	7.2	12/151
	Female	20/374	5.3	22/342	6.4	9/184
Bukoba Urban	Male	10/90	11.1	17/76	22.4	8/43
	Female	35/127	27.5	48/134	35.8	11/57
Bukoba R. Muleba	Male	2/70	2.9	9/64	14.1	7/34
	Female	12/124	9.7	14/97	14.4	5/69
Karagwe	Male	1/119	0.8	3/56	5.4	5/61
	Female	8/153	5.2	8/143	5.6	4/58
Ngara Biharamulo	Male	0/79	0.0	2/74	2.7	0/56
	Female	0/97	0.0	0/102	0.0	0/57
MWANZA (2) (1990/91)	Total	86/1498	5.7	114/1386	8.2	43/852
	Urban	50/467	10.7	62/411	15.1	23/204
	Rural	20/317	6.3	32/335	9.6	11/167
Village		16/714	2.2	640	3.1	9/481
Male Female	Male	16/670	2.4	650	6.9	27/391
	Female	70/825	8.5	436	15.8	16/379

Table 13
Distribution of blood donors by category of donor and relationship to recipient (1993/94)

Category	1993			1994		
	No	% of Total	% HIV-1 Positive	No	% of Total	% HIV-1 Positive
Relatives	23,564	98.3	5.9	5,369	96.6	6.4
Institutional donors	61	0.3	4.9	66	1.2	4.5
Paid donors	52	0.2	1.9	1	0.0	0.0
Unknown relation	284	1.2	10.6	124	2.2	15.3
Total	23,961	100.0	6.0	5,560	100.0	6.6

*Institutional donors are mainly secondary school students.

Data from population-based studies on HIV infection have been used to validate those found among various sentinel groups. Borgdorff *et al.* In 1991, compared the results of a population-based survey in Mwanza region with those from various sentinel groups and the findings which are age-and sex-adjusted are presented in Table 14 below.

Table 14
Comparison of population-based HIV prevalence with that from various sentinel groups in Mwanza region

Category	Prevalence in %		
	Urban	Non-urban	Total
Population survey			
-females	14.9		
-both sexes	11.4	3.1	4.1
Blood donors	12.6	3.4	4.5
Ante-natal clinic attendees	10.9	—	—
Outpatients			
-malaria	17.4	10.8	11.6
-anaemia	12.6	8.4	8.9
-syphilis	27.1	—	—

However, in a very high prevalence area (Bukoba in Kagera) it has been shown by Kwesigabo *et al.* that blood donor sero-prevalence underestimates the population prevalence by 50%. However, these figures were not adjusted for sex and in addition the population-based survey was performed earlier than those involving sentinel populations (see Table 15). Hence comparison of the figures should be interpreted with caution.

Table 15
Comparison of population-based HIV prevalence with that from two sentinel groups in Bukoba.

Category	Crude Prevalence		Age-adjusted Prevalence %	
	%	Total	%	Total
Population survey (1987)	25.3	25.3	25.3	25.3
Ante-natal clinic attendees (1989)	22.8	22.8	17.9	17.9
Blood donors (1989)	11.9	11.9	12.1	12.1

As blood donors are predominantly males and most are young adults, figures derived from blood donor data have to be adjusted for the age- and sex-distribution of the general population.

When the age- and sex-specific prevalences found in blood donors are applied to the general population as projected for 1994, one arrives at an estimated number of 370,000 infected adult males and 460,000 adult females, totalling 830,000 sero-positive adults in mainland Tanzania during 1994.

Based on age-specific fertility rates (ASFR) for Tanzanian women, these women are estimated to have born a total of 79,000 children during 1994, of whom approximately, 30% or 24,000 are HIV infected at birth. The remaining 55,000 children are not infected, but have at least one parent who is likely to develop AIDS in the near future. Including perinatally infected children, the total estimate of HIV sero-positives in mainland Tanzania is approximately 854,000.

13. Orphans

Orphans resulting from the death of one or both parents from AIDS constitute a significant social problem in the Tanzanian society today. The NACP defines orphans as those children aged below 18 years who have lost one or both parents. At present the national estimate stands at 150,000 orphans. Regional data on estimates of orphans is lacking except where specific community-based programmes on orphanage have been initiated. Kagera is such a region where the number of orphans is currently estimated to be over 70,000. However, the definition of an orphan in the Kagera situation is based on those aged below 21 years. Furthermore, the number of orphans is cumulative since those older than 21 are included in subsequent estimates.

14. Projections

The theory of projections

Projections are mathematical extrapolations of current trends and assumptions about the future. Projections are frequently regarded as predictions, i.e. statements about what is likely to occur under various situations. In this report we are concerned with the population of reported AIDS cases and how we may use these to forecast the number of AIDS cases likely to be reported after a given time period.

