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**CONTROL OF HIV AND OTHER
SEXUALLY TRANSMITTED INFECTIONS**

- studies in Tanzania and Zambia

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Cover picture. Sexual network composed of 65% of the population aged between 18 and 35 in 7 villages on Likuma Island, Malawi; only includes sexual relations during the last 3 years that were independently confirmed by both partners, which with the advanced interview technique used was the case for 85% of all reported sexual relation. Green = female, Wine-coloured = males. The picture illustrates a *hypothesis* that a high level of inter-linkage of sexual partnerships could be one part of the explanation for high HIV transmission in parts of sub-Saharan Africa.

From: Kohler H-P, HELLERINGER S. The structure of sexual networks and the spread of HIV in sub-Saharan Africa: evidence from Likuma Island. Population Aging Research Center, University of Pennsylvania (reproduced with the permission of the authors).

“South Africa has faced extraordinary challenges before, and it has prevailed. Now we must face our greatest challenge - protecting the next generation from AIDS. This will take no less than a new social revolution - one that will break the powerful stigma of AIDS so we can seek help without fear; one that will change the way we think about sex and behave so we can save our lives; one that will support government’s treatment plan to provide live saving treatment for all who need it. The challenge is to see AIDS as a crisis that requires our combined attention and efforts.”

Nelson Mandela

ABSTRACT

Background: Efforts to control STI/HIV in sub-Saharan Africa has met with difficulties. Although the epidemic seems to be levelling off, prevalence and incidence are still high in many parts. In spite of 20 years of HIV control activities little or no behavioural change has been reported in Tanzania. Reasons for this could be that determinants of transmission have not been properly addressed or that changing sexual behavioural patterns is difficult and demands long-term interventions to succeed. It could also be that the balance between prevention and care is not optimal or that implementation has not been efficient. In my studies I have focused on the health system and how interventions are planned and implemented.

Objective: The overall objective is to identify and characterise major obstacles to the control of sexually transmitted infections and HIV in Zambia and Tanzania, respectively.

Methods: In papers I and II we determined treatment efficacy and the quality of STI care through participant observation and patient interviews. The main method in papers III and IV-VI was participant observation including interviews and the study of grey and published literature. In paper VII the capacity for antiretroviral treatment (ART) was estimated through a scenario analysis.

Main findings: Paper I showed that the Zambian STI treatment algorithms for genital ulcers were not efficacious as the treatment for chancroid lacked efficacy; paper II demonstrated that the health education part of syndromic management including condom promotion was poor and that vaginal examinations were rarely carried out. Paper III has two components. One is on health sector reform including effects of integration of HIV control activities into horizontal functions and the other on management aspects of STI/HIV control in Tanzania - also the subject of papers IV-VI. There are large differences in prevalence within Tanzania. The limited analysis of disease determinants and the little efforts at explaining these have resulted in plans that do not forcefully tackle the core problems surrounding sexual behaviour and the probability for transmission. Furthermore, since policies in many HIV related areas, such as ART, are linked to international politics, there is a large gap between policies and national and local resources. This has often led to the formulation of unrealistic plans, which are poorly adapted to the resource limitations and therefore rarely fully implemented. Instead they are outlined to attract funding. This has increased drastically during the last few years, but the human resources have remained limited. Although better funding opens up for improvements, over-financing will not increase service output much. The ongoing health sector reform has had to consider a situation of limited resources and how these should be allocated. The short-term interest of effective HIV control has stood against the long-term needs to strengthen the whole system - a dilemma not yet resolved, and now further complicated by over-funding for ART. Paper VII shows that international plans for an ART scale up are unrealistic and that only part of the treatment targets set in the national plan are likely to be met mainly due to the lack of qualified staff.

Conclusions: Disease determinants need to be further researched and analysed. Country specific plans are needed. Current plans for HIV control are neither realistic nor adapted to actual resources causing distortion to how these are used. Plans have to aim at an optimal balance between prevention and care, and focus on the core of the problem: determinants of new infections. Operational issues have to be tackled. Neither STI case management nor ARV treatment currently contribute much directly to a reduction of HIV incidence, but may, if reinforced, add to the effect of prevention efforts. A multi-component prevention programme, if prioritised and scaled up, might - through synergistic interaction - have a major effect of the epidemic and significantly reduce HIV incidence.

Key words: HIV, STI, ART, Health Sector Reform, imbalanced plans, prioritisation, disease determinants, local context, prevention.

LIST OF PUBLICATIONS

- I. Hanson S, Sunkutu M. STD care in Zambia: an evaluation of the guidelines for case management through a syndromic approach. *Int J of STD&AIDS* 1996;7:324-32.
- II. Hanson S, Sunkutu M. Case management and patient reactions: a study of STD care in a province in Zambia *Int J of STD&AIDS* 1997;8:320-28.
- III. Hanson S. Health Sector Reform and STD/AIDS Control in Resource Poor Settings - the Case of Tanzania. *Int J Health Plann Mgmt* 2000; 15:341-60.
- IV. Hanson S. HIV/AIDS Control in sub-Saharan Africa. *Science* 2001; 294:521.
- V. Hanson S. The problems of allocating large sums of money for AIDS. *The Lancet Infectious Diseases* 2003;3:464-65.
- VI. Hanson S. Is HIV control in Africa losing its focus? – need for simplified, prioritised prevention strategies. *Scan J of Public Health* 2005; 33: 233-35
- VII. Hanson S, Thorson A, Rosling H, Örtendahl C, Hunger C, Killewo J, Ekström AM. From plans to reality - an analysis of the capacity for large-scale ART in Tanzania (in manuscript).

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ABBREVIATIONS

ABC	Abstinence, being faithful, condoms
AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical Research Foundation
ANC	Ante-natal Care
ART	Anti-Retroviral Therapy
ARV	Antiretroviral drugs
AZT	Ziduvudine
CDC	Centre for Disease Control
CIDA	Canadian International Development Agency
CMAC	Council Multisectoral AIDS Co-ordinators
CTC	Care and Treatment Centre
CTP	Care and Treatment Plan
DALY	Disability Adjusted Life Years
DHS	Demographic and Health Survey
EU	European Union
GFATM	Global Funds to fight against AIDS, Tuberculosis and Malaria
GNP	Gross National Product
GPA	Global Programme on AIDS
GUD	Genital Ulcer Disease
HAART	Highly Active Antiretroviral Therapy
HIPC	Heavily Indebted Poor Countries
HIV	Human Immunodeficiency Virus
HSR	Health Sector Reform
HSV-2	Herpes Simplex Virus Type 2
IEC	Information, Education, Communication
IHCAR	International Health Care Research
IMF	International Monetary Fund
KAP	Knowledge Attitude and Practise
LY	Live years
MAP	Multi-Country HIV/AIDS Programme
MCH	Mother and Child Health
MDG	Millennium Development Goal
MoH	Ministry of Health
MTEF	Medium Term Expenditure Framework
MTP	Medium Term Plan
NACP	National AIDS Control Program
NGO	Non-Governmental Organisation
OI	Opportunistic infection
OPD	Outpatient Department
PAF	Population Attributable Fraction
PCR	Polymerase Chain Reaction
PEPFAR	President's Emergency Plan for AIDS Relief
PHC	Primary Health Care
PID	Pelvic Inflammatory Disease
PMTCT	Prevention of Mother-to-Child Transmission
PPP	Purchasing Power Parity

PSI	Population Services International
Sida	Swedish international development cooperation agency
STD/STI	Sexually Transmitted Disease / Infection
SWAP	Sector Wide Approach
THIS	Tanzania HIV Indicator Survey
TB	Tuberculosis
T-MAP	Tanzania Multi-Sectoral AIDS Project
UHT	University Teaching Hospital
UN	United Nations
UNAIDS	The Joint United Nations Programme on HIV/AIDS
USD	United States Dollar
VCT	Voluntary Counseling and Testing
VL	Viral load

PREFACE

The HIV epidemic in sub-Saharan Africa was discovered at the beginning of the 1980s. One of the first epicentres was in the neighbouring parts of North-Western Tanzania, the Kagera region and South-Western Uganda, Rakai district. While working in Tanzania I visited the village on the main border crossing in February 1987. I still remember the empty houses pointed out to me along the main road in the village – empty because the owners had died of AIDS. Since that visit much of my professional life has centred on HIV/AIDS. Returning for summer vacation in Sweden the same year, I passed the WHO headquarters in Geneva to visit some old friends from the Smallpox Eradication Programme. They invited me to take part in the WHO/Special Programme on AIDS' first briefing for consultants on HIV/AIDS. The person sitting next to me was Peter Piot, now head of UNAIDS. After the briefing we all went straight out to draw up the first short-term plans. I was in charge of the mission to Cape Verde. Since then I have outlined several HIV control plans both in Africa, Asia and Eastern Europe. In March 1988 WHO appointed me as field epidemiologist for HIV in Tanzania. There I started to work with the people who are still deeply involved in the HIV control activities. My work on HIV also brought me to IHCAR and to Zambia. The thesis is an account of the results of studies carried out contemporaneously with my regular work during these years and what holds it together – my working life. My initial ambition was to write a thesis on STIs in Zambia. The first two studies on STIs were carried out there, but then destiny once again brought me to the National AIDS Control Programme (NACP) in Tanzania, where study III was carried out and papers IV, V and VI were written. The STI studies in Zambia are included in the thesis although the focus is on STI/HIV control in Tanzania. It is likely that the variation in STI case management in Tanzania is greater than the average difference in health worker performance between Tanzania and Zambia, and that the Zambian studies on STIs therefore give information that is also valid for Tanzania. In Tanzania my initial focus on STIs widened and I wrote about my observations of the health sector reform and STI/HIV control giving an account of the reality that I was faced with on a daily basis as I had never seen it described in research articles. I had the privilege of being able to follow STI and HIV/AIDS control at all levels of the health care system - from the dispensary to the Ministry of Health. The main questions that emerged were: Why was reality so rarely taken into account? Why did policies not reflect realities on the ground? Why did development assistance seem so ineffective?

I reported on the observations made in my regular work, from supervision missions, from the National AIDS Control Programme (NACP), from the Ministry of Health and from donor meetings.

To give a better account of my experiences I was advised to write a thesis in monograph format, but since I had already published several papers I chose the normal thesis format. Still the thesis differs somewhat from regular ones published at KI. It aims at providing an overview of the challenges of STI/HIV control in sub-Saharan Africa with a focus on HIV in Tanzania. The cover story has the dual aim of both bringing the contents of the papers together and to covering other essential aspects needed for a broader understanding. As I have done very little research on the underlying determinants of HIV transmission I have depended on a review of the literature for these. Since there is not sufficient information on Tanzania alone this has also included other countries in sub-Saharan Africa to highlight the pertinent issues. Whilst collecting information I also read grey literature on the subject and many informants shared anecdotal evidence particularly on sexual behaviour. Other information was communicated to me by Tanzanian colleagues. I could have left out all information obtained through vague methods to avoid exposing myself to valid criticism of not being “scientific enough”. Instead I have chosen to include much of such anecdotal information and personal communication in the hope that this will enrich the thesis, stimulate discussion and promote more solid research on the determinants of HIV transmission and other factors, which are decisive for the control of the epidemic. I also hope the thesis will contribute to a strengthening of prevention efforts. If these become more effective, I am convinced that it would be possible to control the epidemic to a large extent.

1 BACKGROUND

Since my first visit to the Kagera region in 1987 the HIV epidemic has developed rapidly. Southern Africa is particularly hard hit (fig.2). AIDS has become the leading cause of the loss of disability adjusted life years (DALYs) in sub-Saharan Africa and has had devastating effects on social life. The social fabric is threatened in high-prevalence areas, family networks have been disrupted and millions of children orphaned.

STIs are frequent both in Tanzania and Zambia, as in most of sub-Saharan Africa. They are closely linked to the HIV epidemic and can be controlled through similar measures. But efforts to control HIV appear to have had limited success. The determinants of the epidemic are complex and not yet fully understood. HIV incidence has declined in Uganda and in the Kagera region of Tanzania (UNAIDS and WHO, 2005) and there are also reports of a decline in Kenya (MoH Kenya, 2005), particularly in urban settings. HIV prevalence has remained stable in Tanzania for several years (MoH NACP Tanzania, 2005). In most of East Africa the prevalence has now settled at around 6-7% of the adult population and it would seem that the HIV epidemic in sub-Saharan Africa has reached its peak. Certain sexual behaviour has probably changed, but much of the risky sexual behaviour persists and condom use remains low. The main medical intervention, ARV treatment, still has low coverage in Tanzania, as in most sub-Saharan countries, and prevention of mother-to-child transmission meets with major obstacles.

As a background to my studies on STI/HIV control in Tanzania and Zambia, which aim at identifying and characterising major obstacles to STI/HIV control mainly in Tanzania, I find it important to touch upon five fundamental questions:

- *Why is there more HIV in sub-Saharan Africa than elsewhere?*
- *Why is HIV so unevenly distributed over the African continent and also within Tanzania?*
- *Why has there been so little behavioural change?*
- *Why have control efforts not been scaled up?*
- *How can aid effectiveness in HIV control be improved?*

The first question I will only allude to while I will briefly address the others both in the background section and later in the discussion. To do this I will describe HIV and STI occurrence both in Tanzania and in the rest of sub-Saharan Africa. I will then review the determinants of HIV transmission in an attempt to explain why the infection is so unevenly

distributed over sub-Saharan Africa and within Tanzania. I will finally in the background also briefly describe the health service system and STI/AIDS control in Tanzania and give an account of how STI and HIV/AIDS control has been financed in Tanzania.

STI control, although important in its own right, is in the thesis mainly seen as an intervention aimed at the prevention of HIV transmission. The two main aims of HIV/AIDS control are reflected in the outcome box in fig.1:

- To prevent new HIV infections
- To prolong the life of HIV infected patients who are about to develop AIDS

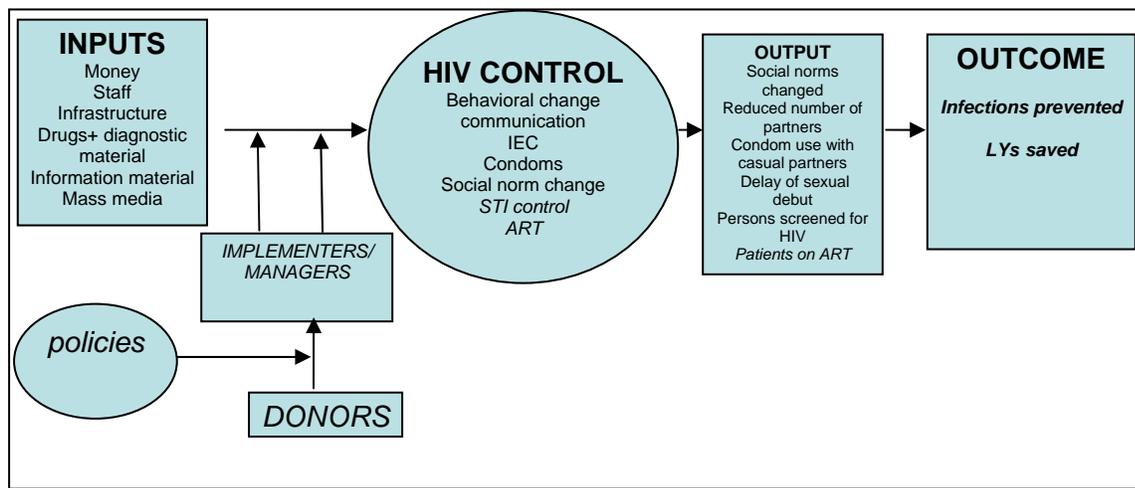


Fig.1. Conceptual framework of STI/HIV control with aspects covered in the papers in italics

1.1 OCCURRENCE OF HIV AND OTHER STIs

The first AIDS cases were reported among gay men in New York by the Centre for Disease Control (CDC) in Atlanta in August 1981 (MWW, 1981). In 1983 the HIV epidemic in Central Africa was discovered. In the same year French scientists identified the retrovirus that causes AIDS and in the following year a blood test was developed by American researchers. In 1987 the first anti-retroviral drug, AZT, was approved for use in the United States. Triple-drug therapy was introduced in 1995 after the synthesis of the first HIV protease inhibitors.

Today HIV has developed into a major pandemic with about 39 million infected persons and 25 million deaths. Most of these have occurred in sub-Saharan Africa, which in 2005 had the highest adult prevalence of around 6%. This is followed by a prevalence of almost 2% in the Caribbean, while the rest of the world only has an adult HIV prevalence of 0.5 -1%. In the

Muslim countries of North Africa and the Middle East the corresponding figure is around 0.2 % (UNAIDS, 2006; UNAIDS and WHO, 2005).

The main mode of transmission also varies. While around 85% of all infections in sub-Saharan Africa are sexually transmitted and around 10% transmitted from mother to child, most infections in Asia are transmitted through intravenous drug use (Adler, 2001).

Detailed genetic studies have shown that the likely first occurrence of the virus dates back to the period between 1910 and 1950 (Korber et al., 2000). It has been suggested that the virus could have been transferred through direct exposure to animal blood in connection with hunting and butchering or through bites (Diamond, 1992). However, the changes in the virus that led to trans-species transmission and pathogenicity in humans are not yet understood (Sharp et al., 2005). Neither is it understood why the epidemic developed much later than the virus mutation. It has been suggested that the start of the epidemic was triggered by social factors, such as urbanisation and better transport networks. The rapid shift from rural traditional societies to modern disorganized urban settings resulted in a variety of context-specific transformations of societal norms for sexual activity (Quinn and Fauci, 1998). This led to new patterns of sexual encounters and the establishment of wider sexual networks (Caldwell et al., 1991; Nzilambi et al., 1988). These special combinations of traditional and new determinants for sexual activity prevailed where the epidemic started in Northern Tanzania.

1.1.1 The development of the HIV epidemic in sub-Saharan Africa

The first well described epicentre of the HIV epidemic in sub-Saharan Africa was on the Ugandan/Tanzanian border. It seems the epidemic spread from there to the rest of Tanzania and Uganda as well as to Kenya at the beginning of the 1980s. Much of the transmission might have occurred along the main highways such as the Kigali – Kampala– Nairobi - Mombasa - highway (Gysels et al., 2001). The fact that many of the low-status sex workers in Nairobi originated from the Kagera region in Tanzania (Piot et al., 1987) may reflect such links. The HIV epidemic started at around the same time in the Democratic Republic of Congo, but there it developed at a slower pace.

In contrast to the development in Congo, a very rapid growth of the HIV epidemic took place in Southern Africa at the beginning of the 1990s. By 1996 it was the most affected region of Africa and still remains so with an adult HIV prevalence of between 20% and 40% (fig.2). The development of the epidemic in West Africa has been much slower and only in the Ivory Coast has an HIV prevalence among antenatal clinic attendees of more than 10% been reported. In a 2002 study of pregnant women in 300 antenatal clinics persistent large differences in HIV prevalence in sub-Saharan Africa was observed ranging from 24% in Southern Africa to 4 % in West and Central Africa and 8 % in East Africa (Asamoeh-Odei et al., 2004). In West and Central Africa as in most of Southern Africa the prevalence among women attending antenatal care has remained stable over the last few years, with the exception of a decline in Zimbabwe and an increase in Mozambique.

These variations are largely confirmed by a number of national population-based surveys undertaken throughout the continent (Asamoeh-Odei et al., 2004). These generally show lower figures than sentinel surveillance statistics. But many population-based surveys suffer from uncertainties due to low response rates.

In Eastern Africa the HIV occurrence varies both between and within countries. After the rapid increase of prevalence at the beginning of the epidemic, in the first Ugandan/Tanzanian epicentre, the epidemic peaked at a national adult average of over 20% in Uganda in the early 1990s (Stoneburner and Low-Beer, 2004). Since then the national prevalence of HIV in adults has steadily decreased in Uganda. The overall adult prevalence is now 7% according to the latest national survey and 6.2% according to ANC surveillance data (UNAIDS and WHO, 2005). The decline has largely been attributed to behavioural change, in particular a reduction of the number of partners (Kilian et al., 1999; Stoneburner and Low-Beer, 2004), which has resulted in lower incidence rates. Since the HIV surveillance is based on measurements of prevalence the recent decline in incidence only became apparent following the deaths of the highest incidence cohorts infected early in the epidemic (UNAIDS and WHO, 2005).

The country-wide household survey of 2004-2005 revealed that many men continue to have multiple partners and HIV-related stigma remains a major problem (MoH Uganda, 2005). Condom use increased particularly among young men in the 1990s, but has now decreased again (Uganda AIDS Commission, 2006).

In Kenya the prevalence peaked later than in Uganda and reached 10% at the end of the 1990s, but has now declined to 7% (MoH Kenya, 2005). The decline can mainly be seen in the urban population.

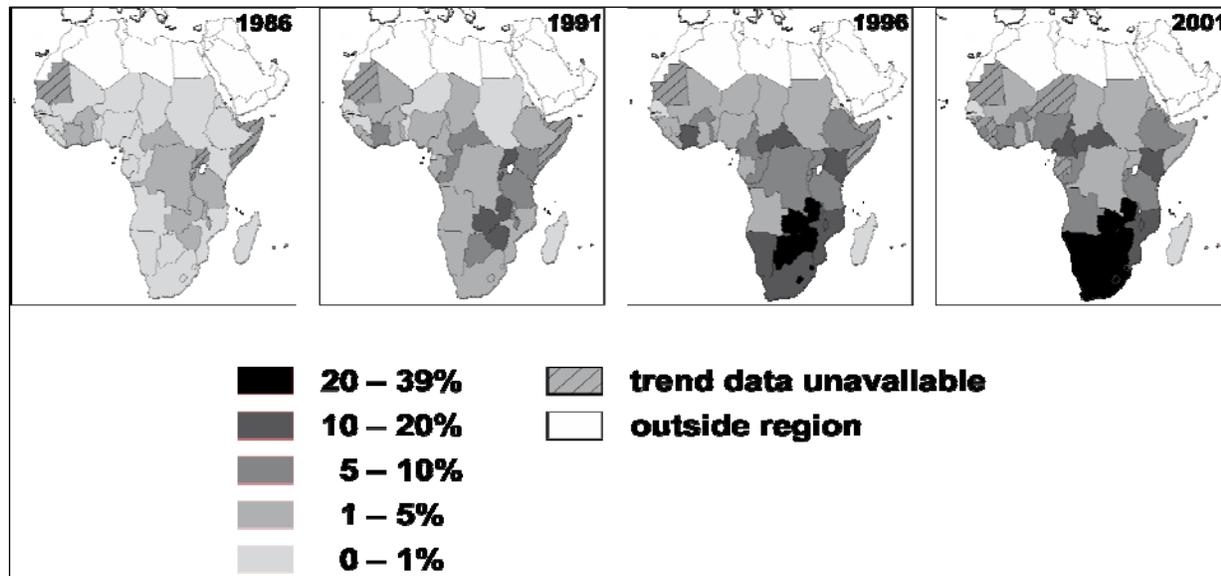


Fig. 2. Estimated HIV prevalence in adults in sub-Saharan Africa from 1986 to 2001 (source UNAIDS)

In 2006, some 30 years into the epidemic, prevalence also seems to have stabilised in Tanzania at around 7% of the adult population. This means that the incidence is no longer increasing. Thus, the occurrence of HIV in Tanzania is now similar to that of its two East African neighbours.

1.1.2 The occurrence of HIV/AIDS in Tanzania

Tanzania – basic data *

Tanzania is a low-income country situated in East Africa with a population of 37 million, of which 30% are reported to be Christians, 35% Muslims and the remaining 35% are reported to hold indigenous beliefs. In Zanzibar 99% are Muslim. There are over 130 different tribes among the Bantus, who make up 95% of the population***. Tanzania has close ties with its neighbours Kenya, Uganda, Rwanda, Burundi, Zambia, Malawi and Mozambique. Infant mortality is estimated at 86 per 1000 live births and under-five mortality at 112 per 1000**. The level of urbanisation is 23%****. The economy is mainly based on agriculture and life-stock keeping, which occupy 80% of the work force, but mining and tourism also contribute substantially to BNP. Per capita income is 700 USD in purchasing power parity and 36% of the population is reported to live below the poverty line of one USD per day***.

*UN population division database, **DHS Tanzania 2004-2005, *** World Factbook, CIA
****Population census 2002/3

The development of the HIV epidemic in Tanzania

It has been suggested the epicentre at the border between Rakai district in Uganda and the Kagera region in Tanzania was the result of economic activity (Killewo et al., 1990). Smuggling and trade across the common border have a long history. The closure of the border during the Ugandan-Tanzanian war between 1979 and 1985 created even more favourable conditions for a lucrative illegal cross-border trade, which generated money and led to an increase of sex work mainly in Bukoba town (Lwihula et al., 1993) and in the border villages. The Kagera region also has a history of a high prevalence of sexually transmitted diseases and infertility. This has been judged to be rooted in the social system with patrilineal inheritance, the payment of high bride prices and the great importance given to fertility – all factors putting women in a strongly dependent position. Further, during colonial times, the introduction of a cash crop economy based on coffee production, gave men the sole control of money and women became economically even more dependent. This economy also brought men to the urban areas while discouraging women from accompanying them, which led to a strong demand for sex workers in the towns and high urban levels of STIs. These subsequently caused infertility among the wives, who were probably infected when the husbands returned home to the villages. This situation, including being denied the right of inheritance of land, might have created the conditions “for the substantial migration of Haya women to urban areas to work as prostitutes” in many parts of the East African region (Lwihula, et al., 1993).

These social conditions combined with a low level of male circumcision, which is currently around 25 %, probably lead to the explosive development of the epidemic in the Kagera region. Already in 1987 it was found that 24 % of the urban and 5 % of the adult rural population was infected. The incidence was estimated at 47/1000 person-years at risk in urban and 5/1000 in rural areas (Killewo et al., 1993).

Following the confirmation of the first AIDS cases in the Kagera region HIV was also reported in other regions in Tanzania and by 1988 the cumulative number of reported AIDS cases per 100.000 in Dar-es-Salaam surpassed that of Kagera. The Mbeya region in the southern highlands subsequently reported the second-highest number of AIDS cases per population and since the introduction of sentinel surveillance among women attending antenatal care, in the mid-1990s, Mbeya has been the most affected region in the country.

The incidence and prevalence of HIV has now decreased in the Kagera region. Thus, the adult prevalence decreased from a high of 24% in 1987 in Bukoba town to 18 % in 1993 and later to 13% in 1996. In the medium prevalence rural area of the Muleba district the corresponding figures were 10 % in 1987, 7 % in 1996 and 4 % in 1999 with the fastest decline among women aged 15 to 24 years (Kwesigabo et al., 1998; Kwesigabo et al., 2005). The prevalence has in all probability continued to decline since then. According to the Tanzania HIV Indicator Survey (THIS) of 2003-04 (TACAIDS & National Bureau Of Statistics, 2005) - based on a representative probability sample of 6900 households in the whole country - the overall adult prevalence for the Kagera region was 3.7 % in 2003. The rapid decline in prevalence is due to decreased incidence, which is confirmed by the decline of prevalence among recently infected young women. Special studies in Kagera have also shown that the incidence declined by 80% in urban Bukoba and was halved in the Muleba district (Kwesigabo et al., 2005).

According to the THIS, the overall prevalence among adults (15 to 49 years) in the country was 7 % in 2003/4, this corresponds to around 1 million HIV-infected adults. This figure must, however, be interpreted with caution since the proportion refusing to be tested was as high as 13% (varying from 3 to 32 % between the regions). The lowest prevalence, 2%, was found in Kigoma and Manyara. Prevalence figures in Mbeya, although declining (Jordan-Harder et al., 2004), and in the neighbouring Iringa region, were still the highest in the country, at 14 and 13 % respectively, (fig. 3) with refusal rates of 7 and 15 %. The Mbeya region also reported the highest numbers of STIs in spite of long-term STI/HIV control efforts. THIS also showed that the high prevalence regions, along with three other regions including Kagera, also had the lowest reported proportion of circumcised men (26 % to 38 %) (TACAIDS & National Bureau of Statistics, 2005). Zanzibar was not included in THIS as it was surveyed in 2002 and found to have an adult HIV prevalence of 0.9 % (Salum, 2003). The UNAIDS estimate of the number of people infected with HIV in Tanzania in 2003 was 1.6 million, but the figure has a wide uncertainty range, stretching from 1.2 to 2.3 million people (UNAIDS, 2004).

The findings of the THIS correspond relatively well to those gained from sentinel surveillance of attendants of antenatal care (ANC) (Changalucha et al., 2002). The system for ANC surveillance was revised in 1999 and since then ANC surveys have been carried out in 2001/2 and in 2003/4. The ANC sites were divided into urban, semi-urban and rural sites. The semi-

urban sites situated near the major roads were called roadside sites, and those near a country border were called border sites.

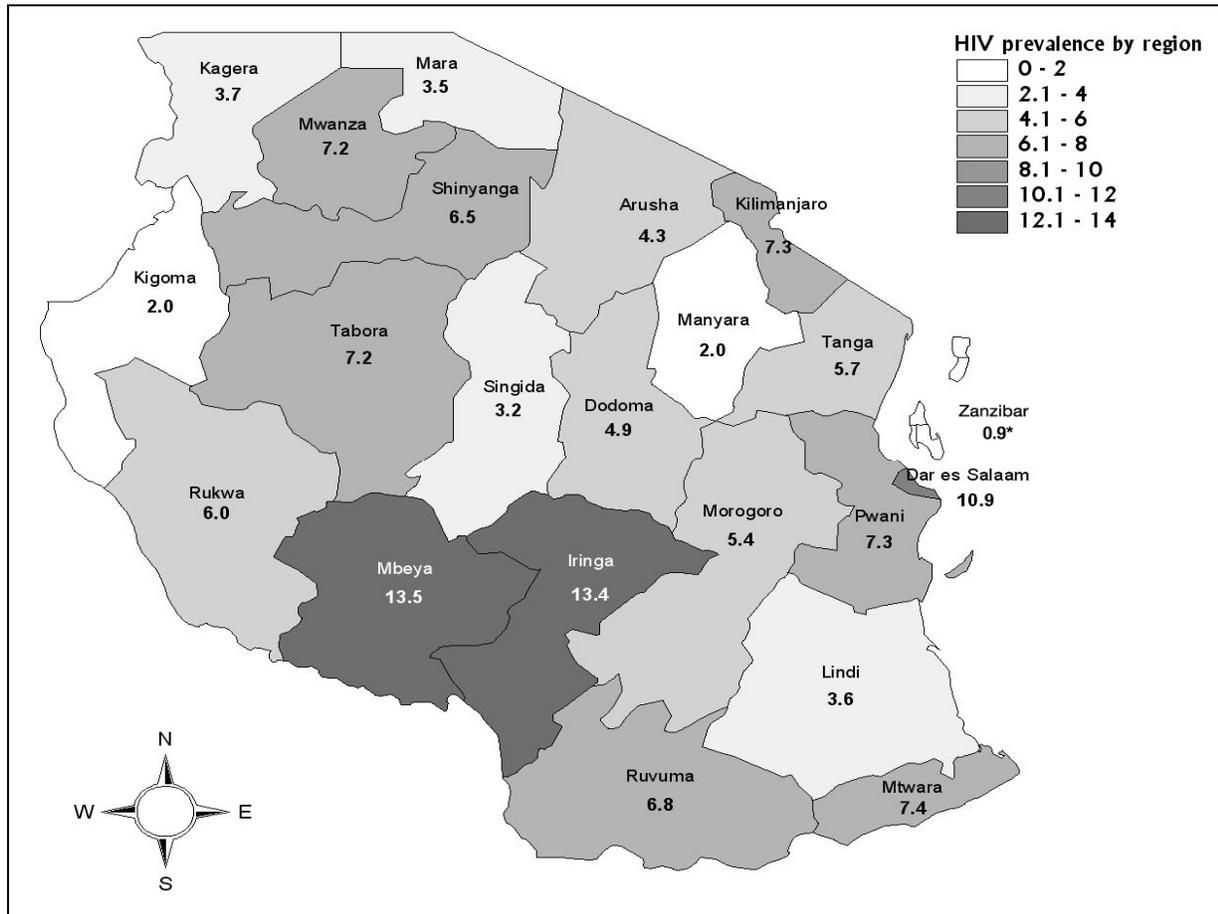


Fig. 3. HIV prevalence by region in Tanzania according to the Tanzania HIV Indicator Survey (THIS) 2003/4 and a community-based survey in Zanzibar* in 2002 (Salum, 2003)

Prevalence was highest at the border sites – 16 % in 2003/4 - followed by urban and roadside sites with 11 % and 9 %, whereas other semi-urban and rural sites had prevalence figures of 5 and 3% respectively. (MoH NACP Tanzania, 2005). According to the ANC/surveillance, the highest prevalence was found in Mbeya and the lowest in the Kagera region. There were no ANC sites in the Kigoma and Manyara regions, which showed the lowest prevalence in the THIS (fig. 3).

