Republic of Zambia

Zambia National
HIV/AIDS/STI/TB Council

ZAMBIA

HIV Prevention Response and Modes of Transmission Analysis

June 2009

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HIV PREVENTION RESPONSE AND MODES OF TRANSMISSION ANALYSIS

Final Report
June 2009

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Executive Summary

The purpose of this HIV epidemic, response and policy synthesis is to provide information to help improve the HIV response. In the synthesis, data on the HIV epidemic and prevention response in Zambia are drawn together, triangulated and reconciled to:

a) "Know your epidemic" (KYE) – describe and understand the epidemiological situation

b) "Know your response" (KYR) – describe and understand the HIV prevention response

c) Link the KYE data and KYR data to understand the scope and relevance of HIV prevention policies and programmes, the alignment of prevention programme resources to strategic prevention priorities, and gaps in strategic information

d) Recommend improvements in HIV prevention policies, programmatic action, and resource allocation to ensure greater success in prevention, and fewer new HIV infections in Zambia.

This epidemic, response and policy synthesis is part of a regional effort led by the UNAIDS Regional Support Team for East and Southern Africa, in partnership with the World Bank Global HIV/AIDS Program's Global AIDS Monitoring and Evaluation Team (GAMET), UNFPA and others, to support better HIV prevention efforts in Eastern and Southern Africa. Similar syntheses with UNAIDS/World Bank support were concomitantly carried out in Kenya, Lesotho, Mozambique, Swaziland and Uganda.

The Zambian National HIV/AIDS/STI/TB Council and the Government of the Republic of Zambia coordinated the synthesis, in partnership with the UNAIDS Country office. The core team of the study included NAC, University of Zambia, Central Statistics Office, Department of Community Medicine/UTH, the Joint UN Team on AIDS, US Government/CDC Zambia, and the World Bank. Technical assistance was provided by the UNAIDS RST-ESA, UNAIDS Geneva, and GAMET/World Bank.

The first phase of the analysis consisted of an initial review of existing surveillance and research data, production of an annotated bibliography, and application of the HIV Incidence Model. The second phase integrated further evidence and produced the epidemic, response and policy synthesis report.

Main findings

Despite some significant decreases in some populations and in some geographic areas, Zambia's HIV epidemic has stabilised at high levels – it has proven to be tenacious. Overall adult prevalence is 14%, and 1.6% of the adult population becomes newly infected each year – approximately 82,681 people in 2009. More effective prevention is imperative (building on successes already achieved), and essential for achieving and sustaining high rates of access to ARV treatment. Of the next 100 new HIV infections, 71 are estimated to arise through sex with non-regular partners, including being or having one, or having a partner who has one or more other sexual partners. A substantial percentage (21%) of new infections occur in people who report that they have only one sexual partner. This signals significant HIV risk even for those who are faithful, given large numbers of couples in which one person is HIV-positive. Low levels of male circumcision in most of the country, still inadequate condom use, and a range of social norms increase risk and help drive Zambia's varied epidemic.

Zambia is seeing the benefits of rapid scaling-up of PMTCT and access to ART, safe blood supply, and behaviour change communication that appears to be showing results in some groups (notably more educated men and women in urban areas, and young women attending antenatal care). But much more effective efforts are needed with regards to multiple and concurrent partners, transactional and inter-generational sex, and discordant couples in order to reduce incidence. Zambia's very rapid scale up of ARV treatment is also an opportunity for concerted "prevention with positives". Rapid rolling-out of male circumcision (with careful counselling and information) to act on Zambia's stated commitment is a priority.

"Know Your Epidemic" summary

Prevalence levels and trends, AIDS-related mortality

Measured HIV prevalence data are available from the 2007 DHS (14.3%, adults aged 15-49 years) and the 2006-07 ANCSS (16.6% mean prevalence at 21 sites, ANC clients aged 15-39 years). According to Spectrum estimates, adult HIV prevalence peaked in the mid-1990s at about 16% and has stayed above 14% ever since. Estimated HIV prevalence in children aged 0-14 years is trending down after reaching a maximum in about 2004.

HIV prevalence levels in ANC clients have recently started to decline. Between the 2004 and 2006-07 ANC surveillance surveys, 15 ANC sites (71%) showed a decrease in HIV prevalence and 6 ANC sites (29%) showed an increase. The largest decreases in HIV prevalence were observed among pregnant women aged 15-19 and 20-24 years. In both groups, the decreases between the ANCSS 1994 and 2006-07, and the decreases between ANCSS 2004 and 2006-07, were statistically significant.

The peak number of annual AIDS-related deaths among adults was in 2003 (66,272 deaths). In recent years, AIDS-related mortality has dropped with increasing access to ART (219,576 adults and children with advanced HIV infection were receiving ART by end 2008). Estimated AIDS-related mortality in children under 14 years peaked in 2003 (14,681 deaths) and has decreased to about half (7,282 deaths estimated for 2009). This decline is a combination of lower fertility, the PMTCT programme and paediatric ART.

Patterns of heterogeneity in HIV prevalence

Gender: HIV prevalence in women aged 15-49 is significantly higher than in men aged 15-49 (16.1% vs. 12.3%). Above 40 years of age, HIV prevalence in women is significantly lower than in men. The female-to-male prevalence ratio for young people aged 15–24 dropped from 3.7 in 2001-02 to 1.6 in 2007 (fewer new infections in young women, more in young men).

Geographical: Provincial prevalence levels range from 7% to 21% (2007). The Northern and Northwestern Provinces have the lowest HIV prevalence levels (<7%), whereas Lusaka, Central and Copperbelt Provinces have HIV prevalence levels of 17% or above. A woman living in Lusaka Province is on average almost three times more likely to be HIV positive than a woman in Northern Province. Prevalence is much higher among residents of urban than rural areas (19.7% vs. 10.3%), and within urban areas, significantly higher in women than men. ANCSS site-specific prevalence levels vary by a factor of 10 between 3.1% in Kasaba/Luapula and 31.2% in Matero/Lusaka. The estimated proportion provinces have of the total number of people living with HIV (PLHIV) in Zambia varies between 3% (Northwestern) and 20% (Lusaka). Comparisons between HIV prevalence levels in 2001-02 and 2007 show that the epidemic is contracting significantly in urban areas, particularly in urban men. Rural HIV prevalence is stable.

Trend analysis of ANC prevalence levels measured in 21 sites over the last 12 years suggests that Zambia has two distinct epidemics: In the 11 urban sites, the long-term maternal prevalence levels are in the 20-30% band, whereas in the 9 rural sites, prevalence levels are in the 5-15% band. Kapiri Moshi, classified as 'semi-rural', has prevalence levels between the rural and the urban prevalence bands.

Significantly higher HIV prevalence was also found in: women often spending the night away from home compared to women staying at home; men and women with higher education compared to those with no or little school education; urban couples compared to rural couples; and couples with large age gaps compared to couples with partners of similar ages.

Estimation of annual HIV incidence and incidence rates

Total number of new HIV infections

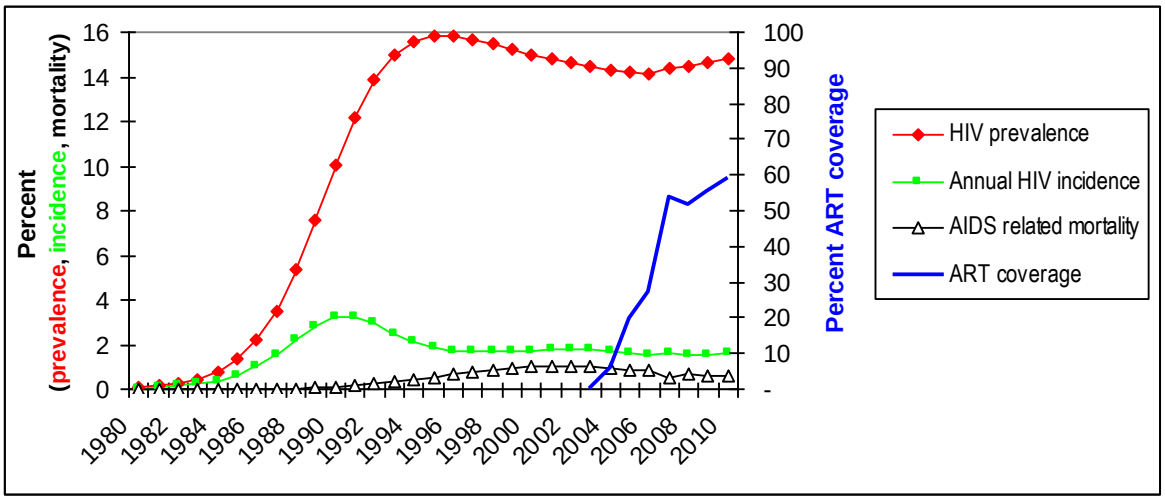
HIV prevalence trends in young women as a proxy for incidence trends: In ANC clients aged 15-19 years, HIV prevalence was 13.9% in 1994 and 8.5% in 2006-07, a statistically significant change suggesting that HIV incidence may be falling. In women aged 15-19 sampled in the DHS (sexually active or not), the change between 2001-02 and 2007 was 0.9% (from 6.6% to 5.7%, not statistically significant).

Estimates of trends in HIV incidence rates: HIV incidence in adults aged 15-49 years has halved since 1990 and is estimated to be at a stable level at 1.6% in 2009 (2% in women, 1.2% in men). In 2009, an estimated 82,681 adults will be newly infected with HIV (59% women, 41% men), which translated into 226 new adult infections per day. Although HIV incidence has stabilised, the absolute number of new HIV infections increases due to Zambia's expanding population. This emphasises the urgent need to reduce the adult HIV incidence rate below the current level of 1.6%. In children aged 0-14 years, the number of new infections has gone down dramatically since its peak level of 21,189 in 1996. This is a combined effect of decreasing incidence in women and the introduction of the PMTCT programme. The estimated number of new infections in children in 2009 is 9,196, translating into 25 new infections per day.

HIV Incidence Model -- incidence in different exposure groups: The model estimated for 2008 that the largest contribution to total HIV incidence came from individuals whose partners have casual heterosexual sex (37% of total incidence), followed by individuals reporting casual heterosexual sex (34%), those reporting low risk heterosexual sex i.e. mutual monogamy (21%), and clients of female sex workers (4%). One percent of new infections are estimated to occur in MSM through unprotected anal sex. The application of this model highlighted the need for excellent current, nationally representative biological and behavioural data to successfully estimate incidence in different exposure groups.

Modelled HIV prevalence and the main factors influencing it - HIV incidence, AIDS-related mortality and ART – are shown in figure 1.

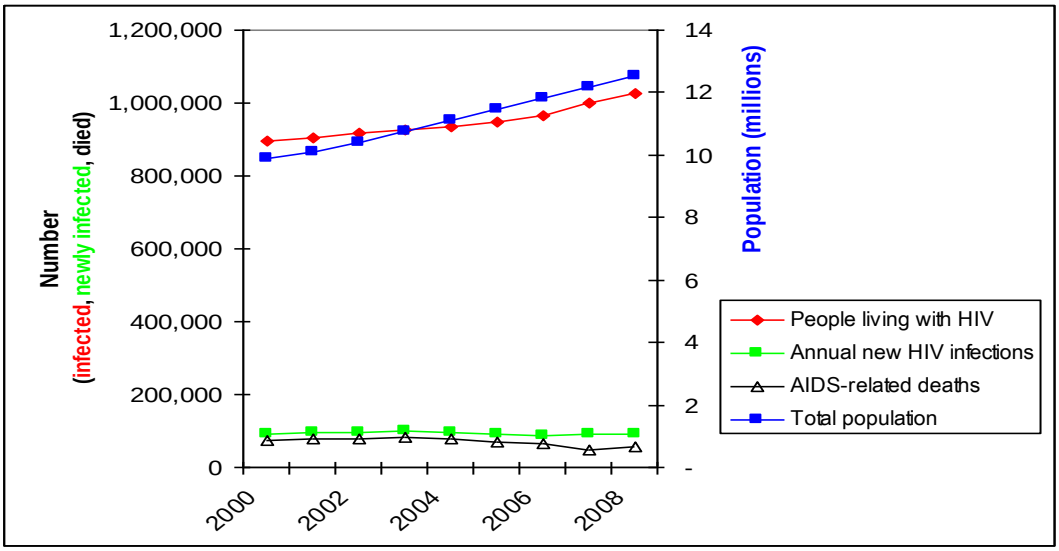
Figure 1: Modelled interplay between HIV prevalence, incidence, mortality and ART coverage in adults aged 15-49 years in Zambia (1980-2010)



Sources: CSO (2008) - 2008 HIV/AIDS projections report, tables 3.1 and 4.2

Absolute numbers of PLHIV, annual new HIV infections, AIDS-related deaths and Zambia's population are shown in figure 2. The figure suggests that absolute numbers of PLHIV increase at a fast rate and almost in parallel with the expanding population.

Figure 2: Modelled absolute numbers of PLHIV, annual new infections, AIDS-related deaths and total population size, adults aged 15-49 years in Zambia (2000-2008)



Sources: CSO (2008) - 2008 HIV/AIDS projections report, tables 3.2 and 3.3.; CSO website for estimated mid-year populations

Factors at the individual and couple level that impact on the risk of sexual transmission

Over the period 1992 to 2007, **important positive changes have been observed in several behavioural indicators of adults and youth in Zambia**. Fewer survey respondents report multiple partners and/or non-cohabiting partners and more report just one (usually married or cohabiting) partner. Condom users have increased as a proportion of the whole population, especially among those married or reporting just one partner in the last year. There are signs that more young people delay **sexual debut** and remain sexually abstinent for longer.

The indicators of sexual behaviour analysed in this report (sex with multiple partners, or paid sex) may be affected by reporting bias, as shown for "age at first sex" in this report.

Regarding **multiple and/or concurrent partners** (MCP), in all surveys, far more men than women report MCPs (14% vs. 1.2%, 2007 DHS). The mean number of reported partners has declined to 0.94 (men) and 0.76 (women) in 2007. The percent of men and women reporting extramarital sex has also decreased (men: 13%, women: 0.7% in 2007). However, data from qualitative assessments on MCP behaviours strongly suggest that MCP and extramarital affairs are underreported in surveys, especially by women. There was a strong positive association between the number of reported sexual partners and HIV infection. The analysis identified many economic, cultural, social and psychological factors leading to or encouraging MCP behaviours.

Reported condom use has increased with all types of partners for both sexes between 1996 and 2007, and was higher with pre-marital, non-regular and commercial sex partners than with marital or regular partners. Reported condom use in people who have MCPs is relatively low at 33% for women and 27% for men. Dry sex practices are not conducive to condom use. Condoms play an increasing but still small role in contraception. Knowledge on sexual transmission increases condom use for HIV protection in contexts where childbearing is not expected (e.g. extramarital affairs). Regular earning by a woman is significantly associated with condom use, but more education is not.

Male circumcision is low in Zambia (13%, 2007 DHS). Reported MC is highest in Northwestern Province (71%), followed by Western Province (40%), and it is low in all other provinces (14% or less). HIV prevalence in circumcised men is slightly lower than in uncircumcised men (10.8% vs. 12.5%). A study in Ndola also found lower HIV prevalence in circumcised men compared to those not, but the study was too small to detect a significant difference. There is conclusive evidence from three trials and ecological studies

that MC is effective in reducing HIV transmission. Acceptance of medical MC is high, both in traditionally circumcising and non-circumcision areas of Zambia, although there are barriers, information gaps and fears about MC, particularly in non-circumcising communities.

Comprehensive **AIDS knowledge** is highest in women and men with the highest school education, but HIV prevalence is also highest in these groups.

Factors at the community level impacting the risk of heterosexual transmission of HIV

Amongst the **cultural practices** that are considered to increase HIV risk are: sexual cleansing, widow inheritance, dry sex, traditional male circumcision, premarital unprotected sex to prove fertility of young girls, wife sharing with kin as a sign of welcome, traditional treatment of infertility by a healer (sex with the woman client), unprotected sex with minors as traditional treatment for HIV and to become prosperous, as well as separate accommodation for pubescent girls (rendering these children vulnerable to sexual abuse).

Intergenerational sex was reported by 4.5% of women aged 15-19 years (with a non-marital, non-cohabiting man who was more than 10 years her senior). The highest level was found in the Copperbelt Province (10.9%).

Qualitative research and surveys indicate that **transactional sex --** the exchange of favours of money for sex – is common, and relative wealth is a strong inducement to start a relationship with a person. In 2005, 22% of males and 11% of females reported that money was exchanged at last sex with a non-regular partner (SBS data). In another study, 9% of the 10-19 year old youth reported having traded sex for food or money, and the figure was higher among married youth.

Commercial sex and sex houses are illegal, and it proved difficult to find statistics on sex work or the population size of sex workers. Zambian men reporting paid sex tend to have higher HIV prevalence.

Sexual violence against females is a problem in Zambia. Most females know the perpetrators of the act of violence. Also, domestic violence at the hands of their husbands and intimate partners, and the fear of such violence, had a direct, harmful impact on their ability to start and continue using ART.

There is a body of local evidence showing that **alcohol abuse** leads to increased sexual risk taking, including MCP behaviours and lower condom use.

Factors at the structural level influencing the risk of heterosexual transmission of HIV

Migration and mobility: Living conditions of seasonal and temporary workers provide contexts of risk. Irregular migrants lack protection and are exposed to a multitude of dangers. There is evidence of a link between mobility and HIV prevalence, and.high risk behaviours have been documented in long distance truck drivers and others who spend many nights away from home.

Gender based discrimination and inequality: Gender discrimination has many effects ranging from denying women access to resources to denying them the right to individual identity. There is a certain level of tolerance or acceptance of gender-based discrimination and inequality in Zambia. School education and women's cash income reduces gender-discriminatory attitudes. In 2008, Zambia placed 106 of 130 countries in the global Gender Gap Index, second lowest in Southern Africa after Angola.

Other sources of new infections (transmission other than heterosexual)

Sex between men is taboo and little understood, but probably not a main contributor to annual HIV incidence. The analysis noted that unprotected anal sex is also practiced by Zambian male and female adolescents: 8% of males and 6% of females aged 10-19 report this high-risk behaviour.

Vertical transmission from mother to child accounts for about 10% of all new infections. The proportion of children under the age of six months that are exclusively breastfed was 61% in the 2007 DHS, a dramatic increase from the 13% recorded in the 1992 DHS.

Transmission through injecting drug use: IDU is probably happening in Zambia on a small scale, but there are no data on the size of the IDU population, frequency of drug injection or sharing of injecting equipment.

Transmission through medical injections is, due to the introduction of disposable injection equipment, estimated to contribute only about 0.2% of all new infections.

Transmission through sharing sharp instruments: There is anecdotal evidence that unsafe tattooing and scarification are taking place. Traditional socio-cultural practices, which involve exchange of saliva and other bodily fluids, may harbour small risks of HIV transmission.

Transmission through unsafe blood transfusions seems to be responsible for a tiny fraction of new infections, probably as low as 0.02% of all new infections. There may be occasions where unscreened, HIV contaminated blood is transfused in emergency situations, but these cases are not documented.

"Know Your Response" summary

HIV prevention policy context

Zambia has developed a legal and policy framework which is supportive of the country's HIV prevention response. This includes the National HIV/AIDS/STD/TB Council, National Decentralisation Policy 2003-2012, National HIV/AIDS/STI/TB Policy 2005, National HIV and AIDS Strategic Framework 2006-2010, Fifth National Development Plan 2006-2010, National HIV/AIDS Communication Strategy 2005, Population Policy 2007, Reproductive Health Policy 2008, National Strategy for the Prevention of HIV and AIDS 2009, and National HIV and AIDS Commodity Security Strategy (in draft). Zambia's diverse HIV epidemic makes the decentralisation policy especially important. Structures at decentralised levels have been put in place to coordinate the local HIV response.

Important instruments against discrimination and protection of human rights are: Constitution of Zambia 1991, Disabilities Act 1996, National Education Policy 1996, National Gender Policy 2000, National Cultural Policy 2003, National Agricultural Policy 2004, Citizens Economic Empowerment Act 2006, National Child Policy 2006, Sexual Offences & Gender Violence Bill, and Lands Policy (draft). However, there is currently no legislation that overtly bans discrimination based on actual or perceived HIV status. Also, there are some laws that present obstacles to effective HIV prevention, treatment, care and support for vulnerable population sub-groups, notably the laws on homosexuality, prostitution and IDU.

Implementers of biomedical interventions (PMTCT, CT, PEP, STI treatment, ART, blood safety, injection safety, universal precautions), have been provided with guidelines to standardise the quality of interventions.

The new HIV prevention strategy defines four priority areas: 1. Prevention of sexual transmission of HIV; 2. PMTCT; 3. CT; and 4. HIV prevention in health care settings including PEP. In addition to service delivery objectives, it contains objectives regarding alcohol and substance abuse, and integrating prevention with other services.

The annual joint HIV/AIDS programme review in 2008 precipitated the strategic reorientation of the NASF, including to focus more on male circumcision and high risk behaviours related to MCPs, discordant couples, male-to-male sex, IDU and wilful transmission of HIV.

Strategic information for prevention

Zambia has developed a functional HIV M&E system with well formulated guidelines, functioning M&E structures, commitment, funding, M&E reference materials, and a committed technical working group. Having signed a commitment to the "Three Ones Principles", between 2006 and 2008, Zambia developed

monitoring systems for programme activities and financial flows, and human capacity at central and sub-national coordinating structures. The 2006-2010 M&E Plan includes a data collection and analysis strategy, biologic and behavioural surveillance, a well-defined standardised set of indicators, guidelines and tools for data collection, a strategy for assessing quality and accuracy of data, and plans for data dissemination and use. There is a central national database as part of NAC's management information system, populated with data on programme content, target populations and geographical coverage of the multisectoral response. Clinical data are aggregated within the Health Management Information System and the Smart care patient information system.

Zambia has remarkable experience in conducting nationally representative household surveys, and recently developed and launched a national HIV and AIDS research strategy. A number of biomedical studies and trials of regional importance, as well as highly relevant operational research and epidemiological studies have been carried out. The first National AIDS Spending Assessment (NASA) was conducted in 2007-2008 and covered the years 2005 and 2006. Data use and information sharing still need to be strengthened, especially at provincial, district and community level. There are challenges concerning the availability of data, reporting channels, duplication, insufficient technical capacity, and poor analysis, interpretation and dissemination of data.

HIV prevention programmes

Behaviour change communication's key focus in recent years was promoting sexual abstinence among youth, faithfulness in marital and stable unions, and condom use to protect against HIV and other STIs. In 2008, a total of 707,163 pieces of IEC material were distributed across all provinces, 4,364 employees were trained to provide HIV BCC to fellow employees, and 24,435 employees were reached through workplace programmes. Specifically targeting youth, 141,984 males and 135,998 females aged 15-24 years received **life skills based HIV education** in 2008. Sex education and HIV/AIDS are now part of the primary and secondary school curriculum. Family Health Education is also being conducted for school drop-outs and out-of school youth. Youth Friendly Health Services were established in 50 districts and are being expanded to cover all health centres. Reducing MCPs and scaling-up evidence-based prevention for young people are core strategies in the new HIV Prevention Strategy.