First we specify a model for the growth of AIDS cases and in the current situation we assume a constant exponential growth. According to this theory, if P_0 is the current total number of AIDS cases, the total number P_t years from now, is given by the following equation $P_t = P_0 \exp(rt)$ (1) where r is the growth rate.

The growth rate r during a given period t can be calculated by solving for r in equation (1) above when the total populations at the two different times, P_0 and P_t and the length of the period, t are known. In the special case of the length of period being one year (i.e. $t=1$), and if the numbers of AIDS cases at the two time points are P_1 and P_2 then $r = \ln(P_2/P_1)$ (2) where \ln is the natural logarithm.

Of interest in projections however, is the length of time required for the number of AIDS cases to double. This is known as the doubling time. We put $P_t = 2P_0 = P_0 \exp(rt_D)$ and it follows immediately that the doubling time t_D is given by the following equation $t_D = \ln 2/r = \ln 2/\ln(P_2/P_1)$ (3) We have therefore adopted this theory in estimating the doubling times in Tables 2 and 3 in this report.

In summary, the basic equation (1) can be used to answer three sorts of questions:-

- (i) How large would the population of AIDS cases become if it increased at some given rate, r , for a definite period of years, t , beginning with some known size, P_0 ? (solve the equation for P_t)
- (ii) What is the rate of growth in some known period, when P_1 and P_2 , and the length of the period, t , are known? (solve the equation-for r)
- (iii) How many years would be required for the population to increase/decrease by some definite amount if it changed steadily at the rate r ? (solve the equation for t).

Projection of Adult AIDS Cases

If the (estimated) number of sero-positives is known, it is possible to calculate the number of future AIDS cases, as the natural history of HIV infection is well known. From cohort studies in the USA, it is well established that 50% of HIV infected individuals will have converted to AIDS within a median duration of 10 years after infection.

In the absence of better AIDS progression data from Africa, the same rate of progression is assumed for Tanzania even though it is believed that it might be shorter due to the higher exposure to endemic diseases, poor nutrition and reduced accessibility to effective medical care.

- Based on the estimate of 700,000 sero-positives in 1990, and the estimated cumulative number of 80,000 by 1990, the projected number of AIDS cases by the

year 2,000 will be 430,000 (i.e. 50% of 700,000 plus 80,000). The year 1990 is conveniently used here because it is 10 years before the year 2000). This is in the absence of any further HIV infection and substantial deaths from AIDS after 1990. Of course the picture is expected to be worse than this due to continued infections.

Projection of HIV infections

The epidemic of AIDS cases started in 1983 and will become strikingly predominant during the 1990's reaching a cumulative number of 430,000 cases by the turn of the century, if HIV transmission is assumed to have halted completely as from 1990.

If, however, transmission continues at a rate of 1% per year up to 1996, this will result in 840,000 more infected adults by the turn of the century, and 420,000 more AIDS cases by the year 2006. The above calculation is based on an adult population (15 years +) of 14,000,000 in mainland Tanzania.

Estimated number of HIV infections

Table 16 summarises the estimated number of HIV infections from 1987 to 1994. These estimates are based on age adjusted HIV prevalence among blood donors. It can be seen that the estimated number of HIV infections has increased relative to the estimates of 1993.

Table 16

Summary of estimated number of HIV infections 1987 – 1994.
(based on age adjusted blood donor prevalence)

	1987	1988	1989	1990	1991	1992	1993	1994
Males	173,656	443,054	238,683	269,713	296,782	268,177	324,108	374,468
Females	236,102	468,411	517,274	452,853	412,858	319,394	303,830	459,595
Total	409,758	911,465	755,957	722,566	709,640	587,571	627,938	834,065
Infected Pregnant women	62,715	99,715	109,810	85,563	75,534	66,163	66,106	91,919
Infected new-borns	18,815	29,914	32,943	25,669	22,660	19,849	19,832	27,576
Uninfected new-borns	43,900	69,801	76,867	59,894	52,874	46,314	46,274	64,343

Based on the experience of other countries, the projected number of AIDS cases in Tanzania by 2000 is likely to be between 300,000 and 500,000. This figure is based on the assumption that the rate of new infections remains constant at 1% per year and that there is no significant mortality from AIDS.

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15. Recent publications

The following are recent publications on HIV infection and AIDS in Tanzania which have been submitted to the MOH. Copies of reprints of these publications can be made available on request from the NACP.