Affluence also seems to be an important factor for HIV acquisition in Tanzania, as the prevalence is up to three times higher among the richest quintile compared to the lowest wealth quintile (fig. 4).

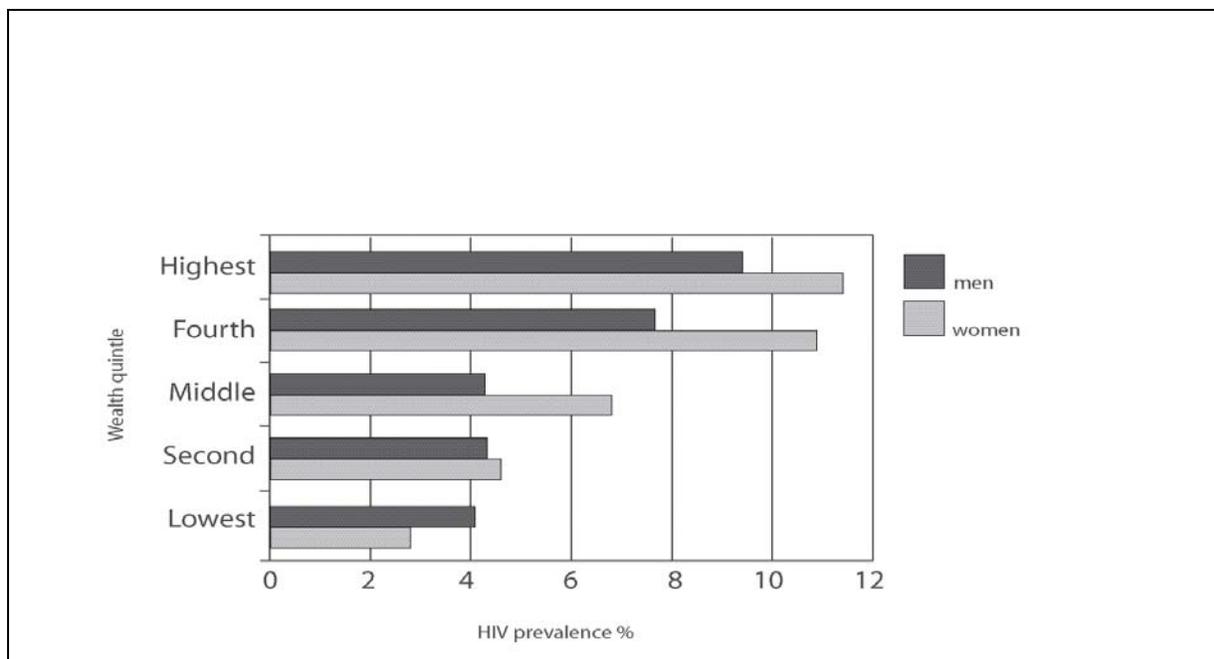


Fig. 4. HIV prevalence by wealth quintile in Tanzania (Tanzania HIV Indicator Survey 2003/4)

Parallel to the HIV epidemic, the incidence of tuberculosis has also increased rapidly over the last few years, but it now seems to be stabilising at around 2%. The number of reported cases increased from 12,000 in 1983 to a little over 60,000 in 2001 and 2002 (Ministry of Health, 2002). Similar figures were reported for 2003. Tuberculosis does not increase the HIV viral load (Day et al., 2004) but it does have an impact on the HIV epidemic mainly by being the main cause of death of AIDS patients.

Urban-rural variations

At the beginning of the epidemic in Tanzania HIV/AIDS was a predominantly urban disease. It seems that infection among high-risk men and women initially fuelled the epidemic in roadside settlements and in urban areas. In the early stages of the epidemic high prevalence was recorded among sex workers in different parts of Tanzania (Nkya et al., 1991). It seems as if a relatively small number of women infected a large number of men, who then infected both their wives and other sexual partners. Regular concurrent extramarital partners are known as “nyumba mdogo”, Swahili for small houses. In urban areas this social arrangement has to a large extent replaced the polygamous marriages of rural settings. The epidemiological pattern in Tanzania represents a so-called generalized epidemic, defined by UNAIDS as a prevalence of over 1% among antenatal women. There is still an urban-rural difference in Tanzania with higher prevalence in

urban (11 %) than in rural areas (5 %). But with only 23 % urbanisation most of those infected are rural dwellers. Although a small study from Uganda (Pickering et al., 1996) suggests that there is only limited sexual mixing between rural and urban communities, a possible scenario is that in the rural areas farmers get infected by young women at the roadside trading centres (Mwaluko et al., 2003), and then bring the infection back to their wives in the polygamous marriages in the villages (Hugonnet et al., 2002), and to extramarital partners, as was found to be the case in Rakai, Uganda (Serwadda et al., 1995).

Gender variations in HIV occurrence

It has been argued that young women are at the centre of the epidemic and that specific efforts must be made to protect them from infection to stem the epidemic (Laga et al., 2001). Young teenage women are more easily infected than older women due to a biological vulnerability. In many studies, including the UNAIDS supported “four-city study” conducted in two low and two high HIV prevalence cities in sub-Saharan Africa (Buve et al., 2001a), it has been shown that there is a much higher prevalence among young women compared to young men (Buve et al., 2001b; Glynn et al., 2001a). A study in Rwanda suggests that the low age of women (< 20 years) in itself is an independent risk factor for HIV acquisition (Bulterys et al., 1994). The group “young women” is both infected by the group “men 5-10 years older with similar prevalence rate” (Gregson et al., 2002; Munguti et al., 1997), and “men more than 10 years older with higher HIV-prevalence”. Many of the 5-10 years older men are also likely to get infected by the young women, who also belong to the same age group of women that they will later marry (Munguti et al., 1997). In the rural area of Kisesa in Tanzania around 20 % of women aged between 15-19 reported having partners 10 years their senior (Boerma et al., 2003). In Uganda it was estimated that the attributable fraction of prevalent HIV infection among young women associated with partners over 10 years older was 10 % (Kelly et al., 2003).

Young women in many parts of Tanzania as well as in neighbouring countries often have extramarital relations (Glynn et al., 2003). It is not uncommon that young pregnant women are found to be HIV positive at ante-natal clinics while their husbands are negative (Mbezi et al., 2004; Risasi et al., 2004). A study on the prevention of mother-to-child transmission (PMTCT) in Tanzania revealed that only 29 % of women agreed to being enrolled. This may at least partly be due to fear of the husband, since only 62% of the HIV-positive women’s male partners, who came for testing, were HIV-positive (Kilewo et al., 2001). The reason for this discordance could

either be premarital relations or extramarital sex during the current marriage. In spite of being crucial for the understanding of the determinants of HIV transmission the social factors behind this sexual behaviour have not been thoroughly studied.

The HIV transmission might also be fuelled by the parallel and mutually reinforcing Herpes Simplex type 2 transmission (HSV-2, responsible for genital herpes). This has as yet not been thoroughly studied in Tanzania, but several sero-epidemiological surveys have shown that young women have a high prevalence of HSV-2 (Langeland et al., 1988; Langeland, 1998; Nilsen et al., 2005; Riedner et al., 2003). The population attributable fraction (PAF) of HSV-2 for HIV infection was over 70% in a nested case-control study in Mwanza at the early stages of the epidemic (Del Mar Pujades Rodriguez et al., 2002).

In Tanzania there also seems to be a correlation between HIV acquisition and circumcision status, although this correlation in the Tanzania HIV Indicator Survey was not strong and the relationship probably blurred by other factors. However, many, mainly urban dwellers, now see circumcision both as a way of increasing cleanliness and of reducing STIs including HIV. Increased rates of circumcision have been reported among ethnic groups in Tanzania that do not traditionally circumcise, particularly among educated men in urban areas (Nnko et al., 2001; Urassa et al., 1997).

1.1.3 STIs in sub-Saharan Africa with a focus on Tanzania

The World Health Organization has estimated that approximately 340 million new cases of the four main curable STIs (gonorrhoea, chlamydia, syphilis, and trichomoniasis) occur every year, 75–85% of them in low-income countries. STIs are more common in sub-Saharan Africa than in other parts of the world. WHO estimated that in 1999 there were 69 million new curable STIs/year in sub-Saharan Africa with a population of 269 million between the ages of 15 and 49 (250/1000) while for Western Europe with a population of 203 million in the same age group the figure was 17 million (80/1000) (WHO, 2001) (fig 5). Thus, the incidence of curable STIs in sub-Saharan Africa was estimated at a little over three times that of Western Europe.

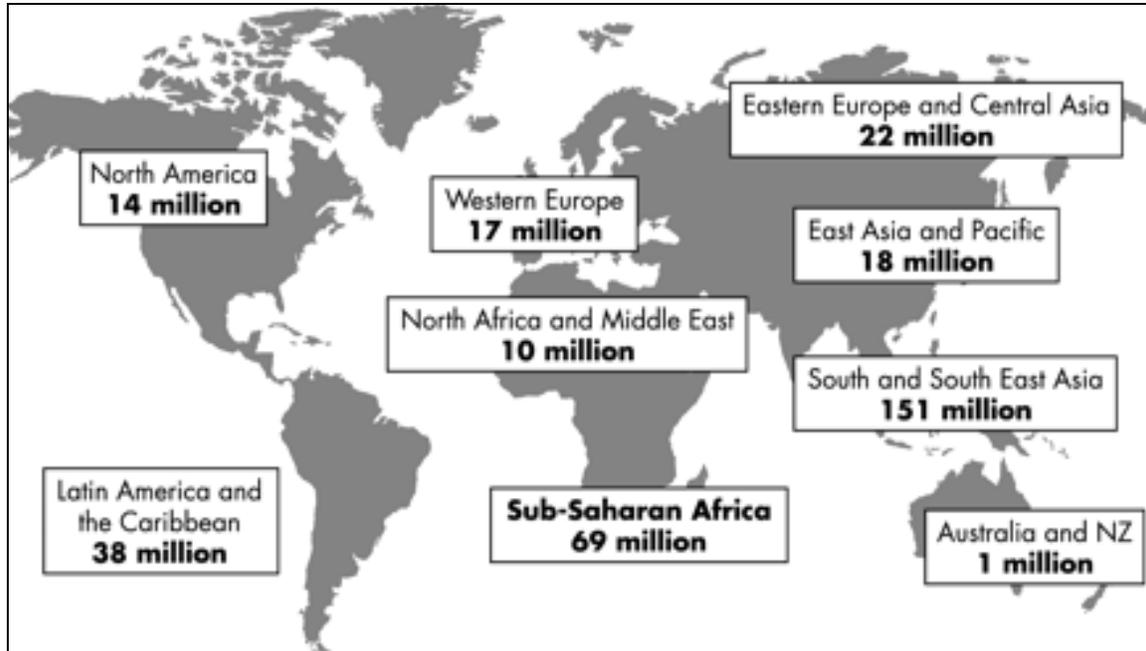


Fig. 5. Distribution of the estimated 340 million new cases of curable STIs among adults in 1999. (Source: WHO, Global prevalence and incidence of four selected curable sexually transmitted diseases).

The World Bank has estimated that STIs, excluding HIV, is the second most common cause of healthy life years lost for women aged between 15 and 44 in Africa, and these four diseases are responsible for some 17% of the total burden of disease (World Bank, 1993). Many STIs lead to complications such as congenital infections, stillbirths and infertility, and the greatest impact is therefore on women and infants. The high prevalence of STIs has contributed to the disproportionately high HIV incidence in Africa, and conversely, HIV has contributed to an increase in STIs, especially of viral agents, such as herpes simplex virus-2 (HSV-2) and human papillomavirus (Mayaud and Mabey, 2004). This has changed the epidemiology of genital herpes, which has emerged as a leading cause of genital ulcer disease in many countries (O'Farrel, 1999).

Most epidemiological STI data have been obtained from prevalence studies and sentinel surveillance sites in a small number of countries. Prevalence surveys only reflect the population groups surveyed, such as university students, antenatal clinic attendees, STI clinic attendees, or sex workers. The results of a number of prevalence surveys among low and high risk women conducted in sub-Saharan Africa are summarized in table 1.

Table 1. Prevalence of STIs and RTIs (reproductive tract infections) among women in sub-Saharan Africa in the 1990s.

Type of infection	High-risk populations*		Low-risk populations*		Low-risk populations; WHO 1995**
	Median %	Range %	Median %	Range %	Mean %
Chlamydia	8	2 – 13	7	4 – 18	
Gonorrhoea	16	6 – 31	2	2 – 9	3
Trichomonas	28	11 – 46	18	10 – 27	14
Syphilis	8	2 – 29	4	1 – 29	4
Candidiasis	33	28 – 38	27	8 – 39	-
Vaginosis	-	-	22	15 – 35	-

Source: * Mayaud and Mabey, 2004; ** Gerbase, Rowley, Mertens, 1998

As you can see from the wide ranges there is great variation in prevalence between countries. It is therefore neither possible to generalise results from studies in one country to another; nor from one part of a large country to other parts of that country. Considerable variations in STI prevalence were also reported (table 2) from the four-city study. It also indicated that HSV-2 and trichomonas were the only STIs with a significant difference between low and high-HIV prevalence cities. Furthermore, this study showed that women in general had higher rates of the STIs included in the study than men, which also held true for other STIs including gonorrhoea (not shown in the table) (Buve et al., 2001a). As can be seen from the table women were also infected at a younger age. Men reached similar prevalence levels 5-10 years later.

Table 2. Age distribution of selected STIs in the four-city study. Prevalence (%) of HSV-2 and trichomonas. Trichomonas only determined for women.

Country	Benin		Cameroon		Kenya		Zambia	
City	Cotonou		Yaoundé		Kisumu		Ndola	
Herpes Simplex Virus-2								
Age group	Women	Men	Women	Men	Women	Men	Women	Men
15-19	9	1	15	3	39	9	23	1
20-24	17	5	39	7	66	17	58	17
25-29	29	5	68	29	79	38	64	42
30-39	42	21	73	48	85	61	76	56
40-49	57	39	77	57	86	65	66	59
<i>All ages</i>	<i>30</i>	<i>12</i>	<i>51</i>	<i>27</i>	<i>68</i>	<i>35</i>	<i>55</i>	<i>36</i>
Trichomoniasis								
Age group	Women		Women		Women		Women	
15-19	6		13		34		52	
20-24	4		17		32		35	
25-29	2		23		34		25	
30-39	2		18		23		26	
40-49	3		18		25		19	
<i>All ages</i>	<i>3</i>		<i>18</i>		<i>29</i>		<i>34</i>	

Source: (Buve et al., 2001a)

If Tanzania had an incidence of the same magnitude as the estimate for the whole of sub-Saharan Africa (fig. 5), over four million new curable STIs would occur annually, many of which would be asymptomatic. In 2001 around 410.000 STI syndromes were reported to the national programme from 12 of the 20 regions, where the programme had been established. If the WHO estimates are correct, there is thus either a large number of asymptomatic, never diagnosed patients, or lower STI incidence in Tanzania than elsewhere in sub-Saharan Africa, or it is a matter of underreporting, or patients seek care elsewhere than from the formal services, government or NGOs. The reported cases were divided into the following syndromes:

- Genital ulcer disease (GUD)	20 %
- Urethral discharge in men	19 %
- Vaginal discharge	22 %
- Pelvic inflammatory disease (PID)	19 %
- Others, including genital warts	20 %

A large part of the GUDs in a quality of care study were clinically judged to be caused by HSV-2, which is not treated. Many of the vaginal discharges are not sexually transmitted and either caused by *Candida Albicans* or bacterial vaginosis. Similarly, many PIDs are not acute infections but chronic inflammations with pain. Many of the reported syndromes are thus not sexually transmitted infections, which makes the reported numbers difficult to interpret.

Until the 1990s there was little data on STI from rural communities, but large community-based studies conducted in Tanzania and Uganda in recent years have provided a wealth of data on STI incidence and prevalence. Studies from Mwanza have shown that STIs are common also in rural areas (Mosha et al., 1993; Watson-Jones et al., 2000). The prevalence of gonorrhoea among rural antenatal women was 2 %, chlamydia 7 %, trichomonas 27 %, candidiasis 14 % and syphilis 10 % (Mayaud et al., 1995). High figures were also reported from urban antenatal women in Dar-es-Salaam (Mwakagile et al., 1996).

1.2 DETERMINANTS OF THE HIV EPIDEMIC

The uneven distribution of HIV within sub-Saharan Africa (fig. 2) has not been well explained. It is clear the major differences cannot solely be due to the time factor, i.e. that the time of introduction of the virus differed (Buve et al., 1995). In fact, in 1983, when the first case was reported in Tanzania, the first cases were also reported from Central Africa. The first cases were

reported in Malawi and Zambia in 1985, and in Zimbabwe in 1987, at the same time as the first cases were reported from West Africa: Cote d'Ivoire in 1985, Senegal and Ghana in 1986, and Nigeria in 1987 (Mann et al., 1992). Still the prevalence today varies considerably between countries in Southern Africa and those in West Africa. Although there was an initial very rapid increase of prevalence in parts of Tanzania, the epidemic in Southern Africa, which did not take off until in the beginning of the 1990s, has led to much higher prevalence levels. In contrast the HIV epidemic in West Africa has never reached two-digit prevalence levels in any country.

In 1997 and 1998 UNAIDS undertook the above mentioned "four-city study"- with the aim of clarifying the reasons for these differences. A number of previously defined determinants for HIV transmission were examined in two low HIV prevalence cities, Cotonou (Benin) and Yaounde (Cameroon) and two cities with high HIV prevalence, Kisumu (Kenya) and Ndola (Zambia). In each city representative samples of 600-900 men and 900-1000 women from the general population and 300 sex workers were selected (Buve et al., 2001b). Only a few of the risk factors, including lack of circumcision and HSV-2 infection, showed statistically significant differences between the populations in low and high prevalence cities. Other factors, like high rate of partner change, sex with sex workers, concurrent partnerships, large age difference between non-spousal partners, presence of other sexually transmitted diseases (gonorrhoea, chlamydia and syphilis) and lack of condom use showed no significant difference. However, many of the determinants were risk factors in all four cities, but did not distinguish low from high prevalence cities. Many risk behaviours, such as reported high rates of partner change, concurrent partnerships and large age differences between partners, were even more common in the low prevalence city of Yaounde than in the two high prevalence cities (Buve et al., 2001a). What was striking, however, was that almost all men in the low prevalence cities were circumcised, whereas the majority of the men in the high prevalence cities were not. Genital ulcers, notably HSV-2, as well as trichomonas infection, were also more common in the high prevalence cities (table 2).

The high HSV-2 prevalence could be the result of a co-variation with HIV, since the chronic HSV-2 infection flares up in a state of immuno-suppression. HSV-2 could also lead to increased HIV incidence since the ulcers both facilitate HIV transmission and increase the HIV viral load. The increased HIV incidence leads in turn to more HSV-2 infections. The two infections

therefore mutually reinforce the transmission of the other in two spiralling intertwined epidemics (Wald and Corey, 2003).

A part of the intra-continental differences could thus be explained by biological factors in particular by the high prevalence of STIs, including HSV-2 and the protective effect of male circumcision (Auvert et al., 2005; Bongaarts et al., 1989; Caldwell 1994; Gray et al., 2000; Moses et al., 1999; Weiss et al., 2000). Other factors are less clear.

Social scientists have focused on the underlying factors, including differences both in traditional practices and modern sexual norms. The latter are likely to have resulted in an increase in concurrent extramarital relations particularly in urban areas. The difference in prevalence may be the result of a combination of interrelated factors. Some of the underlying factors are explicit such as marriage relations and inheritance rules (Larson, 1989), while others are implicit, such as the many factors that are related to culture.

1.2.1 The framework of determinants

A conceptual framework of determinants for sexually transmitted HIV infection has been outlined (Boerma and Weir, 2005) (fig 6). It constitutes the development of an analytical tool originally developed in the 1950s to study the sociology of fertility (Davis and Blake, 1956) and subsequently adapted for HIV transmission. In this framework the underlying determinants are linked to what I have called indirect determinants, which in turn determine the value of what I call direct determinants in my modified version – the factors of the basic reproductive rate of infection - that lead to the health outcomes. The indirect determinants include individual sexual behaviour, STIs, viral load, circumcision status and condom use as the key elements.

The underlying factors could metaphorically be said to form the soil out of which the patterns for sexual behaviour have grown. Together they influence the indirect and direct determinants, which decide the incidence of infection. The underlying factors in the framework fall into two main groups: context and interventions. The contextual determinants include socio-economic and socio-cultural determinants. This section focuses on the contextual underlying determinants as well as the indirect and direct determinants and the following section on the interventions.

1.2.2 Socio-economic factors

Socio-economic factors described here include urbanisation, poverty and affluence, sex work, single men and women, migration and commercialism.

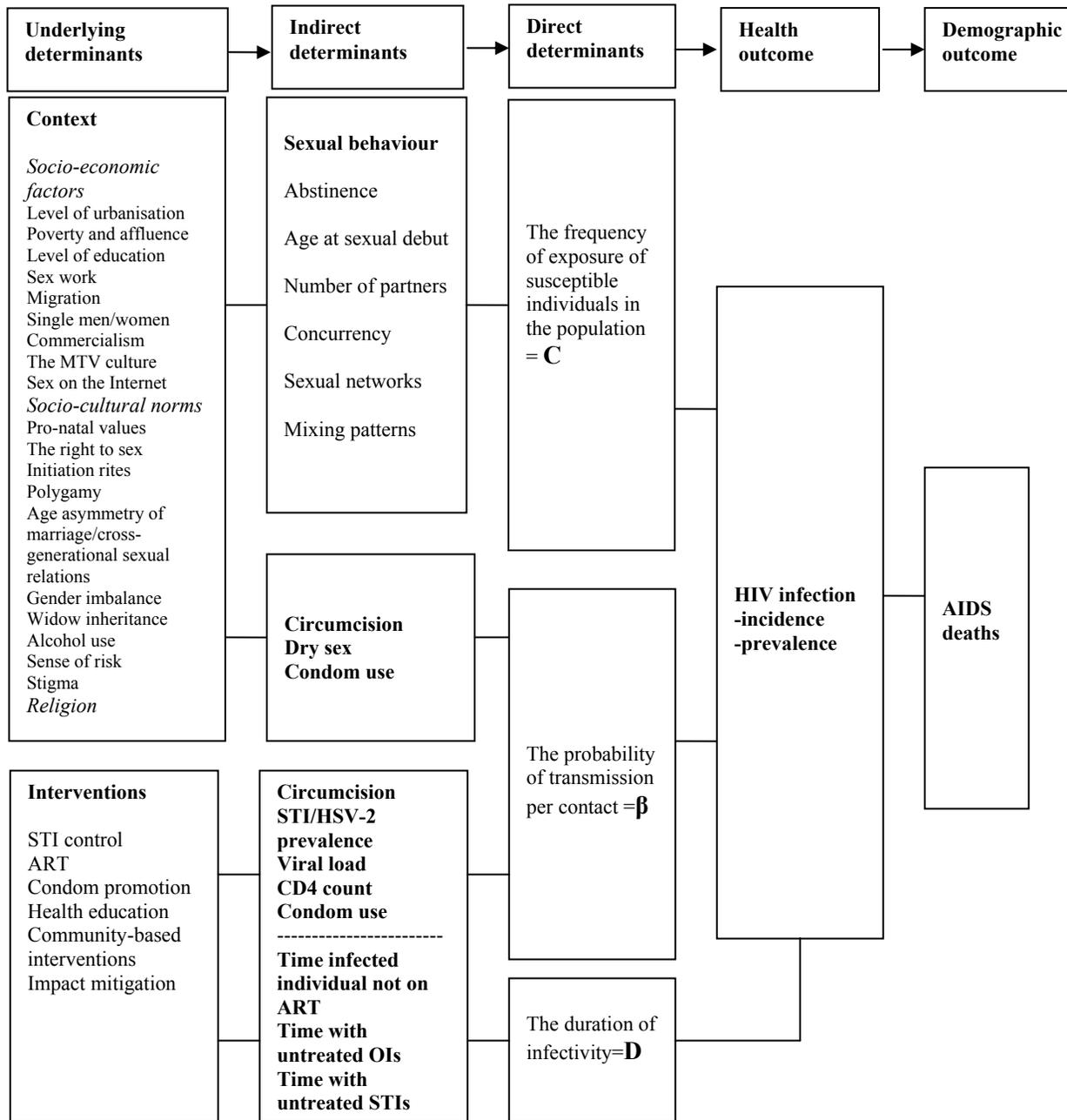


Fig. 6. Conceptual framework for determinants of sexually transmitted HIV infection. (Modified from Weir and Boerma JID 2005:191 (suppl 1))

The level of urbanisation

According to Southall there are two types of urbanisation in Africa: one is the continued growth of old traditional settlements as seen mainly in West Africa, and the other was initiated to cater for the need for labour by the colonial powers as seen in Central and Eastern Africa. The latter was dictated by colonial policies and there was little room for women. Men even provided the domestic services the colonial elite required. This created a demand for sex workers (Southall, 1961).

Much has changed since colonial times. In spite of a great diversity of traditional sexual relations, more uniform patterns created through interplay between cultural, sexual and economic factors, can now be observed in the cities. Research findings on polygyny, divorce, premarital and extramarital sex “illustrate how traditional attitudes have been translated into modern sexual relations” (Larson, 1989).

Still urban dwellers stay in contact with their rural origins. “Both men and women are uncomfortable with many aspects of urban social life and the associated social changes that have occurred so rapidly.” Much of this change is blamed on the “modern woman”, who serves as a symbol for the loss of a tradition that many long for. Modern sexual behaviour is still influenced by traditional inheritance rules, but set in today’s economic realities. This has led to an increase in informal polygyny, with men in the cities having “outside wives”. Different systems exist for those with a matrilineal inheritance, where a woman remains part of her own family, and patrilineal inheritance, where a large bride wealth is paid to ensure control of the wife’s sexual activity and reproductive capacity (Larson, 1989). These systems have led to two different patterns of sexual networks in the cities. The first is mainly found in patrilineal societies, with a small core of female sex workers and a large male clientele, such as in Bukoba and Kagera (Lwihula et al., 1993). A second pattern with roughly the same number of men and women, who both have a set of lovers, either serially or simultaneously, is seen in matrilineal societies. This is the pattern in Kampala among the Ganda (Larson, 1989). In larger cities or in areas with a large number of ethnic groups these patterns are likely to be mixed.

Urbanisation has also at least in some places led to new broader overlapping sexual networks due to new economic systems with larger towns and transport networks, such as among the

Yoruba (Caldwell et al., 1991). These findings are likely to be true also for many other parts of the continent, but there may be important variations between different contexts.

Typically HIV prevalence rates are higher in urban than in rural areas. Although there are urban/rural differences in HIV prevalence within countries, the variation in urbanisation in sub-Saharan Africa cannot explain the differences in prevalence over the continent. The urbanisation level in Southern Africa is, for example, similar to that in West Africa, 42 % vs. 40%, while the HIV prevalence among ANC women is much greater in Southern Africa 24 % vs. 4 % (Asamoeh-Odei et al., 2004).

Poverty and affluence

HIV/AIDS has often been described as a disease of poverty (Johnson and De Cock, 1994). It has further been argued that the cuts in spending in the social sectors of the structural adjustment programmes has led to increased rural poverty prompting migration to urban areas (Denoon, 1995; Kingman, 1987; Lugalla, 1995). This has subsequently led to the disruption of rural social networks and the establishment of new less controlled urban sexual networks.

HIV, however, is not only, and maybe not even mainly, a disease of the poorest in sub-Saharan Africa. The most rapid development of the epidemic has been in the south of the continent, where people have higher per capita incomes than in other parts of sub-Saharan Africa (Buve et al., 2002). Thus there may be a better explanation than poverty for the rapid increase in HIV prevalence namely good communications, such as an excellent road network in this part of the continent and the increased sexual mixing this might entail. Also within Tanzania the HIV prevalence is not mainly related to poverty as shown by the Tanzania HIV Indicator Survey (fig.4). Similar findings of higher prevalence in higher wealth quintiles have also been reported in Uganda (MoH Uganda, 2005). Likewise, the HIV prevalence in Tanzania increased with rising levels of education both for men and women (TACAIDS & National Bureau of Statistics, 2005).

Sex work and transactional sex

Prostitution or sex work is here understood to be a separate service through which sex is offered in exchange for money, whereas transactional sex could be part of other social relations and

economic transactions both regular and casual. It may not involve cash, but gifts or favours and may sometimes be a prerequisite for another important economic transaction such as the sale of a sack of maize or purchase of a basket of fish. Sex work may certainly sometimes be the only way for poor women to survive, but probably a very small group of women in Tanzania resort to this all the time, although many women have reported doing this for shorter periods of their lives (Desmond, 2005). In Zimbabwe it is reported that 10% of all women have been involved in sex work part of their lives (Wilson D. et al., 1992). In a setting where there are a fair number of premarital and extramarital relations and a small number of sex workers, as in many urban settings, sex work will only be very important for the spread of the disease at the beginning of the epidemic. High HIV prevalence among sex workers was reported in Tanzania, Uganda and Rwanda at an early stage of the epidemic (Nkya et al., 1991; Serwadda et al., 1995; Serwadda et al., 1985; Van de Perre, 1984). Later in the epidemic, sex work has relatively speaking been of less importance and was found to play an epidemiologically insignificant role in a study in Mwanza, Tanzania (Quigley et al., 1997). Still, sex work may play a “strategic role” in fuelling the epidemic through the linking of different sexual networks and the initiation of new networks in many settings. It may also constitute a link between the rural and urban epidemics as it is thought that farmers may contract the disease from sex workers at trading stations where they go to sell their products (Hugonnet et al., 2002; Serwadda et al., 1995). Transactional sex on the other hand seems to be common in many parts of sub-Saharan Africa and it is likely to be of much greater importance for transmission in the later stages of the epidemic as it is likely to contribute to the maintenance of sexual networks. As previously mentioned, around 10% of young women in some settings contract the HIV infection from men more than 10 years their senior. Some of these girls might be students, who depend on so-called “sugar daddies” for the payment of school fees. But the importance of sugar daddies has probably been exaggerated in many settings (Kohler and Helleringer, 2006)

Single men and women - migration, the military, mines and lorry drivers

Another factor likely to be an important determinant for the epidemic is the number of single men and women. Military men in Mozambique had more than three times higher HIV prevalence than other blood donors in 1998 (Newman, 2001). According to a newspaper report 60% of the South African military is infected (Marseille et al., 2002). Military recruits in

Tanzania have to remain unmarried for 6 years after recruitment. Such a system does not encourage sexual relations with a single partner.