Another core strategy is strengthening and scale-up of **male circumcision services** as part of both the national comprehensive prevention package and male reproductive health services. Zambia is one of the countries leading the region in rolling-out adult male circumcision. To date, over one hundred doctors have been trained and more than 15,000 men have received medical male circumcision. Significant work remains in building capacity and scaling-up a comprehensive MC intervention while maintaining the quality of clinical services and risk reduction counselling.

Condom promotion and distribution has been part of the national response over many years, and both male and female condoms have been available through different outlets and through social marketing. The Prevention Strategy envisages making affordable quality male and female condoms widely acceptable, available and accessible. In 2008, there were 15,252 condom outlets providing condoms to end users, and 13.55 million male condoms and 442,785 female condoms were distributed. Condom distribution was comparatively high in Southern Province and comparatively low in Eastern and Western Province. The 2008 Logistics System Assessment and Stock Status Survey showed that condom supply to health facilities is good, but that there are occasional stock-outs and supply interruptions.

Sexually transmitted infections are still a major public health problem in Zambia -- up to 10% of all out-patient attendances at health institutions are related to STIs. The HMIS reports for 2008 that 3,170 service providers have been trained to diagnose and treat STIs according to national guidelines. The Prevention Strategy plans to strengthen and scale-up activities to prevent and manage sexually-transmitted infections.

Concerning the **prevention of mother-to-child transmission**, there has been a significant increase in health facilities offering the service, reaching 936 by end 2008. The strategic approach includes primary prevention of HIV among women of child bearing age; prevention of unwanted pregnancies among women of HIV positive or unknown status; prevention of HIV transmission from infected mothers to their babies; care and support to HIV infected families; male involvement; and service promotion. In 2008, 3,538

professional health providers and 2,434 lay/community health providers were trained in PMTCT, and 41,286 pregnant women completed ARV prophylaxis. The GFATM evaluation in 2008 showed that major investments are still needed for appropriate infrastructure, equipment and supplies for PMTCT. Overall in Zambia, the proportion of pregnant women who receive ANC from a skilled provider is high at 94%, but the much lower ANC utilization rates in Western and Northwestern Province are an obstacle to high PMTCT coverage. The annual number of unintended HIV-positive births averted in Zambia by contraceptive use was estimated at 12,823.

The Zambia National Blood Transfusion Service has been **screening blood and blood products** to prevent transmission of HIV since 1988. By 2008, 710 individuals had been trained on blood safety. According to official statistics, 100% of transfused blood units are screened. In 2008, a total of 82,527 units of blood were collected and screened for HIV, HBV and HCV using the WHO standard. This left a 20% gap in meeting the national need for blood. In 2008, 12.4% of all collected blood units had to be discarded due to transfusion transmitted infections.

The Prevention Strategy puts much emphasis on **HIV prevention in health care settings**. In 2008, 327 service providers were trained in standards for infection prevention and health care waste storage and disposal. By end 2008, 6,207 traditional healers had been trained in infection prevention and safe use of sharp instruments according to national standards, and 21% of health facilities offered PEP services on site.

Zambia has been expanding provision of **counselling and testing services** since 1999. By end 2008, a total of 1,563 health facilities provided HIV CT, and 3,827 professional providers and 3,081 lay/community providers were trained to provide VCT services. A total of 511,266 people aged 15 years and older received HIV CT during 2008 and know their results, of whom 84% were females and 16% were males.

Funding for HIV prevention programmes

Zambia spent $141 million in 2005 and $208 million in 2006 on HIV/AIDS activities. The public contribution to the total was 4% in 2005, and 14% in 2006. Zambia's HIV and AIDS response was predominantly externally funded (GFATM, World Bank MAP, and PEPFAR). Over the two years combined, prevention was the second largest expenditure at 27% (US$ 93,505,912). In 2005, 84% of prevention expenditure came from external funding sources, and in 2006, this increased to 97%. Between the two years, the share of funds going into prevention dropped slightly from 28% to 26%, chiefly due to rapidly increasing expenditure for treatment, care and support. In 2005, prevention spending was mainly for BCC activities, PMTCT, VCT, blood safety and STI control. No spending was reported for activities targeting MSM and IDU. In 2006, within the new NASF of 2006-2010, PMTCT activities received the biggest share of prevention spending (28%). VCT received 15%, BCC 12% and community mobilisation also 12%. Some activities received very small amounts, for instance blood safety (0.6%), injection safety (0.4%) and sex worker programmes (0.005%). Unlike in 2005, IDU programmes received some funding in 2006. The NASA report does not provide a breakdown of prevention spending by beneficiary populations. Across all intervention categories and for the two years combined, the majority of spending was for PLHIV (60%), followed by 27% for the general population and 10% for vulnerable populations. Another 2.4% were spent on accessible populations and only 0.3% on MARPs.

Linking the Response to the Epidemic

Are Zambia's HIV prevention policies and strategies based on the latest available evidence and global best practice?

Strengths

- The country has a results-based approach to HIV prevention, evidenced by the new HIV prevention strategy.
- The new HIV strategy is a major step towards conceptualising HIV prevention at several levels, addressing immediate and broader (social, structural) determinants of the epidemic.
- The new HIV strategy aims to integrate HIV prevention into other service areas.

- Zambia has a multi-sectoral approach to prevention, care, support and mitigation, evidenced by the National AIDS Strategic Framework 2006-2010.
- Guidelines for biomedical interventions such ART, CT and blood transfusion are based on local evidence as well as international best practice.
- Government, in collaboration with key partners, has disseminated the biomedical guidelines and made them accessible.

Weaknesses

- There are some laws that present obstacles to effective HIV prevention for vulnerable populations such as the laws on homosexuality and sex work.
- Collection and evaluation of HIV prevention impact data is weak, and quality assessments for many HIV prevention programmes are lacking.

Do HIV prevention policies and programmes respond to the key drivers of the epidemic?

● *Driver 1: Multiple and concurrent sexual partners*. Multiple and concurrent partner (MCP) behaviour is prevalent among all sexually active age groups, and specific communication on the risks related to multiple partners, sexual concurrency and networks, extramarital relationships, secondary partners in transactional and age/wealth disparate relationships is weak. The incidence model estimates that in 2008, about 71% of new infections arose through casual heterosexual sex behaviours, including in people with multiple and concurrent partners. There is evidence of some partner reduction -- declining percentages of men and women report multiple partner behaviours, indicating that risk perceptions, norms and behaviours regarding multiple partners can change.

● *Driver 2: Low and inconsistent condom use*. Condom use has not risen enough to significantly impact HIV transmission. Programmes need to do more to tap the unrealised potential of condoms to prevent sexual transmission of HIV and STIs, and prevent pregnancy in HIV-positive women. The condom programme needs to focus where uptake and impact are greatest, such as in sex work, casual sex, discordant couples and prevention with positives.

● *Driver 3: Low levels of male circumcision in most provinces*. Although the HIV prevention strategy says that "Zambia is one of the countries leading the region in the roll-out of adult male circumcision", even so, this analysis found that scaling up of MC deserves more urgency. MC is not currently reported in the HMIS and NARF systems and the 15,000 medical MCs reported by SFH, UTH and other hospitals may to some extent be normal MC procedures (to keep up the current level of MC, about 11,000 teenage boys need to be circumcised every year). Developing a comprehensive costed plan for rapid scaling-up of an MC intervention package should be given top priority.

● *Driver 4: Mobility and labour migration*. Zones and sub-populations with high mobility are known, but not enough prevention activities are strategically placed and offering adapted HIV services to these populations. For sub-populations in formal employment requiring absences from home, there is further scope to lobby employers for complementary risk reduction measures. There is a great need to effectively target international migrants and other populations with high mobility. Provinces with highly mobile populations and many labour migrants – Lusaka and Copperbelt Provinces – have the highest HIV prevalence levels in the country.

● *Driver 5: High risk behaviours among sex workers and in male-to-male sexual relationships*. Brothels and MSM are illegal, and commercial sex is driven "underground". The number and size of prevention activities addressing sex work is insufficient and most do not include clients of sex workers. Although many sex acts with clients are probably protected, there is still a high level of unprotected sex with clients and steady boyfriends of sex workers. The incidence model estimates that in 2008, almost 7% of all new infections arise from sex work (in sex workers, clients and regular partners of clients). Policies and programmes are also inadequate to address the specific needs of MSM.

● *Driver 6: Vertical transmission from mother to child*. One out of 10 new infections occurs in children aged 0-14 years; most are vertical transmissions from mother-to-child. PMTCT access and coverage must be improved further: It is estimated that in 2008, 41% of all HIV positive pregnant women in Zambia got

ARV treatment. Zambia has built up PMTCT services within a few years and achieved commendable results, including the PMTCT service capacity built at facility level and in the community sector, and innovative partnerships with the private sector. Reproductive health counselling and family planning to prevent unintended and unwanted pregnancies among HIV positive women has been shown effective internationally, and there is further scope in Zambia to reduce vertical transmission more through such interventions.

● *There are a range of other drivers, vulnerability and risk factors at the couple, community and macro levels*, for instance: Low levels of accurate risk assessment; Alcohol use; Gender inequality and beliefs about male sexuality; Intimate-partner violence and sexual coercion; Behaviours such as age-disparate relationships and transactional sex which have cultural resonance; and Taboos and barriers regarding couple communication about sex. Most drivers of the HIV epidemic are underpinned by social and cultural norms. A shift in emphasis from changing individual sexual behaviour to changing social norms is therefore indicated.

Is funding for HIV prevention allocated to where it is most needed?

- A considerable proportion of HIV expenditure is for prevention. According to the National AIDS Spending Assessment (NASA) 2005-2006, 27% of funding was spent on HIV prevention. This compares well with other countries in the sub-region.
- In 2006, expenditure for BCC/SCC was low at 3% of total spending and 12% of prevention spending. PMTCT activities received 28% (+5% for ARV prophylaxis for pregnant women and newborns), VCT 15%, and community mobilisation 12%.
- Injection safety, universal precautions and blood safety are supported; continued commitment is required to prevent HIV transmission within the health care services.
- VCT roll-out is a national priority, but VCT programmes have not been proven by any local or regional research – on a population level – to contribute to reductions in either HIV prevalence or incidence.
- Resource tracking data from the NASA suggest that resource allocation for some populations may not be adequate.
- According to the NAC, the existing national tracking mechanisms are not effective in monitoring and evaluating resource use.

RECOMMENDATIONS

This analysis has highlighted the **urgency to more effectively prevent new infections** in Zambia. This urgency will only increase, as the number of people on lifelong treatment increases (and treatment costs increases).

Most funds for the prevention response come from external donors, and the country is therefore **heavily reliant on continuous and successful mobilisation of external resources**. With the world in economic crisis[1], and **escalating AIDS treatment costs** in Zambia, there is a risk that less funding may be available for HIV prevention in the near future. "Making HIV money work better" is hence a priority for the country's prevention response.

Prevention programmes need to be bold and strategic in their approaches and very well-monitored and evaluated to know their impact. Only prevention programmes which are known to work and which address

[1] *The International Monetary Fund estimated in January 2009 that world economic growth will fall from 5.2% in 2007 to just 0.5% in 2009 (UNAIDS, 2009). Growth in emerging and developing economies is expected to slow from 8.3% (in 2007) to 3.3% (in 2009). Low-income countries will suffer from a reduction in employment and remittances which will have a severe effect on poverty and on household capacity to meet health expenditures. At the same time, low-income countries will have less revenue and that will limit their ability to expand social-sector spending. In brief, each funding source is vulnerable to the impact of the economic slowdown.*

epidemic drivers should be taken to scale. While translating the HIV Prevention Strategy into actions, policy makers, implementers and development partners need to continuously look out for **innovation in HIV prevention** in Zambia and the sub-region – Zambia's mature and persistent HIV epidemic does need '*more and different*', not just '*more of the same'*.

To improve the prevention response in Zambia, the country needs to: (a) prioritise and target evidence-based programmes for specific populations that will avert the highest number of new infections over the shortest period of time; (b) implement programmes sustainably to excellent quality and equity; and (c) measure rigorously to determine programme effectiveness and efficiency.

(a) Prioritise and target evidence-based programmes for specific populations that will avert the highest number of new infections over the shortest period of time

1. Amend laws that criminalise and discriminate against 'high risk' populations

2. Improve HIV prevention programme coordination at national and decentralised levels

3. Improve the *quantity*, *efficiency* and *sustainability* of HIV prevention funding.

(b) Implement programmes sustainably to excellent quality and equity

4. Target services to specific sub-populations in the general population in specific geographic areas based on data and evidence

5. Improve dedicated service delivery to marginalised ('high risk', as per prevention strategy definition) populations

6. Focus and innovate *voluntary* HIV counselling and testing services, and expand *provided-initiated* HIV counselling and testing

7. Rapidly roll-out an integrated and comprehensive male circumcision programme

8. Adapt and deliver – to scale and to exceptional quality – behaviour and social change communication programmes

9. Roll-out efficient and comprehensive PMTCT, integrated with other health services, to every woman of reproductive age and her partner

10. Initiate, revitalise and scale-up innovative prevention programmes for mobile populations

(c) Measure rigorously to determine programme effectiveness and efficiency

11. Obtain evidence about prevention programmes (where knowledge gaps exist), and share available evidence

12. Obtain and use HIV incidence data

13. Improve system, organisational and human capacity to collect, analyse, interpret and use HIV programme related data at provincial and district level, and plan accordingly

14. Improve and link programme monitoring, demand monitoring, and financial monitoring

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Glossary of terms

Casual heterosexual sex	In this analysis, defined as sex with a non-marital, non-cohabiting partner in the past 12 months (=higher-risk sexual intercourse in the DHS)
Commercial sex	The performance of sex acts in exchange for money. In population surveys, commercial sex is referred to as "paid sex".
Concurrent partnership	A specific kind of multiple sexual partnership that occurs when one person has sex with two or more other persons during time periods that overlap (Mah & Halperin, 2008).
Discordant couple	A couple where one partner is HIV positive and the other is HIV negative
Drivers	Factors at the individual, community or structural level that account for many or most new HIV infections, including contextual, social or structural factors that impact strongly on individual behaviour in ways that increase risk and transmission. (There are other definitions of the term "driver" in the literature -- sometimes used to refer only to factors at the community or structural level, and the term "risk factors" used for individual level behaviours that increase HIV transmission risk.)
HIV incidence	The proportion of HIV negative people who have become infected with HIV during a specified period of time (usually one year)
HIV prevalence	The proportion of individuals in a population who have HIV at a specific point in time
HIV prevention	The stopping of *new* HIV infections
HIV risk factors	Factors at the individual level which are directly linked or on the causal pathway to HIV infection (e.g. circumcision status, viral load, concurrent partners, sharing contaminated instruments, low condom use)
Multiple partnership	Multiple sexual partnerships are defined as more than one sexual partner in a certain period of time (Mah & Halperin, 2008). These can be either serial partners (one after the other), or concurrent partners (different sexual partners that overlap in time).
Synthesis	The combination of components to form a connected whole[2]
Transactional sex	Exchange of money, gifts or favours for sex
Universal precautions	Standard infection control practices to be used consistently in all healthcare settings to minimize the risk of exposure to all pathogens (including HIV), e.g. the use of gloves, barrier clothing, masks and goggles to prevent exposure to tissue, blood and body fluids, safe disposal of sharps.
Vulnerability factors	A range of factors that reduce the ability of individuals and communities to avoid HIV infection, such as personal factors like lack of knowledge and skills required to protect oneself and others; factors pertaining to the quality and coverage of services; societal factors such as social and cultural norms, practices, beliefs and laws that stigmatize and disempower certain populations, and act as barriers to essential HIV prevention messages. These factors, alone or in combination, may create or exacerbate individual vulnerability and, as a result, collective vulnerability to HIV.[3]

[2] Oxford Dictionary, 10th edition, ed. Judy Pearsall, Oxford University Press.
[3] UNAIDS (1998).

Acknowledgements

Zambia is one of the countries with hyper epidemic levels of HIV. Government commitment and efforts to scale-up towards universal access to HIV prevention, treatment, care and support services with partner support have started to show gains.

With the increasing burden of the global economic crisis, there is need to provide more evidence as well as deepen our understanding of the HIV epidemic and national response with respect to prioritized prevention interventions that can make the greatest impact and reduce the rate of new infections further. This information is also critical as we start the preparatory process of the new national strategic framework

NAC undertook an epidemiological synthesis aimed at deepening our knowledge of the HIV epidemic and the national response, especially following the release of the 2007 Demographic and Health Survey report. The process involved technical analysis and synthesis of existing epidemiological evidence around the epidemic and the prevention response. The NAC and its partners are very happy with the final product and its content.

NAC wishes to extend its appreciation to partner organizations and individuals that have provided technical and financial support to this important activity. Especially the World Bank, UNAIDS, and UNICEF who provided direct technical and financial support. NAC wishes to thank the following persons and members of the Steering Committee whose significant technical and management input steered through the different phases of the assignment: Dr Ben Chirwa, Director General, Zambia National HIV/AIDS/STI/TB Council; Dr Victor Mukonka –Director Public Health, Ministry of Health; Mr Osward Mulenga, Director, Directorate of M&E and Research, NAC; Mr Harold Witola, Research Specialist, NAC; Dr. Michael Gboun, M&E Advisor, UNAIDS/NAC; Dr. Musonda Rosemary Sunkutu, Senior Population Health and Nutrition Specialist, The World Bank AFTHE; Dr Eric Satin, ART Advisor, NAC; Dr Dara Potta, Centres for Disease Control and Prevention, Zambia; Ms Elizabeth Serlemistos, Chief Advisor, Zambia National HIV/AIDS/STI/TB Council; Dr Sansan Myint, HIV Specialist, UNICEF; Dr Rosemary Kumwenda, HIV Advisor, UNDP, Dr Amaya Gillespie, Country Coordinator, UNAIDS Zambia Country Office; Dr Rosalia Rodriguez-Garcia, Marelize Gorgens, Dr Nicole Fraser and Dr Joy De Beyer, GAMET/World Bank for their valuable input in the process; Dr. Emma Slaymaker, London School of Hygiene & Tropical Medicine (analysis of sexual behaviour trends); Dr Mubiana Macwan'gi, Senior Research Fellow/ consultant, Institute of Economic and Social Research University of Zambia; and Mr Bernard Phiri, Science and Technology Officer, National Science and Technology Council / consultant.

The UNAIDS Regional Support Team for Eastern & Southern Africa and UNAIDS Geneva provided invaluable technical and financial support to the study - Dr. Susan Kasedde, Dr. Mark Colvin and Dr. Eleanor Gouws. The World Bank Global HIV/AIDS Program's Donald Whitson and Eric M. Gaillard played important roles in supporting the study, building capacity in applying the incidence model and advising on the epidemiological and prevention programme review.

This analysis drew extensively on existing research and routine data and the implementers of this study are immensely grateful to all the researchers, service providers and study populations who have contributed to this evidence base. NAC also extends its appreciation to other Cooperating Partners and Stakeholders who supported various planning and preparatory activities and expressed readiness to commit their organizations' resources and structures towards supporting and facilitating the epidemiological synthesis process. Last but not least, I also wish to recognize the team of local and international Reviewers who worked tirelessly to produce this report.

It is my hope that the Epidemic, Response and Policy Synthesis report will add value to the strategic orientation of the national response against HIV and AIDS and indeed to the overall development efforts in Zambia.

Dr. B.U Chirwa
DIRECTOR GENERAL
NATIONAL HIV/AIDS/STI/TB COUNCIL

Abbreviations

AIS	AIDS Indicator Survey
ANC	Antenatal care
ANCSS	Antenatal care surveillance survey
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral
BCC	Behavioural Change Communication
BSS	Behavioural Surveillance Survey
CATF	Community AIDS Task Force
CBO	Community Based Organisation
CD	Compact Disk
CDC	Centers for Disease Control and Prevention
CHS	Casual Heterosexual Sex
CIDRZ	Center for Infectious Disease Research in Zambia
COH	Corridors of Hope (project)
CRIS	Country Response Information System
CSO	Central Statistical Office
CT	Counselling and Testing
CVCT	Couple VCT
DATF	District AIDS Task Force
DDCC	District Development Co-ordination Committee
DFID	Department for International Development (United Kingdom)
DHS	Demographic and Health Survey
ERPS	Epidemic, Response and Policy Synthesis
FBO	Faith Based Organisation
FP	Family Planning
FSW	Female Sex Worker
GAMET/WB	Global AIDS Monitoring and Evaluation Team of the World Bank
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRZ	Government of the Republic of Zambia
HEART	Helping Each other Act Responsibly Together
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HQ	Head Quarters
ICT	Information and Communication Technology
IDU	Injecting Drug Use/User
JHU/CCP	Johns Hopkins University Center for Communication Programs
KAP	Knowledge, Attitudes and Practices
KYE	Know Your Epidemic
KYR	Know Your Response
LRF	Legal Resources Foundation
LRH	Low Risk Heterosexual
MAP	Multi-country AIDS Programme of the World Bank
M&E	Monitoring & Evaluation
MC	Male Circumcision
MOE	Ministry of Education
MOH	Ministry of Health
MoT	Modes of Transmission
MSM	Men having Sex with Men

MTCT	Mother-to-Child Transmission
NAC	National HIV/AIDS/STI/TB Council
NACMIS	National AIDS Council Management Information System
NARF	National Activity Reporting Form
NARS	National Activity Reporting System
NASA	National AIDS Spending Assessment
NASF	National HIV and AIDS Strategic Framework
NCPI	National Composite Policy Index
NGO	Non-Government Organisation
NHC	Neighbourhood Health Committee
PATF	Provincial AIDS Task Force
PDCC	Provincial Development Co-ordination Committee
PEP	Post Exposure Prophylaxis
PEPFAR	President's Emergency Plan for AIDS Relief
PMTCT	Prevention of Mother to Child Transmission
PLHIV	Persons Living with HIV
PSI	Population Services International
PwP	Prevention with Positives
RST-ESA	UNAIDS Regional Support Team for East and Southern Africa
SCC	Social Change Communication
SBS	Sexual Behaviour Survey
SFH	Society for Family Health
SSA	Sub-Saharan Africa
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
SW	Sex worker
TB	Tuberculosis
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNGASS	United Nations General Assembly Special Session on HIV/AIDS
UNICEF	United Nations Children's Fund
UNJT	Joint UN Team on AIDS
UNZA	University of Zambia
USG	United States of America Government
UTH	University Teaching Hospital
VCT	Voluntary Counselling and Testing
WB	World Bank
WHO	World Health Organization
WILDAF	Women in Law and Development in Africa
WILSA	Women and Law in Southern Africa
ZARAN	Zambia AIDS Law Research & Advocacy Network
ZDHS	Zambia Demographic and Health Survey
ZEHRP	Zambia Emory HIV Research Project
ZNBT	Zambia National Blood Transfusion Services
ZSBS	Zambia Sexual Behaviour Survey

CHAPTER 1. Introduction

Since the identification of the HIV virus in 1983 (Barre-Sinoussi *et al.*, 1983; Gallo & Montagnier, 2003), HIV epidemics have evolved with different characteristics (sizes, types and modes of transmission) and at different paces. The epidemics in several Southern African countries grew to unprecedented levels. Prevalence tended to be higher among females than among males, and higher in urban areas than in rural areas (UNAIDS, 2008). Although there is a general understanding of the factors that affect the progression of HIV epidemics, the details of how they operate to shape the epidemic are not well understood. It appears that individual factors, such as behaviour and biological susceptibility, and broader factors such as the political economy, inequalities (wealth, gender), urbanisation, modernisation and socio-cultural factors all play a role in determining transmission dynamics of HIV (e.g. Parker *et al.*, 2000; Boerma & Weir, 2005).