1. Kapiga SH, Shao JF, Lwihula GK, Hunter DJ. Risk factors for HIV infection among women in Dar-es-Salaam, Tanzania. *J Acquir Immune Defic Syndr* 1994;7:301-9.
2. Killewo J, Dahlgren L, Sandstrom A. Socio-geographical patterns of HIV-1 transmission in Kagera Region, Tanzania. *Soc Sci Med* 1994;38:129-34.
3. Killewo JZJ, Sandstrom A, Bredberg Raden U, Mhalu FS, Biberfeld G, Wall S. Prevalence and incidence of syphilis infection and its association with HIV-1 infection among adults in the Kagera region of Tanzania: A population-based study. *Int J STD AIDS* 1994;5:424-31.
4. Mnyika KS, Klepp K, Kvale G, Nilssen S, Kissila P, Ole-King'ori N. Prevalence of HIV-1 infection in urban, semi-urban and rural areas in Arusha region, Tanzania. *AIDS* 1994;8:1477-81.
5. Shao J, Brubaker G, Levin A, Kibauri A, Massesa E, Siso Z, et al. Prevalence of HIV-1 infection in rural, semi-urban and urban villages in Southwest Tanzania: estimates from a blood-donor study. *AIDS* 1994;8:971-6.
6. Shao J, Brubaker G, Levin A, Kibauri A, Massesa E, Siso Z, et al. Population-based study of HIV-1 infection in 4,086 subjects in Northwest Tanzania. *J Acquir Immune Defic Syndr* 1994;7:397-402.
7. Soderberg S, Temihango W, Kadete C, Ekstedt B, Masawe A, Vahlne A, et al. Prevalence of HIV-1 infection in rural, semi-urban and urban villages in south-west Tanzania: estimates from a blood-donor study. *AIDS* 1994;8:971-6.
8. Urassa W, Matunda S, Bredberg Raden U, Mhalu F, Biberfeld G. Evaluation of the WHO human immunodeficiency virus (HIV) antibody testing strategy for the diagnosis of HIV infection. *Clinical and Diagnostic Virology* 1994;2:1-6
9. Martien Borgdorff. Epidemiology of HIV-1 infection in Mwanza Region, Tanzania. A PhD thesis by Martien Borgdorff. Published by The Royal Tropical Institute, Amsterdam, 1994
10. Japhet Killewo. Epidemiology towards the control of HIV infection in Tanzania with special reference to the Kagera region. A PhD thesis by Japhet Killewo. Published by Umea University, 1994.

12. Recent publications

The following site recent publications on HIV infection and AIDS in Tanzania which have been submitted to the MOH. Copies of some of these publications can be made available on request from the NACP.

1. Kibidis SH, Shiso JF, Mwiria GK, Hunter DJ. Risk factors for HIV infection among women in Dar-es-Salaam, Tanzania. *J Acquir Immune Defic Syndr* 1994;2:301-8.

2. Killenow T, Dspidien L, Sanderson A. Socio-demographic patterns of HIV-1 transmission in Kagera Region, Tanzania. *Sex Sci Med* 1994;38:150-3.

3. Killenow T, Sanderson A, Bledped R, Raden U, Mjaria F, Bipathia G, Wali S. Prevalence and incidence of syphilis infection and its association with HIV-1 infection among adults in the Kagera region of Tanzania: A population-based study. *J STD AIDS* 1994;5:454-51.

4. Mukete KS, Kebba K, Kasie G, Nilesen S, Kasas R, Ola-Kundoh N. Prevalence of HIV-1 infection in urban semi-urban and rural areas in Arusha region, Tanzania. *AIDS* 1994;8:1473-81.

5. Shiso T, Bupsiker G, Farai A, Kipunji A, Massesa E, Siso Z, et al. Prevalence of HIV-1 infection in rural, semi-urban and urban areas in Tanzania: estimates from a blood-donor study. *AIDS* 1994;8:321-8.

6. Shiso T, Bupsiker G, Farai A, Kipunji A, Massesa E, Siso Z, et al. Population-based study of HIV-1 infection in 4,088 subjects in Northwest Tanzania. *J Acquir Immune Defic Syndr* 1994;2:383-90.

7. Sodipoed S, Tembawo W, Kadete C, Ekeset B, Masswe A, Vabire A, et al. Prevalence of HIV-1 infection in rural, semi-urban and urban areas in South-West Tanzania: estimates from a blood-donor study. *AIDS* 1994;8:821-6.

8. Tembawo W, Masswe S, Bledped R, Raden U, Mjaria F, Bipathia G. Evaluation of the WHO journal immunological tests (HIV) antibody testing strategy for the diagnosis of HIV infection. *Clinical and Diagnostic Virology* 1994;5:1-6.

9. Tembawo W, Masswe S, Bledped R, Raden U, Mjaria F, Bipathia G. Evaluation of the WHO journal immunological tests (HIV) antibody testing strategy for the diagnosis of HIV infection. *Clinical and Diagnostic Virology* 1994;5:1-6.

10. Tembawo W, Masswe S, Bledped R, Raden U, Mjaria F, Bipathia G. Evaluation of the WHO journal immunological tests (HIV) antibody testing strategy for the diagnosis of HIV infection. *Clinical and Diagnostic Virology* 1994;5:1-6.