Long-distance lorry drivers were considered to be vectors of the disease early on in the epidemic (Nyamuryekung'e, 1997; Smallman-Raynor and Cliff, 1991) and probably still contribute to disease transmission, disproportionately to other groups.

It has been known for a long time that HIV prevalence among migrant workers in the mines of South Africa is high (Jochelson et al., 1991) and that they are likely to bring the infection back to their wives both in South Africa and in neighbouring countries, when they go back for visits. Tanzania has 600-700 small mines mainly for gemstones (Goergen et al. 2001), and a number of larger mines for diamonds and gold. In most of these a large number of unmarried young men work and are in many places sexually served by a smaller number of women living in the neighbourhood.

Commercialism

The increasing exchange between the economies of the world certainly also has its impact on young people in Tanzania (Dilger, 2003). According to anecdotal evidence a mobile phone of the latest model is a motive for many young girls, even relatively affluent ones, to have transactional sex. The music videos and hip-hop music, which penetrates into the smallest villages of sub-Saharan Africa, carry a strong pro-sex message, sending a clear signal to young people. Internet cafés are becoming common in all major cities in Tanzania. Many of them are frequented by young men, who spend part of the day surfing the sex sites. The effect and extent of this is not clear, but it is likely to contribute to the dissolution of social norms.

1.2.3 Socio-cultural factors

Culture is both metaphorically and literally deeply rooted in the soil of Africa, where the ancestors rest. These have played, at least previously, an important role in life in many ethnic groups, as reflected by the following quote: "We are people like everybody else. We have only died." (Åkeson, 1983). It has been argued by some that many African cultural systems have remained largely intact despite strong external influences during colonisation and missionary activity (Caldwell et al., 1989), while others have argued that they have undergone change mainly brought about by the new economic systems introduced during colonial times, which led

to the separation of men and women (Hunt, 1996). This view on change is also supported by Maina Ahlberg, who strongly objects to the view that the culture is static. She shows that sexuality among the Kikuyu of Kenya after Christianisation was “drastically transformed, from a context where it was open, but kept within well-defined social control and regulating mechanisms, to being an individual, private matter surrounded largely by silence” (Maina Ahlberg, 1994).

According to Helman three levels of culture can be distinguished. The tertiary level is explicit and visible, seen by outsiders and liable to change, the secondary level is implicit, known to members of the culture, but rarely discussed with outsiders and finally the primary deeper level, known and obeyed, but never stated. The two latter levels are known to be resistant to change (Helman, 2001). They are also difficult to describe in anthropological terms and probably better captured and understood through fiction as the following examples from the Cameroonian author Calixthe Beyala show.

Calixthe Beyala, in her book “Les arbres en parlent encore”, (Beyala, 2003) writes:

”vous comprendrez pourquoi les Africains ne croit jamais ce qu’ils voient et pourquoi, quarante ans après l’indépendance nos peuples ont toujours les pieds dans l’Antiquité et la tête dans le troisième millénaire”, (why Africans never believe what they see and why our people 40 years after independence still have their feet in the old times and their head in the third millennium).

”Une confession écrite dans une langue étrangère est toujours un mensonge.....On comprendra aisement que cette histoire racontée dans notre dialect n’aurait plus la même teneur. (A confession written in a foreign language is always a lie.... It is not difficult to understand that this story would not be the same if it were told in our dialect).

And about the European visitor: ” il etait si inculte qu’il émiettait des grains de mil que des pigeons venait picorer, montrant ainsi qu’il ignorait que les dieux nourrissait les oisiseaux du ciel (he was so uneducated he crumbled the millet seeds the doves came to eat. This showed that he did not even know it is the gods that feed the birds from the sky).

About a child out of wedlock: ”un enfant est toujours un enfant. Cela vas faire agrandire mes terrains. J’en ai besoin de main-d’oeuvres pour mes champs”. (A child is always a child. This will make my plot bigger. I need the manpower for all my fields).

The choreographer Birgit Åkeson, who spent seven years in Africa to try to understand African

“dance”, finally, after as many years of reflection, understood that it does not exist in the western sense of the word. She then went to Asia only to find the same thing. Cultures it seemed “like the universe” had expanded away from each other from a common origin.

She writes about Africa in the preface to her book “Källvattnets mask”: “jag kom till en del av världen som inte haft behov av ordet kultur, men väl ordet natur – som inte behöver uttalas. Allt man ser, hör är uttalat. (I came to a part of the world where there was no need for the word culture, but certainly the word nature – which does not have to be pronounced. All you see and hear is pronounced.) “Det är i förhållande till naturen insikten om en själv föds.” ”Träden talar genom vinden.” ”Ord för kult eller rit finns inte. Ord för religion finns inte. Ord för rytm behövs inte. Naturen är varat, det som är. Jag är.Vara till, inte ersätta, aldrig imitera eller föreställa.” (It is in relation with nature the understanding of oneself is created. - The trees talk through the wind.- Words for worship or rites are not there?. The word for religion does not exist. The word for rhythm is not there. Nature is the being, that which is. I amTo exist, not to substitute, never imitate or mimic).

The clear difference in the understanding of the world that these quotes demonstrate might explain many of the difficulties and inefficiencies of HIV control because activities have to a large extent been directed by outsiders. Åkeson writes of her research: “Att ställa frågor förutsätter att orden möts, har samma betydelse.” (Posing questions demands that the words meet – have the same meaning) (Åkeson, 1983).

On the tertiary level the expression of culture is seen as widow inheritance, polygamy, gender inequalities etc. These are all important for the individual with regard to disease transmission , but certainly the unpronounced social norms of the secondary and primary levels of culture are of greater importance at the population level, as they dominate all attitudes and thinking. They regulate much of social life including sexual activities.

In many parts of rural sub-Saharan Africa, traditional norms are still of great importance, regulating the marriage system, inheritance etc. These rules also influence the indirect determinants of the framework of the determinants: sexual networks, mixing patterns including concurrency. The ability to address these effectively and achieve change might demand having been brought up in the culture itself. But change is slow in many settings. In line with the idea of

norm change Mandela has expressed the need for a social revolution in Africa (The Guardian, Tanzania, November 2001) implying a need for a more profound change.

Pro-natal values

Caldwell & Caldwell and collaborators have explored the origin of some of the social norms. They conclude that the dominant pro-natal attitude, which, they say is embodied in traditional culture and religion, is “associated with certain types of farming, land tenure and inheritance” and places a “greater emphasis on fertility, than on repression of women’s premarital and extramarital sexuality” (Caldwell and Caldwell, 1996). In many parts of sub-Saharan Africa communally owned land has up until recent generations been readily available and there has been a need for manpower to till the fields. This, according to the Caldwells is different from most of Asia, where the need to control the heritage of privately owned land has also meant a need to control female premarital and extramarital sexuality. This has even meant that “sexually straying wives or betrothed daughters” “might even be killed”. Much of this attitude is also expressed in the world religions, which all developed in Asia and which stress chastity before marriage. In much of their essence, they are different from the African religions (Caldwell et al., 1989; Caldwell et al., 1991). This might also explain why special social norms have remained unchanged in many parts of Africa, even when confronted with the ideas of Christianity (Hunt, 1996).

The desired number of children in Tanzania is still high at five (National Bureau of Statistics, Tanzania and ORC Macro, 2005). The pro-natal values are also demonstrated in a study from the Mbeya and Rukwa regions of Tanzania, where 28% of the men with nine children or more still wanted additional children (Centre for African Family Studies, 1996). Anecdotally, a highly educated Tanzanian man when visiting his home village was always asked by his aunts if he had had any children even though he was not married. When he answered no they insisted, “but you must get at least some children with some of the women around here”.

Others have argued strongly against Caldwell’s view “that African sexuality is inherently permissive” and argue that there were previously very strong systems that guided and controlled social conduct among several tribes in Africa (Ahlberg, 1994).

Furthermore, the WHO/GPA seven-year-long survey of behavioural risk factors for HIV transmission found no indication that sexual behaviour in Africa should be characterised by “extreme promiscuity” (Cleland and Ferry, 1995).

Initiation rites

In many ethnic groups initiation rites, which were previously an important part of many cultures, have disappeared with Christianisation. This is particularly true for female circumcision (Ahlberg, 1994). Once lost the old rites have not been replaced by others (Mziray, 2004). The remaining traditions, however, still retain their importance among many ethnic groups. The practice of the early initiation of girls (unyago), particularly among some groups in the south of Tanzania, apart from bringing essential information to the young girls, also encourages an early sexual debut with an increased risk of infection (NACP, 2002). After initiation it is assumed that the girls, often 12-13 years old, will become sexually active. Sexual activity also starts very early among the Masai (OleMoono and Hanson, 2002) and the word for virginity does not even exist.

The right to have sex

Among the Masai the right to sex is clearly recognised. Thus, OleMoono stresses that male youth have great sexual freedom. Even the right of widows to have sex is of concern to the Masai (OleMoono and Hanson, 2002).

Polygamy

Polygamy is associated with the risks of HIV transmission between concurrent partners, if sexual activity is not limited strictly to the wives. This is, at least in some settings, not always the case, as polygamy has also been found to be associated with extramarital activities and multiple partners both of the wives and the husband (Caldwell, 1999; Caldwell et al., 1990; Orubuloye et al., 1992). With urbanisation traditional rural polygamy has often shifted to having extramarital wives (“nyumba mdogo”-small houses).

It has also been suggested that Polygamy has strengthened the idea of men having many partners (Anarfi and Awusabo-Asare, 1993). It has been estimated that 30% and 40% of women in East

and West Africa respectively live in polygamous marriages, however, according to reports from Tanzania, monogamous marriages are on the increase (Lugalla et al., 2004).

Polygamy may also encourage early marriages and lead to an early sexual debut and cross-generational sex. A ten-year difference between husband and wife is not uncommon in Africa. This may reduce access to suitable marriage partners for younger men, which might lead to an increased demand for sex workers (Caldwell et al., 1990). Child marriages are common in some African countries. A study by UNICEF in Niger showed that 44% of women aged between 20 and 24 were married before the age of 15 (UNICEF, 2001).

Related to this is the idea among at least some ethnic groups, often also reportedly accepted by women, that men are “biologically programmed to need sexual relations with more than one woman, even parallel relationships” (Orubuloye et al., 1997). But the generalisation of this idea has been questioned by others, who resist the idea of a special African sexuality and claim that similar ideas also exist about men in the West (Stillwaggon, 2003).

Gender imbalance

The polygamous practices and the age difference in marriage might also maintain the women in a subordinate position. This is may be even more pronounced in East Africa. In West Africa women tend to be more independent, to conduct their own business to a larger extent, and to have their own budget (Caldwell and Caldwell, 1996). The gender imbalance might force East African women to have unprotected sex even if they strongly suspect that the partner might be infected. It has been found that increased female decision-making power within a relationship leads to safer sex practices (Harrison et al., 2001; Hoffman et al., 2006).

Widow inheritance

The gender power imbalance also implies responsibility to care for and support socially unprotected women, such as widows. Widow inheritance is practiced among many ethnic groups in Africa including in Tanzania. It is seen as a way of providing care for the widow and her children and ensuring the inheritance of the family property (Malungo, 2001). It is often combined with sexual cleansing. Since the widow has a higher than average risk of being

infected with HIV this practice may contribute to additional infections. According to a recent study in the Nyanza district in Kenya with a high HIV prevalence, 47 out of 92 widows had been inherited and 34 were in the process of being so during the study period. The habit is, however, gradually disappearing in parts of Zambia and Uganda and replaced by alternative practices, which do not carry the same risk of infection (Malungo, 2001).

Alcohol use

Alcohol use is closely connected to the inability to control sexual urges, and sexual activity is often associated with the intake of alcohol. Drunkenness has been reported to be a particularly grave problem in Eastern and Southern Africa (Amuyunzu-Nyamongo et al., 1999).

Religion

Looking at the distribution of HIV prevalence over sub-Saharan Africa it is striking that the countries with a high proportion of Muslims in the southern Sahel region have comparatively low HIV prevalence rates. In Tanzania HIV prevalence on the mainland is around eight times higher than on strictly Muslim Zanzibar (Salum, 2003; TACAIDS & National Bureau of Statistics, 2005). Although this could be explained by a stricter control over sexual activity in Muslim societies, it could also partly be confounded by the high proportion of circumcised men in these societies (Gray, 2004).

Sense of risk, “misconceptions”, witch craft and stigma

Although KAP studies and DHS in Tanzania have illustrated a very high level of knowledge of HIV/AIDS and how it is spread (Bureau of Statistics, 1997), many people have not yet incorporated the knowledge into their daily lives, and they do not see themselves as being at risk. Thus, a recent study from South Africa showed that 66% of the respondents believed they were not at risk of contracting HIV. These included a little over half of those, who were already HIV-positive (Shisana, 2005). Similarly, in a study in a rural community in the Mwanza region in Tanzania, people did not feel at risk of HIV and had not changed their behaviour (Mwaluko et al., 2003). There are also reports that young people in many African countries lack knowledge of HIV/AIDS. Only 15 to 49% of young people between the ages of 15 and 24 in eight selected African countries, which did not include Tanzania, had knowledge of the main ways of

preventing HIV according to recent Demographic and Health Surveys (UNAIDS and WHO, 2005).

Studies from Zambia have shown that misconceptions, folk beliefs, including witchcraft and denial impeded the adoption of safe sexual practices. Similar findings have also been reported earlier (Yamba, 1997). It is also not uncommon in Tanzania that people believe condoms can spread HIV (Tanzania KAP-Survey, 1995). Although villagers in Handeni, Tanzania, have been informed about the disease they do not believe it is there as they do not see it around them – the “ghost disease” (OleMoono and Hanson, 2002).

The disease is regarded by many, including religious leaders, as a punishment for sexual sins (Oruboloye et al. 1993). Women are suffering most from the stigma according to information from UNAIDS. They are both regarded as being promiscuous and blamed for infecting the men. Even in communities with high HIV prevalence hardly anyone lives openly with HIV. After the health care setting, the family was cited as being the place with the strongest stigmatisation. In one focus group discussion on stigma it was said: “within the family the stigma is the worst. Some cases are described where families do not want to share food. They might give their AIDS-relatives separate rooms, only leaving the door open a little. They just look but won’t sleep near the patient. Some wash their clothes in the toilet or use a stick to wash their clothes. Even after the death of the patient their clothes are burned and their mattress” (UNAIDS, 2001). But it is not clear how frequent this is. It must also be recognised that it is mostly the families that care for the AIDS patients.

In a study on obstacles to voluntary testing and counselling in Dar-es-Salaam, Tanzania, in 2000, 70% of 570 respondents reported that they were willing to utilise the VCT services. Of those unwilling to do so three-quarters reported stigma to be the main obstacle and two-thirds thought they might lose their job if they disclosed they were positive. A majority (three-quarters) thought they would be discriminated against by their family members, close relatives or colleagues, if found positive and one-third admitted they would also discriminate against others, if they knew they were infected (Fimbo, 2002).

1.2.4 Indirect determinants

Underlying determinants form complex patterns, which constitute the foundation from which the indirect determinants of the framework develop. These include different aspects of sexual behaviour including abstinence and condom use, as well as circumcision status and biological factors, such as STI-prevalence and viral load. These factors indirectly determine the likelihood of sexual contacts resulting in HIV-transmission in the population.

Sexual activity could be described in terms of frequency of sexual intercourses and of partner change; of sexual networks and mixing patterns including the level of concurrency of sexual partnerships. However, much information collected on sexual behaviour faces serious validity problems (Dare, 1994). Particularly women tend to underreport, while men are more likely to exaggerate sexual activity (Buve, et al., 2001b; Buve et al., 2001c; Konde-Lule et al., 1997). In Tanzania in-depth interviews conducted to evaluate the bias showed that men reported almost 50% too many casual sex partners (Ng'weshemi et al., 1996; Plummer et al., 2004). In another study in Tanzania all men and women in one village were studied. Results showed that single women underreported non-marital relationships, and it could not be excluded that men exaggerated the number of sexual partners (Nnko et al., 2004).

Abstinence

Many of the initial IEC campaigns in Africa used the so called ABC approach: sexual abstinence, be faithful, use condoms. In an evaluation of AMREF's programmes among youth in Ethiopia, Uganda, Kenya and Tanzania these were perceived as being against sex and judged to be unrealistic, as these approaches contributed to widening the gap between the accepted moral and what is actually taking place (Amuyunzu-Nyamongo et al., 1999). The reported coital frequency seems remarkably similar all over the world (Caldwell and Caldwell, 1996; Pickering, et al., 1996). Similar figures as in other places, (2.4 intercourses per week for men and 1.7 for women) were also reported from Tanzania (Konings et al., 1994). In Zambia reported coital frequency was 3.4 for men and 3.7 for women. These figures from Africa are lower than those reported e.g. from Brazil (Crael, 1995).

In spite of the difficulties reported from the implementation of abstinence only programmes and their lack of clear effect (Kennedy C E et al., 2006), partner reduction and intercourses that have

been abstained from are likely to be important factors for reduction of HIV-incidence, as shown for Uganda (Stoneburner and Low-Beer, 2004).

Age at sexual debut

Many youth start sexual activity early in Africa (see above under initiation rites), but in most ethnic groups it seems that age at sexual debut is similar to that of many other parts of the world (Caldwell, 1999). The average age of sexual debut in Tanzania was a little less than 17 years among girls and 18 years among boys in a study by Mabala (Mabala et al. 1995). Delays in onset of sexual debut has been reported lately both from Uganda (Okware, 2005) and Zimbabwe (Gregson et al., 2006). Primary abstinence promotion can delay sexual activity up till the age of 19 years according to experiences from a project in Uganda. Among 20-24 year olds the HIV-incidence was, however, the same among those who had delayed the sexual debut and among those who had not.

Number of partners

Reduction of the number of sexual partners has been an important part of the explanation for a decline in HIV prevalence in Uganda (Stoneburner and Low-Beer, 2004) and Zimbabwe (Gregson et al., 2006).

Concurrent partners

The level of concurrent partnerships varies between areas in sub-Saharan Africa and is known to be high in some settings (Lagarde et al., 2001). Such partnerships have been suggested as one of the main underlying factors of the epidemic in the worst affected parts of sub-Saharan Africa (Hudson, 1996; Morris and Kretzschmar, 1997). The great importance of concurrent partnerships has been shown in modelling studies. Concurrency risks leading to the exposure of several partners to the virus particularly during the initial high viremia period (Halperin and Epstein, 2004). However, the level of concurrent partnerships was not found to be significantly different in high and low HIV prevalence cities in the four-city study (Buve et al., 2001b).

Sexual mixing and sexual networks

Even quite late into the epidemic there is still a large difference in prevalence between urban and rural areas. It has been shown in a small study from Uganda that there is little sexual mixing between urban and rural populations. “In general rural men did not feel comfortable in town” and thought the women in town were expensive and “feared being humiliated if they tried to bargain.” Town men thought rural women did not want to have sex with them for fear they had HIV (Pickering et al., 1996). Gradually, however, the HIV epidemic has penetrated into rural areas, maybe mainly from the roadside semi-urban trading centres, and once established there continues to grow through the rural sexual networks.

A detailed study of an island population in Lake Malawi, with an adult HIV prevalence of 10%, has shown that the majority of the population (two-thirds) were linked “together by a single chain of sexual relationships” with a recall period of three years whereas around 20% of the population stayed completely outside the network (Kohler and Helleringer, 2006) (fig.7). Sex-work or ‘sugar daddies’ had little importance for the epidemic on this island.

These findings strengthen arguments for the importance of sexual concurrency in the development of the epidemic, but then have to be confirmed by other findings of similar type from other areas, to be validated. The situation described may be similar to that of some parts of sub-Saharan Africa, but it cannot be excluded that the pattern is specific for the isolated island population.

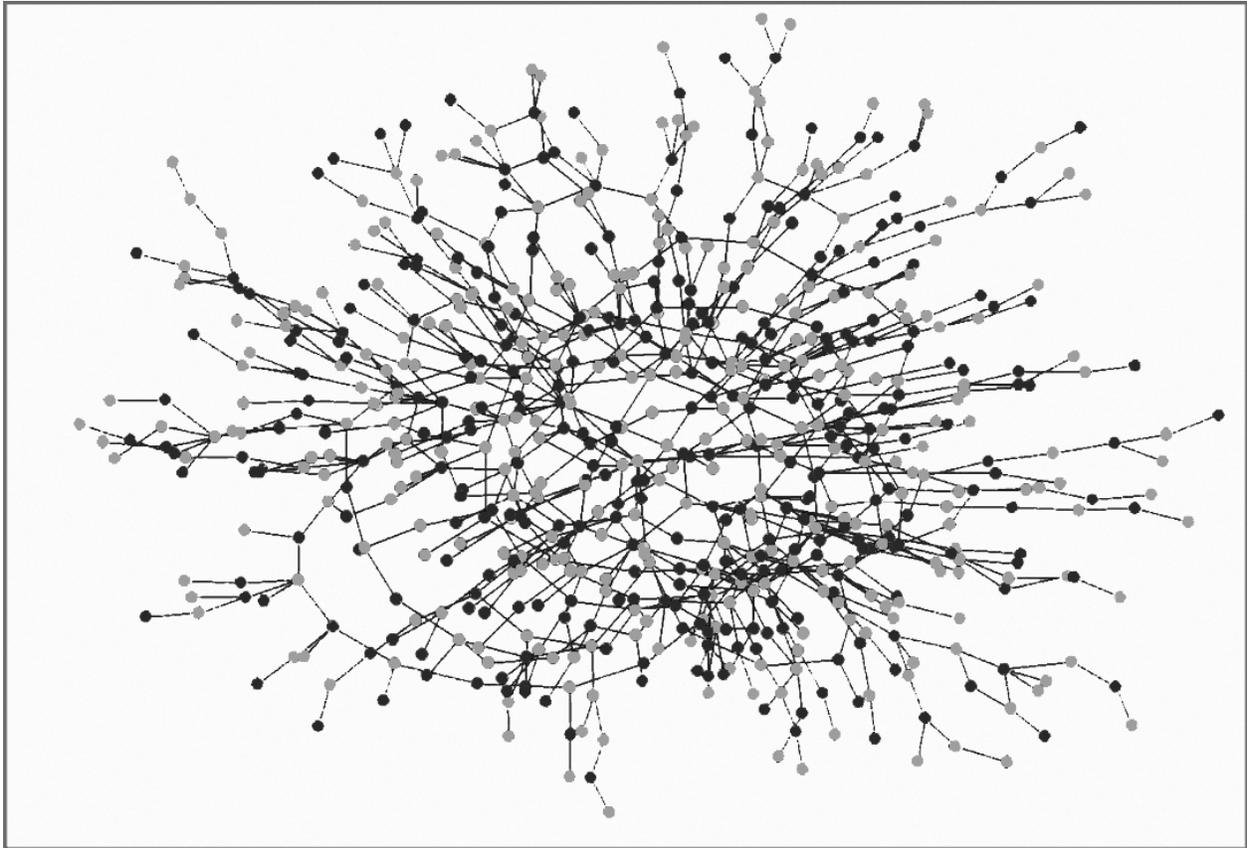


Fig. 7. Sexual network composed of 65% of the population aged 18-35 years in 7 villages on Likuma Island, Malawi; only includes sexual relations during the last 3 years that were independently confirmed by both partners, which with the advanced interview technique used was the case for 85% of all reported sexual relation. Grey = female, black = males. From Kohler and Hellinger, 2006 (reproduced with the permission of the authors)

Circumcision

In 1988 it was observed by a joint Canadian - Kenyan research team that Luo migrants in Nairobi had higher HIV prevalence than men from the other major Kenyan tribe – the Kikuyu. The explanation they found was that Luo men were not circumcised and therefore more readily contracted chancroid, which in turn greatly increased the risk of contracting HIV (Moses et al., 1999). Earlier research showed that the area across sub-Saharan Africa with uncircumcised men geographically corresponded very well with areas of high HIV prevalence (Bongaarts et al., 1989). Several other studies have since shown that male circumcision has a protective effect (Caldwell and Caldwell, 1996; Lavreys et al., 1999). This also includes the four-city study (Auvert et al., 2001b) and has been further demonstrated in several meta-analyses (Moses et al., 1999; Weiss et al., 2000). In a study on discordant couples in Rakai, it was showed that although the HIV incidence was 17 per 100 person-years among 137 uncircumcised male partners, there

was no sero-conversion among 50 circumcised partners (Quinn et al., 2000). According to a recent Cochrane review (Siegfried et al., 2003) evidence to use circumcision as an intervention is not robust, although the association is recognized. Since then a randomized cohort study in South Africa has shown that circumcision confers a 60% protection (Auvert et al., 2005). This is also biologically plausible since the foreskin contains a large amount of Langerhans cells to which HIV has high affinity (Soto-Ramirez et al., 1996). Two additional randomized control studies, one in Kenya and one in Uganda were stopped in December 2006 after interim analysis had shown clear effects of circumcision of over 50% (WHO et al., 2006).

Condom use

Condom use has always been very low in Africa. There is now increasing evidence that increased condom use with casual partners contributes to a reduction in HIV prevalence, but that the effect of this is less than that of partner reduction. This has been reported both from Uganda (Stoneburner and Low-Bear, 2004) and lately from Zimbabwe (Gregson et al., 2006). In both countries it is claimed that the increased condom use has been part of the explanation for the decline in HIV prevalence. In Tanzania reported condom use with a non-regular partner increased between 1994 and 1999 from 20% to 25% among women, but remained stable at around 35% among men (Measure et al., 2001). Condom use in stable relations is still low at around 5%. Current evidence indicates that condom promotion has so far not been a successful strategy for HIV prevention in Africa (Hearst, 2004), but this may change with time. Increased condom use with a non-regular partner among young men has been reported in eight out of eleven countries in sub-Saharan Africa (UNAIDS, 2006; Maharaj, 2006). Still fears and misconceptions about condoms are common.

Sexually Transmitted Infections and HIV

It is clear that “there is an epidemiological synergy between HIV and other STI” (Cohen, 1998). First, there is a biological plausibility for this. It has been shown that STIs increase HIV shedding in the genital tract both among females (Ghys et al., 1997) and males (Dyer et al., 1998). STIs also increase the number of inflammatory cells in the genital tract that are susceptible to HIV. Furthermore, they cause disruption of the mucosa so that this barrier can be penetrated more easily by the virus. Genital ulcer disease (GUD) often leads to bleeding, which increases the risk of HIV transmission. It was thus shown already in 1988 in Nairobi that 43% of

uncircumcised men, who simultaneously acquired a genital ulcer, mainly chancroid, seroconverted for HIV after a single sexual encounter (Cameron, 1989).

The important role of herpes genitalis for HIV transmission has increasingly been recognized. With the availability of a new HSV-2 specific serologic test, which can separate HSV-1 and 2, the number of studies, which include HSV-2 has multiplied. Moreover, the use of PCR has increased the sensitivity of testing 3-5 times. This has resulted in a new understanding of the magnitude of the HSV-2 epidemic. HSV-2 is now recognized as the most common cause of genital ulcer worldwide (Wald and Corey, 2003). It is also clear that HSV-2 is the cause of 40 - 50 % of all genital ulcers in many sub-Saharan countries (Chen et al., 2000). In Mbeya in Tanzania, HSV-2 antibodies were found in 87% of the bar workers and in 35% of blood donors and antenatal women (Langeland et al., 1988; Nilsen et al., 2005; Riedner et al., 2003). In Rakai in Uganda, these antibodies were found in 32 % of the males and 69 % of the females in a randomly selected rural population (Emonyi et al., 2000). The clinical picture of genital herpes is more severe in immuno-suppressed persons. It has been found that even without clinically apparent ulcers, there is viral replication during the reactivation of the infection. HSV-2 has further been found to reactivate 2-3 times more often during the first 6 months after the primary HSV-2 infection than later on, which further magnifies the risk of HIV acquisition during that time period. Moreover, HSV-2 infection increases the HIV-1 RNA levels in serum (Corey et al., 2004; Serwadda et al., 2003). The overlapping HIV and HSV-2 epidemics are therefore strongly mutually reinforcing. In the four-city study the prevalence of HSV-2, lack of male circumcision and trichomoniasis among women were identified as the only factors for which there was a statistically significant difference between the high and low prevalent cities in a multivariate regression analysis (Weiss et al., 2001). The interrelatedness between HSV-2 and HIV was also illustrated in the Mwanza trial (Del Mar Pujades Rodriguez et al., 2002), where the risk of HIV acquisition increased 13 times in those with a recently acquired HSV-2 infection and six times in those with a prevalent infection. In the Rakai discordant couple study, where 61% of the women and 31% of the men were HSV-2 positive, and 87% of the ulcers were caused by HSV-2, the per-contact probability of HIV acquisition increased five times with HSV-2 positivity. There was no such increase for genital discharge (Wawer et al., 2005). In a meta-analysis it was found that HSV-2 infection leads to a threefold increase of HIV acquisition in the general population (Freeman et al., 2006).

Although no increase in HIV acquisition was shown in for genital discharge in Rakai it is clear that non-ulcerative STIs, such as gonorrhoea and Chlamydia also increase virus shedding in the genital tract. Thus, in a study in Abidjan, HIV shedding could be demonstrated in 1.9 times as many female sex workers with gonorrhoea or Chlamydia, as in patients without these micro-organisms. It was also shown that HIV virus shedding was reduced when the STIs were treated (Ghys et al., 1997). Non-ulcerative STIs also increase susceptibility to HIV infection through an increase of HIV target cells in the endocervix. Genital shedding of the virus is also increased during pregnancy, which increases the risk for mother-to-child transmission during delivery (Gray et al., 2005).

Although these observational studies clearly demonstrate the relation between HIV and STI, they cannot quantify the potential effect of interventions at the population level. To do that intervention trials are needed.

Three randomized intervention trails have been conducted in Africa: the Mwanza (Grosskurth et al., 1995), Rakai (Wawer et al., 1999) and Masaka trials (Kamali et al., 2002). In the Mwanza trial symptomatic STI patients were offered improved STI management through syndromic approach. This reduced HIV incidence in the population by 38%, as well as the prevalence of some other STIs, notably syphilis and Chlamydia. In Rakai periodic mass treatment did not reduce the HIV incidence, but to some extent other STIs, including high titre syphilis and trichomoniasis. Similarly, in the Masaka intervention trial neither health education and counselling with improved syndromic management of STIs nor the lack of the latter had any effect on HIV sero-conversion, but both significantly reduced the incidence of both syphilis and gonorrhoea.