According to the 2008 Report on the Global AIDS Epidemic, an estimated 1.9 million people were newly infected with HIV in sub-Saharan Africa in 2007, bringing to 22 million the number of people living with HIV in this region (UNAIDS, 2008). These new infections happened (and continue to happen) despite 20 years of experience with implementing prevention programmes. Success in accelerating access to treatment has not been matched by similar successes in prevention: for every two people who start anti-retroviral treatment (ART), five others get newly infected (UNAIDS, 2008). **Underpinning the shortcomings in prevention is the inadequate use of evidence to inform program decisions**. The result has been prevention interventions of insufficient effectiveness, non-optimal use of available resources and lost opportunities to address the specific factors driving infection in the populations most at risk within each country.

The purpose of this epidemic, response and policy synthesis is **to provide an overall analysis of the HIV epidemic and response in Zambia by drawing together, triangulating and reconciling various and different data sources in order to make recommendations as to how the response could be improved**.

The specific **objectives** of the synthesis were to:

e) **"Know your epidemic" (KYE) – describe and understand the epidemiological situation in Zambia** – the national epidemic phase and trends, the heterogeneity of epidemic and the modes of transmission at national level.

f) **"Know your response" (KYR) – describe and understand the HIV prevention response in Zambia** – the policy environment for HIV prevention, the availability of strategic information to inform prevention, the range of implemented HIV prevention efforts in the country, the stakeholders involved in HIV prevention, and the expenditure for different types of prevention programmes.

g) **Link the KYE data and KYR data** to understand the scope, relevance and comprehensiveness of HIV prevention policies and programmes in Zambia, the alignment of prevention programme resources to strategic prevention priorities, and gaps in strategic information about HIV prevention.

h) **Recommend improvements in HIV prevention policies, programmatic action, and resource allocation** to ensure greater success in prevention programmes, and fewer new HIV infections in Zambia.

The three key questions this synthesis aimed to answer were:

1. Are HIV prevention policies and programmes based on the latest available evidence and global best practice?

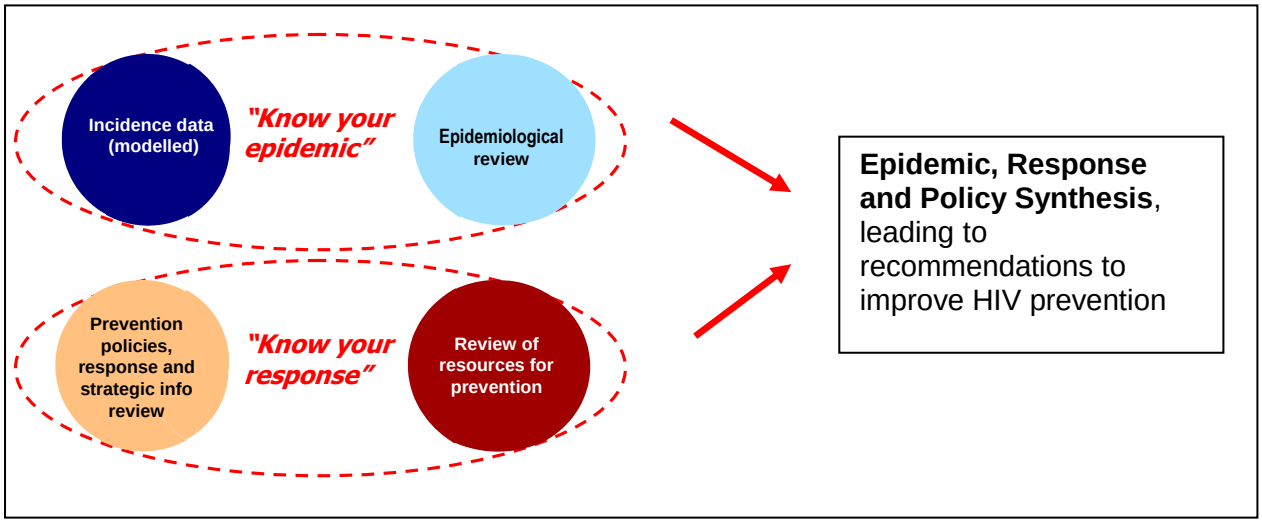
2. Do HIV prevention policies and programmes respond to the key drivers of the epidemic?

3. Is funding for HIV prevention allocated to where it is most needed?

The Zambian epidemic, response and policy synthesis (ERPS) is part of a regional effort led by the UNAIDS Regional Support Team for East and Southern Africa (RST-ESA), in partnership with the World Bank Global HIV/AIDS Program's Global AIDS Monitoring and Evaluation Team (GAMET), UNFPA

and others, to support better HIV prevention efforts in Eastern and Southern Africa. Similar syntheses with UNAIDS/World Bank support were concomitantly carried out in Kenya, Lesotho, Mozambique, Swaziland and Uganda. The general structure of all these epidemic, response and policy syntheses was the following:

Figure 3. Explanation of How the Synthesis Process Works



The HIV epidemiological data and incidence modelling estimates were combined to obtain an epidemiological synthesis ("Know your epidemic" synthesis), and the HIV prevention review data and prevention resources data were combined to obtain an HIV response synthesis ("Know your response" synthesis). The "KYE" and "KYR" syntheses are then compared to understand the gaps in HIV prevention programming, and make recommendations on how the response could be improved (World Bank, 2008). The ERPS is highly relevant to the **concept of universal access to HIV prevention**, since it is designed to assist countries in focusing effective, proven prevention efforts better to those who need the services, and by doing so, progress toward universal access to prevention (UNAIDS, 2007). Unless the key populations at risk and their vulnerability factors are known, and the current prevention response understood, it is impossible to plan, target and deliver interventions that focus on the populations that most need such services, in order to provide universal access to appropriate HIV prevention services to all populations that need them. And effective prevention is critical to achieving and maintaining high coverage of ART treatment.

1.1 Use of the synthesis findings in Zambia

The synthesis will inform policy, strategic planning and programming. It will contribute to the understanding of the Zambian HIV epidemic using local programmatic, surveillance and research data. The findings of the synthesis will specifically be used in Zambia to inform resource allocation for HIV prevention, focus on geographic areas in most need, and guide programming of the HIV prevention response.

1.2 Structure of the Synthesis Report

Chapter 1 provides the background and context for the synthesis. It describes the purpose, objectives and key questions of the synthesis, the synthesis concept and use of the findings.

Chapter 2 describes how the study was carried out – the methodology followed. The methods for each of the components and for the synthesis of all the data are introduced, and the study's limitations noted.

Chapter 3 provides the KYE synthesis results. These include the epidemic state and trends in HIV prevalence and incidence, transmission pathways, sources of new HIV infections, data on sexual

behaviours and male circumcision. It also provides data on the socio-cultural and economic context of the epidemic in Zambia.

Chapter 4 presents the KYR results, which include policy level issues relevant to prevention, strategic information aspects of prevention, and a description of preventive interventions currently provided by implementers in the different sectors.

Chapter 5 links the epidemic situation to the response, i.e. it provides an overall synthesis of the KYE and KYR data presented in chapters 3 and 4. The chapter tries to answer the three key questions posed in this synthesis process.

Chapter 6 lists the recommendations emanating from this analysis. It contains policy level recommendations and programmatic recommendations and presents specific recommendations for capacity building and research/monitoring & evaluation

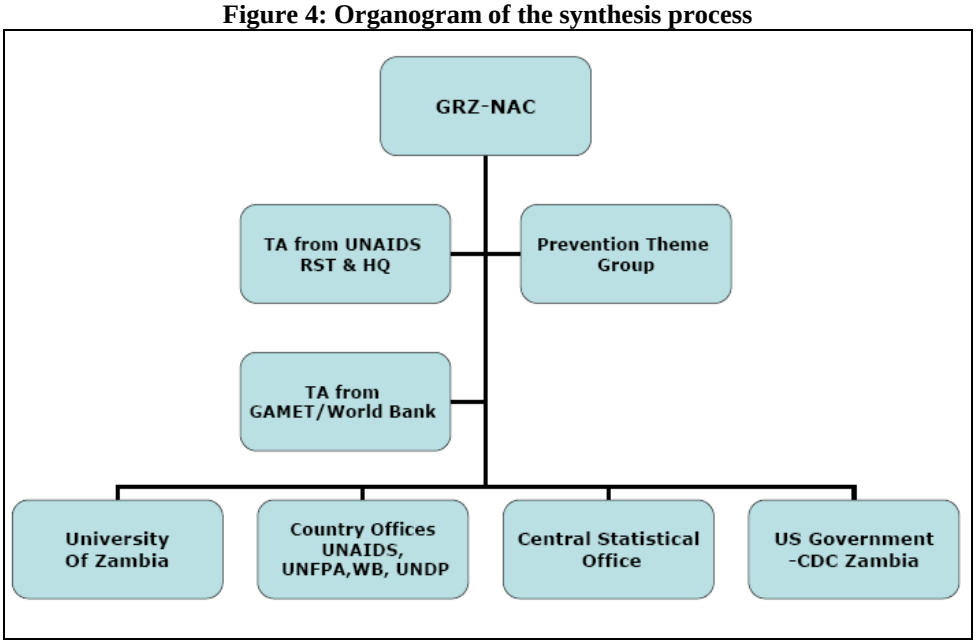
CHAPTER 2. Methodology of the Synthesis

The methodology of the study was largely based on the "Guidelines for modes of transmission review" (UNAIDS/World Bank, version 12) and on the "How to write an HIV epidemiological, response and policy synthesis: a practical guide" (World Bank. version 3.0).

2.1. Study coordination and partnerships

Overall coordination of the synthesis process was by the Zambian National HIV/AIDS/STI/TB Council (NAC) and the Government of the Republic of Zambia (figure 4). The **core study team** included the NAC, University of Zambia (UNZA), Central Statistics Office (CSO), Department of Community Medicine/UTH, Joint UN Team on AIDS (UNJT), US Government/CDC Zambia, and World Bank. Technical assistance was provided by the UNAIDS RST-ESA (entire study), UNAIDS Geneva (incidence modelling), and GAMET/World Bank (study concept and final synthesis process). The in-country partners provided oversight of the synthesis process and review of the deliverables. They also ensured that the synthesis process was closely linked with the mid-term review of the Zambian HIV and AIDS multisectoral response and the drafting of the HIV Prevention Strategy. Within the NAC, the research specialist was most closely involved in the process.

Figure 4: Organogram of the synthesis process



Source: Zambia MoT Country Presentation, July 2008, Johannesburg.

Component reports were drafted and submitted to the NAC Monitoring, Evaluation and Research Directorate and underwent an initial internal review. Subsequently, GAMET/World Bank helped to compile the draft synthesis report which was presented and validated in a national stakeholder workshop in Chaminuka from 15-17 April 2009. The revised synthesis report underwent further technical review at country and regional level through the UNAIDS RST-ESA, before it was finalised. Dissemination of the synthesis report and the translation of findings into policy and practice were the responsibility of the NAC Prevention Theme Group Steering Committee.

2.2. Methods for the KYE synthesis

The epidemiological review was a desk study of existing published and unpublished documentation about Zambia, and relevant studies from other countries in Sub-Saharan Africa (SSA). It was conducted in two phases – the first phase of identifying, reviewing and drafting a synthesis of relevant Zambian literature was conducted by a local Zambian team in 2008, and a further analysis of epidemiological data was done in 2009 by GAMET/ World Bank.

The **first phase** of the analysis consisted of an initial review of existing surveillance data and research studies (see concept note R. Rodriguez-Garcia 14th April 2008). Data from different sources were drawn together, triangulated and presented in a draft report by a local consultancy team appointed by UNAIDS. A large annotated bibliography was also produced. In parallel, the UNAIDS HIV Incidence Model was applied with current best data and a detailed modeling report produced by another local consulting team.

The **second phase** complemented the phase one report by integrating further epidemiological data and adding data on co-factors of the epidemic (such as beliefs and attitudes, culture, gender and women's status, social norms, poverty, inequality, food security, economy, mobility, migration), and was technically supported by a team from the World Bank and UNAIDS RST. Where possible, data were triangulated, and the modelled incidence data were integrated into the epidemiological review. In order to investigate longer-term trends in sexual behaviour in Zambia, data from seven representative household surveys (four Demographic and Health Surveys (DHS) and three Sexual Behaviour Surveys (SBS)) were combined for multivariate analysis. The 1992 DHS did not include men. The 1998 SBS was not included in the analysis since this survey was known to be markedly different to the others both in the questionnaire used and in the results obtained, which were outliers in the previous analysis by Slaymaker & Buckner (2004). **Annex 1** provides further methodological detail on this analysis.

The study team used four strategies to identify as much published and unpublished data and literature relevant to this study as possible:

1. *Solicitation of documents from the in-country Core Team* - The study contacted in-country colleagues, asking for specific documents which were not yet available in the public domain or unpublished.
2. *Searches on organisations' websites* – National, regional and international organizations' websites were searched.
3. *Searches of large online databases and through search engines* - Searches were conducted using Journal storage, PubMed, Medline, Google Scholar, and Google. The searches looked for publications over the 15 years from 1995 to 2009, using the search words defined below.
4. *Search based on citation lists in publications* - The team searched the references of the publications found in steps 1-3 to find additional relevant documents and web sites.

The following search terms were used for Phase 1 database search engines: sexually AND transmitted OR syphilis OR gonorrhea OR chancroid OR herpes OR chlamydia OR HIV OR AIDS AND Zambia.
In phase 2, the following search terms were used alone and in combination:

> *Zambia, Southern Africa, Sub-Saharan Africa, HIV, AIDS, prevalence, incidence, modelling, systematic review, meta analysis, HIV prevention, HIV infection, mobility, migration, sexual behaviour, behaviour change, behaviour adaptation, sexual network, surveillance, DHS, reproductive health, STD/STI, violence, substance use/abuse, heroin, cannabis, alcohol, sex work, anal sex, MSM, homosexual, prison, iatrogenic, medical injection, blood transfusion, social capital, gender and others.*

A total of 350 documents considered relevant to the study were found. All documents were first checked for duplicates and then listed in a matrix to create a document catalogue, containing the document title, institution/author, year, target population, geographical area, file name, and document source.

The data used included measured and projected/modelled data and looked at all transmission pathways (heterosexual sex, male-to-male, medical injections, blood transfusion, mother-to-child transmission, sharps and blades, and injecting drug use). In general, preference was given to recent data (last 2 years) and

to measures indicating recent risk behaviours rather than lifetime exposures, since this analysis is more relevant to current transmission intensity and incident (new) HIV infections. However, older data were also considered, particularly when assessing trends over time. Probability (p) values, odds ratios (OR) and 95% confidence intervals were calculated using the *statcalc* function of Epi Info version 6. P values <0.05 were considered statistically significant. The analysis did not include tuberculosis or any other opportunistic infection (OI), and did not focus on other STIs. Risk factors and drivers were retained as presented in the original literature.

For the analysis of HIV epidemiological data, it was important to use a relevant **epidemiological framework to analyze the risk factors and drivers of the epidemic**. After reviewing different causal models for classifying risk factors for HIV transmission, it was decided to use Poundstone's conceptual model, as it recognizes that individual risk factors for HIV infection are also influenced by factors at the couple level and community level, which are, in turn, affected by factors at the structural level (as described by Poundstone *et al.*, 2004).

Methodology – Incidence Modelling: The UNAIDS Incidence Model was used to model sources of new infections, and overall incidence (model, accompanying CD and manual available from UNAIDS). The modelling was carried out during a workshop in 2008 and the model outputs concerned new infections in 2008 in adults aged 15-49 years. The study team did an extensive data and literature review to find the best recent data to populate the model. If local estimates were not available, default values were used as recommended by UNAIDS in the manual for the model application. If a recommended default was a range of values (min-max), an informed guess was made by the workshop participants as to which value should be used in the model. The injecting drug use (IDU) population was not included in the model due to complete lack of any local data. Definitions used are provided in section 3.5.

2.3. Methodology for the KYR synthesis

Prevention policy context: This was based on a brief literature review and included the report of the National Composite Policy Index of 2007 and the UNGASS Report 2008.

Strategic information for prevention: The main data sources for this analysis were the 2009 status report on the national Zambian HIV M&E system, reports of the M&E system of the MOH (HMIS), the 2008 National AIDS Spending Assessment (NASA) and any other sources which gave insight into M&E, surveillance, research and resource tracking.

Prevention activities and services: This review was based on a desk study of the relevant literature, which included HIV data from the National Activity Reporting Form (NARF), routine data from national programmes, publications on programmatic activities by the government and its development partners, the reviews done in the process of developing the HIV prevention strategy, and summary reports such as the UNGASS Report 2008. Prevention activities were classified based on the National HIV and AIDS Strategic Framework 2006-2010 (NASF) which defines eight areas of focus within the prevention theme:

1. Prevent sexual transmission of HIV with a special emphasis on youth, women and high risk behaviours;
2. Prevent mother to child transmission;
3. Prevent HIV transmission through blood and blood products;
4. Prevent HIV transmission in health care and other care settings and promote access to post exposure prophylaxis treatment;
5. Improve access to and use of confidential counselling and testing;
6. Mitigate stigma and discrimination against HIV;
7. Prevent HIV transmission through intravenous drug use; and
8. Support development and participation in HIV vaccine clinical trials.

HIV prevention resources review: The main data source was the 2008 NASA which covers the years 2005 and 2006. The standard NASA classification of types of HIV programmes was used to present expenditure.[4] Target population and age groups were also standardised within the NASA.[5] The detailed methodology is described in the NASA report (MOH/NAC, 2008). In brief, this tracking of actual expenditures for HIV/AIDS in Zambia used the standard NASA methodology, and captured Zambia government and external sources of funds.[6,7] All major funding sources, funding agents and providers - domestic and international - based in the respective central offices in Lusaka were included in the assessment. The private-for-profit business sector, private insurance companies and expenditure by individuals and households were not included. Actual expenditure records were the primary sources of data, and these were supplemented with data from audited accounts, financial reports on actual spending and annual reports on activities and outputs. At the national/central level, all sources, agents and providers were surveyed. This central information was validated with sub-national data by sampling five out of the nine provinces - Western, Northern, Lusaka, Copperbelt and Southern provinces. In each of these provinces, three districts were sampled based on the presence of funded activities. In all, 104 institutions were included in the NASA (70 in Lusaka, 12 in Copperbelt Province, 7 in Southern Province, 11 in Western Province, and 4 in Northern Province).

2.4. Methods for the KYE - KYR synthesis

This step was largely based on the methodology described in "How to write an HIV epidemic, response and policy synthesis: a practical guide" (World Bank, version 3.0). The key areas of enquiry were:

- To understand the socio-cultural context in which HIV prevention policies and programmes are implemented
- To understand whether HIV prevention policies and programmes are based on the latest available evidence and global best practice
- To understand whether HIV prevention policies and programmes respond to the key drivers of Zambia's HIV epidemic
- To understand whether HIV prevention programmes are in line with the country's HIV prevention policies. If programmes are not in line with policy, to understand whether the policies are outdated (i.e. whether evidence exists that the new, innovative prevention responses are working) or whether the HIV prevention responses need to be adjusted (re-planned, re-designed or re-programmed) to reflect the latest policy-level decisions
- To understand whether the funding allocated for HIV prevention is directed where it is most needed

For the joint analysis of the "know your epidemic" and "know your response" parts, data about risk factors for HIV transmission and drivers of the HIV epidemic were synthesized at the three levels that correspond with the epidemiological model used in this synthesis (Poundstone's framework, mentioned before): individual & couple level, community level, and structural/macro level:

1. *Individual and couple level analysis*: Included biological, demographic and behavioural factors that may influence a person's risk of HIV acquisition, such as education status, circumcision status, number of sexual partners, or may influence the transmission risk and partnership dynamics in a couple such as age disparity;

[4] UNAIDS (2007d): page 18. Table 3.1 shows the AIDS spending categories with the NASA code, the label and the content description for each intervention. http://data.unaids.org/pub/BaseDocument/2007/20071029_nasa_classifications_definitions_en.pdf. This system draws from the WHO Guide for producing national health accounts (2003) and the resulting NASA classification was approved by members of the UNAIDS Global Resource Tracking Consortium in September 2005. Many countries participated in finalising the NASA classification system, and have started to use this standardised NASA resource tracking system as part of the national M&E system

[5] UNAIDS (2007d): page 24. Table 3.2

[6] UNAIDS (2007e) for NASA methods and procedures

[7] UNAIDS (2007d) for classifications and definitions. The NASA excluded private contributions from business, the private health system, and individual spending (these are planned to be included in the next NASA).

2. *Community level analysis*: This analysis summarized drivers of HIV transmission that are outside the direct influence of individuals and couples. Conceptually, such drivers include social and cultural norms, marriage patterns, acceptance of alcohol use and violence.
3. *Structural (macro) level analysis*: This analysis summarized drivers of the Zambian HIV epidemic which are socio-political and at a level above the control of individual communities or sub-populations, such as income inequality, gender inequality, and migration.

2.5. Study limitations

This study had several limitations in the different components of the analysis.

Limitations of the epidemiological review: Large population-based surveys were conducted with a cross sectional study design, so when interpreting the results, it is not possible to determine the temporal sequence of HIV acquisition and risk behaviour. Results presented only as bi-variate analyses should be interpreted cautiously due to potential confounding. Confounding factors may not be equally distributed between the groups being compared, leading to potentially biased results. Not all confounding variables were collected in the population based surveys. As many variables were self-reported, an inability to recall correctly an exposure, for example, could have resulted in participant recall bias, or there may be self-reporting bias, for example, if some respondents report what they think are "correct" or socially approved answers. Other analyses of interest, such as the relationship between a history of violence and HIV status, were not available in the standard DHS reports.

Limitations in the application the incidence model: Some data on risk groups such as MSM, IDU, clients of sex workers and others, were not available, which limited the scope of the application of the UNAIDS Incidence Model (see **section 3.5 on specific data gaps**). In addition, the model was run with data collected in different years – for example, if data about the HIV prevalence of sex workers were only available for 2000, this was used, together with population-level HIV prevalence data from 2007. Furthermore, the model has some inherent limitations: it does not take into account the influence of specific STIs, sexual mixing patterns, concurrency of relationships, or the distribution of behaviours within risk groups (i.e. it does not acknowledge that all persons in a specific risk group do not have the same behaviour, or that persons move between risk groups over time). The same limitations of the survey data used to populate the model apply to the model results.

Limitations in the analysis of prevention activities: Unlike other countries conducting this study in partnership with UNAIDS and the World Bank, there was no collection of new data for the "Know your response" part of the study. Most grey literature was received through the government and there was no specific collection of activity reports from civil society organisations. As a result, there were gaps in the understanding of how and where prevention programmes are conducted. The role and contribution of NGOs, CBOs, FBOs and the for-profit private sector in Zambia's HIV prevention response could not be assessed in detail. The national activity monitoring reports contain the data from those CSOs reporting to the NAC, and these are presented in the KYR chapter. The monitoring reports do however not disaggregate the prevention service data by sector (e.g. civil society, private sector, and public sector). Furthermore, the prevention messages used, the modes of delivery of interventions, the target populations actually reached, the geographic areas covered (at provincial and lower levels) as well as programme evaluation data, were not assessed comprehensively, which limit the conclusiveness of the KYR analysis. Also, the NASA data were only available for the 2005/2006 time period, whereas HIV expenditure might have changed significantly over time.

Limitations in the prevention resources review: The NASA has a number of limitations which are described in detailed in the NASA report. An important limitation is the difficulty of comparing expenditures by AIDS spending category between 2005 and 2006 due to the transition from the National AIDS Intervention Strategic Plan 2002-2005 to the National AIDS Strategic Framework 2006-2010 (different objectives and spending categories were stipulated in the two documents).

CHAPTER 3. Know Your Epidemic Synthesis

The KYE synthesis draws together available data about HIV prevalence trends and patterns, HIV incidence, modes of transmission, sexual behaviours, and community and macro level factors influencing the Zambian HIV epidemic.

There are two established ways of tracking HIV prevalence in the general population. One way is to carry out a ***household-based population survey of a representative sample of women and men and to collect data about HIV behaviour and samples for HIV testing*.** These surveys enable conclusions to be drawn about the HIV prevalence of sub populations with specific behaviours or characteristics. Common types of such surveys are the Demographic and Health Surveys (DHS) and the AIDS Indicator Surveys (AIS).

Zambia has a remarkable track-record in conducting nationally representative household surveys (eight surveys in 15 years), of which the DHS 2001-02 and 2007 were bio-behavioural surveys with an HIV testing module. But even household-based surveys provide **biased HIV prevalence data**. Some persons will not be seen at household level because they are migrants or otherwise away from home, some persons will agree to be interviewed, but not tested for HIV, etc. Reniers & Eaton (2009) have shown that persons who know their HIV status are more likely to refuse consent for an HIV test during a population-based HIV survey. This biases the sample of persons who consent to HIV testing, to be less likely to be HIV positive. In the Malawi DHS, for example, the population level estimate for HIV needed to be upwardly adjusted because of the high refusal bias (Reniers & Eaton, 2009). *In the Zambia DHS of 2007, 18.4% of all women and 17.6% of all men refused to provide a blood sample although they had been interviewed. Refusal of testing was highest in the Copperbelt (W/M 25%) and in Northwestern (W 24%) and Central (W 23%) Provinces.*

In an epidemic in which HIV is mainly heterosexually transmitted, another way of monitoring the HIV epidemic is to assess **HIV prevalence in pregnant women** attending antenatal care (ANC) services. This works best if coverage of antenatal clinics for pregnant women is nearly universal and fertility is high enough that sexually active women are likely to present to an antenatal clinic every so often (WHO, 1988). In Zambia, approximately 97% of pregnant women attend ANC at least once during each pregnancy (DHS 2007 table 9.2). HIV can also be monitored among blood donors, STI patients and counseling and testing clients, but HIV prevalence in these sub-groups cannot be generalised to the general population.
ANC sentinel surveillance (ANCSS) surveys in Zambia have used **unlinked anonymous testing** of blood left over from routine syphilis testing of pregnant women, in order to minimise refusals and bias in the HIV prevalence data. The first ANCSS in Zambia was in 1990. Others were carried out in 1992, 1993, 1994, 1998, 2001-2002, 2004 and 2006-2007. The 1990, 1992 and 1993 surveys were not carried out in all provinces. Later surveys were carried out in all the provinces and could be used to assess trends in HIV prevalence in the whole country and its urban and rural areas.

The HIV prevalence data from the ANCSS, together the DHS HIV testing results, provide **population based HIV prevalence estimates for Zambia and enable HIV prevalence projections to be done.** The latest Spectrum application in 2008 was based on ANC data (rounds 1993, 1994, 1998, 2001-02, 2004 and 2006-07) calibrated with Zambia population based HIV prevalence data (DHS 2001-02 and 2007 DHS) (see Gouws *et al.*, 2008 on calibration). These databases were disaggregated by urban and rural residence. It is important to note that Dzekedzeke & Fylkesnes (2006) showed that Zambia's HIV prevalence estimates for the total general population 15–49 years derived from testing women and men in a population survey was similar to the estimate derived from testing women attending ANC clinics.

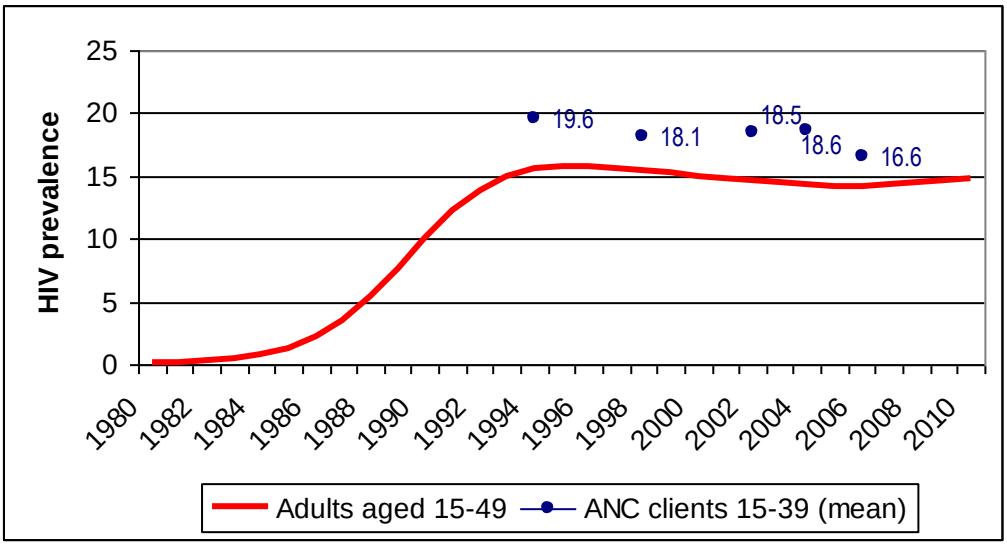
3.1. National trends in HIV prevalence

In the 2007 DHS, HIV prevalence in adults aged 15-49 years was 14.3%. In the 2006-07 ANCSS, the mean site prevalence for pregnant women aged 15-39 years in 21 sentinel sites was 16.6%.

The two data sources, DHS and ANCSS in conjunction with Spectrum estimates, allow the following observations regarding HIV prevalence trends:

The estimated adult HIV prevalence peaked in the mid-1990s at about 16% and has stayed above 14% ever since – see figure 5. Spectrum estimates of the HIV prevalence in adults aged 15-49 years suggest that the Zambian HIV epidemic has been fairly stable[8] over the last 15 years with a very modest decline after the initial peak prevalence. The Spectrum estimate for the adult HIV prevalence in 2009 is 14.6%. ANC prevalence levels are higher than estimated HIV prevalence levels in the general population. This is expected in countries with generalised epidemics (Gouws *et al.*, 2008)) and is described by Michelo *et al.* (2008) for Zambia.

Figure 5. Estimated adult and maternal HIV prevalence levels in Zambia (1980-2010)

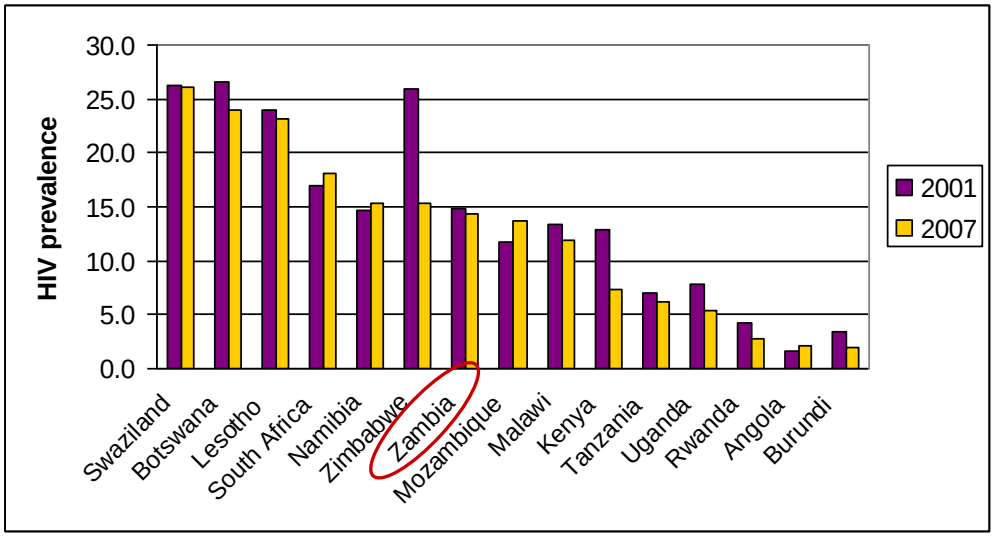


Sources: Red line: CSO (2008) table 3.1., HIV/AIDS projections report 2008. Prevalence trend in adult population aged 15-49 based on Spectrum estimates using ANC data (rounds 1993, 1994, 1998, 2001-02, 2004 and 2006-07) which were calibrated with Zambia population based HIV prevalence data (DHS 2001-02 and 2007 DHS). Blue dots: Mean HIV prevalence in ANC clients aged 15-39 years in 21 ANCSS sites in 1994, 1998, 2002, 2004 and 2006-07 (Mongu excluded - prevalence is 18.6 for both 2002 and 2004).

The adult prevalence level of 14.6% (Spectrum estimate for 2009) places Zambia in the mid-range of HIV prevalence of countries in the region - see figure 6. However, it is among the countries in the region with the smallest prevalence drop between 2001 and 2007 (Zambia: 0.5% decrease, Swaziland: 0.2% decrease).

[8] Stable HIV prevalence in a population used to arise from equilibrium between numbers of people joining the pool of infected (new infections) and leaving the pool of infected (deaths). The provision of life-extending antiretroviral treatment (ART) has resulted in an increasing number of people staying in the pool of infected people for a longer time, maintaining prevalence at a higher level than in the absence of ART.

Figure 6. HIV prevalence in adults by country, eastern and southern Africa (2001, 2007)



Source: Adapted from UNAIDS 2008 Report on the global AIDS epidemic. The HIV prevalence of Mozambique has been updated with the 2001 and 2007 estimates of the latest Spectrum application, the Kenyan prevalence has been newly added based on the 2008 DHS (no data in UNAIDS Global report), and the Zambian prevalence data have been updated with the estimated value for 2007 (AIDS projections 2008).

HIV prevalence in adults has declined, but only slightly. Table 1 shows prevalence levels for adult women and men in the 2001 and the 2007 DHS. The differences in HIV prevalence between 2001 and 2007 did not reach statistical significance for women only or men only, but was almost significant in women and men combined (p=0.051).

Table 1. HIV prevalence levels in adults aged 15-49 years and in young women aged 15-19 in Zambia (DHS 2001-02 and 2007)

	HIV prevalence 2001	HIV prevalence 2007	Chi^2 test (p-value)
Adult women (15-49)	17.8%	16.1%	3.14 (p=0.08)
Adult men (15-49)	12.9%	12.3%	0.45 (p=0.5)
Young women (15-19)	6.6%	5.7%	0.50 (p=0.48)
All	15.6%	14.3%	3.82 (p=0.051)

Sources: DHS 2001-02 table 14.12, DHS 2007, table 14.4

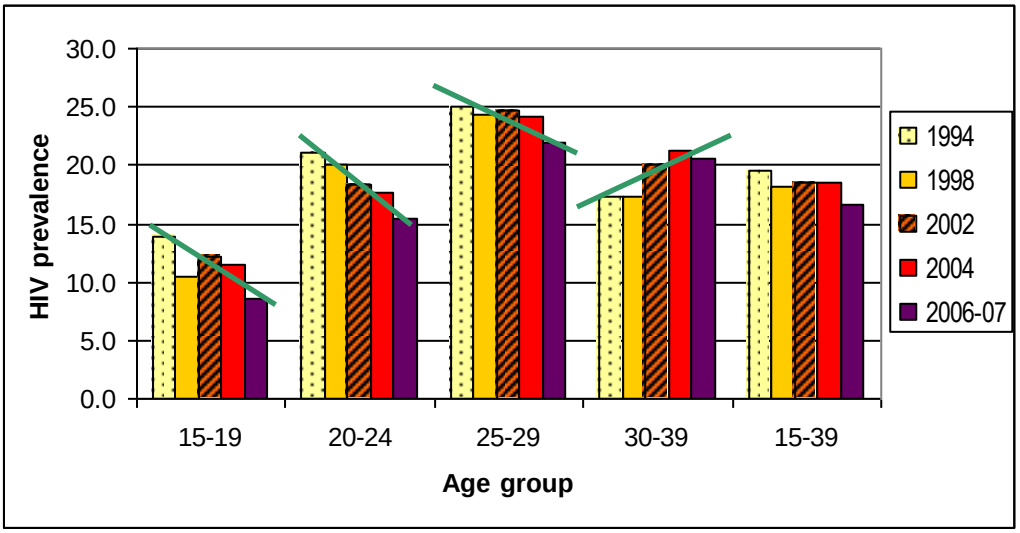
Mean HIV prevalence levels in ANC clients have been above 16% consistently since 1994 and recently started to decline (blue dots in figure 2). The mean site prevalence in the 2006-07 survey had dropped significantly to 16.6% from 18.6% (clients aged 15-39, 21 sites). The higher HIV prevalence in pregnant women compared to the general population is a common observation in countries conducting both population-based and ANC sentinel site-based surveillance, as mentioned above. The structure of the ANC client population may be changing - in the last ANCSS in 2006-07, more women knew their HIV status through the available CT programmes than ever before. This may result in lower HIV prevalence measured among pregnant women because women who know their positive HIV status may be less likely to fall pregnant due to HIV-related reduced fertility, the use of barrier methods to prevent HIV transmission, and increased family planning ('selection bias').[9]

[9] A recent longitudinal study in Malawi by Hoffman *et al.* (2008) found that, after learning their status, HIV-positive women are less likely to want children and more likely to use contraceptives.

ANC sentinel site-specific data further confirm the downward trend in maternal HIV prevalence. Between the 2004 and 2006-07 ANC surveillance surveys, 15 ANC sites (71%) showed a decrease in HIV prevalence and 6 ANC sites (29%) showed an increase. The greatest increase in HIV prevalence between 2004 and 2006-07 in any site was found in Kasama, Northern Province (+4.0%). The greatest decrease was found in Mansa in Luapula Province (-10.2%).[10]

Mean site HIV prevalence has dropped in ANC clients over the last 12 years – figure 7, 21 sites. The largest decreases in HIV prevalence were observed among pregnant women aged 15-19 and 20-24 years, see trend lines in figure 7 (decreases between 1994 and 2006-07 statistically significant with p<0.00001 in both age groups, decreases between 2004 and 2006-07 statistically significant with p<0.01 in both age groups). In pregnant women in their 30s, prevalence increased between 1994 and 2004 and a small reduction in HIV prevalence in this age group was reported only in the 2006-07 survey.

Figure 7. HIV prevalence trends in pregnant women in Zambia (1994 to 2006-07)



Source: Appendix 3 - ANCSS 1994-2006 Report, 21 sites excluding Mongu.

Zambia has been using HIV prevalence in women aged 15-19 years as a proxy for incidence (see also section 3.4. on incidence):

- In ANC clients aged 15-19, HIV mean site prevalence was 13.9% in 1994, dropped to 12.0% in 2002, and 8.5% in 2006-07 (figure 7, 21 sites). This suggests that HIV incidence is falling.
- A less pronounced downward trend in HIV prevalence of women aged 15-19 was observed in DHS data (all women aged 15-19 years, regardless of sexual activity). In the 2001-02 DHS, the HIV prevalence was 6.6% in this age group and 5.7% in the 2007 DHS (p=0.48, see table 1).[11]

Stringer *et al.* (2008) analysed HIV prevalence in ANC clients in Lusaka District and found a significant decrease between 2002 (24.5%) and 2006 (21.4%, p< 0.001). Among women <17 years of age, seroprevalence declined from 12.1% (N=635) to 7.7% (N=481, p=0.015). The authors concluded that in Lusaka District, maternal HIV prevalence was declining and the decline was most dramatic among women <17 years of age, suggesting a reduction in incidence in this important age group.

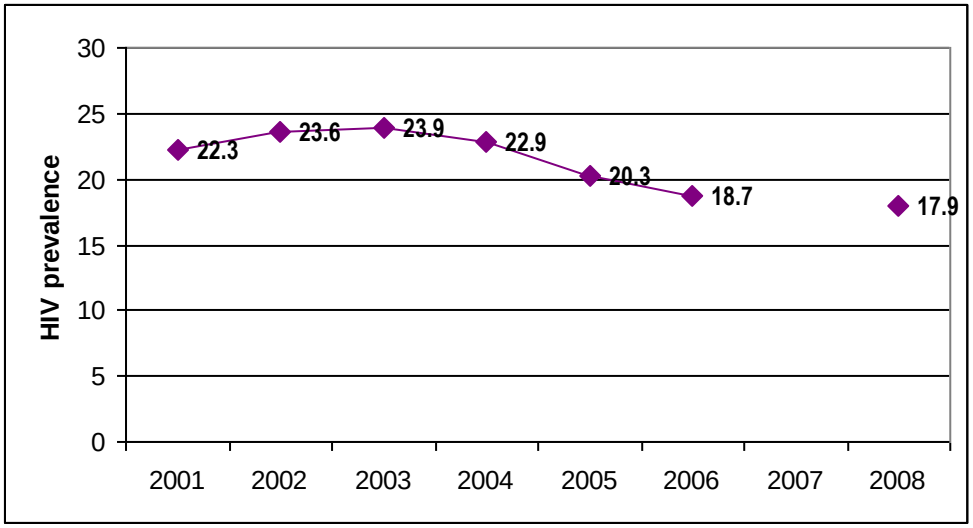
HIV testing data from PMTCT services for pregnant women support the interpretation that population prevalence has started to decrease – see figure 5. Prevalence data from HIV counseling and testing provided within the PMTCT programme can be used to track trends, but the data must be interpreted with caution. Pregnant women can choose not to undergo testing (Zambia has used an "opt-out"

[10] Mongu in Western Province also recorded a large decrease (-11.7%), but caution has been expressed about the validity of the data.

[11] This is contrary to what Michelo *et al.* (2006, 2008) found: That trends among young ANC clients under-estimate declines in HIV in the general population. The authors suggested that this difference is partly explained by educational attainment and delays in the age of first pregnancy among young women over time.

system in the PMTCT programme since 2006), the accessibility of PMTCT-related CT varies throughout the country, and there may be repeat testing during pregnancies which can affect these HIV prevalence statistics. The number of PMTCT testing sites has grown significantly year after year, and the number and profile of pregnant women undergoing HIV tests has changed (Reference). Therefore, the annual HIV prevalence levels are not strictly comparable. With these caveats in mind, figure 8 presents data from PMTCT sites. The percentage of women attending PMTCT clinics testing positive for HIV declined since 2003: it was 23.9% in 2003 and 18.7% in 2006.

Figure 8. Trends in HIV prevalence in PMTCT HIV testing sites in Zambia (2001-2008)



Source: Zambia Voluntary Counselling and Testing Services/Global Fund Impact Evaluation (data for 2001-2006). Monitoring and reporting form by WHO 2009 (data for 2008).

The national averages of HIV prevalence obscure sub-national (provincial, local) trends. Section 3.3.2 on geographic variations will discuss whether the epidemic has levelled off in all regions of the country.

The peak number of annual deaths due to AIDS among adults 15 years and older was in 2003 when an estimated 66,272 people died of AIDS. AIDS has profoundly changed mortality patterns of adults and children. In recent years, AIDS-related mortality has dropped due to increasing access to antiretroviral treatment (ART)[12] – see figure 9. The Spectrum model indicates **higher AIDS-related mortality in women than men**. In 2009, an estimated 23,554 women and 17,693 men will die of an AIDS-related cause.

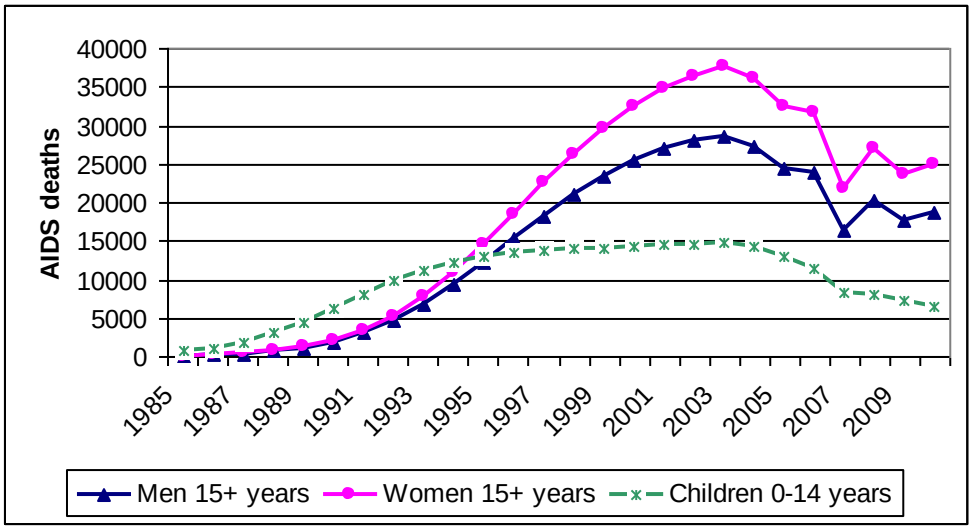
ART will affect population prevalence and transmission dynamics into the future. By December 2008, 219,576 people received ART in accordance with the approved treatment protocol (WHO 2009 Monitoring Form) -- 66% of the 331,502 people in need of ART (AIDS projections report 2008). The effect of ART is that *HIV prevalence is maintained at a higher level* by reducing AIDS-related mortality. Trends in prevalence data then become increasingly difficult to interpret, hence the interest in monitoring HIV incidence (see section 3.4).

On the other hand, without ART, viral load and risk of HIV transmission increase steeply at the late stage of infection. **ART reduces the infectiousness of sexually active people with advanced HIV infections** (Cohen *et al.*, 2007; Boily *et al.*, 2009), which reduces incidence. **Annex 2** provides an illustration of HIV viraemia in the body over time. The National ART Protocols of 2007 recommend starting treatment at a CD4 count of 200, or between 200-350 if there is more than one clinical stage 3 sign or repeated stage 3

[12] The number of adults and children with advanced HIV infection receiving ART increased from 143 in 2003 when the programme was launched (AIDS projections report 2008 table 4.1) to 219,576 by December 2008 (WHO 2009 Monitoring Form).

problems (protocol p9). Starting treatment earlier at CD4 count 350 contributes indirectly to HIV transmission reduction by lowering the infectiousness of the patient. There is, therefore, a convergence of individual[13] and population benefit in early recruitment of HIV-positive patients into ART programmes.