Attempts at explaining these seemingly contradictory results on HIV incidence have focused on the differences in HIV prevalence – the maturity of the epidemic, STI prevalence and sexual behaviour, at the intervention sites. In Mwanza HIV prevalence rate was around 4%, while it was 16% in Rakai. There was also a high prevalence of bacterial STIs in Tanzania (Corbett et al., 2002). In an early epidemic the high-risk groups are still susceptible to HIV. Since members of the high-risk behaviour groups have many partners, STIs in those groups will disproportionately increase HIV transmission in the population. In a mature epidemic many in the high-risk groups will already be HIV infected and most of the HIV transmission takes place

in the general population. Here, STIs are not equally prevalent. When the HIV infection has reached the general population, STIs are therefore no longer equally important for HIV transmission at the population level. In the generalised HIV epidemic, most HIV sero-conversion occurs without concomitant recognized STI symptoms or STIs detected by screening (Hitchcock and Fransen, 1999).

The population attributable fraction (PAF) of STI thus varies with the state of the epidemic. It is higher in the beginning and decreases with the maturity of the epidemic. According to a simulation model estimate, it decreased from over 90% during the 1980 to 1990 period of the epidemic in Uganda to lower levels of around 20% in a mature epidemic of the year 2000 in a low cofactor scenario. However, it still reached 51% in a high cofactor scenario (Robinson et al., 1997). In a case-control study in the Mwanza trial at the early stages of the epidemic with an HIV prevalence of 4 %, a very strong correlation between HSV-2 infection and HIV acquisition was found (see above). The PAF of incident HIV infection was 74% in men and 22% in women (Del Mar Pujades Rodriguez et al., 2002). In Rakai with a mature epidemic and an HIV prevalence of 16%, the attributable fractions of STIs were much lower. The risk of HIV acquisition more or less tripled with simultaneous genital ulcer disease in both sexes. It was increased in males with discharge (RR 2.4), but not in women. The PAF in males was 9 % for genital ulcer disease and 7 % for urethral discharge (Gray et al., 1999).

Beyond the initial stages of an HIV epidemic, when the epidemic has become generalised, the impact of STI treatment programmes on HIV transmission may mainly depend on behavioural risk reduction. STI case management programmes are unlikely to substantially reduce HIV incidence in such populations in low-income countries since the community effectiveness of the intervention is likely to be low. At the individual level STIs are associated with significant HIV risk, and STI management is needed here to treat individuals.

Viral load and CD4 counts

In the Rakai study it was shown that viral load was the main predictor of the risk for heterosexual transmission among discordant couples. The viral load varied with the stages of the disease (fig.8). Almost no transmission took place between sexual partners if the viral load was below 38.500 copies/mL (Gray et al., 2001). Sero-conversion was around 12 per 100 person-years both for male-to-female and female-to-male transmission (Quinn et al., 2000). In a more

recent study the rates of HIV transmission per coital act has been estimated for the different stages of infection (Wawer et al., 2005). Results showed that the average rate of HIV transmission was 8/1000 during the first 2.5 months after sero-conversion, subsequently decreased to around 2/1000 in the period between 6-15 months, was then further reduced to 1/1000 and again increased to 3/1000 in the period 6-25 months before death. This means that nearly one half of the observed HIV transmission events were related to a newly infected partner (Cohen and Pilcher, 2005), well in line with common theories of transmission being dependant on variations in the viral load (fig. 8).

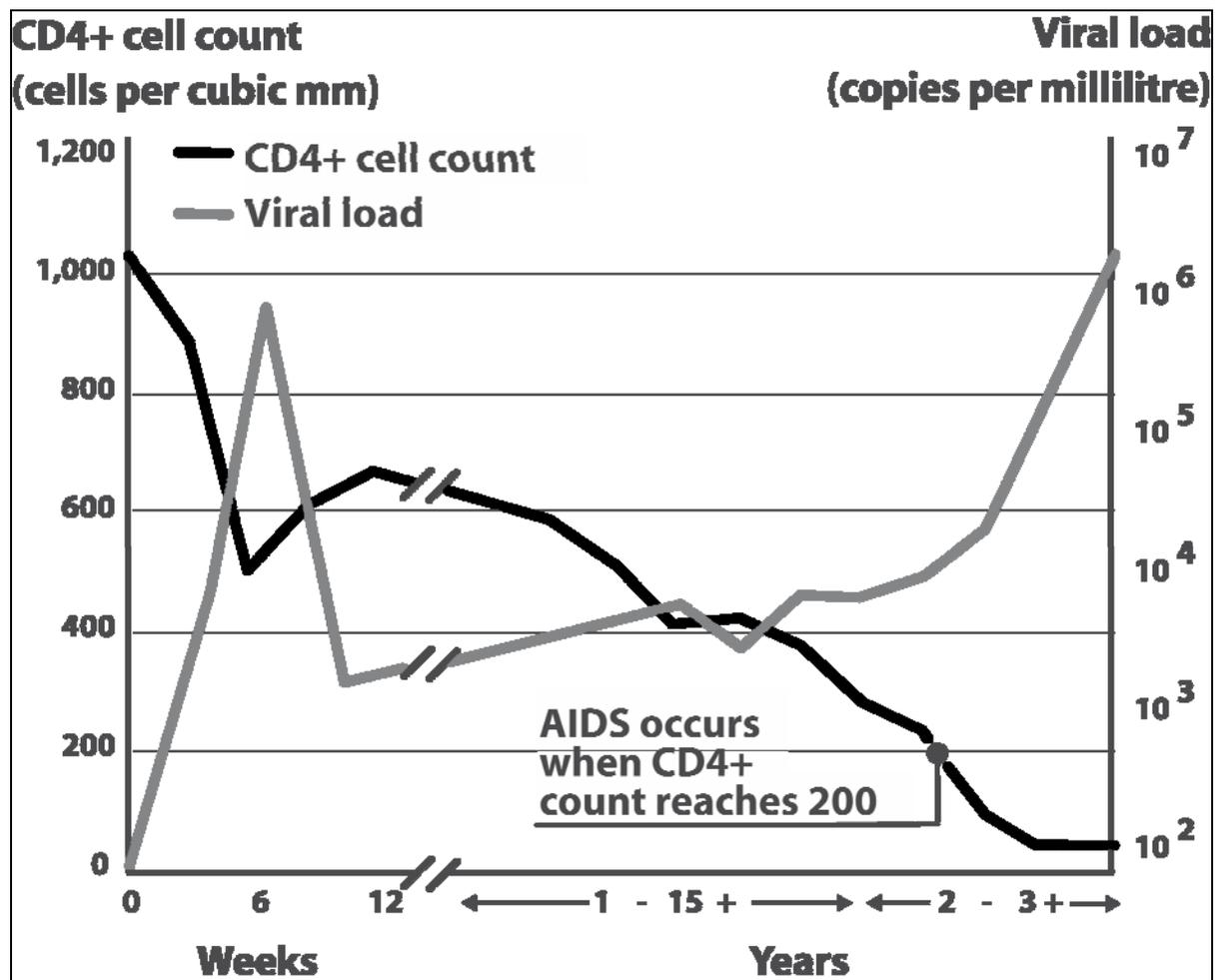


Fig. 8. Variation of viral load and CD4 count over the whole HIV/AIDS disease period

A large part of the transmission, particularly among young couples, also took place in the last phase of the disease when the viral load increased again. AIDS defining symptoms were accordingly associated with an increase in transmission (Quinn et al., 2000) (fig.8).

According to the Rakai study in Uganda 20% of the HIV-infected population had viral loads >55,000 copies/ml (Gray et al., 2003). In another community-based study in South Africa 50% of the infected were above this level (Auvert et al., 2004). The reason for this difference has not yet been determined, but might, if real, have major implications on our understanding of the difference in HIV prevalence between southern Africa and the rest of sub-Saharan Africa.

1.2.5 Direct determinants

In estimating the magnitude of HIV transmission, the complexities of the indirect determinants are compressed into a simple formula (Anderson, 1992; Garnett, 2001):

$$\textit{The reproductive rate of infection } R_0 = \beta CD$$

β is the probability of transmission per partner per unit of time, C is the frequency of contact between uninfected individuals in the population and D the duration of infectivity (fig. 6).

Probability of transmission β is mainly related to biological factors including the transmission efficiency of the organism, simultaneous STIs and viral load (VL); further to the disruption of the mucosa by microbiological agents and the virus concentration in genital fluids.

As treatment of herpes is rarely available in low-income countries, abstinence or consistent condom use during the sickness period are important.

Frequency C measures exposure to infection at the population level and is related to the sexual networks, patterns of mixing and concurrency of sexual relations, as well as the state of the epidemic. In a mature epidemic most high-risk people are already infected. This has an impact on the pool of those susceptible and the probability of transmission per contact.

Duration D of infectivity is, as shown above (fig. 8), mainly related to the high viremia during the initial period of 1-2 months and to viremia at the end of the disease, when the immune system breaks down (Wawer et al., 2005).

The importance of the suppression of the viral load through ARV treatment is gradually increasing also in sub-Saharan Africa. ART coverage is still low in most countries, but had

reached a third of those in need in Uganda by 2005 (UNAIDS and WHO, 2005). This, however, corresponds to only 5-10% of those infected.

It has been shown in several studies that treatment with antiretroviral drugs reduces the viral load in seminal fluids and cervico-vaginal specimens, but it does not eliminate the virus (Cohen et al., 1997; Sadiq et al., 2005). It has also been shown that antiretroviral treatment reduces heterosexual transmission of HIV in the individual (Musicco et al., 1994), but the effect at population level is not yet known.

The duration of infectivity is also linked to a delay in the treatment of both viral and bacterial causes of ulcer disease, such as syphilis and chancroid; it is also affected by the treatment of opportunistic infections as some of these have an impact on the viral load. The length of time STI or OIs are left untreated is therefore important for the duration of infectivity.

1.3 INTERVENTIONS AND THE IMPLEMENTERS IN TANZANIA

I have divided HIV/AIDS control activities as follows:

- Sector-based interventions
 - STI/AIDS control activities within the health sector
 - AIDS control activities in other sectors
- Activities implemented by NGOs, in the private and informal sectors

1.3.1 Interventions in the health sector

Since HIV was understood at an early stage to be a health problem, a sexually transmitted infection, the response was initially outlined and implemented by the health sector. Although the response is now multi-sectoral the health sector still continues to be the sector, which has the main responsibility for control efforts. At the beginning of the epidemic many of the governments of the affected countries were hesitant to act, and the initial response was outlined with strong support and certain pressure from the international community, notably WHO, initially in 1985 through the Special Programme on AIDS (SPA), thereafter from 1987 through the Global Programme on AIDS (GPA). Since 1996 UNAIDS has taken over and has been responsible for a multi-sectoral programme.

The implementation of control activities has been directed through the formulation of Short and Medium-term Plans (STPs and MTPs) with similar content for all countries. Interventions can be divided into those related to prevention, to monitoring and to the provision of clinical and laboratory services as well as to the mitigation of the effects of the epidemic through counselling and home-based care. They include information, education and communication (IEC) activities to inform the public, condom distribution, STI services, case reporting and disease surveillance, blood screening and other laboratory services (NACP, 1998). Lately they have also included ARV treatment.

Such plans have also been outlined for Tanzania, where activities started in 1985 after the formulation of the first Short-term Plan. The National AIDS Control Programme was established in 1988 with several units corresponding to the above-mentioned activities. The Short-term Plan of 1985 was later followed by three five-year Medium-term Plans running up to 2002. The eleven intervention areas of the third Medium-term Plan 1998-2002, in descending order of priority, were the following:

1. Provide Appropriate STD Case Management Services
2. Reduce Unsafe Sexual Behaviour among Highly Mobile Population Groups
3. Reduce HIV Transmission among Commercial Sex Workers
4. Prevent Unprotected Sexual Activity among the Military
5. Reduce Vulnerability of Youth to HIV/AIDS/STD
6. Maintain Safe Blood Transfusion Services
7. Reduce Poverty Leading to Sexual Survival Strategies
8. Promote acceptance of Persons Living with HIV/AIDS
9. Reduce Unprotected Sex among Men with Multiple Sex Partners
10. Improve Education Opportunities Especially for Girls
11. Reduce Vulnerability in Women in Adverse Cultural Environment

The HIV/AIDS epidemic has meant an increase in demand for health services both in Tanzania and other sub-Saharan African countries (Mkony et al., 2003; Whiteside, 1997) as well as the need to introduce new services. The demands have been beyond the capacity of the health service system, which was unable to produce quality services already before the HIV epidemic (Maier and Urassa, 1997). However, the NACP has succeeded in conveying to the population a high level of knowledge of HIV and the ways it is transmitted (Bureau of Statistics, 1997). Prevention activities have mainly focused on condom use, STI control and individual behaviour

change. The need for a change in individual sexual behaviour has been communicated both through the mass media as well as directly to the individual through a number of interventions such as STI services, prevention of mother-child transmission (PMTCT) and voluntary counselling and testing (VCT) (fig.9). Social norm change has so far been little explicitly addressed.

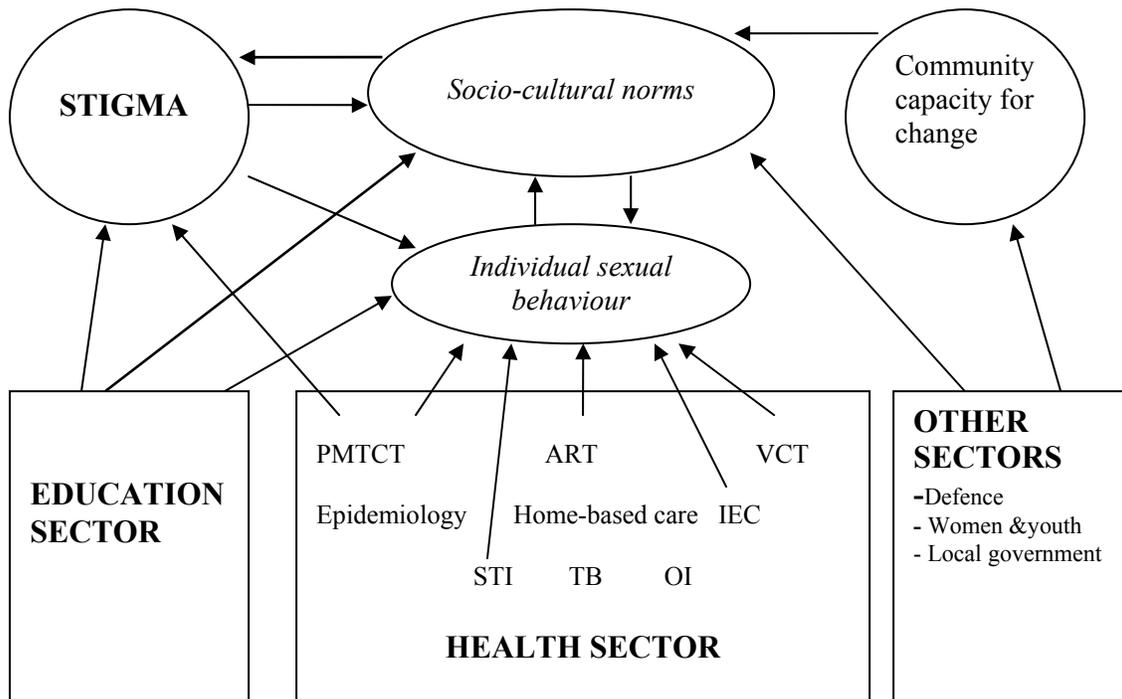


Fig.9. Channels for HIV prevention through which sexual behaviour change can be communicated within the government sectors

A comprehensive surveillance system is being built up. Blood screening for HIV covers the whole country, and STI control has been scaled up to cover most regions. Major efforts are also being made to inform young people mainly through the Sida supported Femina magazine. Voluntary testing and counselling (VCT) has lately gradually been scaled up (fig. 10). ART is being rapidly scaled up. But some health sector based activities such as home-based care, orphan care and the treatment of opportunistic infections still only provide a limited coverage. There are also problems with the quality of services.

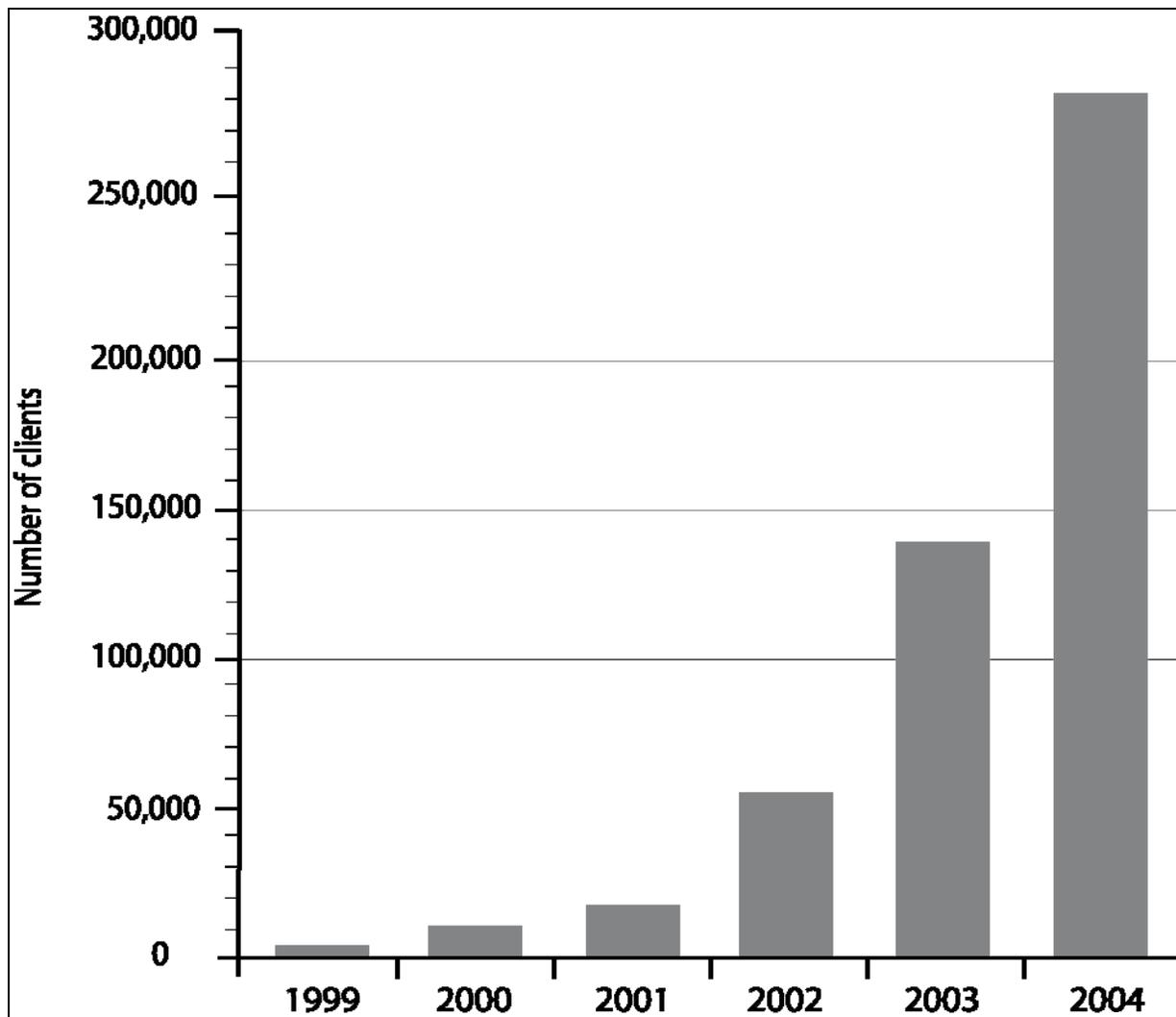


Fig.10. The expansion of VCT services in Tanzania. The number of clients who have undergone counselling and testing per year from 1999 to 2004.

STI control in Tanzania

The Ministry of Health of Tanzania adopted a syndromic approach to STI management as a national policy in 1992. After the encouraging results of the Mwanza trial on the relationship between STI control and HIV transmission, it was decided to scale up STI control in Tanzania region-wise. On the basis of studies made in parallel with the trial, it was concluded that it was feasible to implement STI control in Tanzania as part of the regular PHC activities at a limited cost.

The implementation of the EU-supported STI control activities was initiated in 1996 and reached a coverage of 12 out of 20 regions in 2002. The project was successful in increasing the number of reported cases of STI syndromes from around 50,000 for the whole country in 1996 to around 400,000 for a little over half of the country in 2002 (Nyang'anyui, 2002). Most cases were reported in the south-west of the country, which also has the highest HIV prevalence. STI control has subsequently increased its coverage to cover additional regions, and at the end of 2005 the NACP reported that all hospitals, all public health centres and 60% of the dispensaries offered STI services (TAC-AIDS, 2006).

Although there has been a large increase in the number of treated STI patients reported, and an improvement in the quality of care, with many more drugs being made available, activities have also faced several quality problems that have been observed during routine supervision and in two quality of care studies. The first of these was carried out in 2002 in randomly selected health facilities with at least one reported STI patient per day in six selected regions and included 225 observed treatments (Temba, 2004). 76% of the observations were on female patients. In many health facilities there was a problem with privacy. In most OPDs, there was a lack of both specula and a proper light source. Even in the OPDs where these were available, it seemed that vaginal examinations were not routinely carried out, even if the patients complained of a vaginal problem. The proportion of patients diagnosed with PID was high. Diagnosis of PID is known to be difficult. It is likely that a large proportion of those diagnosed as having PID suffer from disorders that are not cured using antibiotic treatment. The number of reported cases of GUD was also high. It was observed that both the number and proportion of reported cases of GUD had gradually increased, probably due to an increase in the incidence of herpes simplex, because of the increasing rate of underlying HIV infection. HSV-2 is not given specific treatment in the current treatment algorithms. Another problem was the poor information given to the patients. Attempts at contact tracing had little success and at the most 30-35 % of the contacts of STI patients were reached.

STI control is internationally monitored through the use of three indicators. The first indicator measures the quality of case management, the second advice on condom use and partner notification and the third the availability of drugs. For the first quality of care study the two last indicators had to be adapted to the Tanzanian situation. The first indicator showed that 41% of

the patients were both correctly assessed and treated, the second indicator that 61% of STI clients received appropriate advice on condom use and partner notification and the third STI indicator that 37% of the health facilities had been able to provide STI drugs continuously during the preceding 12 months.

The second quality of care study was carried out with the support of the Center for Disease Control, USA in 2005. It was undertaken in 30 districts in 10 regions and assessed 180 health providers in health facilities, which had reported at least one STI patient per day. It therefore used similar selection criteria as the previous study in 2002 and similar, but not exactly the same indicators. The first indicator showed that 67% of the health care providers had correctly assessed and treated the patients. However, health providers only examined the genitals of 22% of the women and 40% of the men. The second indicator showed that most of the providers had provided advice on condom use, 40% had handed out condoms and 30% demonstrated the use of condoms. 42% had handed out partner notification slips. 37% of the health providers reported stock-outs of drugs (NACP, 2005). Thus, although STI services have been scaled up and the quality of care improved major challenges still lie ahead.

ART in Tanzania

The fact that preventive efforts in many places in sub-Saharan Africa have led to few changes in behaviour has probably contributed to the shift in the focus of internationally directed control efforts from prevention of HIV transmission to access to ART. Several global initiatives have been launched in response to the HIV/AIDS pandemic, including the WHO “3 by 5” initiative, the Global Fund (GFATM), the Clinton Foundation’s ARV access initiative and the American President’s Emergency Fund for AIDS Relief (PEPFAR). The focus in these initiatives is on increasing access to ART. Considerable funds have been budgeted for care in Tanzania (table 3) (Forster et al., 2005). Although around half of the funds have been earmarked for drugs, the remaining sum is so large that the system might not have the capacity to transform it into effective services.

Scaling up access to ART requires an increase in the uptake of VCT, as well as the screening of more antenatal women. The number of clients who have undergone VCT has increased rapidly from around 10,000 in 2000 to 280,000 in 2004 after the introduction of ART (figure 10) and continues to increase.

There were an estimated 1.6 million (1.2-2.3 million) infected individuals (UNAIDS, 2004) in Tanzania at the time of the study. Of these around 176,000 (165,000 adults and 11,000 children) will develop AIDS each year. The Tanzanian Government started to scale up ART activities in mid-2004 according to the five-year Care and Treatment Plan (CTP) (United Republic of Tanzania 2003), developed from the comprehensive “Health Sector HIV/AIDS Strategy for Tanzania 2003-2006” with the assistance of the Clinton Foundation and approved by the Cabinet in October 2003. The CTP aims at providing ART to “as many HIV-infected residents as possible” by strengthening the health care infrastructure and integrating the programme into existing structures in line with the on-going health sector reform. In the plan it is estimated that 9,300 additional staff need to be employed to enable implementation of the plans.

Individuals with a CD4 count of less than 200/ml will be offered treatment at care and treatment centres (CTCs). Those with better immune status shall be monitored and initiated on ART when needed. The system for ART provision will be built up by gradually accrediting more CTCs. These are planned to increase from 20 in mainland Tanzania in 2005 to 240 by 2009. As more facilities are accredited additional staff will be employed. According to plans CTCs at consultant and selected regional hospitals shall recruit 1000 patients per year, while each remaining regional and district hospital shall recruit 600 patients per year, implying that 85% of all eligible patients will be recruited by 2009. 423,000 patients (420,000 mainland, 3000 Zanzibar) will be on ART and 1,269,000 patients under CD4 monitoring (table 2, paper VII).

Other initiatives, such as the WHO “3 by 5”, the Global Fund and PEPFAR have also set targets for a rapid scale up (fig. 3, paper VII). The number of patients on treatment has so far been below the targets set both in Tanzania and in other African countries (Dabis et al., 2005). In Tanzania 8,300 patients were on treatment in June 2005. In December 2005 this figure had reached 24,000 far below the 225,000 planned according to the “3 by 5” and also below the target 40,000 set for the CTP. By March 2006 34,000 patients were receiving ARVs (NACP, 2006) against around 50,000 planned in the CTP. It is not yet clear what population coverage and what quality of care existing health systems will be able to deliver in the longer term .

Both international and national funding has increased rapidly since 2002 (fig. 11 and 12), but the shortage of staff still remains. With the introduction of ART there is a serious risk of crowding out effects and competition for qualified staff between different health programmes. Although

the previous hiring freeze has now been lifted the high demand for qualified staff for ART may cause distortions in the way the Tanzanian health system addresses the total burden of disease, thus risking allocations of human resources out of line with the needs of other disease categories.

Health sector reform in Tanzania

Health sector reform in Tanzania commenced gradually in the second half of the 1990s and has been going on since then. It is part of the larger Local Government Reform. It has focused on the service system and initially on financial management and the reduction of costs.

The final aim of health sector reforms in general is a more efficient use of limited resources through the sharing of tasks, the co-ordination of training, supervision, logistics and drug supplies, the establishment of integrated health management information systems as well as unified donor funding directly to the districts, so called "basket funding". Overall, this means the reinforcement of local decision-making powers at district level. A key element for the implementation of the reform is the strong leadership of the Ministry of Health and a close partnership with donors. There has also been a simultaneous donor policy shift away from project support to sector support through the so-called sector-wide approach (SWAP). The reforms could thus be seen as an operationalisation of the PHC strategy of Alma Ata 1978, but in that case should ideally also include factors outside the service system, which are important for health, e.g. community participation or even better the establishment of a "true partnership" with the community, where inputs from both sides are given similar importance. A development in this direction might be crucial for the prevention and control of STI/HIV. Lately the importance of community involvement for HIV control has been recognised.

1.3.2 Human resources in the health sector in Tanzania

Manning the health system with qualified staff has been a serious problem in Tanzania, as in almost all low-income countries, since the 1980s when the system was built up to an unsustainable size and governments were no longer able to afford to maintain the infrastructure and pay for the large public health workforce. A hiring freeze, which was introduced in Tanzania in 1993 as part of an agreement with IMF, has added new problems. Since no new staff have been employed, existing staff have now grown old (50 % > 40 years and 15% >50

years) and the attrition rate is high. The number of health workers declined from 67,000 in 1995 to 54,000 in 2002. Of these, 65% are in the public sector, 22% in private not-for-profit and 14% in private-for-profit sectors. Public sector staffing levels are far below those estimated necessary by the Ministry of Health. It has been estimated that the decline, which has mainly been the result of a reduction of unqualified staff, will continue to 52,500 in 2007 (Kurowski et al., 2004). However, since these estimates were made, the hiring freeze has now been lifted and it is possible to offer employment to newly trained staff. However, the recruitment of new staff is likely to be a slow process because the training capacity still remains limited.

At the same time as the reduction in health staff, the overall disease burden has increased drastically through HIV. Staff attrition has been further accelerated through the death of health staff in AIDS, as also reported in South Africa (Ncayiyana, 2004).

Furthermore, it is often the case that qualified personnel are no longer working clinically probably mainly because clinical work, at least until recently, has been poorly paid in the government health services. In Dar-es-Salaam there were only a handful medical officers working in the health facilities in the city at the end of 2004, while the large majority of medical officers held administrative posts. Outside the main cities there is a shortage of both clinicians and managers. The lifting of the hiring freeze is likely to gradually reduce this problem.

1.3.3 The multi-sectoral response

Although the last two MTPs have had the ambition of being multi-sectoral, almost all activities were carried out within the health sector (TACAIDS, 2002). The importance of initiating activities also in other sectors has been gradually increasingly recognised; in 2001 the Tanzania Commission for AIDS Control was formed and in 2003 the first National Multi-sectoral Strategic Framework (2003-2007) was formulated. In the Framework the achievements of the last 16 years of HIV control activities are recognised, but it is also stated that these efforts “were insufficient to reverse the dynamic of the epidemic.” Further, it was concluded that there were a number of limitations in the achievements. Many activities were limited in scope and coverage, insufficiently coordinated and hampered by quality problems. To meet future challenges a new framework was drawn up and approaches and guiding principles defined. In addition, an umbrella plan was outlined, which is divided into four thematic areas: prevention including

gender; HIV/AIDS care and support; social and economic impact mitigation and crosscutting issues. Under this umbrella plan each sector should produce its own plans. The division of roles between the different sectors was defined on the basis of the “comparative advantages” of the various sectors.

The health sector plan was formulated in 2003. In 2005 the Ministry of Education outlined its sector plan and by the end of 2005 21,000 primary school teachers and 1,300 secondary school teachers had been trained and a scale up of school-based sex education initiated (TAC-AIDS, 2006). HIV related activities undertaken by the Ministry of Education, however, only accounted for 2% of the over all public expenditure on HIV/AIDS in 2004/5 (Forster, 2005). As with the health sector, the education sector suffers from a lack of resources, both human and financial. A large number of teachers have died of AIDS. Apart from the ministries of health and education only the Ministry of Defence has so far accounted for any expenditure related to HIV control (Forster et al., 2005). However, plans for the other sectors have been presented for the financial year 2006/07.