Figure 9. Estimated number of annual AIDS-related deaths in Zambia (1985-2010)



Source: CSO (2008) tables 3.2 and 3.3, HIV/AIDS projections report 2008

In summary, it can be said that HIV prevalence peaked in Zambia in the mid-1990's and recently has decreased, but the decrease between the 2001/02 and the 2007 DHS does not reach statistical significance. Increasing coverage of ART for those in need leads to lower AIDS-related mortality and contributes to a **stable HIV prevalence level at about 15%** in the adult population of Zambia.

3.2. Heterogeneity in HIV prevalence

Despite Zambia's overall generalised and stable epidemic, there is considerable heterogeneity – by age, gender, geography, migration, education, marital status, couples and sub-populations. This is important for prevention priorities and programming.

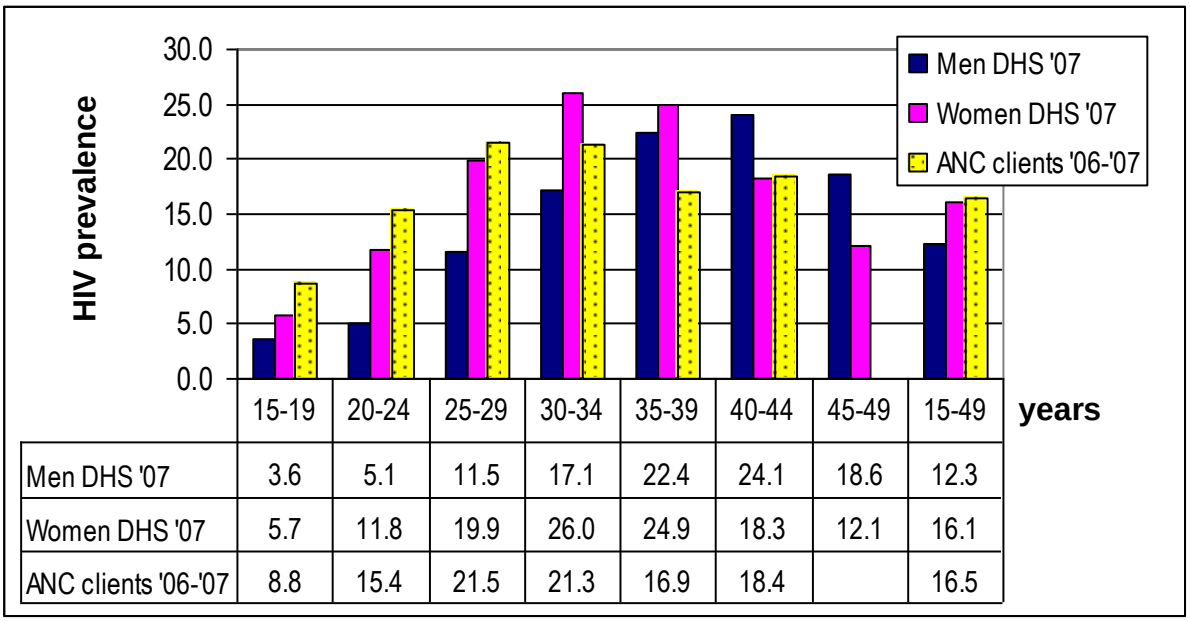
3.2.1. Age and gender-related heterogeneity

ADULTS

HIV prevalence in females is significantly higher than in men at younger ages, and significantly lower at older ages – see DHS 2007 data (figure 10) with table showing HIV prevalence levels. The DHS 2007 data on HIV prevalence display the typical age and gender pattern found in Southern African epidemics. In Zambia, women aged 15-19 years already have significantly higher HIV prevalence than their male age peers ($p<0.05$). The differential between female and male prevalence is very large in the age groups 20-24, 25-29 and 30-34 years ($p<0.0001$ in each age group). In the 35-39 year age group, male and female prevalence levels are similar ($p=0.3$). In the older age groups of 40-44 and 45-49, men have significantly higher HIV prevalence than women ($p<0.05$).

[13] Bendavid *et al.* (2008) found an additional gain in life expectancy of 5.3 months if ART was started at a CD4 count of 350 in an analysis for Southern Africa.

Figure 10. HIV prevalence by age and gender in Zambia (2006/2007)



	15-19	20-24	25-29	30-34	35-39	40-44	45-49	15-49
Men DHS '07	3.6	5.1	11.5	17.1	22.4	24.1	18.6	12.3
Women DHS '07	5.7	11.8	19.9	26.0	24.9	18.3	12.1	16.1
ANC clients '06-'07	8.8	15.4	21.5	21.3	16.9	18.4		16.5

Sources: DHS 2007, table 14.38; and ANCSS 2006-07, table A2 in appendix 3 (23 sites, Mongu excluded).
Note: Data table shows HIV prevalence levels. For ANC clients. no data were available for the age group 45-49 years. The 16.7% in the right hand column is for the ANC age group 15-44 years.

Figure 10 also shows the HIV prevalence data obtained in the latest ANC surveillance survey of 2006-07. As reported in 1998 by Fylkesnes and colleagues, ANC surveys overestimate female prevalence in younger age groups and underestimate HIV prevalence in older age groups. The prevalence level of all ANC clients combined is at 16.6% (ANCSS 2006-07), and is very similar to the 16.1% HIV prevalence level for women aged 15-49 years reported from the 2007 DHS (the refusal rate of 18% of interviewed women to provide a blood sample in the 2007 DHS needs to be borne in mind).

Overall, HIV prevalence in adult women aged 15-49 is 16.1%, significantly higher than prevalence in men aged 15-49 (12.3%, p<0.0001). Again, this is similar to other countries in the region. The DHS data on female prevalence suggest that women acquire HIV not just when young, but also later in their sexual lives.

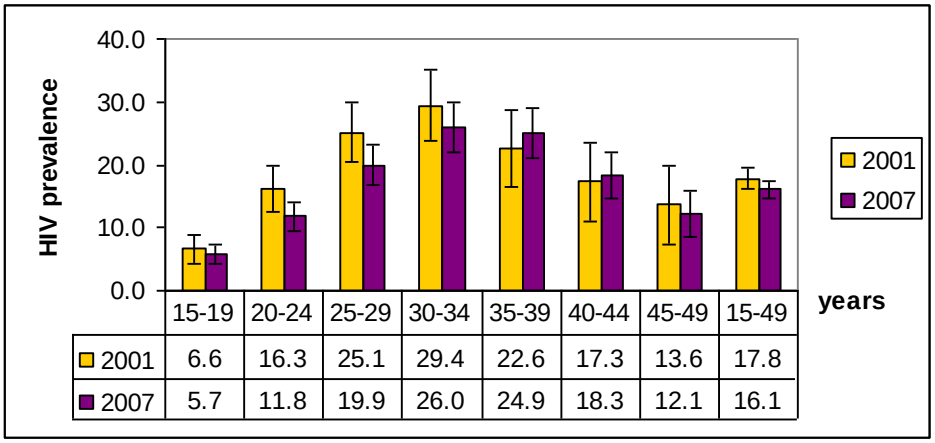
Trend analysis of HIV prevalence in 2001-02 and 2007 shows that overall, the proportion of PLHIV has decreased in the younger age groups up to 35 years of age and slightly increased in those aged 35-45 years – see figure 11.

The decreasing trend observed in young women does not apply to young men: men aged 15-19 years had an HIV prevalence of 1.9% in 2001-02, which increased to 3.6% in the 2007 DHS (not significant, p=0.1) – see figure 11. This increase in HIV prevalence in young men is also described by Gouws *et al.* (2008). Overlapping confidence intervals show that differences in HIV prevalence were not significant.

Comparing age-specific prevalence in 2001/2002 and 2007 shows how the HIV epidemic has matured over time: **the peak prevalence has shifted to older ages**, probably due to aging of cohorts, and infection levels among young women have declined. The female-to-male prevalence ratio for young people aged 15–24 years in Zambia fell from 3.7 in 2001/2002 to 1.6 in 2007 (fewer new infections amongst young women, more new infections amongst young men). The peak prevalence among adult women was slightly lower in 2007 than in 2001/02, and peaked at a slightly higher level and at an older age among men in 2007.

Figure 11. Trends in HIV prevalence in adults aged 15–49 in Zambia (2001-02, 2007)

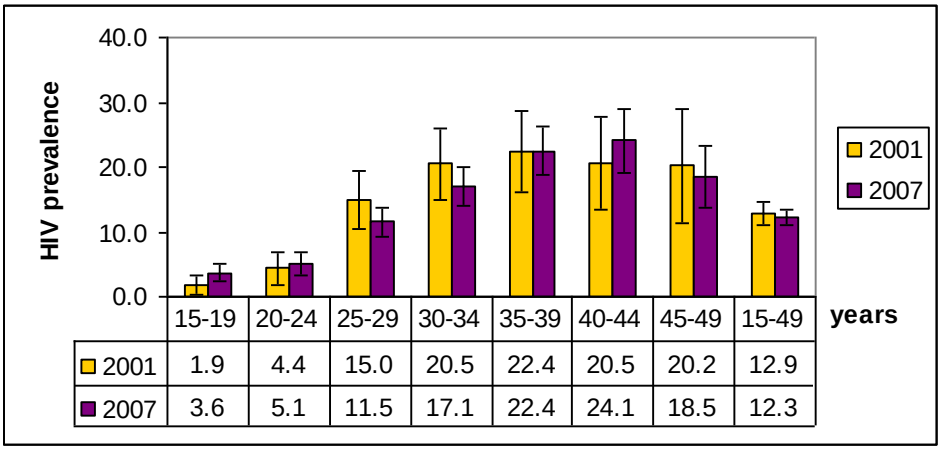
a) Women



	15-19	20-24	25-29	30-34	35-39	40-44	45-49	15-49
2001	6.6	16.3	25.1	29.4	22.6	17.3	13.6	17.8
2007	5.7	11.8	19.9	26.0	24.9	18.3	12.1	16.1

Sources: DHS 2001-02 table 14.11 and table B.2 for sampling errors; DHS 2007 table 14.38 and table B.2 for sampling errors.

b) Men



	15-19	20-24	25-29	30-34	35-39	40-44	45-49	15-49
2001	1.9	4.4	15.0	20.5	22.4	20.5	20.2	12.9
2007	3.6	5.1	11.5	17.1	22.4	24.1	18.5	12.3

Sources: DHS 2001-02 table 14.11 and table B.2 for sampling errors; DHS 2007 table 14.38 and table B.2 for sampling errors.

CHILDREN

HIV prevalence in children aged 0-14 years follows a downward trend after reaching a maximum in about 2004. The Spectrum model estimates that a peak level was reached in 2004 at 89,928 HIV positive children. The estimate for 2009 is 82,911 HIV infected children. The bulk of these infections arise from MTCT, and the scaling up of the PMTCT programme is steadily reducing the estimated number of infected children.

Studies involving children have reported the following measured HIV prevalence levels:

- 0.3% in school children in 1989 (in Mansa, see Perine *et al.*, 1989)
- 2.6% in children from a peri-urban area (see Mwandu *et al.*, 1992)
- 9.4% in children under 5 years of age in 1990-91 (children admitted to the Accidents & Emergency Department of the University Teaching Hospital Lusaka, see Chintu *et al.* 1995).
- 10.7% in children under 15 in 1990-91 (control children in a trial, UTH Lusaka, see Chintu *et al.*, 1993)
- 9.6% in children aged 1 month-15 years in 1991-1992 (control children, UTH Lusaka, Luo *et al.*, 1994)
- 12.5% in children under 5 years of age in 1994 (control children, Lusaka, see Baboo *et al.*, 1999)
- 5.5% in children under 15 years of age in 1994 (Lusaka, see Muyanga, 1994)

- 19% in 473 children hospitalized with the clinical diagnosis of measles at the UTH, Lusaka, (23% were incompletely immunized; coverage of measles vaccine among children who were at least 9 months old was 59%) (Setse *et al.*, 2006).

Mortality figures for children:

- Among a cohort of HIV-positive children aged 1-14 years in Lusaka, mortality was 27.2 per 100 child years at risk in the absence of ART (Walker *et al.*, 2006). The strongest baseline predictors of mortality were weight-, height-, and body mass index-for-age; CD4 count; haemoglobin; current oral candidiasis; current/prior malnutrition; and number of previous hospital admissions (all $p<0.001$).

AIDS-related mortality in children aged 0-14 years peaked in 2003, according to Spectrum estimates – see figure 9. In 2003, 14,681 children died of an AIDS-related cause; the projected number for 2009 is about half (7,282). The number of new infections in children began to fall by 1997 – much earlier than among adults (CSO, 2008, projections report). The initial reduction would have been due to a decline in fertility which would have been precipitous among women with HIV, and then enhanced after 2003 when the PMTCT programme was scaled up.

Childhood cancers have increased with the HIV epidemic - Chintu *et al.* (1995) assessed the effect of the HIV epidemic on the epidemiology of cancers in children younger than 14 years in a retrospective study at the UTH in Lusaka. Cancers occurring before and after the onset of the HIV epidemic were compared, and a significant increase in the occurrence of total childhood cancers was found. This was mostly due to a highly significant increase in the incidence of paediatric Kaposi's sarcoma ($p<0.0001$), which is causally related to HIV, and a significant increase in the incidence of retinoblastoma ($p=0.02$). There was also a gradual and sustained increase in the incidence of non-Hodgkin's lymphoma, nasopharyngeal carcinoma, and rhabdomyosarcoma, and a significant reduction in the incidence of Burkitt's lymphoma.

3.2.2. Geographic variations

Provincial and district HIV prevalence levels show large variation – see figure 12 and **Annex 3**. The DHS 2007 data show that the Zambian HIV epidemic is geographically heterogeneous with **provincial prevalence levels ranging from 7% to 21%.** The Northern and Northwestern Provinces have the lowest HIV prevalence levels at just below 7%. These are areas of low population density, with inhabitants who are mostly rural and have the highest levels of extreme poverty in the country.[14] Important other co-factors, like the relatively low proportion of adults reporting multiple partners in Northern Province, and the relatively high male circumcision level in Northwestern Province, are presented in other sections of the report. In contrast, Lusaka Province as well as Central Province and the Copperbelt, much more densely populated provinces with large urban settlements, have very high HIV prevalences of 17% or higher.

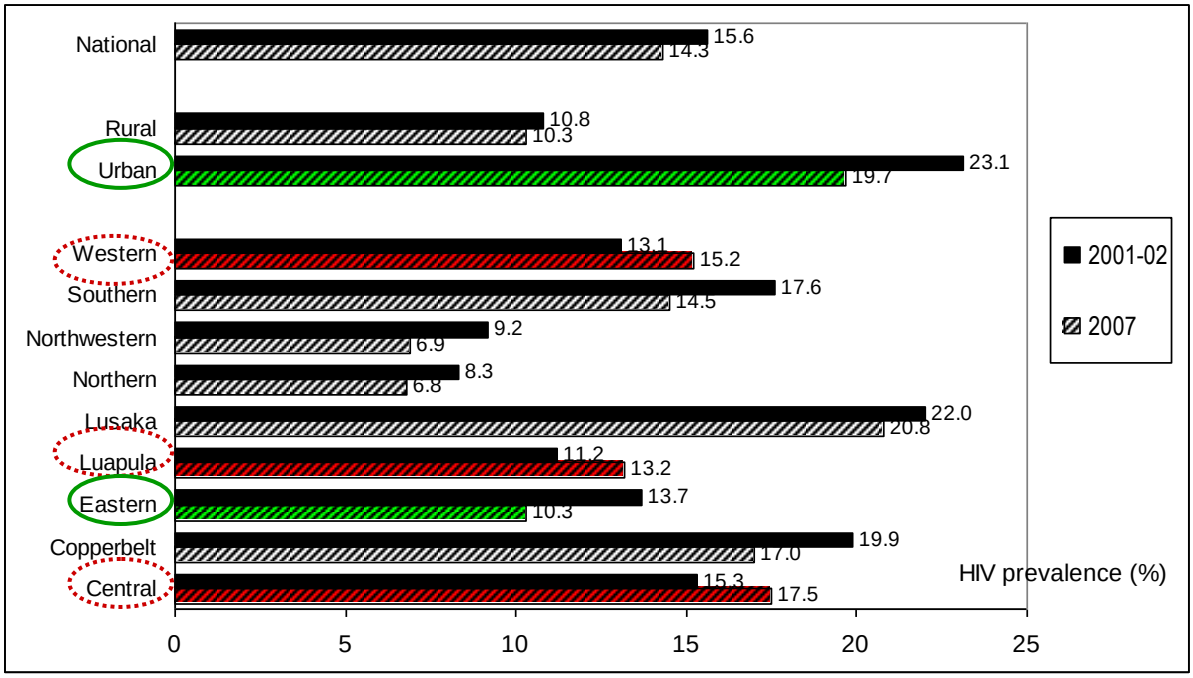
There is equally a large and highly significant prevalence differential between residents of urban and rural areas – see figure 13. The DHS 2007 found that people living in urban areas are almost twice as likely to be HIV positive as people living in rural areas (19.7% vs. 10.3%, $p<0.00001$).

Comparisons between HIV prevalence levels in 2001-02 and 2007 show that the epidemic is contracting in urban areas with a significant prevalence decrease of 3.4% in the time period ($p<0.01$) – see figure 12, green bar. The only other significant prevalence drop is in Eastern Province ($p<0.05$). HIV prevalence in three provinces was higher in 2007 than in 2001-02 (Central, Luapula, Western – figure 9 red bars), but the increases did not reach statistical significance. The rural HIV prevalence is virtually unchanged between the two DHSs.

[14] The CSO Living Conditions Monitoring Survey reports that 64% and 57% of the population in Northern and Northwestern Provinces were extremely poor in 2006.

This contraction of the urban epidemic is also supported by figure 22, which shows HIV prevalence trends from 1994 to 2006-07 in ANC clients 15-19 years, the group used as incidence proxy (Spectrum modelled HIV incidence data not available by urban-rural). In figure 22, mean HIV prevalence has decreased faster in young ANC clients in urban areas compared to rural areas (7% and 3% decrease between 1994 and 2006-07, respectively). However, HIV prevalence remains significantly higher in urban areas, where there is a concentration of populations with key risk factors - higher migration, higher education and wealth. More in-depth multivariate analysis needs to be conducted in order to better understand the different dynamics of the urban and rural epidemics.

Figure 12. HIV prevalence levels by geographic zone in adults in Zambia (2001-02 and 2007)



Source: DHS 2001-02 table 14.11 and DHS 2007 table 14.4.
Colours: Green for significant prevalence decrease in 2007, white for decrease (not significant), red for increase (not significant)

Sex specific HIV prevalence also displays large geographical heterogeneity – see figure 13.
DHS 2007 data for women: HIV prevalence levels range from 7.7% (Northern Province) and 9.1% (Northwestern Province) to 22.0% (Central Province) and 22.4% (Lusaka Province). A woman living in Lusaka Province is on average almost three times more likely to be HIV positive than a woman in the Northern Province.

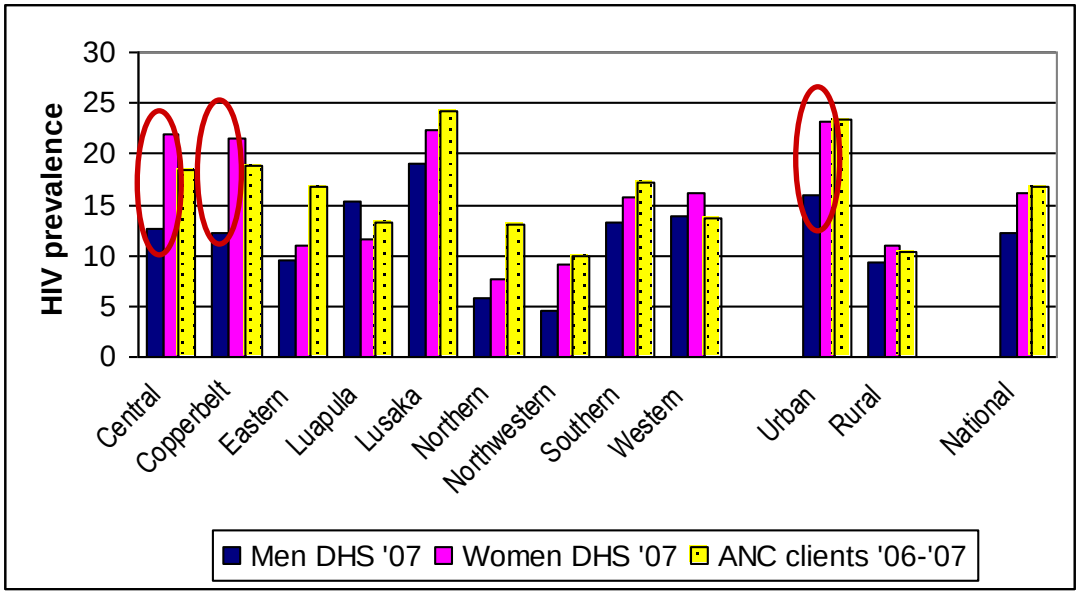
DHS 2007 data for men show the lowest prevalence in the same two provinces - Northern and Northwestern Provinces. Highest prevalence levels were found in Lusaka Province (19.0%) and Luapula (15.3%).

Large differentials of >9% between men's and women's HIV prevalence were found in Central Province and the Copperbelt – see figure 13. In all provinces except Luapula, female prevalence levels (DHS data) are higher than male prevalence levels (Luapula Province: differential not significant, p=0.12). In three provinces (Central, Copperbelt, Lusaka), female prevalence is above 20%. In the majority of provinces, prevalence levels in pregnant women (ANCSS 2006-07 data) are higher than prevalence levels of women in the general population measured by the DHS, which is - as stated previously - due to the different methodology of the two survey types. Also, there are large prevalence differences between sentinel sites in a single province (see figure 14).

HIV prevalence is significantly higher in urban women than urban men – see figure 13. While sex specific prevalence levels are similar in rural areas, they differ significantly in urban areas with 23.1% of

women infected compared to 15.9% of men (p<0.00001). Interestingly, female urban and rural prevalence levels measured in the ANCSS 2006-07 closely reflect the levels measured in the DHS 2007. In these datasets, the ANC surveillance system with its sentinel sites in all provinces, therefore seems to represent well the rural-urban HIV prevalence pattern in the general female population.

Figure 13. HIV prevalence levels by geographic zone in Zambia (2006/2007)



Sources: DHS 2007, table 14.4; and ANCSS 2006-07, tables A2 and A7 in appendix 3. ANC data include 23 sites (Mongu data not included). **Note:** Age groups – DHS '07: 15-49 years, ANCSS '06-'07: 15-39 years.

HIV prevalence in urban men decreased significantly between 2001-02 and 2007 by 3.3% – see table 2. HIV prevalence also decreased in urban women in this time period (prevalence differential 3.2%, difference not reaching statistical significance, p=0.06). In contrast, HIV prevalence in rural women and men stayed at similar levels (a small decrease in women, small increase in men).

Table 2: HIV prevalence levels in urban and rural women and men in Zambia (2001-02 and 2007)

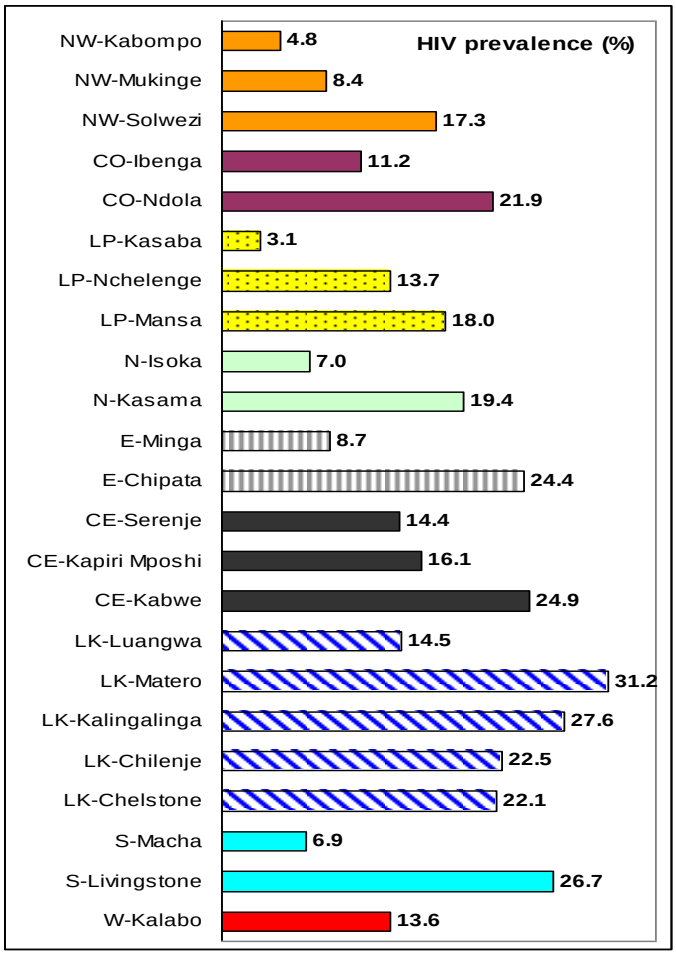
	2001-02	2007	chi^2 test (p-value)
Urban women	26.3	23.1	3.52 (p=0.06)
Urban men	19.2	15.9	4.04 (<0.05)
Rural women	12.4	11.0	1.81 (p=0.18)
Rural men	8.9	9.4	0.25 (p=0.62)

Sentinel site-specific data on maternal prevalence demonstrate the large variation of epidemic levels in the country (figure 14). In the 23 ANC sentinel sites (Mongu excluded), prevalence levels vary greatly between 3.1% in Kasaba, Luapula Province and 31.2% in Matero, Lusaka Province (ANCSS 2006-07 data).

Zambia is one of the most urbanised countries in Africa; almost 39% of the population live in urban areas (2000 population census).

Epidemic dynamics in the rural and urban areas are very different – see figure 15. Trend analysis of the ANC prevalence levels measured in 21 sites over the last 12 years suggests that **Zambia has two distinct epidemics**. In the 11 urban sites (Mongu excluded), the long-term maternal prevalence levels are in the 20-30% band (black lines in figure 12), whereas in the 9 rural sites, the prevalence levels are in the 5-15% band (green lines). One sentinel site, Kapiri Moshi, is classified as 'semi-rural' and the prevalence curve for Kapiri Moshi lies in between the rural and the urban prevalence bands (black dotted line).

Figure 14. HIV prevalence by ANC sentinel site in Zambia (2006/2007, clients aged 15-39 years)

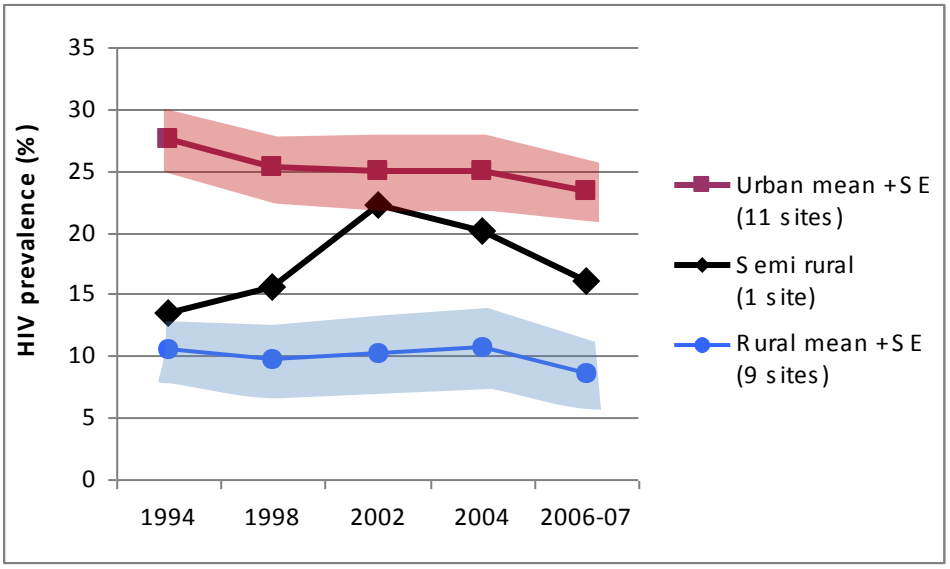


Source: ANCSS 2006-07, table A2 in appendix 3. Mongu excluded.

Median site prevalence in the urban sites was 22.5% in 2006-07 (down from 26.2% in 2004 – red line figure 15), and in the rural sites it was 8.4% (down from 11.0% in 2004 – blue line). In Chipata and Macha, prevalence has declined continuously since 1998, and in Kapiri Mposhi, Kabwe, Nchelenge, Chilenje and Kalabo prevalence declined after 2002. In the rest of the sites in which prevalence declined, this happened after 2004. The increase in prevalence in three out of the four sites in Lusaka Province could be partly due to the effect of ART.[15] The recent increases in prevalence in Solwezi and Kasama (which both reported "rural-type" prevalence levels a few years ago), but also Serenje and Matero could reflect growing epidemics. Overall, ART access is probably better in urban areas, especially in Lusaka City (NAC, 2009, talks about "glaring inequalities between urban and rural areas" in service provision), and this will influence HIV prevalence levels especially in the urban ANC sites as explained earlier. The urban-rural HIV prevalence pattern and urban centres are also shown in a map in **Annex 3.**

[15] In 2005, 47% of all ART patients were from Lusaka Province (JAPR 2006, p98); by 2008, Lusaka Province had ART coverage >100%, suggesting that people in need of ART residing in other provinces receive treatment in Lusaka (JAPR, 2008 p36).

Figure 15. HIV prevalence in rural, semi-rural and urban ANC sites (1994 to 2006-07)

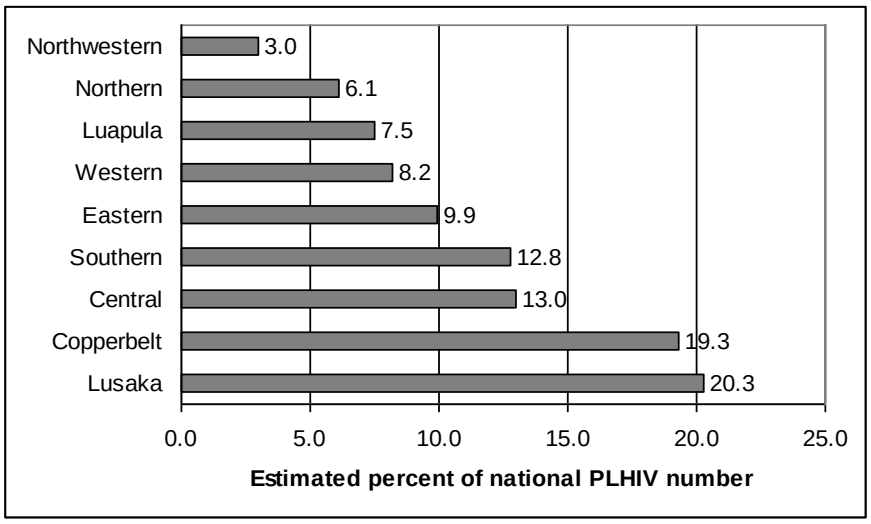


Source: Derived from ANCSS Report 2006-07, table A7, appendix 3. Data for Mongu are not shown.
Notes: Coloured areas indicate standard error of the mean site prevalences in urban and rural sentinel sites. Only Kapiri Moshi is classified as a semi-rural site.

Zambia's urban and rural HIV epidemics show significant differences in their scale and epidemic trend. Urban residents are significantly more likely to be HIV positive. While the urban epidemic has been contracting, especially among urban men, the rural epidemic only shows a minor prevalence decrease between the two last DHSs. In 2007, HIV prevalence was significantly higher in urban women than urban men. In contrast, in rural areas, gender-specific HIV prevalence levels are similar.

The estimated proportion in each provinces of the total number of people living with HIV (PLHIV) in Zambia varies between 3% (Northwestern) and 20% (Lusaka) – see figure 16 and footnote of figure on methodology. Modelled estimations of the number of PLHIV in each province of the country suggest that there is a high variation in the size of the problem posed by HIV and hence the needs for secondary prevention, treatment, care and support provision for PLHIV in each province. Forty percent of PLHIV are in the two provinces of Copperbelt and Lusaka, where prevention with positives (PwP) activities such as prevention counselling for PLHIV therefore seem a key priority.

Figure 16. Estimated provincial proportions of the number of people living with HIV in Zambia (2007)



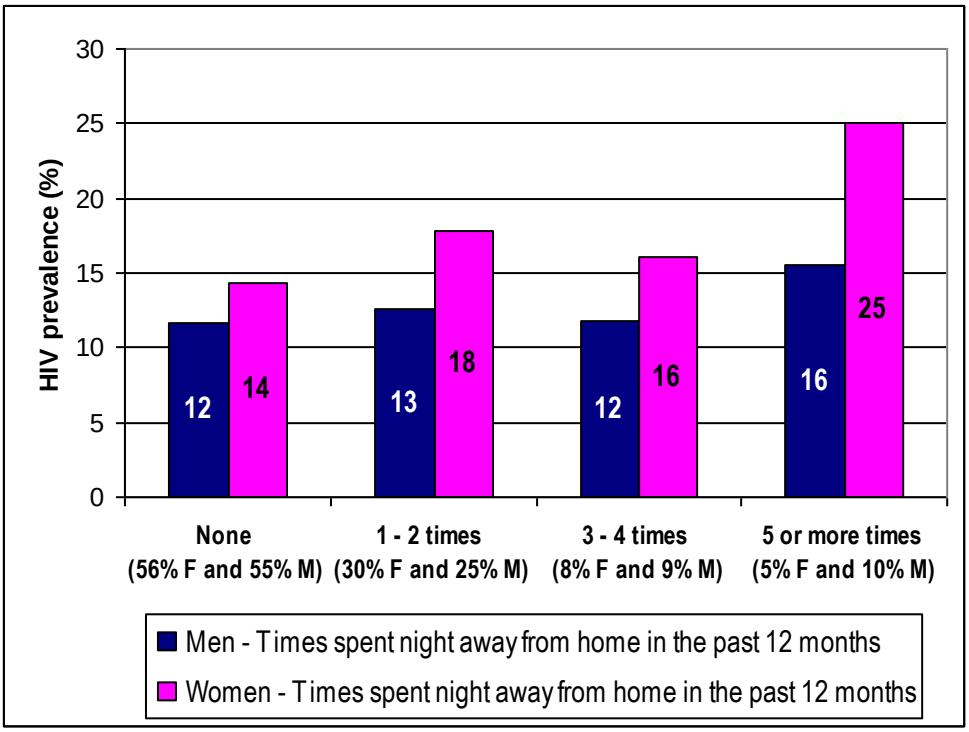
Sources: Estimations were done using the provincial adult HIV prevalence data from the 2007 DHS and the projected mid-year population in each province in 2007 from the CSO Population Projections Report (http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf)

3.2.3. Heterogeneity across mobility patterns

Throughout the world, people with high mobility are at greater risk for HIV than people who are less mobile (Wolffers *et al.*, 1995; Lurie *et al.*, 2003). A model on the impact of migration on the HIV epidemic identified short term migration, i.e. frequent migrant return, as a crucial risk factor (Coffee *et al.*, 2007, using South African data). The model also predicted that migration primarily influences HIV spread **by increasing high risk behaviour**, rather than by connecting low risk areas with high risk areas. It has been shown in the region that mobility and migration is associated with higher HIV both in people who are mobile (e.g. Nunn *et al.*, 1995 in Uganda; Chirwa, 1997 in Malawi) and their partners back home (Lurie *et al.*, 2003 in South Africa; Kishamawe *et al.*, 2005 in Tanzania).

In Zambia, being away from each other poses higher risk for HIV infection. Figure 17, for example, shows that women who often travel and spend the night away from home have significantly higher HIV prevalence[16]. This was to a lesser extent also the case for men, and is due to higher risk behaviour by the travelling partner, or the partner who stays at home. The DHS 2007 also found that women who were sometimes away from home in the last 12 months for one month or more at a time had higher HIV prevalence (19%) than those who were not away for such longer periods (14%, $p<0.01$), but this was not the case for men. Overall, the pattern of HIV prevalence and mobility of women (DHS 2007 data) suggests that more frequent stays away from home increases women's risk of HIV infection. Further analysis of the DHS data is recommended, in order to better understand sexual behaviours of women and men who travel and of their respective partners.[17]

Figure 17. HIV prevalence by number of times spending the night away from home in Zambia (2007)



Source: DHS 2007, table 14.5

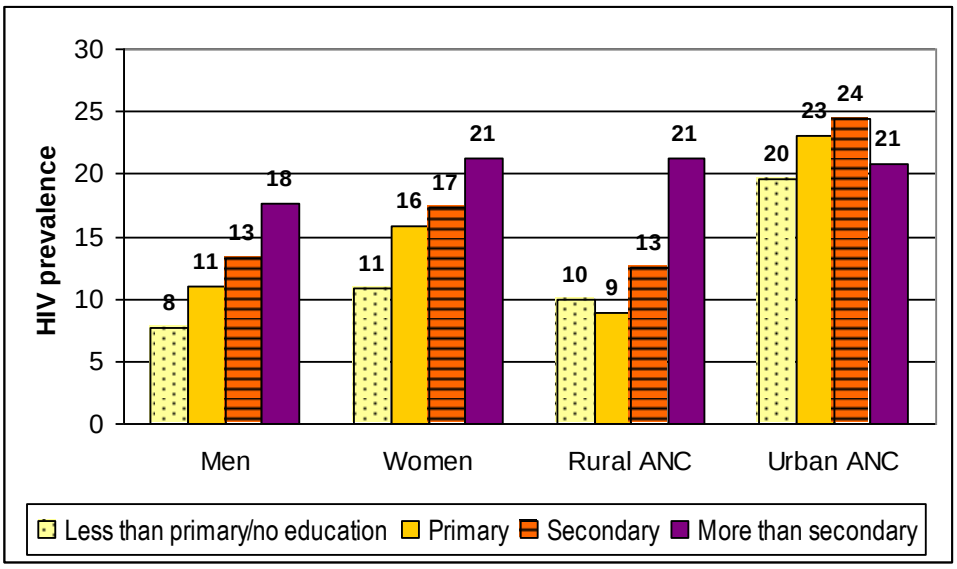
[16] The question in the 2007 DHS was: "In the last 12 months, on how many separate occasions have you travelled away from your home community and slept away?"

[17] Possible lines of enquiry are: Do partners of individuals who often travel tend to report more multiple partners than partners of individuals who do not travel? Do those travelling themselves report more multiple partners? What are condom use rates in the different groups? Does age explain some of the association between HIV prevalence and travelling?

3.2.4. HIV and education status

Men and women with higher education have higher HIV prevalence than those with lower education – see figure 18. In the DHS 2007 data, the higher educational attainment, the higher the risk of HIV infection. The ANCSS 2006-07 also found this positive association between education and HIV in rural women, and to a lesser extent in urban women. More analysis is needed to understand the factors associated with having more education that increase HIV risk. A possible explanation is that rural women with higher education are more likely to have a history of travel and staying away from home for their studies or professional work (see previous figure showing a positive association between frequent stays away from home and HIV infection in women). Also, those with higher educational attainment are generally older than those with less education, and age may confound the HIV-education association.

Figure 18. HIV prevalence by education status in Zambia (2006-2007)



Sources: DHS 2007, table 14.4; and ANCSS 2006-07, tables A3 and A4 in appendix 3.
Note: Age groups – DHS '07: 15-49 years, ANCSS '06-'07: 15-44 years.

Hargreaves *et al.* (2008) looked at time trends in the association between educational attainment and risk of HIV infection in African populations. Overall, **HIV prevalence fell more consistently among highly educated groups than among less educated groups**, in whom HIV prevalence sometimes rose while overall population prevalence was falling. Zambian data from a series of three population-based HIV surveys conducted in 1995, 1998 and 2003 in Kapiri Mposhi and Chelstone/Lusaka are shown in **Annex 4**. The main findings in youth aged 15-24 years were:

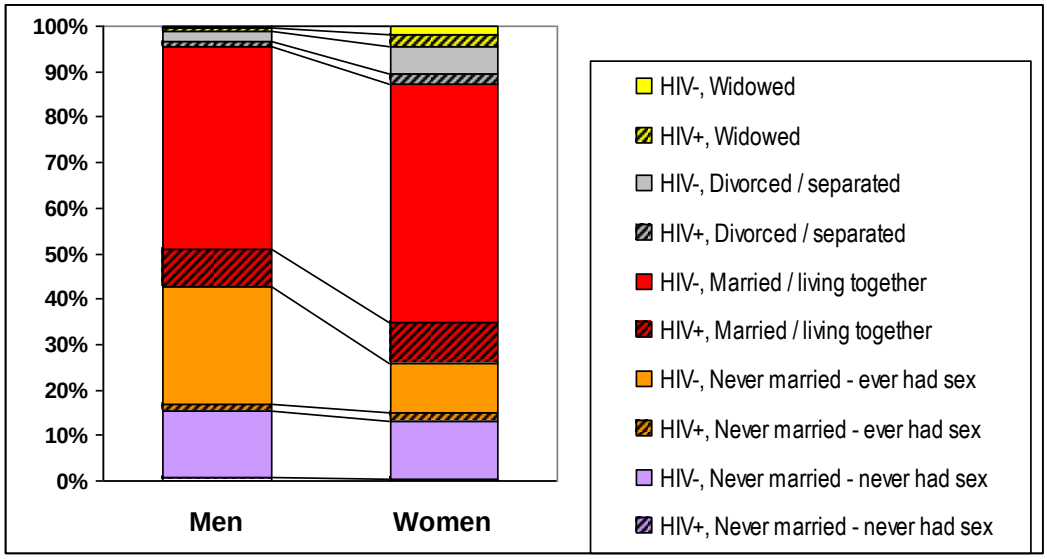
- Urban males: there was no association in 1995 and 1999, but **by 2003 there was a lower risk of infection among the most educated.**
- Rural males: Educational attainment was not associated with risk of infection in any survey year.
- Urban females: There was no association in 1995 and 1999, but **by 2003 a lower risk was seen among the most educated women.**
- Rural females: There was no association in 1995 and 2003, but a higher risk of infection among the most educated women in 1999.

3.2.5. HIV, marital status and type of marital union

People "married or living together" are the largest group with the most HIV infected people; HIV prevalence in these men is 16% (higher than average for men) and 15% in women (slightly lower than average for women) – see figure 19 (DHS 2007 data). Although HIV prevalence of widowed and

divorced or separated men and women is much higher[18], there are relatively few of these persons in the community (5% M and 13% F). Among never married women who have had sex ('premarital sex'), HIV prevalence is 15%.

Figure 19. HIV prevalence, marital status, and population share for men and women age 15 and older in Zambia (2007)



Source: DHS 2007 table 14.5

Few people in Zambia are in formal polygynous unions (4% M and 9% F). HIV prevalence among men in these unions is slightly higher (19%) than men in monogamous unions (16%) (not significant, p=0.08).

3.2.6. HIV in married and cohabiting couples

In almost one in five couples, either one or both people are HIV positive.[19] In the 2007 DHS, among couples living in the same household,

- 8% of couples were concordant positive (M+ F+)
- 11% of couples were discordant (6.6% M+ F- , 4.6% F+ M-)
- 81% of couples were concordant negative (M- F-)

One or both people were HIV positive in nearly half the couples in the Zambia Emory HIV Research Project (ZEHRP), a cohort study recruiting couples at a couple VCT centre from 1994 to 1998 in Lusaka (Kempf *et al.*, 2008):[20]

- 26% of couples were concordant positive (M+ F+)
- 23% of couples were discordant (11% M+ F-, 12% F+ M-)
- 51% of couples were concordant negative (M- F-)

The DHS 2007 also reported higher infection levels amongst couples in Lusaka Province (16% M+ F+, 18% M+ F- or F+ M-, see next figure) than the national average.

[18] HIV prevalence levels - Men: divorced/separated (33%), widowed (63%, small sample size); - Women: divorced/ separated (29%), widowed (53%)

[19] The term "HIV positive couples" is used to include concordant (both partners HIV positive) and discordant (one of the two partners HIV positive) couples.

[20] The couple VCT was conducted as a recruitment mechanism for studies of HIV transmission and the natural history of HIV disease (Kempf *et al.*, 2008). Eligibility criteria for enrolment in the study included: Cohabitation in a sexual relationship for at least 6 months and residence in Lusaka at the time of enrolment; Discordant HIV ser-status between members of the couple; Age 18-48 years for women and 18-65 years for men (Coldiron *et al.*, 2008). Couples were enrolled upon written informed consent.