During the last few years, with the introduction of ARV treatment, the focus of control activities has again shifted back to the health sector. There is now a risk that too few resources will be devoted to prevention (UNAIDS and WHO, 2005). However, there are also signs that prevention is gradually being paid more attention, mainly through the activities of the WB-supported; Tanzania AIDS Commission managed Tanzania Multi-sectoral AIDS Project (T-MAP) (TACAIDS, 2005). There is also a rapid increase in government funding directly to the districts (Forster et al., 2005).

1.3.4 The role of NGOs

The role of NGOs is crucial for STD/AIDS control since many government sectors are weak as regards community work. Their work is therefore of particular importance at the community level. In Uganda the NGOs play a very important role and there is a long tradition of cooperation between them and the Government. Many of the established NGOs there are small effective organisations, which carry out community work of high quality (Killewo, 2004). This fact plus the openness initially shown by the President and subsequently to a large extent adopted by society as a whole might constitute an important explanation for the relative success of AIDS

control in Uganda. In Tanzania the religious NGOs are closely linked to the Government, which finances a large part of their budget through grants. Around 40% of the health institutions belong to voluntary organisations or religious NGOs. These provide a large part of the health services in the country. Experienced NGOs have also played a major role in STD/AIDS prevention. With AIDS and the drastically increased need for community involvement for a change of social norms and individual behaviour to come about their role has become even more prominent. Still, most of the small NGOs that now have access to funding have little previous experience and competence with regard to HIV control (Regional Facilitation Agency, Rukwa/Mbeya, Tanzanian Multi-sectoral AIDS Programme, 2005). Attempts to strengthen them are now being made through the T-MAP (TACAIDS, 2005).

1.3.5 The remuneration system in Tanzania

The current remuneration system for health workers in Tanzania, as well as in other sub-Saharan African countries, is to a large extent built on workshop allowances. These are now not only a repayment of incurred expenditure, but have also come to be regarded as a complement to low salaries. Since the current accounting system of the Ministry of Health does not separate salaries from allowances, it is impossible to easily find out what proportion of the overall remuneration allowances and salaries each represent. The basic salaries have been low and for many staff remuneration has to a large extent been through allowances. For medical officers an attendance of 3-4 workshop days in 2004 meant an income equivalent to their monthly salary after the deduction of the estimated actual costs and taxes. This is not conducive to routine work and contributes to an unfair distribution of remuneration. Only those who are invited to participate in workshops can benefit from the allowances. This might have satisfied the economic needs of people at the central level, who have access to many of the workshops, while the majority of staff in the periphery has been left out. However, the salaries for medical staff have recently increased and the monthly salary of a newly trained doctor is now around 400 USD, while senior medical officers receive double that salary. Still, the pay for routine work is relatively low, in particular for other staff categories, and the relative importance of workshop allowances remains, albeit now less pronounced. Today, the system has also been imitated by even the small NGOs, who therefore to a large extent no longer represent a more cost-effective implementation alternative.

It appears that the allowance system was introduced by international agencies and donors in order to have access to the most qualified staff. The allowances have gradually increased. Although they now clearly distort the function of the health system by giving the wrong incentives, the system is maintained without protests from the donors. The Government does not have much choice. It does not have enough money to maintain the current health service system and up until now the only way to access donor money has been via the workshop allowances since donors do not contribute to salaries. However, more donors are now giving support directly to the Government budget – so-called budget support. This makes it increasingly possible for the Government to adjust the remuneration system through a further shift towards regular salaries.

In a situation with a poorly balanced system, too much money if it is poured in too quickly, may have, contrary to intentions, a negative effect on service output. If the supply of funds was gradually increased, it could be used to increase the number of staff through the training of new staff. Now the system with its distorted incentive signals encourages the staff to favour workshops before routine work. If there are a lot of funds in circulation, the number of workshops will increase. This will in turn affect the time available for routine work and is likely to contribute to ineffective control and a reduction in the amount of relevant HIV/AIDS information and services to reach the target groups in the villages and townships.

1.4 THE FUNDING AGENCIES

1.4.1 Funding HIV control in Tanzania

The first budget for HIV control was outlined in 1987 and disbursements were made the following year. For the two-year period 1988 to 1989 seven million USD were disbursed. Since then the NACP has received relatively regular funding of around two million USD annually up to 1995. In the financial year 1995/1996 there was a gap in donor funding during the transition from WHO/GPA to the newly formed UNAIDS (Hartwig et al., 2005). In the financial year 1998/99 the funds actually disbursed to the NACP began to increase again only to drop a few years later awaiting the establishment of the new multi-sectoral commission TACAIDS in Tanzania in 2002 (fig.11).

Until around 2000 the Government committed very little recurrent funding for HIV control, apart from salaries. According to a World Bank study the Government only contributed 5.4% in 1993, while donors contributed 83.8%. The rest was covered by private and employer funds (World Bank 1996). Most funds, 84%, went to prevention, 98% of which was paid by donors while 16% was allocated to curative care, most of which was paid through private funding (Tibandebage, 1996). From then on Government funds have steadily increased as money has been allocated as part of the poverty reduction process in accordance with the conditions for highly indebted countries (HIPC). The Government thus allocated around 12 million USD to HIV control in 2004/5, which represents a little less than 10% of total Government spending on health, but the Government budget for HIV control for 2005/6 has increased to 30 million USD. Donor spending has increased even faster. After the shift from a focus on prevention to ART, increased donor funds have again started to be allocated to the health sector and the NACP. Donors paid over 90% of the total expenditure for HIV control of 131 million USD in 2004/5 (fig.11, table 3). This is budgeted to increase to 243 million by 2005/6 when per capita expenditure for HIV/AIDS (including outside budget spending) is expected to exceed 8 USD/capita, which is more than the total per capita public expenditure for health in 2004/5 (Forster et al., 2005).

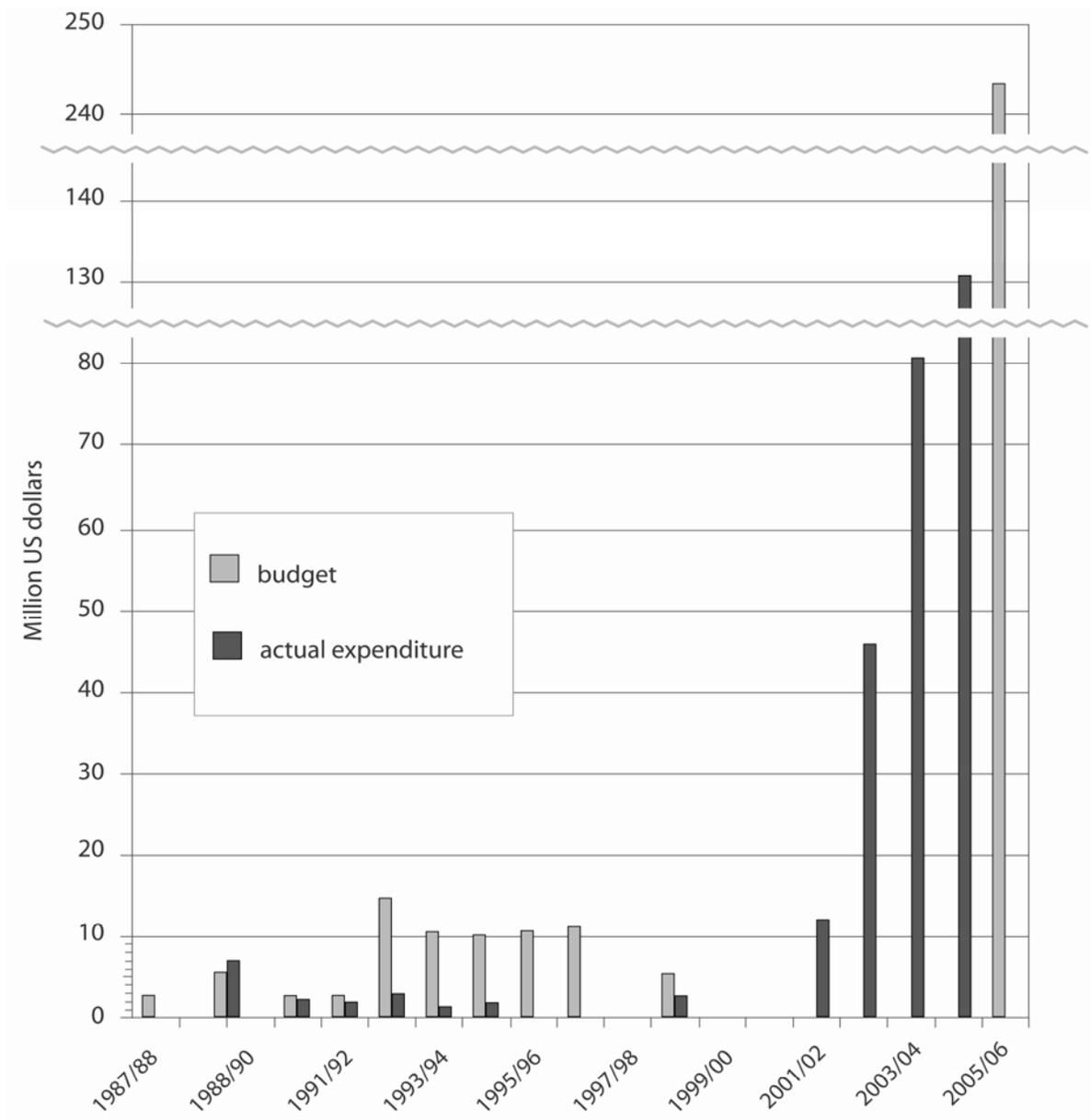


Fig. 11. Available data for NACP budget and expenditure from 1987 to 1998 and total public and donor expenditure on HIV control for all sectors from 2001 to 2005; figures for 1988/89 and 1989/90 are lumped together in 1988/90; comparable figures for 1997/98, 1999/2000 and 2000/01 have not been possible to find. The budgets for 2001 to 2005 are missing (Forster et al., 2005; Hartwig et al., 2005; Prime Minister's Office and TACAIDS, 2003).

Spending on HIV now absorbs close to 10% of total external assistance. Of the donor funds, 75% are coming from the Global Fund, PEPFAR and the World Bank. Sida and CIDA add another 10% (Forster et al., 2005). A great deal is allocated to care and treatment (mainly ARV treatment), which received 59% of all HIV control funds in 2004/5 and will receive 66% in

2005/6 according to the budget (table 3). During the period 1987-2001 almost all Government funds allocated to HIV control was provided through the National AIDS Control Programme. In

Table 3. Donor funding for HIV control and ARV in Tanzania (million USD). Recalculated from figures in Tanzania Shillings (TZS).

Funding agency	Actual expenditure 2004/5			Budget 2005/6		
	Govt	NGO	Total	Govt	NGO	Total
US (PEPFAR)	26	44	70	27	55	82
GFATM	5	6	11	43	20	63
World Bank	3		3	14	4	18
Sida			10			10
Other donors			26			40
Total donors			121			213
Thereof for care*			72			140
Govt. recurrent expenditure			10			30
Total Public & Donor expenditure on HIV/AIDS			131			243

Source: (Forster et al., 2005); Exchange rate 2004/5 1USD= 1120 TZS; 2005/6 1 USD=1199 TZS

* mainly ARV but includes VCT as part of care and treatment as well as palliative and home based care

the financial year 2004/5 it received 54 % of the funds while TACAIDS received 36% and the Ministry of Education 2.4%. After the introduction of medium-term expenditure frameworks (MTEFs) in 2001, and public expenditure reviews for HIV/AIDS in 2003/4 (the Prime Minister's Office and TACAIDS, 2003), as well as the improvement of the budget process, figures have gradually become more complete. Reviews are, however, difficult to carry out as still only 16% of the total expenditure is recorded in Government accounts. Most donors do not transfer their funds via the Treasury and considerable funds are transferred straight to the NGOs and are therefore not always easy to trace (Forster et al., 2005).

Public expenditure for HIV/AIDS control for the period 1987-2005 is shown in figure 11. Since public HIV/AIDS funds were almost exclusively allocated through the NACP during the initial period, the figures in fig. 11 are largely comparable throughout the entire time period as they represent the bulk of public expenditure on HIV control, both donor and Government. Even if the numbers may not be exact the drastic increase in funding after the introduction of ART in 2004 is obvious.

1.4.2 The aid architecture and HIV

Financial support for HIV control has been delivered through the regular aid system – the so-called aid architecture. This has been dominated by bilateral donors and the UN agencies. It is gradually undergoing major changes through the introduction of a number of Global Initiatives. These include a number of older disease-oriented initiatives including the Roll-back Malaria initiative, the Global Alliance on Vaccine and Immunization (GAVI) and STOP TB. More recently, new initiatives focusing on HIV control funding have been added. These include the WHO “3 by 5” Initiative, the World Bank Multi-sectoral AIDS Project (MAP), the Global Fund (GFATM), the Clinton Foundation’s ARV access initiative, the Bill and Melinda Gates Foundation and the American President’s Emergency Fund for AIDS Relief (PEPFAR). (Fig. 12)

Much of the focus of the global HIV control initiatives have been on universal access of ARV treatment. Much of the financing of HIV treatment, in particular ARV, has therefore shifted from the bilateral donors and the UN agencies to private foundations and the Global Fund.

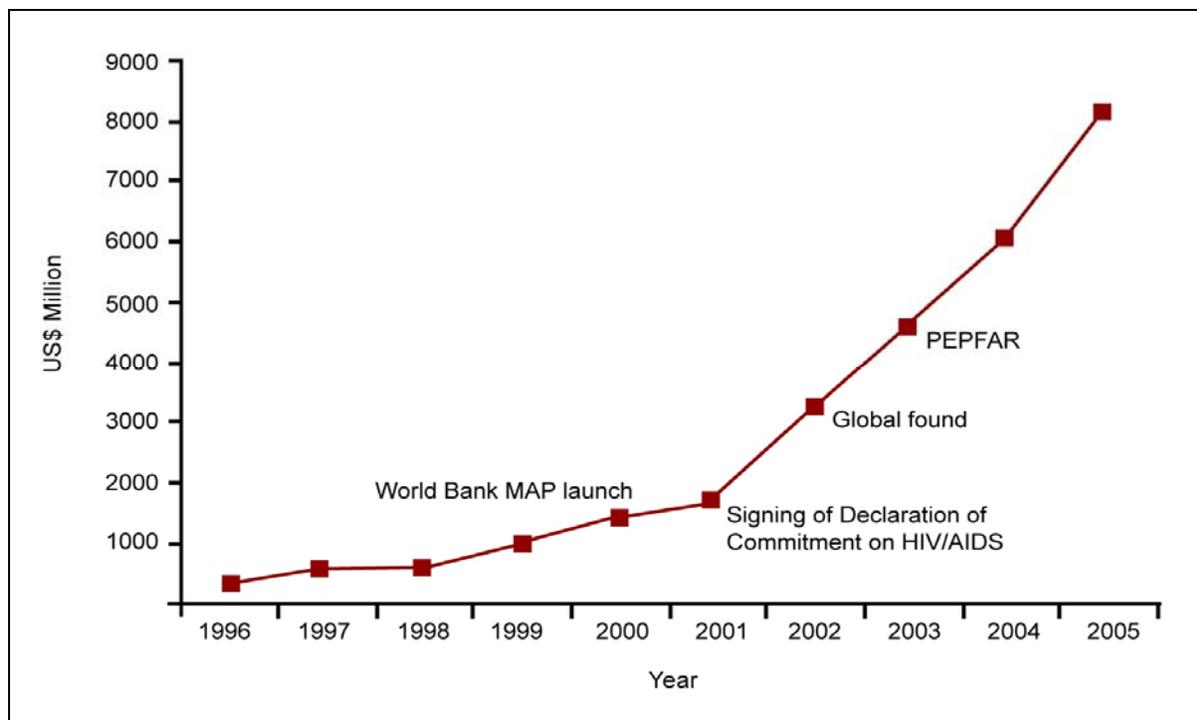


Fig. 12. Total annual donor contributions to HIV/AIDS control worldwide 1996-2005

This is also reflected in a rapid increase in funding for HIV/AIDS control efforts worldwide. This reached over 8 billion in 2005. The increase has largely been the result of the Global Health Initiatives (fig.12) (Piot, 2006).

The main sources of Government funding in Tanzania, the Global Fund, PEPFAR and the World Bank (table 3), all used their own systems for disbursement and accounting. The use of different disbursement and accounting procedures constitute a major obstacle to a smooth flow of funds as it often leads to delays. The Government encourages the use of the Government system, which reduces the administrative burden and facilitates and speeds up the transfer process. The shift to one single system is making slow but steady progress. Sida and CIDA will transfer their funds in the shape of budget support from 2006 and the World Bank will probably also shift to budget support once the current T-MAP is terminated (Forster, 2005). This will shift a large part of the administrative burden over to the more resourceful donors, since these now risk being forced to apply different accounting systems for each country, rather than the other way around, as is now the case.

2 OBJECTIVES

2.1 OVERALL OBJECTIVE

The overall objective is to identify and characterise major obstacles to the control of sexually transmitted infections and HIV in Zambia and Tanzania, respectively.

2.2 SPECIFIC OBJECTIVES

- to determine the efficacy of STI treatment guidelines in Zambia (paper I);
- to evaluate the quality of STI care in Central Province in Zambia (paper II);
- to describe and discuss the possible consequences of the health sector reform for STI/AIDS control in Tanzania (paper III);
- to elucidate health sector management constraints in HIV/AIDS control in Tanzania (papers III, IV, V and VI);
- to analyse the feasibility of scaling up ARV treatment in Tanzania (paper VII).

3 MATERIAL AND METHODS

The studies were undertaken in conjunction with the pursuit of a professional career in project management, epidemiology and clinical medicine. The period during which the studies were conducted spans 18 years. In 1988 I was appointed as WHO epidemiologist for the National AIDS Control Programme in Tanzania. In 2006 I completed the study on the feasibility of the scaling up of ART in Tanzania. During that time the global HIV epidemic grew from an estimated 8 million infected in 1988, to 39 million in 2006. A great deal of knowledge with regard to the microbiology, epidemiology, social science and health system aspects of STI/HIV has been accumulated.

3.1 PAPER I

The aim of this paper was to determine the efficacy of STI treatment guidelines in Zambia. The algorithm flowcharts for the diagnosis and treatment of genital ulcer disease, urethral and vaginal discharge were evaluated at the outpatient department of the University Teaching Hospital (UTH), Lusaka, Zambia. During the second half of 1991 consecutive patients, male and

female, who attended the STD clinic in UTH with genital ulcers or genital discharge, were recruited for the study. Those who had taken antibiotics during the preceding two weeks were excluded. A total of 436 patients were included; 139 male and 98 female patients with genital ulcers; 100 male patients with urethral discharge and 99 women with vaginal discharge. In addition to the clinical syndromic diagnosis, patients were also examined with laboratory tests for syphilis - both serology tests and phase contrast microscopy - as well as serological tests for HIV and Chlamydia; cultures for gonorrhoea and urethral and cervical smears by direct microscopy were also made. In a separate pilot study cultures for *Hemophilus Ducreyi* were also carried out on genital ulcer patients. Patients were treated and followed up in accordance with the national treatment algorithms. The treatment outcome and cure rates were determined for the different syndromes on the basis of preset definitions of cure. Cure rates were calculated on the basis of calculations for life tables. The confidence intervals for cure rates were estimated using the of SAS Proc life test.

3.2 PAPER II

The aims of the study were: (1) to characterize the STD patients; (2) to describe and discuss case management and patient reactions and (3) to compare the case management of clinical officers with and without special STD training. The study was conducted in two urban and four rural health centres and in two district hospitals in Central Province, Zambia between April and October 1993. To highlight the quality of STI care, sit-in observations over a period of 1-2 weeks per health facility, were performed on the clinical management of consecutive STI patients. At the end of each visit, exit interviews were made with the patients. Interviews with 24 staff were conducted. The patients were treated either by nurses or clinical officers. A total of 94 case managements were observed and 88 patient interviews conducted, but the analysis of case management was limited to the 59 first-visit patients treated by clinical officers, 42 men and 17 women. Three of the clinical officers had received special training on STI management, while eight had only received basic training. Of the 59 patients, 28 were treated by the former and 31 by the latter. The case managements were observed by an experienced clinical officer and observations noted on a specially designed form. The 88 patients were interviewed by a nurse using a structured questionnaire. The two research assistants had undergone a one-week training course during which the form and the questionnaires were piloted.

3.3 PAPER III

The first objective of this paper was to describe the health sector reform in Tanzania and the possible effects of the health sector reform on STI/AIDS control. The second objective was to elucidate management constraints in STI/HIV control. Paper III is based on observations made as well as data and material gathered from 1997 to 1999 when I was working at the National AIDS Control Programme in Tanzania. The paper thus includes two components. The first deals with the health sector reform and its effects on STI/AIDS control and the second deals with management constraints in STI/HIV control. The three short debate papers IV, V and VI constitute expansions of the discussion on the second component of paper III. The findings of this component in paper III are presented together with the additional findings that were subsequently obtained after 1999 and used as a base for the discussions in papers IV, V and VI.

The main method of the study was participant observation as defined by Denzin (1970): “a field strategy that simultaneously combines document analysis, respondent and informant interviewing, direct participation and observation and introspection”. The study was conducted during professional assignments as planner and implementer of HIV/AIDS control, mainly in Tanzania.

I had gained experience from HIV control long before I started collecting material for the paper. As a planner of HIV control I was a member of the WHO teams that drew up short and medium-term plans in six sub-Saharan countries between 1987 and 1990. I interviewed government officials in ministries of health on 15 HIV/AIDS planning and monitoring missions for WHO in sub-Saharan Africa to increase my understanding of the issues around HIV control. The outlined plans had the same format as those implemented during my later assignments in Tanzania.

As an implementer I worked for six years at the National AIDS Control Programme in the Ministry of Health, Tanzania. During the first period in 1988 I worked as field epidemiologist for WHO. I participated in the implementation of the first Medium Plan for HIV/AIDS control in Tanzania together with the National Programme Manager. From 1996 to 2000 and from 2001 to 2003 I was in charge of both the EU-support for STI/AIDS control in Tanzania and the monitoring of the health sector reform in the country. I participated in the management of STI and HIV control on a daily basis. This included the implementation of the third Medium-term Plan (MTP-III) (1998-2002), monitoring, supervision and the evaluation of STI control activities

through visits to the health institutions in twelve of Tanzania's twenty regions where the project was implemented; repeated visits to the Medical Stores Department to assure the distribution of STI drugs and HIV kits. I participated in meetings at the Ministry of Health and regular meetings with donor representatives involved in STI/HIV control and the health sector reform. I also participated in drawing up plans for new STI/HIV control activities. The study material was collected during formal and informal professional activities, as well as from other sources encountered in activities outside my professional activities (table 4).

The Government plans and reports were available to me as original regular working instruments. The content was analysed for aspects that were pertinent to the management related issue that was being studied. The findings were written down in a notebook. This was also done for most of the other formal material. The subsequent outcome of the content analysis of this material constitutes the main part of the results of the paper.

Table 4. Materials collected for paper III during formal, informal and activities outside the profession

Type of activity	Sources of collected material
Formal activities	Government plans, epidemiological and statistical reports Notes from meetings with ministerial and donor staff, Quarterly reports written to the EU Observations and notes from managerial meetings at the NACP District plans Observations and notes from planning meetings at regional and district level Reports from supervision visits as part of my regular work
Informal activities	Unstructured interviews with managers and staff at national, regional and district levels Discussions with colleagues at the NACP Notes and recollection from observations on supervision trips Notes and recollections from visits and participation in community-based projects
Activities outside the professional activities	Interviews and discussions with university faculties Publications and other documents on HIV/AIDS control in Tanzania Publications on HIV/AIDS control in other parts of sub-Saharan Africa Abstracts from national HIV/AIDS conferences Newspaper articles, radio transmissions Interviews with staff at NGOs, other staff especially drivers

The material from the informal activities consisted of brief notes that were consecutively entered into a small notebook if they were pertinent to the issues I was studying or otherwise of special interest. Interesting newspaper articles were collected in a file. A great deal of information and understanding was derived from discussions with colleagues working in Tanzania in the government services, at the university and for international agencies. The notebook material

from the informal activities and other informants was analysed separately for health sector reform and management constraints to HIV/AIDS control. The result formed the understanding of the context in which the plans were implemented. Findings were analysed and systematically compared with those of the few published research papers on the subject. Finally, the manuscript was circulated for comments to people at the Ministry of Health, to donor representatives, to the faculty of Muhimbili University College of Health Sciences and to the local and central level EU staff.

The triangulation between methods and material as well as the iteration of the analytical process as new material was obtained and new knowledge generated enabled a contextual interpretation of the information. By comparing information from many different sources I aimed at identifying patterns and getting a fuller picture. Information was collected from all levels of the health system - from community to health facility, to district, regional and national health sector level. Participation as a health educator in a community-based project on HIV control among the Masai in the southern part of the Masaisteppe in Tanzania gave me the opportunity to study the feasibility of this project in context and to gain an in-depth understanding of the context in which risk behaviour and transmission occurs. I participated in initiation ceremonies, traditional dances and in discussions about the culture and how social norms could be changed among the Masai.

3.4 PAPERS IV, V AND VI

The aim of these papers was to further clarify management constraints as ARV treatment was introduced and large sums of money were allocated to HIV control at the same time as the focus of activities shifted away from prevention to care. These discussion papers are largely based on material collected from 1997 to 1999 for paper III, but also on additional material collected using similar methodology (table 4) during my working period in Tanzania from 2000 to 2003. The three short papers constitute an expansion of selected aspects of the discussion in paper III, especially regarding the HIV problem definition, planning and operationalisation, human resources and the donor-recipient relationship of HIV control (table 8).

3.5 PAPER VII

Paper VII aimed at analysing the feasibility of scaling up ARV treatment in Tanzania. It is based on a theoretical framework for ART service provision (fig.2 paper VII). We assumed that funds, drugs and supplies would be provided by donors and therefore not be limiting factors. We then identified the health staff component of the framework as the main limiting factor. Among the health staff we identified the prescribing clinicians as the most crucial group as they cannot be replaced by other less qualified staff and moreover are in short supply. On the basis of these assumptions we outlined a formula for ART service provision based on availability and productivity of clinicians and estimated the capacity for ART output in Tanzania through a scenario analysis. We identified ranges for input values for the formula variables through a review of published and grey literature and documents on human resources for ART in Tanzania and other low-income countries in sub-Saharan Africa. We finally selected different possible input values to calculate four different scenarios for the scale up of ART in Tanzania.

3.6 THE COVER STORY

For the cover story of the thesis I reviewed the literature on HIV and STI control. I first conducted a search of Medline and Popline with the key words "HIV/AIDS" "sexually transmitted infections" (or diseases) and "interventions" and "developing countries." I also made a content review of selected journals and secondary reference searches. I consulted the Cochrane Library for randomised trials on STI/HIV and relevant topics (for example, the HIV-STI relationship, and partner notification). I made use of UNAIDS/WHO publications on HIV and STI, existing systematic reviews, grey literature from the Ministry of Health, Tanzania, as well as additional material from my personal library.

3.7 ETHICS CONSIDERATIONS

Studies 1-2 concerned patients and ethics clearance was obtained from KI and University Teaching Hospital (UTH) Lusaka in 1991. Papers 3-7 only involved reviews of secondary data without any ethical concerns.

4. RESULTS

The findings are presented in the order of the specific objectives. The first two studies, undertaken in Zambia, estimated the efficacy of the national treatment algorithms of the syndromic approach (paper I) and assessed aspects of the quality of STI care (paper II). The results in paper III are divided into those concerning the health sector reform and HIV, and those concerning management related aspects of HIV control. The latter are discussed both in paper III and in the expanded discussion of selected subjects of study III that constitute papers IV, V and VI.

4.1 PAPER I: Efficacy of STI treatment guidelines

The first study aimed both at estimating the cure rates for the most common STI syndromes and at finding out if it was possible to use a “red flag indication” to detect low efficacy of the treatment algorithms used in the syndromic approach. The WHO “red flag indicator” is determined by clinically defined cure rates. It is intended to alert the responsible national authorities when cure rates for STIs fall below 95% through the use of “limited operational studies” (WHO, 1984). Around 100 consecutive male and female patients (436 in total) with each of the selected syndromes were followed (table 5). The cure rates are shown in table 5. Study results showed that cure rates were above 95%, the limit for an acceptable indicator value set by WHO for both male urethral discharge and vaginal discharge. But they were below the indicator value for genital ulcer disease in both sexes, 83% in women and 69% in men respectively (table 5).

Table 5. Selected findings from the evaluation of the guidelines for STD case management through syndromic approach (paper I).

Syndromes	No of patients	Care seeking delay (days)	Sex after onset of symptoms	Concurrent partners	Cure rates % (CI)
Male ulcers	139	8	22 %	57 %	69 (60 – 79)
Female ulcers	98	9	27 %	24 %	83 (73 – 98)
Male discharge	100	5	12 %	69 %	97 (93 – 100)
Female discharge	99	9	22 %	18 %	98 (94 - 100)

In a separate associated study we also found that 6 out of 10 isolates of *Haemophilus Ducreyi*, the cause of chancroid were resistant to trimethoprim-sulfa (Ahmed H. J., unpublished data), which is the drug recommended for treatment of chancroid in the national guidelines.

We also found that the WHO red flag indication was only partly useful in low-income countries. Thus, it is only useful for the confirmation of efficacious treatment regimens that are above the 95% cure rate limit. If the cure rates are < 95%, the indicator only shows that the recommended combination of drugs is not effective, but neither indicate which of the drugs may not be efficacious and nor why this is so. To find this out additional investigations on the different etiological agents of the syndrome must be carried out.

4.2 PAPER II: Quality of STI care

The study subjects constituted 94 STI patients (69 men and 25 women), who had come either for a first visit or a revisit to the selected health facilities (see methods). The patients were treated both by clinical officers and nurses. Case management for all these patients were observed and 88 of these patients were interviewed (64 men and 24 women). All these patient interviews were analysed, but the analysis of case management observations was limited to the 59 patients (42 men and 17 women) who came for their first visit, and was managed by clinical officers.

As regards these 59 patients, the men were mostly farmers and the women housewives or students. The risk assessment showed that most of the patients knew their sexual contacts well and the sexual encounter was linked to transactions of gifts or money in almost half of the cases. 80% of these transactions consisted of money. Half of the men and one third of the women had consumed alcohol before sexual intercourse. People were not aware of the risk of HIV infection that this entailed and did not believe they could be infected by their fellow villagers. Half of the male and one quarter of the female patients reported they had sought care somewhere else before coming to the hospital or health centre. They had mostly been to traditional healers, although some patients in urban districts had been to private practitioners. The analysis of the whole of the material of 88 patients did not change these findings.

In an extra question added to the questionnaire two-thirds of this largely uncircumcised population said that they were favourably inclined towards the circumcision of a future son if this would reduce the HIV transmission risk (Hanson, unpublished data).

The staff interviews showed that the main problems of STI control were a shortage of drugs and difficulties in persuading the patients to bring their partner. Few staff considered privacy to be a problem.