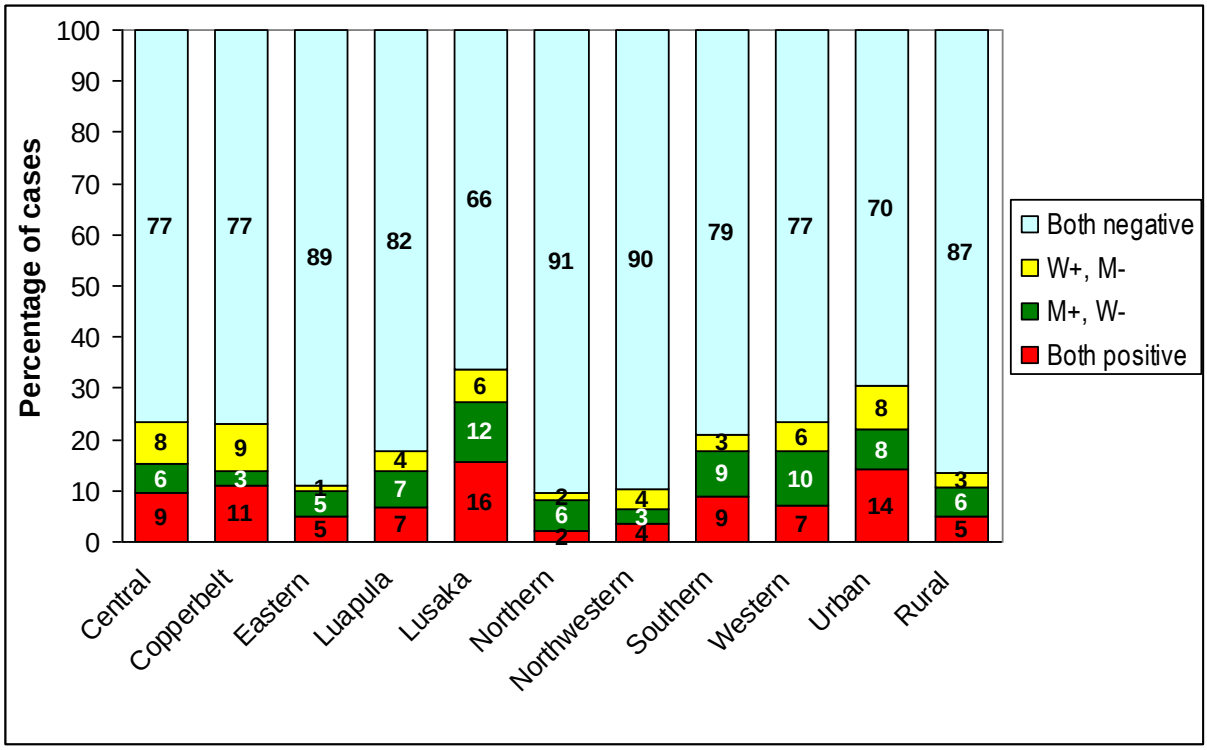
Geographical analysis of HIV prevalence in HIV infected couples shows the following (DHS 2007 data) – see figure 20:

- **The percentage of couples with one or both HIV positive** was highest in Lusaka Province (34%) and lowest in Northern Province (10%), and was also high in urban couples (31%).
- **Discordance in HIV positive couples** was highest in Northern Province (79%) and lowest in the Copperbelt (52%), but numbers in each category were small.
- **In Northern and Eastern Provinces, more than three quarters of all discordant positive partners were men.** In rural areas, 69% of discordant couples were male positive and female negative.
- **In the Copperbelt, more than three quarters of all discordant positive partners were women.** Copperbelt has large seasonal and transient populations (pseudo regular couples with low condom use and higher than average level of female sex work).

Couples with large age gaps between partners have a higher risk of being HIV positive, as illustrated in figure 21 (figure 11 showed that male HIV prevalence peaks about 10 years later than female HIV prevalence). More of the 19% of couples in which the man is 10 or more years older than the woman are HIV positive than where the age difference is smaller. For the 4% of couples where the woman was older, HIV infection was also slightly higher due to the percentage of HIV positive females (F+ M-).

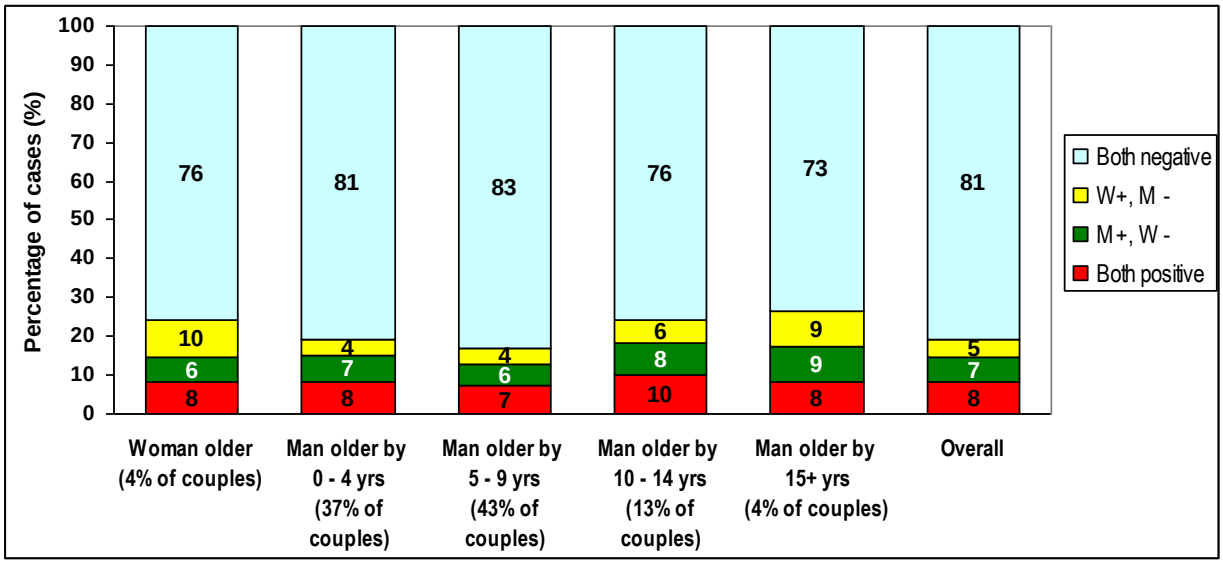
The HIV negative partner in a discordant couple has a high risk of being infected by his/her partner. Trask *et al.* (2002) used molecular epidemiology analysis to determine the occurrence of linked and unlinked infections with a high level of certainty in a prospective cohort of discordant couples in Lusaka, Zambia. The results showed that of 149 cohabitating couples assumed to have transmitted to each other, 129 (87%) were molecularly confirmed as epidemiologically linked. In contrast, viruses from 20 couples (13%) were only distantly related, thus ruling out transmission between the two partners.

Figure 20. HIV prevalence among couples living in the same household by geographic zone, in Zambia (2007)



Source: DHS 2007 table 14.12.

Figure 21. HIV prevalence among couples living in the same household by age gap, in Zambia (2007)



Source: DHS 2007 table 14.12

3.2.7. HIV in sub-populations

At the time of this review, few HIV prevalence data were available from sub-populations including those likely to be at high risk of acquiring HIV or of transmitting HIV – see Table 3. The BSS studies done in the past have sometimes measured prevalence of other STIs (gonorrhoea, chlamydia, trichomoniasis and syphilis), but not HIV. With the available HIV prevalence data on higher risk groups, it is not possible to determine HIV prevalence trends over time.

Table 3: HIV prevalence data in sub-populations

Population	HIV prevalence	Sources
Female sex workers	69% (Ndola, 1987-88, N=319) 65% (Ndola, 2005, N=283)	Buve *et al.* 1991 Kamanga *et al.* 2005
STI patients	Major urban sites: 57% (1990), 64% (1991), 58% (1993) Outside major urban sites: 45% (1990), 43% (1991)	UNAIDS ESF 2008[21]
TB patients	Lusaka site: 61% (1990), 83% (1999) Rural site: 52% (1990)	UNAIDS ESF 2008
Men having sex with men	33% (2006, N=641)	Zulu *et al.*, 2006
Prisoners	Kitwe, Kabwe, & Solwezi (prison sites Kamfinsa, Mukobeko, & Solwezi): 27% (1998-99, N=1566)	Simooya *et al.*, 2001
Police recruits	15.4% (Lusaka, 1991, N=312) 11.5% (Lusaka, 1992, N=87)	Msiska, R., 1992
Refugees	Kala Camp: 3.3% (2006, N=300), Mwange Camp: 2.4% (2006, N=295) Maheba Camp: 3.9% (2006, N=304)	ANC Sentinel Survey Report 1994-2006

Zambia has not systematically monitored HIV prevalence in populations usually at high risk of HIV, such as sex workers, men who have sex with men (MSM), prisoners, men in uniform and transport workers. The available HIV prevalence data confirm that female sex workers, STI and TB patients, MSM and prisoners are disproportionately infected with HIV in Zambia. Refugees assessed in three camps in

[21] Source: http://www.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_ZM.pdf, accessed 9 March 2009.

2006 were found to have prevalence levels well below population prevalence. The review could not identify any HIV prevalence data from transport workers.

The most striking heterogeneities in the Zambian HIV epidemic are:

Significantly higher HIV prevalence in

- adult women, young women and urban women compared to adult men, young men and urban men
- women often travelling and spending the night away from home, compared to women staying at home
- men and women with higher education compared to those with no or little school education
- urban residents compared to rural residents
- urban couples compared to rural couples
- couples with large age gaps compared to couples of similar ages

Very large provincial and sentinel site differences in HIV prevalence

Very large differences in the provincial proportions of all PLHIV of Zambia

3.3. Trends in STI prevalence

3.3.1. Laboratory confirmed STIs

General adult population and ANC client data

In the 2007 DHS, 4% of women and 5% of men age 15-49 in Zambia were found to have syphilis. Of all eligible respondents aged 15-49 who were tested for syphilis, 7% were found to be positive on the screening test (RPR) and 4% were found to be positive on both the screening test and the confirmatory test (TPHA). In the 2001-2002 DHS, 9% of respondents had tested positive for syphilis on the screening test and 7% tested positive on the confirmatory test. Although **prevalence of syphilis declined between the 2001-02 and the 2007 surveys**, the difference is not statistically significant.

The population testing positive on both syphilis tests rises rapidly with age, from a low of 1% in the 15-19 age group to a peak of 8% in the 30-34 age group, then falls to 3% in the 35-39 age group, and varies among older age groups (2007 DHS table 14.17). The pattern varied slightly for women and men, peaking in the 40-44 age group for men.

Syphilis prevalence is similar for women in urban and rural areas (3 and 4%, respectively), and is the same (5%) for men in urban and rural areas (2007 DHS table 14.18). Southern (9%), Western and North-Western Provinces (6%), and Lusaka (5%) had prevalence levels above the national average. The lowest syphilis prevalence was among respondents with more than secondary education.

Men reporting higher-risk sex[22] have higher syphilis prevalence (8.1%) than men not reporting higher-risk sex (3.8%) (2007 DHS table 14.20). Syphilis prevalence was much higher among men who paid for sex (12.6%) than those who did not (4.2%). In women, syphilis prevalence was only 1.6% in those reporting higher-risk sex, but 4.9% in those women not reporting higher-risk sex.

Syphilis tests are also performed in ANC clients within the ANCSS surveys. In 2006, the mean site syphilis prevalence among pregnant women aged 15-39 was 5.5%, which is similar to population prevalence. Sites with syphilis prevalence of 10% or higher were Solwezi/Northwestern Province (10%), Kalabo/Western Province (11%) and Nchelenge/Luapula Province (15%). A positive syphilis test was

[22] Sex with a non-marital, non-cohabiting partner

associated with never having had a live birth, stillbirth in last pregnancy, and interval since last birth of less than one year.

Similar to the trend in the adult population, syphilis prevalence shows a slight downward trend in ANC clients. The mean site prevalence among pregnant women aged 15-39 was 7% in 2002 and 5.5% in 2006.

Herpes Simplex Virus-2 (HSV-2), which causes genital herpes, is widely prevalent in Zambia. A cross-sectional population-based study in Ndola found that HSV-2 prevalence levels of 55% in women and 36% in men (Weiss *et al.*, 2001). HSV-2 prevalence rose rapidly in teenage girls and young men in their 20s. In multivariate analysis, being married, divorced or separated, as well as having had higher numbers of lifetime partners, were significantly associated with HSV-2 infection in women and men. In contrast, age at first sex and male circumcision status did not seem to be linked to HSV-2 status. HSV-2 positive individuals were over four times more likely to also be HIV positive (statistically significant in men and women). Sadoki & Reid (2004) found in high risk HIV negative women in George and Matero compounds in Lusaka that 56% were seropositive for HSV-2. Among HIV positive women, 73% were seropositive for genital herpes. Commonly observed presentations of HIV-2 in these women were vulvar vesicles, gluteal vesicles, pustules, and ulcers, and cervicitis with vesicles, pustules and ulcers.

STI Data from other populations

The prevalence of gonorrhoea, chlamydia, trichomoniasis and syphilis was assessed in 2003 among FSW in Chirundu, Livingstone, Kapiri Mposhi and Nchelenge within the Corridors of Hope (COH) intervention project (FHI, 2003).

Overall, 51% of FSW had at least one of the STIs tested for (FHI, 2003). The prevalence levels of gonorrhoea, chlamydia, trichomoniasis and syphilis were 11%, 5%, 30% and 26%, respectively. STI prevalence was lower among FSWs registered with the COH project than those not registered. Multivariate analysis showed that trichomoniasis levels differed significantly between the registered and non-registered FSWs - clients registered in the COH project were 44% less likely to have trichomoniasis than those not registered. Comparison of FSWs' STI prevalence levels in the two sites included in the 2000 and the 2003 survey (Chirundu and Livingstone) showed that the prevalence of gonorrhoea, chlamydia, trichomoniasis and syphilis was lower in 2003 than in 2000.

Over a third of FSW had a history of genital ulcers in the past 12 months preceding the survey (FHI, 2003). During the physical examination, a total of 4.1 percent had genital ulcers. The etiology of the ulcers was not investigated.

3.3.2. Self-reported STI symptoms

The 2007 DHS asked respondents who had ever had sex if they had had a disease acquired through sexual contact in the past 12 months, or if they had either of two symptoms associated with STIs (a bad-smelling abnormal discharge from the vagina or penis, or a genital sore or ulcer).

Overall, 6% of men and 5% of women reported having had an STI or STI symptoms during the last 12 months (2007 DHS table 13.13). Among women, 3% reported an STI, 2% a bad smelling abnormal discharge, and 3% a genital sore or ulcer. Among men, 4% reported an STI, 3% a bad-smelling abnormal discharge, and 4% a genital sore or ulcer. Among both women and men, the prevalence of STIs and STI symptoms was highest among respondents who were divorced, separated or widowed. Residents in urban areas were more likely to have had an STI or STI symptoms than those in rural areas. Among women, the prevalence of STIs or STI symptoms was highest in Lusaka Province (5%) while, among men, self-reported STI prevalence was highest in Central Province (6%).

3.3.3. Relationship between STI symptoms and HIV infection

Respondents with a history of STIs or STI symptoms had substantially higher levels of HIV infection than those with no history of STIs or STI symptoms (2007 DHS table 14.10). Women who had an STI or STI symptoms in the past 12 months were twice as likely to be HIV positive (34%) as women who did not have an STI or STI symptoms (17%, $p<0.000001$). Similarly, men who reported having an STI or STI symptoms in the past 12 months (30%) were more than twice as likely to be HIV positive as men who did not report an STI or STI symptoms (13%, $p<0.000001$).

In brief, survey data suggest that **syphilis prevalence has slightly decreased in recent years** and that about 5% of the adult population (2005 data) and about 26% of female sex workers (2003 data from four transport/border sites) are infected. Other STIs are also prevalent in female sex workers, such as trichomoniasis (30%), gonorrhoea (11%), and chlamydia (5%). Adults with a history of STIs or STI symptoms are at least twice as likely to be HIV positive as those with no history of STIs or STI symptoms.

3.4. Estimation of HIV incidence

An important focus of the MoT study is to assess HIV incidence and the epidemiology of incident (new) infections.

In Zambia, some HIV incidence data have been provided by cohort studies:

1. In a study on the effectiveness of condoms and spermicides in a cohort of discordant couples in Lusaka, the incidence rate was **8.7 per 100 couple-years** (Hira *et al.*, 1997). The rate was higher among sero-negative men than sero-negative women.

2. Among couples enrolled in a research study in Lusaka, HIV incidence was **9.3 per 100 person-years** (Stephenson *et al.*, 2008). Male-to-female and female-to-male transmission rates were similar in this cohort.

3. In an HSV-2 treatment trial of HIV-negative, HSV-2 seropositive women, HIV incidence was estimated at **4.5 per 100 person-years** (Celum *et al.*, 2008).

4. In a study evaluating the suitability of populations for microbicide efficacy trials, HIV incidence was **2.6 per 100 person-years** in 239 women in Lusaka (Kapina *et al.*, 2009).

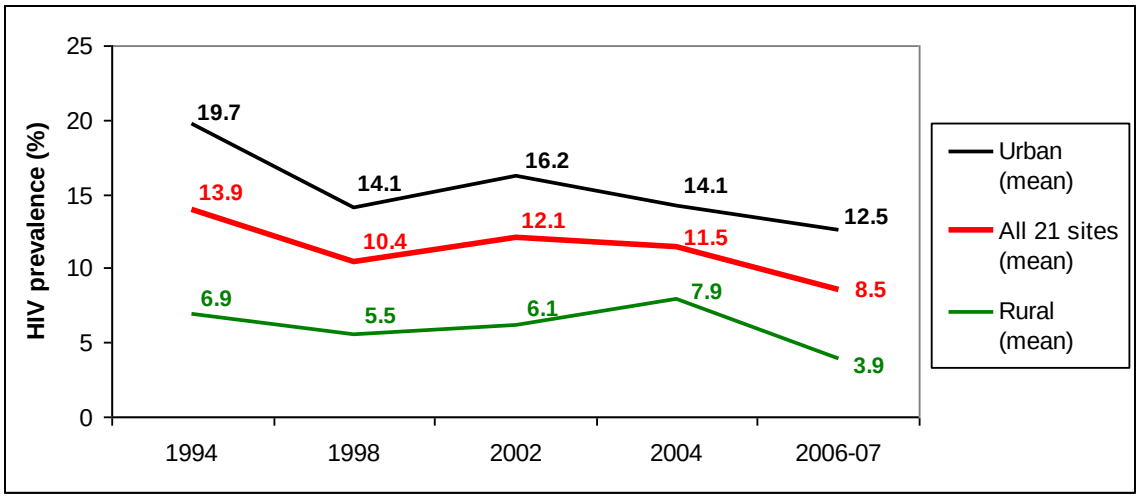
However, these incidence figures need to be interpreted with caution, as the risk of HIV transmission in the cohort populations reported above (partners of HIV+ individuals, urban women in Lusaka), are probably higher than the HIV risk in the general population in Zambia.

ADULTS

As a proxy for new infections, HIV prevalence levels of ANC clients aged 15-19 have been reviewed (see also section 3.1):

Between 1994 and 2006-07, average site prevalence decreased overall in 15-19 year old ANC clients – see figure 22, red line. **After the initial drop between 1994 and 1998, mean site prevalence levelled off and then showed another downturn in the ANCSS 2006-07.** The decrease in the most recent ANCSS was larger in rural sites (3.9%, which is 4% down from 2004) than in urban sites (12.5%, which is 1.6% down from 2004).

Figure 22. Incidence proxy: HIV prevalence trends in 15-19 year old ANC clients in Zambia (1994-2007)

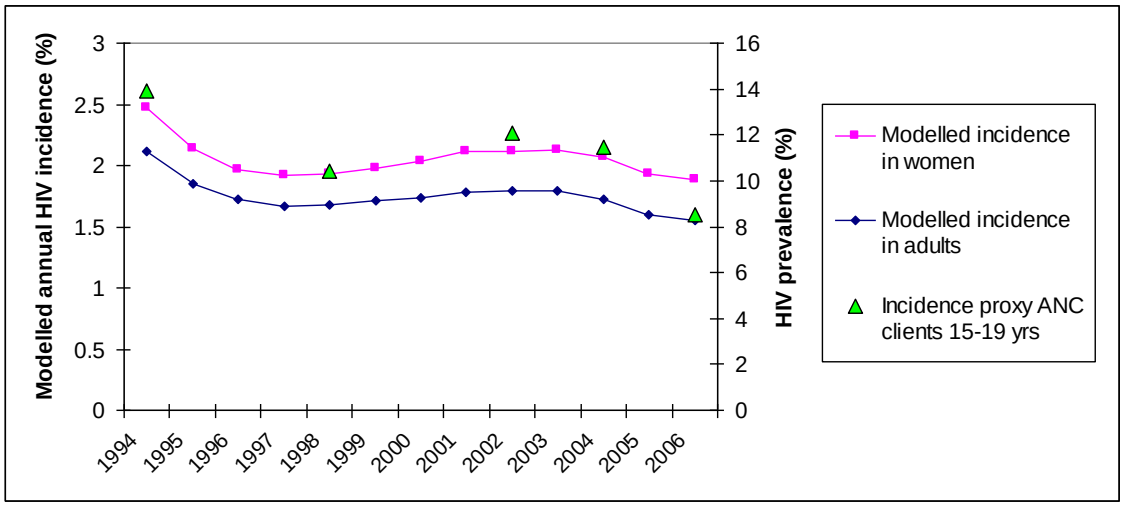


Source: Derived from ANCSS Report 2006-07, table A7, appendix 3. Data for Mongu are not shown.

In order to understand better the performance of the 15-19 year old ANC clients as a proxy for incidence, measured HIV prevalence from these young ANC clients (figure 23, green triangles) were plotted with Spectrum-modelled incidence curves for adult women (pink) and all adults (blue) (see below for more information on Spectrum modelling). **Overall, the proxy group seemed to provide similar trends on the evolution of incidence over time as the Spectrum model estimates.** Only the last ANC data point from 2006-07 seemed to deviate from the Spectrum predictions with HIV prevalence in 15-19 year old ANC clients being lower than what would have been expected if the proxy data followed the modelled incidence curve. A possible explanation of this deviance with the last data point might be *either* that Spectrum might have overestimated annual incidence in those recent years, *or* – the most likely explanation – that the ANC client sample performed less well as a proxy for incidence in that survey due to low sample sizes, or changes in the socio-demographic composition of the sample of young pregnant women over time, with later sexual debut and teen pregnancy education programmes working.

Figure 23. Estimated annual HIV incidence over time in Zambia (1994-2006/07)

Left y-axis: Modelled incidence in women and adults in percent
Secondary y-axis on right: HIV prevalence in ANC clients aged 15-19 years in percent



Source: CSO (2008) - 2008 HIV/AIDS projections report, table 3.1 for incidence curves.

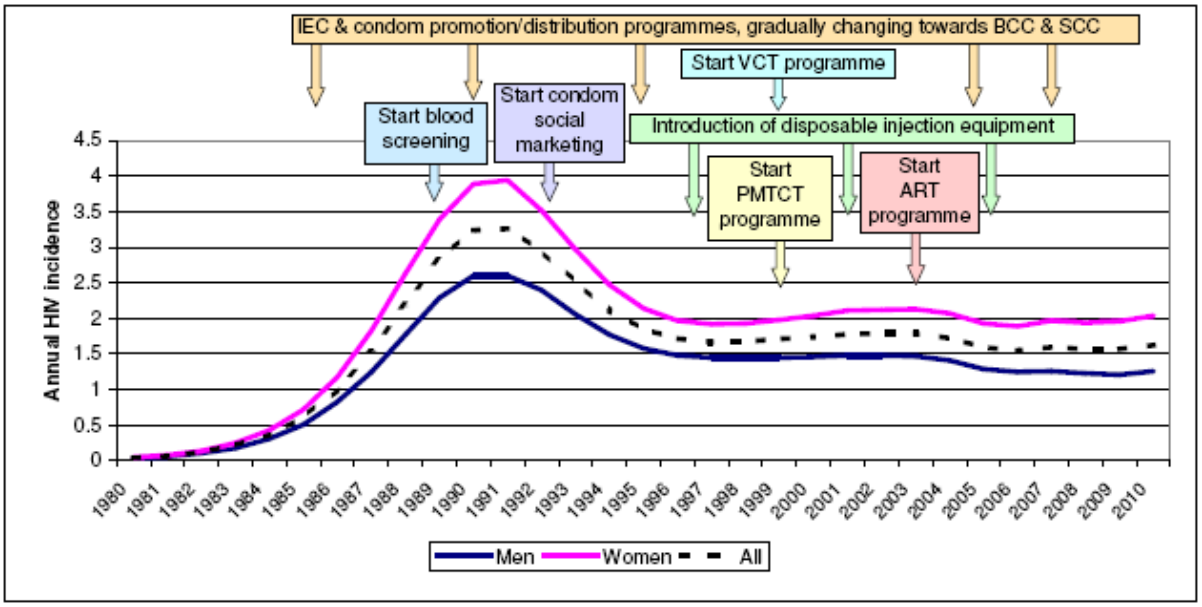
Estimation of HIV incidence by using mathematical models:

Zambia has applied the Spectrum model to compute annual HIV incidence, and, as part of this present study, the UNAIDS HIV Incidence Model was used (see section 3.5). Spectrum provided the following modelled incidence data for Zambia:

Modelled HIV incidence in adults aged 15-49 years has halved since 1990, but since 1995, it has levelled off – see figure 24 which shows fairly stable incidence levels since 1995. The most recent Spectrum estimates are that annual incidence among adults aged 15-49 is about **1.6% in 2009** (dashed line), having decreased from about 3.3% in 1990/91. Between 1991 and 1995, HIV incidence declined, particularly in women. Some of this decline is due to natural epidemic dynamics, in which those at highest risk of HIV were infected first, leaving a pool of less susceptible individuals (which is constantly diluted by new age cohorts also containing highly susceptible individuals).