One aim was to compare treatment by clinical officers with and without training. Due to the small sample the study failed to test whether the performance of the health workers was different for clinical officers with and without training. Furthermore, the groups were not directly comparable since the clinical officers had not been randomly selected for the STI training. It is likely that better performing clinical officers were chosen. The performance in the groups seemed, however, to be similar in many aspects. While history-taking was good, speculum examination was rarely done, and patients were poorly advised about abstinence, condom use and the risk of HIV (table 6). The diagnosis was correct for 80% of the patients, but only 59% of all the patients were given the correct treatment and the required drugs were only available at the health institution for 58% of the patients. This meant that $(80 \times 59 \times 58) = 27\%$ would have been cured if they depended on drugs from the health facility, if the drugs were efficacious and if they were not re-infected.

Table 6. Findings on case management by clinical officers (COs) with and without STI training. Out of the 59 case managements that were observed 28 patients were treated by the former and 31 by the latter.

Elements of case management	With STI training	Without STI training	Total
History-taking - asked about :			
Symptoms	28/28	31/31	59/59 (100 %)
Sexual partners	28/28	28/31	56/59 (95 %)
Physical examination:			
Inspection of genitals	27/28	31/31	59/59 (100 %)
Use of speculum	3/7	0/11	3/18 (17 %)
Diagnosis and treatment:			
Most likely diagnosis made (etiologic or syndromic)	19/21	21/29	40/50 (80 %)
Correct treatment given - both drugs and dosage correct	13/16	10/23	23/39 (59 %)
Drugs available at health institution	16/28	18/31	34/59 (58 %)
Information to the patient:			
Informed about the diagnosis	14/28	7/30	21/58 (36 %)
Informed about transmission routes	10/28	10/31	20/59 (34 %)
Informed about condoms	7/28	3/30	10/58 (17 %)
Informed about the risk of HIV	5/28	1/31	6/59 (10 %)
Instructed to abstain from sex during treatment	5/28	1/31	6/59 (10 %)
Instructed to come for revisit	26/28	7/31	33/59 (56 %)
Asked to inform sexual contacts	18/28	8/30	26/58 (45 %)

4.3 PAPER III: Health sector reform and STI/AIDS control in Tanzania

The health sector reform in Tanzania had many similarities with the health sector reforms in other African countries in the 1990s. The health systems in many African low-income countries suffered from varying degrees of dysfunction many years before the HIV epidemic. The malfunction of the public health service could be traced back to the attempt to achieve complete coverage through an expansion of the public service systems in the 1960s and 1970s (Smith and Bryant, 1988). The expansion was not accompanied by simultaneous economic growth. This eroded the financial base for the intended free health service. Development aid covered a large part of the cost for the construction of facilities and training of staff, but not for recurrent expenditure.

The status of the health system in Tanzania

Information from different sources consistently indicated that the Tanzanian health system was functioning poorly throughout the 1990s. According to the Ministry of Health the public service system suffered from the lack of financial resources, low staff morale, drug shortages as well as

a lack of equipment and supplies (Ministry of Health, 1998). During the five-year period 1990-95 10% of government expenditure was allocated to health, which corresponded to an annual budget of only 3.5 USD (exchange rate) per capita. The decline of per capita expenditure on health started already in the 1970s. The per capita expenditure declined further by about 40% from 1991/2 to 1997/8. The entire national health budget was set at 120 million in 1997/8. Before the health sector reform that was initiated in 1995 around 70 % of government health expenditure went to the district level and below. This corresponded to 2.8 USD per capita for the basic primary health care packages that are an essential part of the reform plan. This was 1/3 of the 9 USD (13 USD including water and sanitation) that the World Bank, at that time, estimated to be necessary for such a package (World Bank, 1993). The inadequate funding resulted in a decline of wages. Real public sector wages had started falling earlier and fell, for example, by over 50% during the 1970s in Sub Saharan Africa (Cartier-Bresson, 1999). At the end of the 1990s the drug supplies were also under funded by 40 to 50%. Informants at district and facility level reported that the drug supplies often did not last for more than 3 weeks per month. The infrastructure was oversized in relation to both existing financial and human resources and in relation to the national economy. The little service provided was often of low quality (Maier and Urassa, 1997). Thus, the entire system was imbalanced in terms of the different types of resources needed for service provision when the health sector reform was initiated in the middle of the 1990s.

STI/HIV Control and health sector reform in Tanzania

Health education through the mass media was probably the main factor behind the broad knowledge of HIV/AIDS and the routes of transmission that was gained in the second half of the 1990s and captured in KAP-surveys (knowledge, attitudes and practices surveys) (Bureau Of Statistics, 1997). Reports and field visits strongly suggested that the screening of blood for transfusion achieved a high coverage already at the beginning of the 1990s. STI control through the syndromic approach was gradually expanded and by the end of 1999 covered all hospitals and health centres in 12 of the 20 regions in the country as summarized in reports to the EU (Annual report. Project 8 ACP/TA/021, 1999). However, condom use remained low as indicated by commissioned reports and a DHS report (Bureau of Statistics, 1997) as well by information from informal sources. Some changes in sexual behaviour, especially as regards the reduction in the number of partners also took place, maybe particularly in the highly affected regions

Table 7. Main findings and conclusions regarding Health Sector Reform and STD/AIDS Control in Tanzania (paper III).

Issue	Findings Conclusions
The health system	Inefficient, imbalanced system oversized in relation to the national economy; Either the system size should be reduced or additional resources secured
STI/HIV control and HSR	Good knowledge of the disease and its transmission in the population; STI control and blood screening scaled up; lack of political commitment, resistance from religious leaders, sexual matters not openly discussed; interventions limited in scale even in high-risk populations; low condom use Need for strong vertical input to maintain efficiency in HIV control; implementation through the integrated system only when it has capacity and sufficient resources; below a certain resource level the service output in integrated systems is likely to be lower than in systems based on vertical programmes
The donor–recipient relationship	Donors have shifted from supporting vertical programmes to supporting the whole system. They control both the reform and much of the HIV control activities. Plans have been based on international templates. Need for a shift of initiative and responsibility to aid recipients; donors should be reactive not pro-active; need for system-wide analysis which includes HIV control

(Kwesigabo, 1998). Throughout the period 1997 to 1999 there was a lack of political commitment and political hesitancy dominated, presumably because of a fear of negative reactions from the constituencies, as reported in West Africa (Caldwell, 1999) and also in Tanzania (pc Mng’ong’o 2004). Only at the end of 1999 did President Mkapa declare HIV/AIDS a national disaster. There were additionally strong reactions from religious leaders, who opposed many of the control efforts, in particular the encouragement of the use of condoms. The issues around sexual behaviour patterns were almost never publicly debated. Most control interventions were of limited scale even among high-risk populations, such as commercial sex workers and the military. Communities had only been involved to a very limited extent.

In 1998 the third Multi-sectoral Medium Term Plan was formulated. Although it was more focused than previous plans it was still comprehensive and aimed at covering all government sectors and all districts. It had wide ambitions, which included the strengthening of the position of women and ‘the reduction of poverty leading to sexual survival strategies’.

The health sector reform that started around 1995 was part of a larger Local Government reform in Tanzania. A parallel Civil Service Reform is also ongoing. The health sector reform implies

service delivery through a decentralised integrated system of governance. It also aims at improving process-related problems such as financial management and the quality of care. But it does not directly address the main problem of the health sector: the shortage of resources and the imbalance between the production factors for service provision, i.e. the staff, the funds, the drugs and diagnostic material, and the infrastructure. The shortage of funding for the intended service provision was hardly ever addressed at donor meetings and when brought to the table it was met by silence.

There is little experience of decentralised integrated systems in Tanzania. Tanzania has for a long time been a one-party state with a highly centralised government system. There are few examples of integrated programmes in Tanzania. UNICEF has run a highly successful integrated child survival programme (CSPD) in several regions for many years (UNICEF, 1996), but there are few other examples. In spite of the lack of experience of integrated approaches and a shortage of evidence, the integration policy was strongly advocated by many donors. It was thus proposed in a donor commissioned consultancy report that the NACP should be dismantled; the epidemiology unit of the NACP shifted to the general epidemiological services of the Ministry of Health, the training in HIV control shifted to the training department of the ministry etc. (Decosas et al. 1997).

The donor-recipient relationship

Before the 1990s donors supported the establishment of vertical health programmes. This was based on the preference for the cost-effectiveness of single interventions rather than on concerns for the function of the entire health system. This shifted at the beginning of the 1990s when donors started to support the reform of the health sector as part of a more holistic view of service delivery. Donors became highly proactive and exerted strong influence on both the health sector reform and the HIV control activities throughout the 1990s.

4.4 MANAGEMENT ASPECTS OF PAPER III and PAPERS IV, V AND VI

HIV control activities in Tanzania are both limited by a lack of resources and the ineffective utilisation of the scarce resources that exist. Furthermore, many interventions are not targeted at the key determinants of the epidemic. I have highlighted the management related issues of HIV

control in paper III and discussed selected additional managerial aspects in papers IV, V and VI (table 8). The results are presented in the same order as they appear in the table.

4.4.1 Problem definition and substance of interventions

Matters related to sexual behaviour are rarely publicly discussed in Tanzania as is also the case in most of the rest of sub-Saharan Africa. This stands out as the main reason why the core issue of HIV control, the sexual behaviour patterns, have not been sufficiently addressed. Informal discussions with national colleagues at the National AIDS Control Programme and with other informants revealed a wealth of knowledge and considerable understanding of the link between sexual behaviour and HIV in Tanzania. Information on sexual behaviour clearly indicates large variations within the country, but although many have great knowledge of their own and some other ethnic group, no one, as elsewhere, seems to have an overview and a clear idea of the magnitude of different sexual patterns in the different population groups. Some of the information collected through these informal discussions have recently been confirmed by published research studies (Luke, 2003), but most of these are qualitative and also lack quantitative information. At the formal level within the Ministry of Health sexual behaviour is also discussed e.g. in the situation analysis of the MTP-III, but then in much more general and superficial terms.

The way in which HIV control was planned also contributes to making the analysis more superficial. When the Medium Term Plan III (MTP-III) (NACP, 1998) was outlined by the NACP, the regular “logic framework” based format was not used, but planning followed a UNAIDS procedure. This included several workshops and the participation of representatives from all sections of society including all sectors of government. The third medium-term plan was thus carefully prepared. It covered the necessary interventions against heterosexual transmission, such as reducing transmission among commercial sex workers and men with multiple partners (box on page 50). However, although the determinants were analysed in a special workshop they were never subject to any in-depth analysis of how and why sexual transmission takes place. It is probably more likely that such an analysis would have been undertaken if the planning had been done by local experts and if a problem tree had been created as prescribed by the “logic framework” approach. A deeper analysis was in the UNAIDS approach replaced by a ranking of determinants of HIV transmission identified in a preceding workshop. The ranking was carried

out by multi-sectoral groups of 5-6 people mainly consisting of civil servants from different ministries and of NGO representatives under the leadership of staff from the national level. Many of the participants had limited knowledge of HIV and its control.

The intervention that aimed at the reduction of multiple sexual partners was given low priority in the ranking (box on page 50). Although sex work was ranked higher among the priorities of the plan this might not have been well motivated. The identified interventions against heterosexual transmission tended to be based on a stereotype image created by international experts and included in the planning templates, such as those of the “sex worker”, “the poor woman as victim”, and the “sugar daddy” images. These images do sometimes, but not always fit in well with local contexts. Information early on conveyed an understanding of relatively widespread transactional sex, which at the 1998 stage of the epidemic probably would have been a much more important focus for prevention than sex work.

According to the epidemiological reports there was a great variation in HIV prevalence in blood donor data over the different parts of the country in 1996. The prevalence varied between 5% and 20% (Ministry of Health, National AIDS Control Programme, 1997). The reasons for this were not discussed in the situation analysis maybe at least partly because it was thought the differences were due to the time factor and would gradually even out over time. I have no records of either myself or any of my national colleagues using these prevalence levels to discuss sexual patterns and improve the understanding of sexual behaviour in the country in order to identify targets for prevention. No questions about the reasons for the uneven distribution of infection were thus posed and the question of the role of ethnicity as regards sexual patterns was never publicly discussed.

Table 8. Main findings and **conclusions** on management related issues of HIV control in Tanzania – papers III IV, V and VI

Issue	Paper III Management aspects of HIV control	Paper IV HIV control in Sub-Saharan Africa	Paper V Problems of allocation of large sums of money	Paper VI Is HIV control losing its focus
Problem definition & scope of interventions	Little public debate on sexual behaviour as a determinant of HIV transmission			Limited analysis of sexual behaviour in different contexts; insufficient focus on prevention; First need for action against determinants that drive the epidemic; then social norm change; ART to reduce stigma and open up discussion
Planning & implementation	Main purpose of plans is to attract funding - this leads to unrealistic plans; large structures and few qualified staff at district level and below; all sectors involved and no prioritisation Need for realistic plans; to adapt international templates and to separate short and long-term goals; Prioritisation to avoid spreading human resources too thin; focus on key sectors; need to retain the regional level and to use NGOs to increase capacity and grease the government machinery	Use of experienced NGOs to oil the government system	Plans based on international templates; Need for locally formulated plans, which consider local resource limitations	Lack of penetrative analysis, which considers local social context; current plans lack strategic choices; Prioritisation of cost-effective interventions directed towards local factors that fuel the epidemic; Initial focus on key sectors: health, local government, education and defence
Human & financial resources	Shortage of financial resources and qualified staff hamper Implementation at all levels; Need for long-term financing which spans 20-30 years	Drastic increase of funding in 2002/3. Over-financing will not lead to major increase in service provision due to shortage of staff	Main problem not money, but human resources; risk of crowding out effects if additional health staff not employed; Money welcomed, but over-financing risks distorting existing systems; Need for money at measured pace over long time; Need for balance between monetary input and human resources	Shortage of qualified staff is a main problem
Major obstacles to effective HIV control at community level	Low awareness of risk of HIV; low quality of communication, lack of community involvement and little or no sharing of information with the community members; lack of political commitment; resistance from religious leaders.			Continued risky sexual behaviour; no focus on social norm change; few interventions with proven effectiveness; Need to encourage open discussion on sexual matters in the community

4.4.2 Planning and implementation

I found that plans had not taken human resource limitations into consideration. Since plans were based on international templates it was difficult to include local realities in the planning process, which was determined by the preset planning format. As pointed out in paper III, although the planning formats are “often well formulated and comprehensive” “they also risk leading planners away from local perspectives and local priorities, and do not encourage the conduct of a comprehensive analysis.” Thus, although the preset process was effective in arriving at a plan quickly, it was never based on a thorough local analysis and nor did it consider the local context or the limitations in local human and financial resources. Plans, such as the MTP-III (NACP, 1998) lacked therefore a balance between human and financial resources. Since the main purpose of these plans has been to attract funds, the resource limitations have not been given much consideration. Important local factors have therefore been left out as they were not even brought up in the planning process. Often the process itself may thus be limiting.

This was the case, for example, in 1998 when Zanzibar was outlining its third medium-term plan. This was first done with local resources, in what I, as an invited outsider, found to be a relevant process, which resulted in a reasonably ambitious plan, which was based on action directed at locally defined determinants. The plan seemed possible to finance and implement using local resources. When the UNAIDS team subsequently carried out a planning exercise in mainland Tanzania using the new methodology based on the ranking of determinants described above, the planning that had already been carried out in Zanzibar was considered inadequate and was then repeated, using the UNAIDS methodology. This resulted in a much more ambitious and costly plan, which was much more general and less adapted to the local situation and resource level, and therefore seemed much less feasible to implement. In this plan poverty had become the most highly ranked determinant – hardly a feasible target for a medium-term plan for HIV control.

It was noted both at formal meetings and during informal discussions that planning had also been influenced by the fact that the generated documents would be used to release considerable amounts of international funding for HIV control. The reluctance to publicly debate and document sexual behaviour combined with the reluctance to argue with representatives of agencies that would bring generous funding seemed to be important reasons for the general and therefore relatively superficial documentation of the extensive knowledge and understanding of

sexual behaviour patterns that exists among Tanzanian managers of the HIV/AIDS control programme.

In the third Medium Term Plan (MTP-III) there was also a lack of separation between short and long-term goals. Interventions would have to be divided and implemented bearing different time perspectives in mind. I found that this was not the case in existing plans. Interventions with short-term objectives were mixed with those with long-term objectives and the operational problems related to this were not discussed. As pointed out in paper III, according to the third Medium Term Plan (MTP-III) sector ministries should, for example, address HIV related factors “such as poverty eradication” and “the position of women in society” – both long-time objectives. (NACP, 1998).

I also noted that plans in general lacked strategic choices. The shortage of both funding and staff should have made it necessary to prioritise interventions to maximise effectiveness and increase feasibility. But, even the latest strategic framework plan such as the National Multi-sectoral Strategic Framework on HIV/AIDS (2003 – 2007) is so comprehensive that it covers all possible interventions without any strategic choices. It seemed plans were made ambitious to secure as much funding as possible, therefore no prioritisation took place. This was true both for the MTP-III, the current health sector plan for HIV/AIDS control and the Care and Treatment Plan, which is scrutinised in paper VII.

Even in a situation of limited capacity both as regards implementation and co-ordination, donors still advocated a multi-sectoral approach (World Bank, 2000). This approach has involved all government sectors. It is clear from my notes from several planning meetings I participated in that many of the ministries, such as the ministries of natural resources and tourism, planning, finance, foreign affairs etc. had very little understanding of HIV control and were able to contribute little to the discussions compared to more “naturally” involved ministries, such as those of health, education, local government and defence.

4.4.3 Human & financial resources

In addition it was clear that the focus on the securing of resources was on financial resources. There was, to my knowledge, no discussion on how a balance between financial, human and other necessary resources should be arrived at. Furthermore and more recently, when the latest Health Sector Strategy 2003 – 2006 was planned in 2002/3, the risk the over-financing of one control intervention, ARV treatment, would involve, in an environment with a shortage of resources, was never brought up – at least not officially - either by the Government or by donors.

4.4.4 Major obstacles to HIV control at community level

I further observed that little was done to involve the villagers and the community at large. Up to 1999 there was to my knowledge only two small community-based projects in Tanzania, one of which was a research project. The general public was mainly reached through various mass media. The effectiveness of most interventions had not been proven. They were mainly based on so-called best practices. The often poor quality of communication is well reflected in the speeches, made each year on World AIDS Day by leading politicians. These tend to be a monotonous repetition of that year's selected theme with little or no reference to the local situation or HIV transmission that local implementers are faced with. Furthermore, the issue of increased condom use was often referred to by religious leaders as an encouragement of sexual activity and strongly opposed in particular by the Catholic Church. The disease was also not brought up by the political leadership. The late President Nyerere, a staunch Catholic, never mentioned it, and President Mkapa only declared HIV/AIDS a national disaster in 1999, more than 15 years after the disease was discovered in Tanzania. Political directives aimed at bringing up the matter at regional and district levels were therefore never issued.

4.5 PAPER VII: The feasibility of scaling up ARV treatment in Tanzania

Our findings show that the targets set for ART provision in the current government Care and Treatment Plan (CTP) are too ambitious. Neither staff limitations nor mortality and patient losses were taken into consideration when service output was estimated in the plan. From the UNAIDS estimate of 1.6 million (1.2 – 2.3) for the number of infected individuals in Tanzania (UNAIDS, 2004) it can be estimated that 175,000 new HIV infections will occur each year

assuming constant incidence. The same number of people will develop AIDS each year and will be in need of ARV treatment. However, for a number of years when ART is being scaled up only a portion of new patients will have access to ART. Most resources will be devoted to maintaining previously enrolled patients on treatment after the first few years. On the basis of a simple framework for ART (fig. 2, paper VII: page 8), we estimated the capacity for service output in Tanzania based on the availability and productivity of clinicians. To be able to do this a number of assumptions had to be made. These included an assumption that the international community would pay for drugs, other supplies and part of the salaries, and that qualified staff would thus be the main limiting factor for ART provision. Based on a review of the literature we also assumed that patient losses would be 20%/year (Ferradini et al., 2004) and first-year mortality of patients would be 15% (Coetzee et al., 2004; Tassie et al., 2003) in the most likely scenario. Four scenarios were outlined.

Instead of the current target of the Care and Treatment Plan (CTP), a recruitment rate of 85%, i.e. 85% of AIDS patients in need of treatment enrolled in ART programmes by 2009 and 350,000 life-years (LY) saved, we found that the maximum recruitment rate that it would be possible to reach with available resources according to our most likely scenario, was only 31% with 100,000 life-years saved. According to this scenario, out of the 125,000 that would be on treatment in 2009 there would be around 44,000 new patients whereas the remaining around 81,000 would be previously enrolled patients. Furthermore, according to this scenario, 712,000 AIDS patients, around 80% of all those who will develop AIDS during the 2004-2009 time period, will die without ever having been treated with ART. Even if the Care and Treatment Plan is implemented, 454,000 AIDS patients, out of a total of 825,000 AIDS patients, over 50%, will die during the same period without having been treated. Reaching a coverage of 65%, which is estimated necessary by WHO's Commission on Macroeconomics and Health in order to reach the Millennium Development Goals in 2015, would, according to our most likely scenario, require a reduction of incidence of around two-thirds from the current level of 175,000 new cases/year to fewer than 60,000 new cases/year.

5 DISCUSSION

HIV control in Tanzania is complex. HIV prevalence has levelled out at different levels in the various regions during the last few years. HIV prevalence has declined in the Kagera region, where the epidemic started. Sexual behaviour has also changed there (Lugalla et al., 2004). In most other parts of the country sexual behaviour, it seems, has changed very little or not at all (Mwaluku, 2003; TACAIDS & National Bureau of Statistics, 2005). Condom use remains low (TACAIDS & National Bureau of Statistics, 2005; Measure 2001).

The lack of apparent success as regards interventions might be due both to the fact that this is a difficult task and to fact that plans are poorly adapted to the various local contexts. These issues are studied in paper III. Control efforts may also be ineffective because plans fail to tackle the main determinants of HIV transmission. Before I address the obstacles to HIV control in Tanzania I will therefore first review these determinants. I will then discuss STI control, which addresses one of the main determinants and thereafter discuss the health sector reform and the managerial constraints in the same order as in the results section. Finally, I will discuss the ARV treatment programme, currently the main HIV control intervention in Tanzania.

The fact that 85-90% of HIV infections are sexually transmitted in Tanzania means that prevention of sexual transmission has to be the main objective of control activities. There is also an obvious need to treat those infected, who are sick, when this is feasible. Interventions and plans are therefore assessed in relation to their potential contribution to the two main components of HIV/AIDS control:

Main components of HIV control in sub-Saharan Africa

- Prevention of new infections
 - Reduction of the size of sexual networks and frequency of partner change
 - Reduction of the probability of HIV transmission per sexual contact
- Prolongation of life of HIV infected persons, who are about to develop AIDS

STI control is seen mainly as an HIV prevention intervention and ART is assessed both as a potential contribution to prevention and a means of prolonging life. The prevention of new infections depends on how effectively the factors that determine the size of sexual networks and the probability of transmission are addressed.

5.1 DETERMINANTS OF HIV TRANSMISSION

The variation in HIV prevalence between the different parts of Tanzania appears to be as great as between the countries of sub-Saharan Africa. Therefore this section reviews the understanding of HIV transmission both in Tanzania and the rest of sub-Saharan Africa, in order to be able to discuss whether HIV/AIDS control activities in Tanzania are relevant, tackle the main determinants and are based on evidence. I will review studies on the relative importance of different underlying, indirect and direct determinants. The result of the analysis of these defines the local HIV problem.

When analysing the determinants of sexual transmission of HIV in sub-Saharan Africa two questions cross the mind: *“Why is the HIV infection so unevenly distributed over sub-Saharan Africa and also over Tanzania?”* and *“Why has behaviour changed so little in spite of the devastating consequences of the epidemic?”* The first question is related to the local variation of determinants of infection and the second to difficulties in changing social norms and the ineffectiveness of interventions.

In response to the first question we know from the description in the background section that some determinants are likely to be more important for the epidemic than others. These include indirect determinants such as sexual behaviour, including sexual mixing and concurrency, condom use, sexually transmitted infections including genital ulcers, in particular HSV-2, virus load/CD4 count as well as ARV treatment. Underlying determinants include pro-natal values and gender imbalance including polygamy and age asymmetry (fig. 6).

Several studies show that the age at sexual debut and the reported frequency of intercourse seem to be fairly similar the world over (Caldwell, 1999; Carael, 1995). The main behavioural difference between sub-Saharan Africa and most other parts of the world is the reported number

of concurrent extramarital partners and, according to some, a higher proportion of risky sexual encounters (Shisana, 2005; Munguti et al., 1997). But this may not be enough to explain the 5 to 10-fold difference in HIV prevalence between Africa and most of the rest of the world. Additional explanations are required.

There are also major differences in HIV prevalence within sub-Saharan Africa. There is thus a 5-fold difference in HIV prevalence between West Africa and Southern Africa. Although social norms and other factors have many similarities within the continent, there are also differences in determinants within Africa. These may, at least partly, explain the large differences in HIV prevalence within the continent. There may still be major determinants that remain to be discovered and characterised.

There are also large regional differences within Tanzania with a 15-fold variation in HIV-prevalence. The highest prevalence is in Mbeya and the lowest in Zanzibar (fig. 3). On the mainland the prevalence in Mbeya is around 7 times higher than in the Kigoma and Manyara regions. There is still no satisfactory explanation for these huge differences between the regions. Variations in the local combination of factors, including status of male circumcision, the number of concurrent partners and underlying social factors could certainly play a role. These factors are likely to vary between different ethnic groups in rural Tanzania. The initial high prevalence in the Kagera region was probably related to a high level of uncircumcised men and large sexual networks. Prevalence declined once the high-risk groups in the population were saturated with the infection and those infected at the early stages of the epidemic started to die off, at the same time as the incidence in subsequent cohorts was reduced due to changed sexual behaviour, prevalence declined. The high prevalence in the south-west of the country, in the Mbeya and Iringa regions, also seems related to a high level of uncircumcised men and to a high level of other STIs, including HSV-2. Here the incidence appears not to have declined and prevalence has remained at a high level. No attempts have yet, as far as I know, been made to try to explain the uneven HIV distribution in Tanzania by giving weight to the various determinants for different ethnic groups described above.

Gradually a clearer picture of the epidemic is emerging. The transmission rate seems to be the result of a complex interplay between the underlying socio-economic and culturally determined factors catalysed by biological factors (Aral and Holmes, 1999; Buve et al., 2002).

However, many unanswered questions remain. Although the reasons for the higher prevalence among young women compared to young men is explained by the age asymmetry in sexual relations, the high prevalence rate among older women in the top wealth quintile in Tanzania is not yet fully understood. It is likely to be influenced by the disempowered position of women, who are infected by their husbands, even if many sexual relations might also be initiated by the women themselves. The underlying causes may vary between different ethnic groups.

Caldwell et al. have tried to examine which underlying social-cultural and socio-economic factors could explain the difference in prevalence between the various sub-Saharan regions. However, apart from more subtle differences in extramarital and regular concurrent sex, only lack of *circumcision* remained as an explanation for the uneven distribution in the analysis of the underlying determinants (Caldwell, 1996).

The second question on *why has there been so little behavioural change* in spite of the seriousness of the epidemic, was also scrutinised by Caldwell. AIDS has rapidly emerged in what Caldwell et al. have described as culturally conservative social contexts, in which there is limited capacity to change behaviour swiftly in order to prevent the spread and mitigate the serious effects of the epidemic. Although many current behaviours favour the spread of HIV, neither social nor traditional cultural norms related to sexual activity have so far undergone much change. Here “is a mystery at the heart of the African epidemic” (Caldwell, 1999). Changes have taken place in other parts of the world where the epidemic appeared. In the West the gay sauna clubs were closed; in Thailand many brothels closed because of lack of clients and successful 100% condom policies were implemented (Rojanapithayakorn and Hanenberg, 1996). In Africa behaviour change has been reported in Uganda (Stoneburner and Low-Beer, 2004) and Zimbabwe (Gregson et al., 2006), but little change has been reported in other countries.

Caldwell & Caldwell in their book, “Reasons for limited behavioural change in the sub-Saharan African AIDS epidemic” have tried to find an explanation to this limited behavioural change by scrutinising findings from a large number of studies of sub-Saharan Africa. Central to their reasoning is the procreative attitude of many African cultures (Caldwell, 1999). They argue that any society, which emphasises high reproductive rates and high fertility, is inherently subject to sexually transmitted infections. Caldwell continuing on the reasons for the epidemic discusses “the need for sex”, that men “are widely described as suddenly needing sex, often with new

partners”. Studies among Nigerian men have shown that fears of AIDS have not diminished these feelings (Orubuloye and Oguntimehin, 1999).

Others disagree and regard Caldwell’s description as an unacceptable generalisation of studies mainly conducted in a small area of Nigeria. They claim there is no proof for such sweeping statements (Stillwaggon, 2003) and continue by saying that “the notion that men must have many sexual partners to be satisfied” is not different from the situation in the United States. Stillwaggon further claims that existing evidence does not at all support the idea that sexual behaviour among Africans is different from elsewhere. Thus, according to the WHO/GPA seven-year-long survey of behavioural risk factors for HIV transmission, “the results are totally incompatible” with the idea that the HIV epidemic in Africa “was fuelled by extreme promiscuity” (Cleland and Ferry, 1995). Furthermore, the results of the four-city study indicated that there was no correlation between partner change and HIV prevalence (Buve, 2001)

Maybe the most important reasons for the lack of behavioural change are related to stigma and silence as regards HIV/AIDS. This, according to Caldwell, is connected to a double moral. While most of the population experience “significant levels of premarital sex and quite a portion of those married have extramarital relations”, religious and political leaders either deny that this takes place or preach that the situation should be rectified. In East Africa HIV has been regarded as a curse (Amuyunzu-Nyamongo et al., 1999) - a punishment for sexual sins – an idea reinforced by religious leaders, both Muslim and Christian (Orubuloye et al., 1993). The disease therefore carries a heavy stigma and is, for example, not mentioned as the cause of death at funerals. Caldwell et al. argue that the gulf between the sexual behaviour advocated and that actually occurring makes it impossible for community members to come together and sit down to discuss what could be done to address the situation. Nor has it been brought up in a serious action-oriented way by governments, apart from in a few countries like Uganda.

Another reason for inaction is the belief, in many places, that the infection is not caused by a virus alone, but that an element of witchcraft or supernatural forces are involved (Caldwell et al., 1992; Yamba, 1997). Moreover, “death is seen as predetermined and the most certain way of becoming sick is to worry about death” and to change one’s way of life. They also draw attention to “an extraordinary stoicism towards death” (Caldwell et al., 1992). The fear of death in no way dominates decisions about life-choices. “Foreign observers throughout Africa

expressed astonishment at the contrast to the situation in their own countries". The growing importance given to survival in other cultures, according to one researcher, has arisen from a secularized society with increasing doubt about an after-life. The thinking in many African societies seems to be different. A researcher summarised the East African philosophy in the words: "everybody will die anyway." "Most people feel that death is uncontrollable by human beings." (Amuyunzu-Nyamongo et al., 1999). It also appears that attitudes are shaped in a context of high mortality and that AIDS is only one of many causes of death. Others have argued in the opposite direction and a researcher in Uganda claims that the higher mortality there made the members of society more sensitive to the dangers around them, which contributed to a change in behaviour particularly among the educated (Ayiga et al., 1999).

Much of what has been reviewed above for the whole of sub-Saharan Africa might also be valid for Tanzania. However, there is still no consensus regarding what causes the high HIV prevalence rates in Southern Africa, nor is there any clear explanation for high prevalence in the South-West of Tanzania. A separate analysis for individual ethnic groups and socio-economic contexts is necessary to explain the differences both within the country and across the continent.

Although, many socio-economic realities and most modern social norms may be shared by most urban inhabitants, some cultural practices are specific to each ethnic group in Tanzania. The general determinants include stigma, ignorance, poverty and transactional sex to pay for school fees, clothes and food. The position of women and their lack of power when it comes to controlling their own sexual lives is perhaps a major factor. Traditional practices that contribute to HIV transmission include widow inheritance, the sharing of wives and early initiation. The occurrence of such practices varies widely between ethnic groups. These practices may not contribute much to transmission in urban settings, but the epidemic is now to a large extent a rural problem - in Tanzania over half of the HIV infected live in rural areas - and the importance of traditional practices is likely to be greater in rural areas. Their role has to be defined and analysed by people with intimate knowledge of the issues. This is best done by people from these ethnic groups, and addressed by the community members themselves for the problem to be effectively tackled. This has not been done on the whole and the issues are rarely, if ever, publicly discussed, maybe partly because of the radical and difficult transformation that the altering of century old ways would entail, and partly because of the tribal character and political sensitivity of the matter.

The magnitude of the influence of traditional cultural practices is not clear and certainly varies across the continent and within countries. The existence of these practices might also be seen as a reflection of resistance to change and of difficulties in accepting new social norms. Still, the need for change to the practice of widow inheritance has been recognised and the need for a social revolution has been clearly expressed by former President Mandela. This is also part of a general development towards a more modern society, which also has to include a levelling out of gender imbalances.

5.1.1 Understanding of the determinants of HIV incidence

Most aspects of sexual behaviour in most part of Africa seem not to be different from those of the rest of the world. This includes the frequency of intercourse. It seems that the high HIV transmission levels may not be a matter of quantitative differences in sexual behaviour but of qualitative. There is also a great variation within Africa. However, it would seem that subtle differences in sexual behaviour between ethnic groups, if multiplied by other factors that facilitate transmission, could have a major impact on HIV incidence. It appears that extramarital sexual relations are more common in many African cultures than in Britain, for example (Munguti, 1997). However, and perhaps more importantly, there is evidence also in Tanzania that many of these relations are concurrent partnerships (Lagarde, 2001, Hudson, 1993; Halperin, 2004). The hypothesis that emerges from modelling studies is that frequent concurrent partnerships could at least partly explain the rapid spread of the epidemic. The character of concurrent partnerships has recently been demonstrated in one study in Malawi. Most people belonged to one large sexual network. This finding might be specific to the island where the research was conducted, but similar networks may also exist in other parts of sub-Saharan Africa. This is not, however, enough to explain the severity of the epidemic. Other factors, such as concomitant STIs that facilitate transmission are also needed to explain the high rates of HIV transmission. It could be concluded that certain of these other determinants are of greater importance for HIV incidence than others. I have tried to single these out in a partly hypothetical model for new HIV infections (fig.13). However, most of the model builds on clear evidence. I have mainly chosen factors, which are possible to address. The model is based on the formula for the reproductive rates of infection, and focuses on sexual networks and the factors that facilitate HIV transmission within the networks.

The factors to the left in figure 13 are likely to influence the size of the sexual networks, while those to the right influence the likelihood of transmission. About two-thirds of the population were part of the main sexual network on an island in Malawi (Kohler and Helleringer, 2006) with a resulting HIV prevalence of 10% among antenatal women. This situation could be specific to this island population, but may also not be unique. The maintenance of large sexual networks could at least to a certain extent explain the difference in prevalence between different areas also in Tanzania.

It also seems clear that cultures with stricter control over sexual activity and thus probably much smaller sexual networks, as in many of the Muslim cultures of the southern part of the Sahara, have a low HIV prevalence. In Tanzania the prevalence is around 8 times lower in Zanzibar than

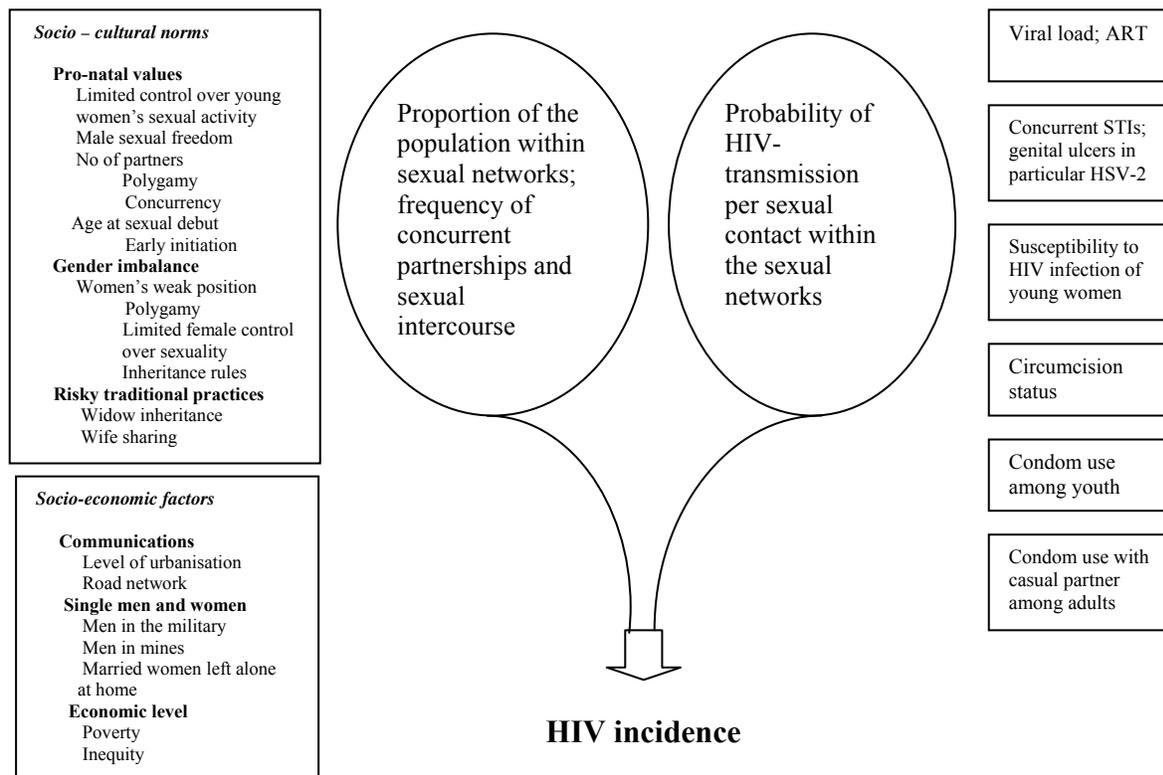


Fig.13. Hypothetical model for determinants of HIV incidence resulting from sexual transmission in sub-Saharan Africa - most of which can be addressed through feasible interventions

on the mainland. One explanation for the difference in prevalence could be the size of the sexual networks and the level of concurrency this entails.

The great importance of young girls and women for the epidemic is clear, but the extent to which they are mainly victims of the gender imbalance, or if they also actively contribute to risky sexual behaviours, probably varies within and between different populations. Such variations may determine the size of the sexual networks. Although “sugar daddies” may be important for disease transmission in many settings, their role may be exaggerated in many others, because it seems young girls mainly acquire the infection from men who are not more than 5-10 years their senior (Gregson et al., 2002; Munguti et al., 1997). It also seems likely that male sexual freedom is an important factor for the maintenance of sexual networks (Orubuloye and Oguntimehin, 1999). Polygamy might also be a crucial factor both because it reinforces gender imbalances and because it increases the size of the sexual networks if sexual activity is not strictly limited to the polygamous partners. The role of traditional practices is not clear. Widow inheritance and wife sharing still seem widely practiced but the epidemiological role of such practices remains unclear.

Social life in many parts of sub-Saharan Africa is based on an old culture. This has, according to many, remained largely unchanged in its fundamentals in many parts of the continent, despite being exposed to colonisation and religious missions. Many of the problems with HIV control may lie in the recognition and understanding of this culture (see page 32).

Socio-economic factors, which force married couples to live apart and young military men not to marry, might certainly contribute to increased HIV transmission. It seems feasible to address these. The importance of the economic level is less clear. Although poverty and equity are likely to be important underlying factors, the impact they have on the epidemic in Tanzania is not clear. Instead the Tanzania HIV Indicator Survey showed that high wealth and education levels were related to high HIV prevalence (TAC-AIDS 2005).

Regarding the factors on the right of the figure the important role played by viral load (Wawer et al., 2005) and STIs, particularly HSV-2 infection, seems clear (Weiss et al., 2001) and has already been described in the background section (page 44-46). ART coverage is increasing in sub-Saharan Africa, but has still not reached levels, which would have a major impact on HIV incidence (Baggaley, 2006). Access to ART might have its main function in an increase of VCT and a reduction of stigma. The controversy surrounding the effect of circumcision has now been addressed through additional randomised control studies and it should be possible for the

governments to recommend this as a control measure. Another factor is condom use. Young people all over the world are more closely linked than ever before through the global cultures, such as the music culture. This is likely to influence behaviour. Young people in many countries tend to have sex earlier than before, but more young people are also using condoms at least in some sub-Saharan countries (UNAIDS, 2006).

Scaled up STI control in its current form may not have any major effect on the HIV epidemic in Tanzania. Still, perhaps it will become important later on mainly by contributing to behavioural change including the promotion of condom use – currently the main feasible way of controlling at least the viral STIs, such as HSV-2.

In conclusion there is no strong evidence that quantitative aspects of sexual behaviour are very different across the world. But there seem to be more concurrent extra-marital partnerships in parts of sub-Saharan Africa. This combined with other factors that increase the probability of transmission, such as lack of circumcision and concomitant HSV-2 infection, could explain a large part of the difference both between sub-Saharan Africa and the rest of the world and within Africa. It may also explain the difference between different ethnic groups within Tanzania.

5.2 STI CONTROL IN ZAMBIA AND TANZANIA (Papers I and II)

STIs are among the most important determinants of HIV transmission. STI control is the subject of the first two articles and also discussed in the third article. It has previously never been given priority in public health planning and has been hampered by the stigma sexually transmitted diseases carry. STI control both in Tanzania and Zambia, apart from being part of regular OPD activities, used to be mainly carried out through the treatment of individual patients in special STI clinics (Pallangyo, 1987). It also included screening of antenatal women for syphilis at MCH clinics.

It is only after the importance for HIV transmission of other STI has been recognised that STI control has been given more prominence. Thus, it has been given additional resources after it was shown that it led to a reduction of HIV incidence in a randomised control trial in the Mwanza region, Tanzania (Grosskurth et al., 1995). The so-called syndromic management of

STIs, or more correctly sign and symptoms based treatment, was initially developed in Africa to tackle the problems of the large number of STIs at primary health care facilities, which were mostly manned with unqualified staff (Latif, 1986). It was also known that clinical diagnosis has a low level of accuracy (Dangor, 1990; O'Farrell, 1991). Algorithms were designed to address these issues and to treat all the most common etiological agents that cause the sign or symptom. The inherent problem of this approach is the overuse of antibiotics as well as the costs and problems of drug resistance that are linked to this.

Although STIs in themselves cause a large burden of disease (World Bank, 1993), STI control is here mainly seen as a way of controlling HIV. If STI control is to have an effect on the HIV epidemic, it needs to be of a certain scale and community effectiveness and the management of the individual have to be efficient and address key determinants of HIV transmission.

In study I we demonstrated that treatment algorithms for the treatment of genital ulcers were not efficacious. The most likely reason for the lower cure rates for the ulcer syndromes was that one of the main etiological agents, *Haemophilus Ducreyi* that causes chancroid, was found to be resistant to the selected drug, trimethoprim-sulfa in 6 out of 10 isolates. A likely reason for the higher cure rates among women was that there were more cases of syphilis among them, and syphilis is sensitive to benzyl-penicillin, the other drug of the ulcer algorithm.

We also found that the WHO red flag indication was only partially helpful. If a regimen was showing signs of not being effective, WHO suggested that the use of the indicator and “supervision, data review and/or limited operational studies may help clarify the situation”. However, we found that for the syndromic approach things might be more complicated than that. Since a treatment regimen consists of treatment with several drugs, an indicator value below 95% only shows that the whole regimen does not work well, but it does not tell you which of the drugs is not efficacious. To find that out laboratory examinations must be carried out for each of the etiological agents. Such examinations are often beyond the capacity of laboratories in low-income countries. “Limited operational studies” are therefore often not enough.

The main limitation of the *first study* was the relatively high loss to follow-up (22 %) among male patients. The loss was much lower among female patients. The reason for the losses could be either that the patients were already cured or because they sought care elsewhere. Patients

lost to follow-up were excluded from further analysis in the data analysis, which has perhaps led both to falsely high or falsely low results.

Another methodological problem in *paper I* was the potential misclassification of cure. A number of definitions were introduced and the research assistants were trained prior to the study to reduce the problem. Still, the classification of vaginal discharge in particular is difficult. It included a judgement made by the patient, which is known to be unspecific. Still, since the study was carried out by three experienced clinical officers, non-random misclassification was not likely to be a major issue.

Furthermore, non-compliance, both with instructions on medication and on abstinence from sex, could have influenced the results. The degree of non-compliance was checked through a questionnaire. This approach may have led to an overestimation of compliance since patients might have given the answers they thought were desired.

In *paper II* we found that history-taking was good but that speculum examinations were rarely carried out and that patients were poorly informed about the need for abstinence from sex, little advised on condom use and the risk of HIV infection. Although a correct diagnosis was made for 80% of the patients, a low percentage for correct treatment and a shortage of drugs meant that an estimated 27% of all patients would have been cured if it were assumed that they did not get re-infected and the drugs were efficacious.

The *second study* suffered from a small sample size. For practical reasons it was not possible to reach the intended number of patients. It was therefore not possible to make any statistical analysis to compare the different types of providers. Still, the study generated potentially useful information on the quality of care and sexual behaviour. Another main problem was that the method used, participant observation, was carried out by an experienced clinician, whom most of the providers were likely to know or at least have heard of. This might initially have improved their performance. This situation is, however, almost unavoidable in a country with few well-qualified health workers. However, after some observation time health workers are likely to have fallen back into their regular habits in spite of the presence of the observer.

The conclusion of the findings was that to improve STI control major improvements both in service provision and care seeking were required - “a huge educational task lies ahead for service providers and consumers”. Mainly information to the patients on sexual behaviour, condom use and the risk of contracting HIV has to be improved. Patients have to learn to seek care earlier.

These findings in Zambia could be compared with those observed in two quality of care studies conducted in Tanzania. The first was undertaken in 2002 six years after extended STI control had been introduced (Temba, 2004) and the second in 2005 (NACP, 2005). These studies in Tanzania included many questions of the same aspects of STI control as study II in Zambia some 10 years earlier.

As in Zambia (Hanson, unpublished data, 1996), in most OPDs, there was a lack both of specula and a proper light source. The results of the 2002 quality of care study in Tanzania were similar to those of study II in Zambia for STI indicator 1 (41% against 47%); STI indicator 2 showed a higher value of 61% in Tanzania against 17% in Zambia, while STI indicator 3 on drug availability was not estimated through the use of comparable measurements in the two studies.

The results of the 2005 quality of care study showed an STI indicator 1 value of 67%, but also showed that only 22% of the women and 40% of the men had their genitalia properly examined. STI indicator 2 had been measured in a different way than in the Zambian study. STI indicator 3 showed that 37% of the health facilities had experienced stock-outs.

The main obstacles to control efforts in Tanzania included irregular drug supplies, a lack of equipment and poor supervision (Nyang'anyui, 2002). Similar problems were also observed in Zambia (Hanson, unpublished data 1996)

Later STI studies in sub-Saharan Africa give a picture, which is similar to the one that emerges from the studies in Zambia in many respects, but findings on cure rates deviate from those of study one (Fonck et al., 2001; Voeten et al., 2001). Thus, cure rates elsewhere tend to be high for genital ulcer syndromes in both sexes and urethral discharge in men, but tend to be lower for vaginal discharge syndromes (La Ruche et al., 1995; Pettifor et al., 2000) unlike what we found

in Zambia. There was, however, a simple explanation for this difference: the Zambian treatment guidelines were not efficacious since the antibiotic treatment for chancroid was not correct.

Studies in sub-Saharan Africa further show that patients not only seek care in the government facilities, but also to a large extent in private practice clinics or with traditional healers; from unqualified practitioners, street drug vendors or pharmacists (Crabbe et al., 1996). Self-medication is also common. Patients seek care in the private sector for many reasons, including the greater accessibility and convenience, and the more confidential, less judgmental, and less stigmatising nature of the services. For example, a community-based study found that inhabitants in Lusaka were reluctant to seek care at the special STI clinic of the University Hospital (Msiska et al., 1997). Patients, in particular women, tended to seek care late similar to what we found in study I (table 5).

The review of the international literature also showed that although the quality of care was improved with the introduction of syndromic treatment, little or no information on the disease and the risks involved is generally given to the patient, the proper use of a condom is often not demonstrated, condoms not offered to the patients and partner notification has low effectiveness (Faxelid et al., 1994). Women are often not examined vaginally, and specula and a proper light source are often missing, just as we also found both in Zambia and Tanzania.

In conclusion this means that the findings of study two are largely confirmed by the quality of care studies in Tanzania and the review of the literature, and that the deviating findings from study one can be easily explained.

STI control and HIV prevention

There are few studies from scaled up STI control programmes. It is clear that even if a relatively high number of patients are cured under ideal conditions in special clinics, far fewer patients are cured at scaled up government services and only a small proportion of all individuals with STIs in the community are cured by the government services (Buve A et al., 2001). Many of the patients are asymptomatic and only a portion of those with symptoms seek care (Wilkinson, 1997).

Effective interventions are needed at every step of the process from transmission of infection in the community to cure at a health facility to achieve comprehensive STI control. It also has to include better care seeking (Rao et al., 1998). The syndromic approach entails an improvement in cure rates compared to treatment based on an etiologic diagnosis at least in low-income settings, and therefore constitutes an increase in effectiveness in at least one of the steps mentioned above, but the other steps still need to be improved.

Even though STI control was shown to reduce HIV transmission early on in the epidemic, the population attributable fraction of STIs for HIV transmission in a mature epidemic is greatly reduced according to modelling studies (Gray et al., 1999; Robinson et al., 1997). These may, however, not fully have taken account of the parallel HSV-2 epidemic.

HSV-2, the STI, which probably has the greatest importance for HIV transmission, is not treated with drugs in current syndromic STI management algorithms. It has recently been suggested that the continuous treatment with anti-viral drugs of dually infected HIV-1/HSV-2 patients might prove cost-effective (Reynolds and Quinn, 2005) in a situation of high HIV prevalence. However, the feasibility of such an approach has not been studied. Perhaps the two epidemics in a mature HIV epidemic are so closely interlinked that the control of HSV-2 implies the control of HIV. - Maybe it would be better to multiply efforts to produce a vaccine for HSV-2, because such a vaccine might be easier to develop than a vaccine against HIV and may also become more effective.

The main importance of STI control may lie in control of syphilis among ante-natal women, since ANC has a wide coverage to which syphilis screening could easily be added, where this has not already been done. STI management also has to be offered to individuals as part of the regular health services. Clinical care cannot, however, control STIs in low-income countries (Rao et al., 1998) and contribute little to HIV control in these settings. Its main importance lies potentially in the possibility of informing high-risk patients of the risks of HIV, having them tested for HIV and making them change their behaviour and increase the use of condoms. As shown in study II and in the two quality of care studies in Tanzania, these aspects of STI control still remain weak and need to be improved. If it were possible to achieve this, STI control, maybe particularly if it focused on HSV-2 control, would have an important role to play and would constitute an important part of a potentially effective HIV prevention package. If

combined with a number of other prevention interventions, such a package could have a decisive effect on the epidemic in Tanzania.

5.3 HEALTH SECTOR REFORM AND STI/HIV CONTROL IN TANZANIA

(Paper III)

The Tanzanian health system faces three major interrelated problems: the shortage in funding and staff, the inefficiency of the service system and the HIV epidemic. The health services in Tanzania have been built up to achieve a high coverage without much consideration of the inability to cover running costs. The expansion was carried out at the expense of quality. There are not enough qualified health workers to cover the peripheral facilities, which are to a large extent manned by unqualified staff. The difficult situation has been further compounded by a hiring freeze on health staff imposed by IMF in 1993 as part of the structural adjustment programme. This has now been lifted, but the shortage of qualified staff largely remains because training outputs were previously adjusted to the hiring freeze requirements (Kurowski, 2004). The burden of disease has now increased with the HIV epidemic and a number of staff has died from the disease. Service provision is not likely to be cost-effective in this imbalanced system.

In the paper it is assumed that the objective of the health sector reform in Tanzania is the ambition “health facilities equitably distributed, well equipped and functioning, the referral system operational, manned by qualified staff in all cadres, all vertical programmes cost-effectively integrated “ as expressed by the Ministry of Health in 1998 (Ministry of Health, 1998). It has been concluded that present reform efforts are unlikely to reach this target. According to the findings, the main problem for the sector is the discrepancy between the size of the system and the shortage of resources. This problem has not been directly addressed by the reform, which is not based on the specific Tanzanian situation, but largely follows the internationally formulated prescription for health sector reforms. If the ambition is to establish a fully integrated system, as was the declared goal, the only way to achieve this would be through a major increase of resources, as such a system would be larger than the sum of the existing vertical programmes.

If additional resources cannot be secured, I suggested the system size would have to be reduced to increase effectiveness. However, a reduction in system size is politically almost impossible

particularly since the system is not over-sized in relation to need. “We will not reduce the system, but share the little resources we have” – expressed by a member of the health sector reform team in the ministry in a comment on paper III. If additional resources are not secured and if a low resource integrated system is created to meet the reform target, such a system might not be able to increase the service output. In a situation with very limited resources (3 USD in 1998 and 6 USD/capita in 2003 against an estimated need of 9 USD in 1998 and currently 40 USD/capita for basic health services) it probably matters little “if services are delivered in a centralised or decentralised” system, as pointed out in the paper. Health workers will have no choices, but “will still deliver the same basic services.” I also argued in the paper that below a certain resource level the service output of an integrated system may “be lower than in systems based on vertical programmes.”

As the results indicated, there was sound knowledge of HIV and transmission routes among the general population, but this has not resulted in major changes in behaviour. In the Kagera region, which was the first epicentre of the epidemic, behaviour has changed (Lugalla et al., 2004). Certain behavioural changes have certainly taken place also in other places, such as the reduction of the number of partners, but much risky behaviour has remained unchanged. The epidemic seems now to have levelled out at 6-7% of the adult population. When the article was written the political commitment was very limited. President Mkapa declared HIV/AIDS a national catastrophe in 1999, but political openness is not great enough yet to encourage an open dialogue in society. Such a dialogue is likely to be necessary to transfer the epidemic to a lower prevalence level.

The integration of vertical programmes, one of the main policy components of the health sector reform (HSR), was also to be applied to HIV control. It led to discussions of how HIV control could be integrated into the regular services. The integration approach was driven very strongly by some of the donors, but never took place. If it had been attempted, it would surely have led to a further loss of effectiveness of HIV control as many of the departments that are responsible for the horizontal functions of the Ministry of Health are seriously understaffed and operating poorly. This dilemma of both strengthening the whole system and maintaining the effectiveness of important disease control programmes has never been solved, as pointed out in the article. The integration approach was also resisted by the Ministry of Health and with the introduction of ARV treatment the clout of the NACP has been further increased. In the paper I discussed how

the resource and operational problems might be addressed and argued against the present stress on a sector-wide approach in the low-resource setting of Tanzania, but in favour of a combined approach (the whole sector including projects) with the continued strengthening of the entire system mixed with strong vertical inputs for key diseases, such as HIV and the use of the horizontal functions of the system, only when this is clearly within the capacity of the system.

In my opinion, in order for HIV/AIDS projects to be effective, they must to a large extent be centrally directed, have strong vertical components and be carried out in project form at least partly outside the reforming systems. This should be implemented through a close coordination of the latter with the aim of utilising and reinforcing existing horizontal functions where possible rather than adding on new structures. However, the build up of a larger system mainly in order to integrate would risk becoming unsustainable. Effective HIV control depends to a large extent on a well-functioning health service system (Buve et al., 2003). Therefore it would not be wise to let a dogmatic approach to reform based on integration lead the development of the sector. It may reduce effectiveness considerably in a low-income situation and rather than being an aim in itself it should be a natural consequence of strengthened horizontal functions. i.e. integration has to go hand in hand with the increase of resources - not precede it.

Such integration into horizontal functions has to some extent taken place, but additional structures have also been established as new projects have been initiated. There has been no integration of the NACP into the regular structures, but with the initiation of a scaling up of ART through the Care and Treatment Programme and with the start of the Tanzania Multi-sectoral AIDS Project (T-MAP) a number of new structures have been established. This might have been necessary, but it would have been more reasonable if it had been combined with efforts to strongly prioritise activities. In the paper I also argued in favour of the use of experienced NGOs to strengthen the capacity of the region as this had been found to be effective in STI control (Meheus and Aral, 1999). This approach is now also used in the T-MAP, but no longer in the health sector.

The donor-recipient relationship

Donors have directed both the health sector reform and HIV control in Tanzania and most other sub-Saharan African countries. This has led to a continuing *problem of the ownership of plans*

and as pointed out in paper III “there is a need to strengthen national leadership and let local knowledge have a stronger say in health sector planning”. In addition donors often abruptly change focus, many times throwing local staff and managers into disarray. In Tanzania donor contribution to HIV control varied unpredictably during the 1990s, “creating a spinning rotation of dance partners as donors would step in and out of their contributions” (Hartwig et al., 2005). For example, a large successful AMREF co-ordinated project in so-called high transmission areas along the highways, was given support by a major donor from 1993 to 1999, when support was withdrawn, in spite of the obvious importance of the project, through a long outdrawn process, presumably because support through projects was no longer in line with the new policies of the sector-wide approach and financing through the district councils.

To avoid the problems caused by strong donor dominance there is a need for a shift of initiative and responsibility to aid recipients. Donors, I argue in paper III, should be reactive not proactive and ideally wait for the government to act. To reduce the problem of distorted allocations of funds between the overall system and HIV control there is a need for a system-wide analysis, which includes HIV. Only then - and only if the position of the national governments also has been strengthened - can a more rational resource allocation based on a broader analysis be made and the use of resources optimised.

5.4 HOW TO CONTROL THE HIV EPIDEMIC ?

(Management aspects of paper III and papers IV, V and VI)

Progress in our understanding of the HIV epidemic has been made both in biomedicine and in social sciences. A relatively solid evidence base for policy-making has been established, but this has not been fully reflected in national policies in the most affected countries yet (Lancet, 2001), nor has it led to a breakthrough in outlining interventions. The observations in Tanzania indicate that an international “blueprint” response to the epidemic has driven HIV control activities in sub-Saharan Africa. Policies have been formulated internationally to cover all “developing countries” irrespective of context, determinants of transmission and local resource situations as reported in paper III. The absence of a local definition of the main causes of transmission and how these could be addressed through prevention in each context has led to plans, which are poorly adapted not only to the local opportunities for prevention, but also to the local resource level. The findings displayed in table 8 constitute some of the main obstacles to effective HIV

control and will be discussed one by one in the same order as they appear both in the results and in the table.

5.4.1 The problem definition & the substance of interventions

Policies and the problem definition

The problem definition that is used internationally to direct control activities appears to be the result of an analysis, which to a large extent is derived from the context of HIV in Western high-income countries. Prevention is based on individual behavioural change and individual human rights, whereas social norms give priority to the community over the individual in many communities in sub-Saharan Africa. (Hyden and Lanegran, 1991). The importance of the *local, cultural, social and economic context for sexual behaviour* as pointed out in paper VI, has not been fully recognised in Tanzania. This is in accordance with what has also been pointed out for Zimbabwe (Decosas and Padian, 2002). Prevention will in the most affected population require both a reduction in the size of the sexual networks and a reduction in the likelihood of HIV transmission at each intercourse (fig. 13). To communicate this implies a need to address local socio-cultural and socio-economic determinants with the aim of achieving changes to social norms. Such an approach has not yet been explicitly discussed in Tanzania. With the introduction of ART the focus of interventions has instead shifted from prevention and a problem definition based on local contexts to the care of the sick. Yet, it seems obvious that a highly affected low-income country with a weak health system cannot use the treatment of those already infected as a main strategy to reduce the impact of HIV. There is no evidence base for a strongly treatment-based approach to HIV control in such settings. The balance between the two main aims of HIV/AIDS control, prevention of infection and prolongation of life became distorted when most resources are allocated to care. It seems clear that more life-years are likely to be saved through the prevention of new infections, rather than through the treatment of people who are about to develop AIDS. This is also reflected in cost-effectiveness estimates (Creese et al., 2002; Marseille et al., 2002, Stover et al. 2006). Encouragingly, however, moves to address prevention issues more forcefully have been initiated of late (UNAIDS, 2006; African Union, 2006).

Prevention efforts directed at heterosexual transmission are further hampered by the fact that matters related to sexual activity are not publicly debated in Tanzania. A wealth of knowledge

with regard to the norms of how sexual activity is regulated within different ethnic groups and settings in Tanzania was noted to exist within the leadership of HIV control activities and their consultants. Still, these issues have not been brought to the public level maybe both because the issue at stake concerns sexuality and because they are therefore politically sensitive. Still, some of the issues, such as a levelling out of gender imbalances, are already part of government policies. But also certain biological factors are evidently difficult to tackle. Thus, a number of key determinants for HIV transmission have not as yet been sufficiently addressed in efforts to control the HIV epidemic in Tanzania and most of the rest of sub-Saharan Africa. These include both biomedical and social determinants (fig 13):

- Male circumcision
- Genital ulcer disease, in particular HSV-2
- Social norms out of tune in an era of a major deadly sexually transmitted infection; including norms that maintain gender imbalances:
 - Concurrent partnerships
 - The freedom of male sexual activity
 - Protection and control of the sexual activity of adolescent girls
 - Risky traditional practices

Addressing the social norms demands the involvement of the community in control efforts. This has also not been sufficiently achieved yet.

The substance of interventions

The template plans have not been good at taking locally generated evidence into consideration and where sexual behaviour is concerned they have to a large extent built on internationally formulated stereotypes. Therefore, many driving factors behind the epidemic have not been addressed. HIV/AIDS control activities in Tanzania started in 1985 and were up until 2002 determined by plans formulated with strong support and directives initially from WHO and since 1996 from UNAIDS, but implemented by the Ministry of Health.

Interventions were divided into those aimed at preventing transmission through sexual routes, from mother to child, through blood and skin-piercing instruments and those employed to monitor the epidemic and finally those that aimed at mitigating the effects of the epidemic (see above under 1.3 Interventions and implementers, page 51). It was realised early on that single men in the military, mines and along the trucking routes were particularly exposed and that sex workers as well as other young women were important for the propagation of the epidemic. It also became clear that age asymmetry, widow inheritance and some other traditional practices

were important in most areas. The importance of other STIs for HIV transmission was demonstrated initially through observational studies and later confirmed through a randomized control trial conducted in Mwanza, Tanzania (Grosskurth et al. 1995).

The interventions have partly shifted as there has been an increase in knowledge as regards the different determinants. As new interventions have been introduced internationally, such as STI control, counselling, home-based care and ARV treatment, they have also gradually been introduced in HIV control in Tanzania. Interventions have thus mainly been determined by the general policies of international agencies. Local research findings, even from Tanzania, have with few exceptions, such as the findings of the Mwanza trial on the effect of STI control on HIV transmission, had little influence on the substance of interventions.

Hudson, already in 1996 discussed the importance of concurrent partnerships (Hudson, 1996) on the basis of findings from Uganda (Hudson, 1993) and proposed what could be done to prevent HIV infection. He even called this a “paradigm shift” and suggested already then that efforts should be made to break the sexual networks as even small changes in these might have substantial effects on transmission (Woodhouse et al., 1994). Even though many of these proposals might have been unrealistic in the Tanzanian context, they were based on findings that merited an assessment regarding their importance in each setting.

Similarly, the successful approaches to HIV control in Uganda, characterised by openness, the involvement of religious organisations, community-based and culturally appropriate behavioural change strategies, have only been repeated to some extent in Tanzania. These approaches, it seems, led to the formation of more open social communication networks, which has yielded behavioural change (Stoneburner and Low-Beer, 2004) and might pave the way for future changes.

Incidence has to be reduced in order to control the HIV epidemic. The main aim of control activities has to be the prevention of new infections and a focus on determinants that drive the epidemic in each context as pointed out in paper VI. The review of the literature and the analysis of determinants show that certain determinants are likely to be more important for the propagation of the epidemic than others (fig.13). It is the main determinants outlined in figure 13 that need to be addressed if an evidence-based approach is to be used. Such urgent and feasible

interventions include the reduction of concurrent sexual relations, avoidance of separation of men and women due to socio-economic factors, such as giving the right of military conscripts to marry, and efforts to reduce risky sex with young girls (Laga, 2001), such as the abolishment of early initiation, increase of condom use among young people as well as offering circumcision through the regular health services.

Following such scaled up short-term interventions, long-term goals aiming at social norm change or even “social revolution” (Mandela, Guardian Nov 2001) might have to be defined.

Such an analysis of determinants has to be carried out on the basis of the understanding of the local context and a detailed knowledge of the specific interplay between a number of determinants that carry site specific weights as pointed out by Buve et al. (1995). To my knowledge this has not been done much either in Tanzania or elsewhere in Africa, nor has it been part of the international planning formats.

Thus, as far as I know, there have not been any interventions aimed at a break up of large sexual networks nor to discourage contacts between older men and young women. Still, research also from Tanzania has shown that this is likely to be an important factor for disease transmission (Boerma et al., 2003). Similarly, apart from activities in some privately run larger mines very little action has been taken to address the situation of single men in small mines. In Tanzania new conscripts are not allowed to marry during the first six years of service, which leads to a large number of single men in demand of sexual services. This issue has as far as I have been informed also not been addressed. In addition, the issue of the early initiation of girls in the south of the country has not been tackled. The issue of involving community members by informing them in a detailed way about epidemiological data as suggested in paper III has also not been brought up.

It therefore seems that neither evidence nor local disease determinants are able to influence the choice of interventions in Tanzania in the current aid architecture. It also seems to have been a tendency to passively wait for the international agencies to initiate control activities rather than using the improving national capacities. Sometimes, as has been the case with male circumcision, the people themselves have taken action and preceded the international research community, the donors and the Government. Thus, male circumcision increased already in the

early 1990s in Tanzania (Caldwell and Caldwell, 1996) and has probably increased substantially since then in urban settings, while the international research community has been very careful not to make any hasty conclusions on findings, which to many have seemed clear for a long time (Bongaarts et al. 1989). Furthermore, locally generated epidemiological reports have not been used much either to focus preventive efforts or as a basis for discussion on the importance of ethnically specific rules for sexual behaviour. Such a discussion might have to be initiated if social norms are to be changed.

Such changes we know from the long struggle against female genital mutilation are extremely difficult to introduce and continue to be met with strong resistance. Similarly, a struggle against widow inheritance, the early initiation of girls, child marriages and eventually even polygamy will be very long and difficult. Still it has to be initiated. If, as former President Mandela expressed it, there is a need for a social revolution, it has to be started. Although ARV treatment in itself is important and may indirectly contribute to the struggle it risks becoming a side track, which deviates resources from prevention efforts if given too much prominence. It does not constitute a starting point of the “revolution”. Perhaps the most feasible way to initiate this would be by attempting to change risky traditional practices. Although these may not be very important epidemiologically, altering or abandoning them will show that change is possible.

A biomedical approach would be to try to address biologically important determinants such as the lack of male circumcision and HSV-2 infection. The control of these determinants might be easier to achieve and might have to involve reinforced efforts towards producing an HSV-2 vaccine.

Certainly these two approaches have to be implemented in parallel. They should constitute the central part of HIV control as they both aim at *reducing new HIV infection* without which the epidemic cannot be controlled.

5.4.2 Planning & implementation

The numerous HIV control plans outlined on Tanzania have, according to the findings of paper III, been drawn up in line with international “fashion” and the focus of interventions and funding has fluctuated with it. No penetrative country specific problem analysis on HIV has been carried

out for the different parts of Tanzania, either with regard to the determinants of transmission, or how plans might be implemented in a situation of scarce resources. Plans have therefore not been outlined bearing feasibility and resource limitations in mind. Little or no effort has been made to find a balance between human resources and available financial resources. Plans have tended to be comprehensive and have been directed towards what is seen as donor priorities rather than towards meeting the priority needs of local populations, as also pointed out also for other countries (Alban, 2002). The main objective of planning seems to have been to secure funding. Although it is easy to understand this method of getting urgent activities initiated as regards the initial plans, it is rather more difficult to find reasons why later plans should not be based on an analysis of what is feasible to implement.

The use of planning templates

My findings about the need to move away from templates to realistic country specific plans are based both on experience from the planning and implementation of seven short and medium-term plans in sub-Saharan Africa. I contributed to the implementation of two such plans in Tanzania – both mainland and Zanzibar - and have seen the limitations of using preset formats since these restrict the situation analysis and the components of the plan to what is included in the template.

For the formulation of the MTP-III in Tanzania, the planning process implied that an analysis by a small group of experts was substituted by a participatory approach of a large group of representatives from different sections of society. This is hardly conducive to making a sharp analysis, which is what is needed. Such an analysis would demand that the most knowledgeable individuals are brought together. This was not the case as many of the civil servants, who participated in the MTP-III planning, had little knowledge of HIV.

However, the use of preset planning formats also has certain advantages. The format guarantees that most essential elements are included in the plans and the formats therefore serve as a checklist. But the format itself tends to dominate the process. Issues, which are not part of the format, are never discussed. Since the analysis will emanate from the preconceived ideas brought up in the format, such as the importance of sex work, poverty and sugar daddies for disease transmission, the process itself might lead the plans away from the local realities and a more detailed discussion of what actually drives sexual activity in the local context. For example, as

shown above for the MTP-III in areas where sex work is not of major importance for disease transmission, efforts to control sex work will still appear as a major intervention in the plan. Transactional sex is likely to have been of much greater importance than sex work for HIV transmission in most areas, but it was not targeted in the plan. There is therefore a need to adapt the planning formats to the local situations to render them useful.

Plans without strategic timing

There has also, as discussed in papers III and IV, been a lack of a strategic approach and a failure to clearly define what needs to be done *in the short and long term* (table 8). While it is important for people to obtain relevant information about the disease and the way it is spread quickly, many of the social factors that determine transmission, such as gender imbalance, are linked to general development. These, as other norm changes, can only be effectively addressed in a broader perspective over longer time periods (paper VI). Evidence, such as the importance of concurrent partnerships, early initiation and lack of circumcision, all well-known, could form the basis of more concrete short-term actions, which are likely to be more easily accepted and more feasible than a change of whole norm systems. At the same time, as argued in paper VI, they would serve as an initiator of the more profound and complicated change process, which, after making hard decisions, would eventually lead to permanent changes in gender relationships, other norms and eventually in transmission.

Later plans, such as the National Multi-sectoral Strategic Framework on HIV/AIDS (2003-2007) are also comprehensive and lack strategic choices (TACAIDS, 2003). Plans for neighbouring countries also have the same weaknesses (Somali Aid Co-ordinating Body (SACB), 2003); Uganda AIDS Commission, 2004).

Prioritization of interventions

The need for the prioritisation of interventions and the allocation of scarce human resources for these, (papers III, V and VII) has hardly been part of policy discussions in Tanzania. There has thus been little dialogue on how ambitious plans should be implemented with the use of the existing resources to maximize the effects of control efforts. Governmental systems in many affected low-income countries are inefficient. Already weak before the epidemic, they have been

further crippled by it, and cannot fully take on the task of AIDS prevention unless considerably strengthened. There are therefore strong reasons to focus on how to utilise the existing limited resources effectively, which has also been argued by others (Ainsworth and Teokul, 2000). The failure to do so has led to unrealistic plans, which have often not been financed and which, to a large extent, have not been implemented (TACAIDS, 2003; Alban, 2002). The latest example is the plans for scaling up ART (paper VII).

Current policies do not reflect the need to prioritise. Thus, as discussed in paper III, HIV/AIDS policies for Tanzania at the time of the MTP-III, advocated a multi-sectoral response and action to cover all the districts of the country (Ministry of Health, 1996). This approach means spreading scarce resources thin and risks being ineffective since the few available qualified staff will have to be employed to assist in the planning and co-ordination at central and district level with even fewer left to supervise, monitor and strengthen implementation on the periphery. Furthermore, donor policies for the health sector currently favour a sector-wide approach with general budget support as well as a reduction of administrative and technical staff. This leaves little room for specifically directed categorical inputs through project support. This has led to a shortage of funding and support for small community-based projects, which are likely to be crucial for AIDS control in Africa. Moreover, the multi-sector approach to AIDS control may lead to delayed activities in key sectors like health and education. Broad, internationally formulated, often poorly adapted policies, thus dominate while operational aspects have been pushed aside (Hanson, 2003).

In paper VI I further argue in favour of the prioritisation of cost-effective interventions directed towards local factors that fuel the epidemic. The introduction of the public provision of ARV treatment in low-income countries has introduced new criteria for priority setting. The cost-effectiveness and poverty criteria have been exchanged for criteria related to human rights and the distribution of resources between low and high-income countries rather than within low-income countries like Tanzania.

Even at a price of 30 USD/month Marseille et al. estimated ART intervention to be 28 times less cost-effective than a selected prevention programme consisting of PMTCT, female condoms for sex workers, STI control both for sex workers and the general public, VCT and safe blood supplies (Marseille et al., 2002).

The approach of basing discussions on ART on cost-effectiveness estimates has been severely criticised by UNAIDS that claim that costs are not the limiting factor anyway, instead implementation capacity is. “Prevention and care involve different constituencies” and investing in both simultaneously would have synergistic effects, they argue. ART would also reduce costs for averted palliative and opportunistic care and would also have “substantial positive effects on national development”. They also rightly argue that Marseille et al. offer a “static perspective” (Piot et al., 2002), but the rest of the argument against the use of cost-effectiveness as a measure, is difficult to understand as costs for these mentioned effects could also be assessed and included in the cost-effectiveness estimates. If the ambition is to use resources effectively within a country cost-effectiveness analysis undoubtedly still has a role to play.

It is therefore not possible to comprehend the strong focus on ART of WHO/UNAIDS from a resource allocation perspective, it should instead be seen from a political or human rights perspective in order to be understood. However, maybe as WHO/UNAIDS became fully aware of the difficulties in reaching the unrealistic targets of the “3 by 5” initiative (see paper VII), the goal of universal access to ARV has now shifted to the similarly ambitious, but better balanced goal of universal access to both prevention and care (UNAIDS and WHO, 2005).

Effectiveness of interventions

Governments have also had objective reasons to hesitate. As argued in paper VI many proposed interventions have had little or no proven effect. This could partly be due to the poor adaptation of intervention models to local circumstances, but to a large extent the efficacy of many interventions remains unclear. For example the effectiveness of STI control seems to vary with the context. Although the association between HIV virus shedding and STIs has been clearly demonstrated and the limiting effect on HIV transmission of treatment of symptomatic STI patients, through a so-called syndromic approach, has been shown in a randomised control trial in Mwanza, Tanzania (Grosskurth et al., 1995), other studies covering the same subject in the Rakai and Masaki districts in Uganda, albeit in different epidemiological situations, have not been able to confirm these findings (Wawer et al., 1999). And even if STI control is shown to have an effect in a study area this is likely be diluted in a scaled up STI programme (Buve 2001 d).

Another important intervention, the prevention of mother-to-child transmission, is having to struggle with a low uptake in Tanzania because it in practice demands the disclosure of test results at home and delivery in a health institution (Mbezi et al., 2004), conditions which many women are reluctant to accept. As long as it is not combined with the lifelong treatment of the parents, it will lead to more orphaned children, entailing a high risk of the child dying prematurely. The effectiveness of a number of behavioural interventions, such as the effect of VCT on risk behaviour (Dennison et al., 2006); of ART on sexual behaviour (O'Reilly et al., 2006) and abstinence-only programmes (Kennedy et al., 2006) has recently been analysed at John Hopkins School of Public Health and reported at the last International HIV Conference in Toronto in 2006. No or very small effects of these interventions have been demonstrated in meta-analyses. One reason for the lack of significant results has been due to poor study design, but even well designed studies have not been able to demonstrate any major effects (Mini satellite meeting, AIDS Conference, Toronto, 2006).

Despite the lack of solid evidence, different models for how control activities should be implemented have been introduced mainly by UNAIDS (UNAIDS, 1998). These are based on the assumption that certain interventions are more important for HIV control than others. These models or so-called "Best Practices" include the idea of the importance of strong national leadership, the need for a continuum of care and support as well as the idea of the effectiveness of a combination of control of tuberculosis and STI/AIDS with voluntary testing as an entry point to prevention and control (UNAIDS, 2002). It also includes ideas of women as victims, the "sugar daddy" concept and the idea of sex work caused by poverty. Based on such ideas, many of which are at best supported by conflicting evidence, but in many contexts seem plausible, various intervention packages have been worked out.

Operationalisation of plans and scaling up of interventions

To address the operational scaling up problems, I have argued in papers III and VI that interventions should initially be limited to a few key sectors. Furthermore, according to experience of STI control, the use of experienced well-established NGOs to strengthen the capacity of the regional authorities has been effective (Meheus and Aral, 1999).

Only few interventions were previously brought to scale (table 9). One main reason for the lack of scaled up of activities has certainly been the lack of resources (fig. 11). In Tanzania, apart from salaries, the Government allocated almost no money to AIDS during the whole of the 1990s. The support from the donors was also very limited during this period (fig.11).

Service coverage for most HIV control interventions has been low in relation to the needs in most low-income sub-Saharan countries, including Tanzania, but has improved of late. In a survey of all sub-Saharan countries, Tanzania was considered to have a programme of medium strength second only to that of Uganda and Senegal (Kumaranayake and Watts, 2001). In medium-strength countries, interventions were, in the year 2000, estimated to have an average coverage as shown in table 9.

Since then the scaling up of HIV interventions has progressed in Tanzania and coverage has been much improved recently. STI control covers all regions, but faces problems with regard to both the quality of care and to the limited coverage of supervision (Nyang'anyui, 2002; Temba, 2004).

Table 9. Estimated coverage of selected HIV/AIDS prevention interventions in 15 sub-Saharan countries, including Tanzania, in 2000

Intervention	Coverage
Youth in school reach by prevention activities	30 %
Youth out of school reached by prevention activities	10 %
Patients with symptomatic STI treated at clinics	15 %
Proportion of labour force with access to prevention activities	10 %
Proportion of blood tested in rural settings	90 %
Proportion of urban adults with access to VCT	1 %
Proportion of urban antenatal women offered PMTCT	0.5 %

Source: Kumaranayake and Watts, 2001

At the end of 2005 home-based care activities with modest coverage were implemented in 61 out of 121 districts in Tanzania and 22,000 patients were reached. VCT uptake has increased in the last few years after the introduction of ART and now covers a large proportion of those in need (fig.10). Around 1800 counsellors had been trained by the end of 2005 (TACAIDS, 2006). This should make it possible to further scale up VCT. However, a too rapid scale up might also lead to increased competition for scarce human resources.

Although little research has been conducted on this subject and no figures are available on costs, (Johns et al., 2005) it has been reported that the scaling up of complex interventions in a low-resource setting has met with great difficulties. Experience is that it does not succeed if centralised, but demands a participatory approach and close co-operation with those primarily affected (Binswanger, 2000). Most scaling up of HIV control efforts has not been carried out in that way and may therefore also suffer from a loss of effectiveness.

Reduction in the size of structures

Scaling up is also hampered by the shortage of qualified staff. As discussed above there is therefore a strong need to prioritise interventions and focus on what is likely to have the greatest effect. This would also make it possible to reduce the size of structures. Still such a reduction does not yet seem to have been contemplated.

Instead in the MAP-project the Tanzania AIDS Commission now also aims at involving all available civil society organizations (CSOs). This means a scrutiny of hundreds of small project proposals mostly of very low quality from organizations with little or no experience of HIV control and is one of the reasons why mitigation projects focused on orphan care dominate and prevention projects aimed at opening up discussions in the community are almost non-existent. A more effective alternative would be to focus on a limited number of experienced NGOs per province and hand over the mitigation and food security projects to the departments they rightly belong to: social welfare and animal husbandry. Then the NGO activities could also be monitored. A shift from quantity to quality; from what is popular and easily acceptable to what is more rational.

5.4.3 Human & financial resources

The human resource issue is mainly addressed in paper V where I argued for the need for plans with monetary inputs in balance with human resource capacity, and stated, the now widely held view, that the main problem is not money but the shortage of health staff. The demand for

additional staff for HIV control risks diverting health workers away from other priority diseases and more cost-effective interventions as also discussed in paper VII.

The sudden allocation of large sums of money to an under-funded health system, with a distorting remuneration system, may aggravate imbalances. Major donor-recipient co-operation efforts have been made for several years to improve the effectiveness of these systems through broad health sector reforms (Cassels, 1995) as discussed above. But reforms have only included HIV control activities to a limited extent. The efforts directed at the health system as a whole now risk being hampered when additional large sums of HIV/AIDS money (for Tanzania as large as the rest of the health budget (Forster et al, 2005)) are allocated to these weak systems. “Such large sums will have serious consequences for the painstakingly achieved progress of reforms and risk to further increase the imbalance of the systems”. Certainly money is welcomed, “but preferably in reasonable portions at measured pace and combined with an increase in qualified manpower to handle it”, as pointed out in paper V.

5.4.4 Major obstacles to HIV control at community level

In paper III I address the failure to involve the community. Serious attempts must be made to do so even though the task may seem overwhelming. There is little awareness of the risk of contracting HIV. This limited sense of risk has also been demonstrated in the above mentioned study in South Africa (Shisana, 2005). The members of the community should have the right to be informed about the disease and encouraged to change social norms that lead to risky sexual behaviour. Initiatives to start a discussion in the community on sexual behaviour patterns and related subjects should be taken. As indicated in fig. 9 the community certainly has a capacity for change. A small project among the Masai has shown that it is possible to open up for lively discussions on how to change the rules that govern social life, but this demands qualified staff with a deep understanding of the culture and the local situation (OleMoono and Hanson, 2002). Experience from Kagera and Uganda also shows that it is possible to open up a discussion in the community (Lugalla et al., 2004). This has been linked to behavioural change and a reduction in HIV prevalence in Uganda and Zimbabwe (Stoneburner and Low-beer, 2004; Gregson et al., 2006; Hayes and Weiss, 2006).

The opening up of discussions on sexual matters is in itself a major challenge. The discussions need to be brought down from a general level to one which is linked to the realities of everyday life in the local context. The challenge here is for the administration to bring up the sensitive issues related to sexual behaviour; to move from official, general and relatively superficial plans to dealing with concrete issues at the local level. This can partly be done by using methods such as the “community mapping” approach developed in the Mwanza region (TANESA, 1996). This method employs the identification of situations of exposure to risky sex as a starting point for discussions in the community. The current community involvement process, which is led by the district councils and planned to be implemented at the ward level, is part of the Tanzania Multi-sectoral AIDS Project (MAP), and has just been initiated. It is not clear to what extent it will succeed in addressing the problems in the local contexts. There is a great risk that the public system will continue avoiding the sensitive issues surrounding sexual behaviour and instead focus on the much less controversial aspects of HIV control such as the mitigation of suffering e.g. chicken keeping to help support the HIV infected, and clothes and school uniforms for orphans. Although important in their own right these interventions have more to do with the social services than HIV control and will not contribute to a reduction of HIV incidence. Maybe a more direct approach by locally identifiable and culturally competent individuals would be more effective. Or perhaps other spontaneous and less formal processes will prove to have a greater impact.

There are also other obstacles preventing control activities from having the desired effects. Caldwell et al. argue that African governments have done little to address the epidemic both because the public has not demanded action and because the governments have been uncertain of what to do. They might also have feared that the introduction of interventions that threaten the existing order would put them up “against the young and middle-aged men they fear the most” (Caldwell, 1999). The top leadership has avoided including the issue on the political agenda, giving local politicians few directives to act upon. Some of the interventions, such as condom use, have also met with resistance from religious leaders as discussed in paper III.

In conclusion, the management related issues could be characterised in the following way. The main objective of planning has been to assure funding. Planning has been governed by internationally formulated blueprints. This has led to the formulation of ambitious general and relatively superficial plans, which do not take the limited resources into account. Many key

determinants have not been addressed in these plans. In order to address these issues, realistic strongly prioritised country specific plans should be outlined, which consider local contexts and resource limitations, and which target locally important determinants. This has to be done in a culturally acceptable way and attempts have to be made to initiate a discussion on specific sexual matters out in the community. Initially activities might better be carried out in a smaller structure and focus on the key sectors of health, education, defence and local government.

5.5 THE ROLE OF ANTIRETROVIRAL THERAPY IN HIV CONTROL

(paper VII)

Paper VII is based on a formula for output of ART. In the paper we had to make a number of assumptions about the factors we used for estimating ART provision as there is little or no data available on these factors. They included the loss of patients during the first year as well as the following years and estimates of the number of first and after-first-year patients a clinician will treat on average. The values we used may later prove to be either too high or too low. We have tried to get around this by making a scenario analysis based on different assumptions about the formula factors. Still it is only possible to make a limited number of scenarios. The accuracy of the conclusions will depend on the accuracy of the assumptions made.

There is therefore a high level of uncertainty in our estimates. So far predictions in our most likely scenario have been well in line with reported actual service output (NACP, 2005) (fig.1 paper VII). This is far below the planned results. We also found that current plans are unrealistic and that it will only be possible to treat a portion of those in need of treatment. This proportion can only be increased if the number of new infections is considerably reduced. At a feasible level of coverage this will only reduce the viral load in such a small proportion of those infected that it will hardly have any impact at all on overall HIV transmission. We therefore suggested that prevention leading to a decrease in incidence is the only way forward. ART has to a large extent to be seen as part of a prevention effort and planned accordingly. We therefore concluded:

Firstly, the scenario analysis indicated that both the CTP and international targets are unrealistic. There is an urgent need for realistic evidence-based plans that can reduce the gap between

international funding and what it is feasible for the country to spend. The CTP is not adapted to the human resource capacity of Tanzania. Patient losses and mortality are not included in the plan. The planned recruitment ratios and life-years saved are therefore unlikely to be achieved.

Secondly, the human resource problem is at the centre of both HIV/AIDS and other development issues and if it is not tackled other problems will also remain unsolved. A struggle over limited human resources is emerging between ART implementation and other health care activities. Tanzania's severe human resource crisis will only be understood, analysed and addressed if the actual situation is described in detail.

Thirdly, from the programme perspective an explicit choice should ideally be made between a small well-controlled programme and a larger less-controlled one with a higher coverage at the cost of quality. Factors such as the risk of drug resistance favour an initially small incrementally developing programme. The fact that HAART constitutes life-long treatment means that the future task of treating HIV infected individuals over very long time periods is enormous, and this combined with the human resource shortage, currently hardly leaves any other feasible option open.

Fourthly, ART will potentially have a significant impact on the dynamics of the epidemic. There is a great deal of evidence that points at the importance of retaining *a programme focus on prevention and social norm change* and also regarding ART as a contributor to this by reducing the stigma and opening up discussions. It is only when preventive efforts have reduced incidence that a reasonably high coverage level can be achieved. These conclusions have also been supported by other researchers. Van Damme and Laga suggest that plans for ART should be reviewed and new systems built to "support chronic care for millions" and plans outlined "for large scale HIV prevention efforts" (Van Damme et al., 2006).

6. CONCLUSIONS

The epidemic, it seems, is a result of a complex interplay between biological, socio-cultural, socio-economic and political factors. No single factor has been identified that can fully explain the different epidemiological patterns either across the African continent or in Tanzania. There is, however, increasing evidence that a combination of a few factors, both biomedical and social, might explain most of the variation in HIV occurrence. The main biomedical factors include increased transmission due to genital ulcer disease, in particular herpes simplex-2 infection and the lack of male circumcision. The main underlying socio-cultural factors, it seems, includes pro-natal values, the gender imbalance, concurrent partnerships and the sexual freedom of males. Socio-economic factors include urbanisation, sex work and men and women living separately due to economic activities such as mining, the military and seasonal jobs. There are several feasible interventions to tackle these determinants, but many of them have not yet been addressed.

Efforts to control HIV in sub-Saharan Africa have met with considerable difficulties. Although indications are that the epidemic is leveling off in most parts of the continent, including Tanzania, the prevalence and incidence levels are still high in many places. Little or no behavioural change has been reported in most parts of Tanzania in spite of 20 years of HIV control activities. Condom use remains low. Reasons for this could be that the disease determinants are poorly defined and therefore not properly addressed or that the task of changing old life patterns is difficult and demands long-term interventions to succeed. It is certainly also linked to the large gap in the understanding of reality, between the population groups who are most affected by the epidemic, and these staff in international agencies who to a large extent direct control efforts.

Another reason could be that control activities have not been efficiently implemented. A health sector reform to reinforce the system has been ongoing since the mid 1990s. This reform has not directly addressed the main problem of the sector – the shortage of resources. Both the reform and HIV control have to a large extent been governed from the outside on the basis of general ideas, which do not consider the specific situation in Tanzania. Many of the specific Tanzanian problems have therefore not yet been addressed. This has reduced effectiveness.

The HIV problem – the disease determinants

Little or no effort has been made to explain the differences in prevalence between the different regions and ethnic groups in Tanzania. Since sexuality is not openly discussed in public the determinants of the variation has not been brought up. The importance of concurrent partnerships in large sexual networks as an explanation for the uneven distribution of the disease has not yet been researched in Tanzania, but there is solid knowledge about the existence of this pattern of sexual contacts both at the community level and among programme managers at the national level. There are strong reasons to identify the determinants of HIV transmission in Tanzania more explicitly. The focus of interventions must be on prevention. It is crucial that an open discussion is initiated at the local and national level about how to change the perceptions that govern sexual behaviour.

Policies

There is a huge gap between national policies and the local realities. Policies are often strongly influenced by international politics. Both government and donor policies have to be better adapted to the realities and the resources available at national and local levels. These must guide policies and implementation, and therefore be subject to a more thorough analysis. The health sector reform has to address the resource problem more forcefully. The government must be assured of long-term financing to become more independent. It must subsequently take more responsibility for control efforts while donors should have more of a monitoring and evaluating role.

Plans and the substance of interventions

The current large gap between policies and reality leads to the formulation of unrealistic plans. These are still comprehensive in nature since the main purpose is to attract funding. Feasibility is not seriously considered. The lack of a clear and specific definition of transmission factors of HIV has made it impossible to outline effective plans. These have mainly been templates of internationally outlined plans and therefore not considered the specificities of the Tanzanian situation. It is necessary to move away from these to country specific plans. These have to be based on existing local evidence. The main objective of planning must shift from assuring financial resources to maximising the use of scarce resources.

It seems that interventions directed at the community and that are aimed at behavioural change have had a strong impact on the epidemic in Uganda. There are good reasons to intensify current efforts encouraging the involvement of the community, both qualitatively and quantitatively, also in Tanzania. These should aim at social norm change, at feasible limitations to male sexual freedom and be culturally adapted to the different ethnic groups and social contexts. It is known from the struggle against female genital mutilation that achieving these changes will be difficult and will demand long-term sustained efforts. These have to be led by people with a deep understanding of and influence of the local context.

Operationalisation

Since plans are not adapted to the local resource level, they cannot in practice function as an instrument that directs implementation. Many of the previous ambitious plans have never been implemented. Realistic plans must be outlined. The human resource problem must be addressed. The first measure might be to attempt to use existing staff more effectively through a further reform of the remuneration system.

There is a risk that the multi-sectoral approach could lead to resources being spread too thinly. An initial focus on key sectors, such as health, local government, education and defence, is likely to be a more effective option. The use of experienced NGOs to strengthen the regional level and support implementation at district level and below, which is now actually practised through the Tanzania Multi-sectoral AIDS Control Project (T-MAP), is commendable and should be expanded to also include the health sector. There is a need to subject the health sector and STD/AIDS control to a joint analysis, which focuses on the human resource issue. The short-term need to address the AIDS problem through effective systems, implying strong vertical components in a resource poor setting, stand against the long-term interest of the gradual reinforcement of the entire health system through integration and the establishment of functional horizontal operational systems. The solution might be to do both at the same time – both to strengthen the system and support important interventions through projects.

Prioritised interventions

There is a need to prioritise instead of spreading resources too thin. Addressing determinants that fuel the epidemic and maintain sexual networks as well as factors that increase the probability of transmission must be short-term priorities. These should also include major programmes for male circumcision and a study on the feasibility of control of HSV-2 in the Tanzanian context.

Synergistic effects through a combination of interventions

Major interventions like STI control and ART are in themselves not likely to have any major direct impact on the epidemic in Tanzania. The scaling up of interventions is likely to lead to problems of the maintenance of quality and considerable loss of effectiveness because of the weakness of the system. Community effectiveness of STI control is likely to be low. ART is likely to have little impact on the incidence of HIV. However, both these interventions, if reinforced, can still contribute to HIV control mainly through making prevention more effective. There is a need to review the current focus on care in control efforts and there are strong reasons to shift focus to prevention. The focus of interventions has to be on sexual behavioural patterns including concurrent partnerships and the main determinants of transmission, including circumcision status and genital ulcer disease. Bearing the low infectivity of the virus in mind, a combination of prevention interventions, including prioritised and context specific interventions aimed at changing behaviour and social norms as well as STI control and ART, if scaled up, is likely to have a decisive effect on the epidemic. However, social norm change is also likely to meet with great resistance and will demand an effort that is maintained over a very long time.

In order to ensure that there is no doubt where the focus of HIV control must be, maybe it is time to shift from the current two-objective approach: the prevention of new infections and prolongation of life of those infected and who are about to develop AIDS, to a strategy with one single main objective and also see the current life prolongation objective as an indirect contribution to this:

PREVENTION OF NEW HIV INFECTIONS

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