HIV incidence is consistently higher in women than in men. For 2009, it is estimated that annual incidence is about 2% in women (pink line, figure 19) and about 1.2% in men (blue line).

Figure 24. Estimated annual HIV incidence in adults aged 15-49 years in Zambia (1980-2010)

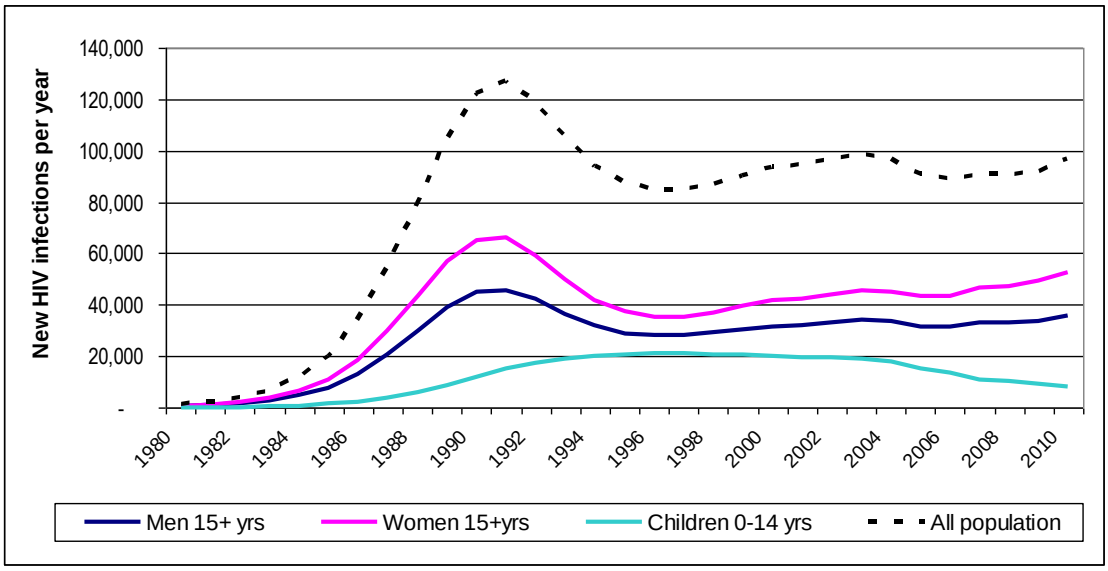


Source: CSO (2008) - 2008 HIV/AIDS projections report, table 3.1 for incidence curves. Programme reports for data on programme initiation.
Note: Direct associations between the modelled HIV incidence and the implemented HIV prevention programmes have not been established.

In the course of 2009, an estimated 82,681 adults will be newly infected with HIV. Of these, 59% are predicted to occur in women (49,144 infections) and 41% in men (33,537 infections) (Spectrum estimates 2008). Although the annual HIV incidence has stabilised, the absolute number of new HIV infections is increasing due to Zambia's expanding population.[23] Figure 25 depicts trends of the number of new infections in adult men and women, and children aged 0-14 years. In 2009, approximately 226 adults are newly infected each day (see table 4). By 2012, this number is estimated at 276 (a total of 100,780 new infections in 2012, Spectrum modelling). **The projected increase in the absolute number of annual new infections (linked to the positive population growth), despite the stabilised HIV incidence, emphasises the urgent need to reduce the adult annual HIV incidence below the current level of 1.6%.**

[23] According to the CSO, population growth rate was at 2.9% in 2008 (CSO Populations Projections Report, http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf)

Figure 25. Estimated new HIV infections in adults aged 15-49 years in Zambia (1980-2010)



Source: CSO (2008) - 2008 HIV/AIDS projections report, table 3.2.

CHILDREN

In children aged 0-14 years, the estimated number of new infections has gone down dramatically since its peak level of 21,189 in 1996 (or 58 new infections per day in 1996) – see figure 23. This is a combined effect of decreasing incidence in women and the introduction of the prevention of mother-to-child transmission (PMTCT) programme. **The estimated number of new infections in children in 2009 is 9,196, translating into 25 new infections per day** (Table 4).

Table 4. Estimated number of new infections in adults and children in Zambia (2009)

	Adults 15+ yrs	Children 0-14 yrs	Total new infections
Males per year	33,537	4,666	38,203
Females per year	49,144	4,530	53,674
Total per year	**82,681**	**9,196**	**91,877**
Total per day	**227**	**25**	**252**

Source: CSO (2008) - 2008 HIV/AIDS projections report, tables 3.2 and 3.3

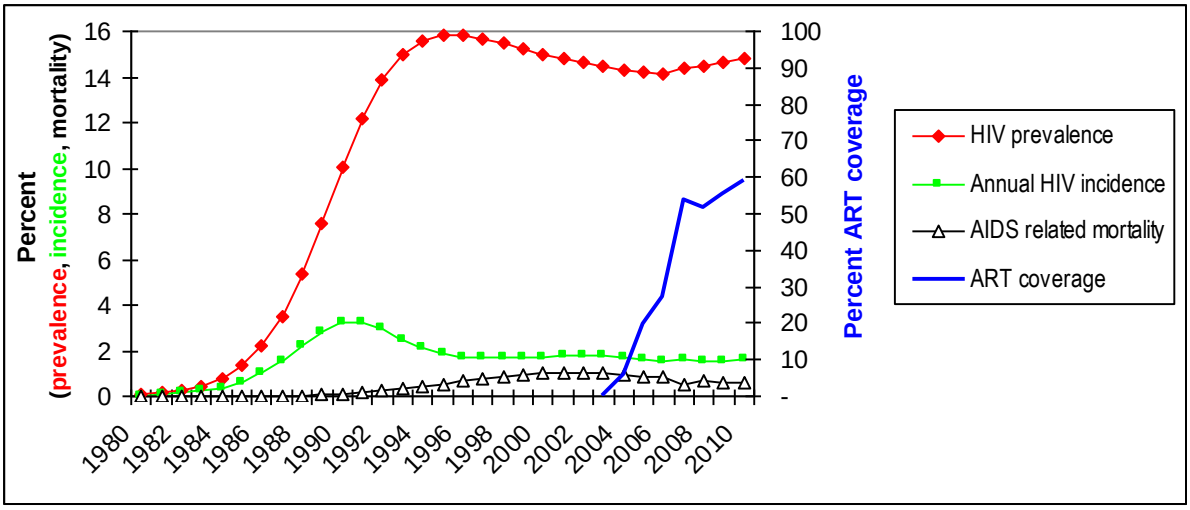
Incidence rates have also been assessed among cohorts of infants born to HIV+ mothers: Brayfield *et al.* (2003) reported, within the first 12 months post-delivery, an incidence rate of **18.2/100 person-years in infants born to HIV+ mothers**.

- In Zambia, HIV incidence is estimated to have peaked in about 1990/91 at an estimated 3.3%.
- In 2009, incidence in adults is estimated to be at about 1.6%, but is higher in women (2%) than in men (1.2%).
- An estimated 82,681 adults will get newly infected with HIV in 2009 (226 per day), which is double the number of adults dying from AIDS in 2009 (41,247).
- About 90% of the estimated 91,877 total new infections in 2009 will occur in adults and 10% in children aged 0-14 years
- The annual number of new infections is estimated to increase, despite the stabilised annual HIV incidence, due to Zambia's expanding population, emphasising the urgent need to reduce the adult annual HIV incidence below the current level of 1.6%.

The modelled relationship between HIV prevalence, annual HIV incidence, AIDS-related mortality and very rapid increase in coverage of ART among PLHIV in need is summarised in figure 26, based on Spectrum model estimates (note that ART coverage is plotted on a different y axis scale). It shows the

estimated decrease in AIDS-related mortality with increasing ART access, which in turn is contributing to a small increase in HIV prevalence from 2007, despite estimated level HIV incidence from about 2005 onwards.

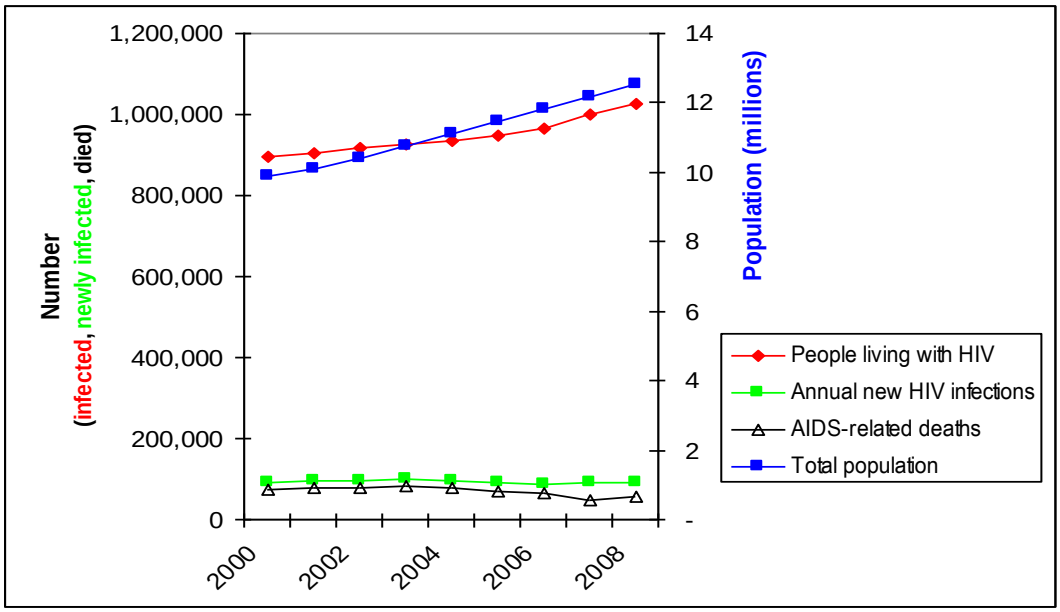
Figure 26. Modelled interplay between HIV prevalence, HIV incidence, AIDS mortality and ART coverage in adults aged 15-49 years in Zambia (modelled data, 1980-2010)



Sources: CSO (2008) - 2008 HIV/AIDS projections report, tables 3.1 and 4.2

The relationship between estimated numbers of PLHIV, new HIV infections per year, AIDS-related deaths and the total population size (second y axis) is presented in figure 27. It shows that although HIV prevalence (a percent measure) has stabilised, absolute numbers of PLHIV increase almost in parallel with the expanding population. (Naturally, total population grows slightly faster than the number of HIV positive people, because population grows mainly through new births, whereas new PLHIV can come from a very wide age range of the population).

Figure 27. Modelled absolute numbers of PLHIV, annual new infections, AIDS-related deaths and total population size, adults aged 15-49 years in Zambia (2000-2008)



Sources: CSO (2008) - 2008 HIV/AIDS projections report, tables 3.2 and 3.3.; CSO website for estimated mid-year populations

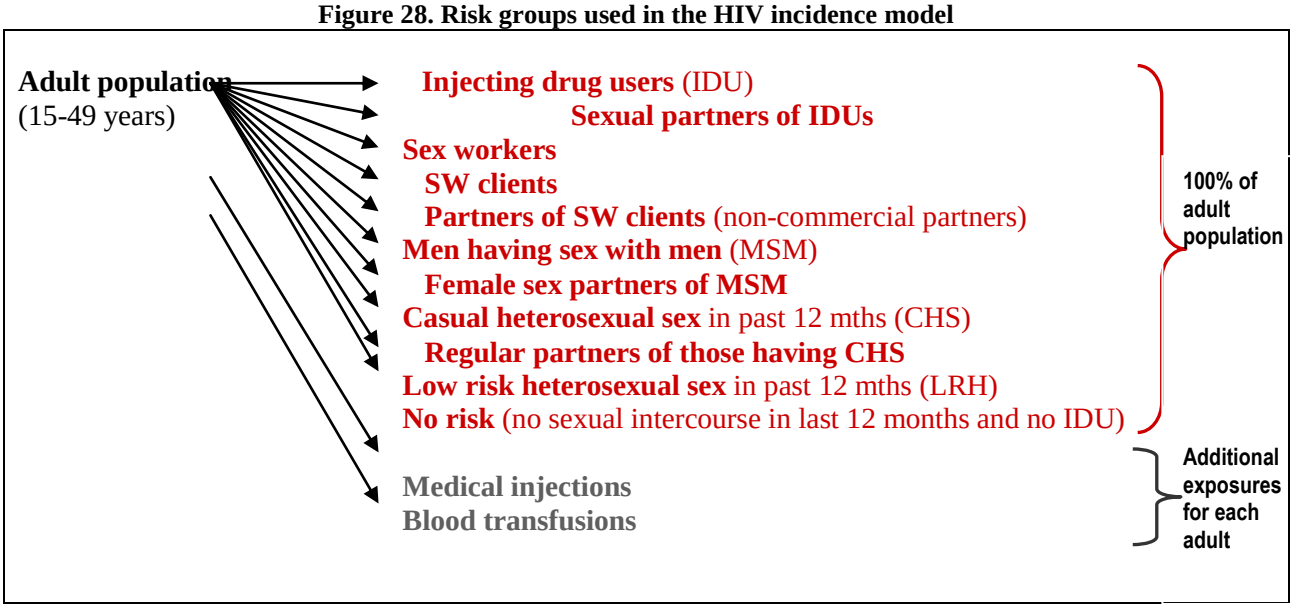
3.5. Main sources of new HIV infections

Knowing the sources of new HIV infections is important, as this should influence the focus of HIV prevention policies and programming. Using the **UNAIDS HIV Incidence Model**, the number of new infections in each exposure group during 2008 were estimated and the main results are presented in this section and section 3.7. Further details on the application of the incidence model are presented in **Annex 5**.

In the incidence model, every person aged 15-49 is allocated to a risk group based on reported sexual behaviour and main exposure to HIV (figure 28). People in more than one risk group were allocated to the group with highest risk of transmission. For example, a person who is a client of SWs and also has multiple heterosexual partners was allocated to the group "SW clients". The incidence model makes assumptions about transmission pathways between the risk groups, for instance, it assumes that all infections in clients of sex workers come from sex workers (this is a simplification for modeling purposes and might not be true in reality). The operational definitions are given in **Annex 5**.

It is important to note that in the Zambian model application, the group **"casual heterosexual sex"** (CHS) comprised all individuals who reported sex with a non-marital, non-cohabiting partner in the past 12 months.[24] The group "**low risk heterosexual sex"** (LRH) included all the adults reporting mutual monogamy.

Figure 28. Risk groups used in the HIV incidence model



The UNAIDS incidence model in its current version has several limitations, e.g.

- The model does not take into account the distribution of behaviours within risk groups – for instance, for the variable "number of sexual partners", the arithmetic mean is used, which does not capture the distribution of the values, which may be skewed
- The model does not distinguish between multiple serial and multiple concurrent partners, although this distinction is highly relevant to transmission risk
- The calculations use the best current estimates for transmission probabilities per act (male/female and vice-versa), and the influences of STIs and male circumcision on transmission risk, but these coefficients are under constant review[25]

[24] This corresponds to "higher-risk sexual intercourse" (sex with a partner who neither was a spouse nor who lived with the respondent) in the past 12 months, among all those sexually active in the past 12 months

[25] The transmission probabilities used were: Male-to-female transmission: 0.0011 and female-to-male transmission: 0.0007 (Baggaley *et al.*, 2004; Gray *et al.*, 2001); STI cofactor: 4 (Fleming & Wasserheit, 1999; Gray *et al.*, 2001); Male circumcision: Female-to-male transmission: 60% reduction in transmission and male-to-female transmission: no impact (Auvert *et al.*, 2005 ; Bailey *et al.*, 2007; Gray *et al.*, 2007)

The model requires detailed biological and behavioural surveillance data on a number of variables: the size of the population aged 15-49 years and the size of the various risk groups, prevalence of HIV and STIs in this age group and the various risk groups, percentage of men circumcised, number of sexual partners per year, frequency of coitus with each partner and level of condom use. In cases where Zambia-specific data were not available, appropriate assumptions based on local knowledge were made or comparable data from the Sub-Saharan region were used. For this reason, **the model results should be triangulated with other epidemiological evidence, to ensure that model results are interpreted appropriately.**

The following assumptions were made for the model:

Female Sex Workers (FSW): available data came from a study in one urban site, Ndola (1998), which estimated that 2.7% of women in the general population are FSWs (FHI, 2000; Vandepitte *et al.*, 2006). The sample in this study was purposefully selected, targeting areas where FSW were likely to be found. To generalize this information to the whole country, consideration was given to the fact that Zambia is only 35% urban. A weighted average was calculated, estimating that 0.56% of women in the general population are FSWs.

Clients of FSW: No data were available on this variable. Therefore the lowest value (3.0%) in the Sub-Saharan region was used, because it matched the calculated population size of FSW in Zambia. The sex industry in Zambia is not as well developed and institutionalized as in some countries in the region (UNAIDS 2007).

HIV Prevalence for Casual Heterosexual Sex (CHS) population: Since most CHS occurs in the 30-35 age group (DHS 2007), it was assumed that HIV prevalence for the CHS population would be about that of the age group 30-35.

HIV Prevalence of Low Risk Heterosexual (LRH) population: It was assumed that the HIV prevalence of the LRH will be the same as that of the general adult population, 14.3% (DHS 2007).

HIV Prevalence for Partners of CHS, Female Partners of MSM and Partners of Clients of FWS: These data were not available. It was assumed that HIV prevalence in these groups is slightly higher (16%) than HIV prevalence in the general population (14.3%) because they are exposed to high risk sex through their partners.

Number of Partners/Year for Clients of FSW: The only Zambian data available for number of sexual partners per year was for Long Distance Truck Drives, Light Truck, Minibus Drivers and Uniformed Personnel in Transportation Border Route, estimated at 2 partners per year (Family Health International, 2005). This is too low to be consistent with the number of partners reported by FSW. The logic of the model is that the number of partners multiplied by number of sexual acts should be about equal for FSW and Clients. Hence to match the number of sexual acts between FSW and Clients the number of partners per year for Clients was adjusted from 2 to 5.

Number of Acts of Exposure/Partner/Year: There were no Zambia-specific data on this variable. Based on UNAIDS recommendations for Spectrum and on local knowledge, the value was estimated to be “twice a week” for the general population and higher for groups with elevated sexual risk behaviour.

Percentage of Acts Protected: Available data on condom use showed a wide discrepancy between FSW and their clients, 39% and 82%, respectively (FHI 2005, FHI 2006). Considering that sex is taking place between these two risk behaviour groups, condom use is expected to be about the same. Therefore, the figures were adjusted to 52% for FSW and 50% for Clients of FSW. This is consistent with data from other countries in the region, where condom use among FSW and their clients is higher than in CHS (UNAIDS 2007) and fits with the Zambian data which shows that condom use among CHS is 43% (DHS 2007).

The model outputs were reviewed by key personnel at the NAC (Director for Prevention and Multisectoral Response and Chief Advisor) and UNAIDS (Monitoring and Evaluation Advisor) and a dissemination and consensus meeting with the HIV and AIDS Prevention Theme Group, researchers and HIV and AIDS policy makers and implementers was held on 7 February 2008 in Lusaka. In May 2008, a consultative meeting was held with UNAIDS Geneva, CDC-Lusaka, UNAIDS-Lusaka and the consultants working on the incidence modelling in order to finalise the model.

3.5.1 Results of the application of the Incidence Model

The HIV incidence model predicted 74,263 new infections for 2008.

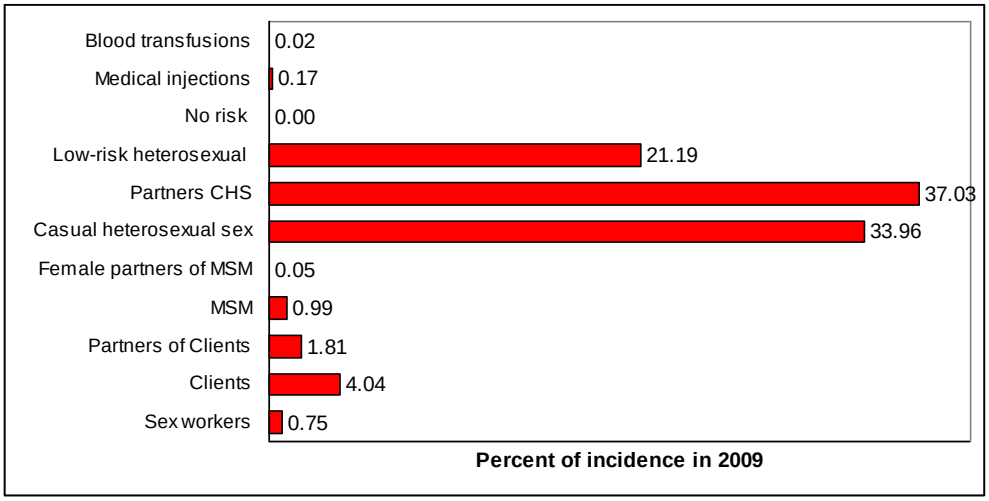
The incidence model estimated for 2008 that the group contributing most to HIV incidence was individuals whose partners have casual heterosexual sex (37% of total annual incidence) – see figure 29. Condom use among this group is very low at about 6% (SBS 2005).

The second highest share of HIV incidence was among individuals reporting casual heterosexual sex (34% of total annual incidence). Condom use was 43% in this group (2007 DHS). So 71% of all new infections in 2008 were in those who had casual sex, or whose partners had casual sex.

The share of HIV incidence among people reporting low risk heterosexual sex was 21%. The members of this group reported one sexual partner only during the past 12 months, and sero-discordance within the couple or sexual concurrency (secondary sex partner[s] not reported in the survey) must have been the main reason for the predicted new infections in this group.

Clients of female sex workers contributed an estimated 4% of new infections. Other behaviour risk groups contributed less than 1% and as expected there were no new infections in the no risk group.

Figure 29. Estimated share of HIV incidence in adult risk behaviour groups in Zambia (2008)



Source: Output HIV Incidence Model (final version of 12th June 2008)

The summary of the model outputs is that **sex with multiple partners as well as with partners who are neither spouses nor cohabiting (="casual sex") is the main source of new infections, accounting for 71% of new infections in 2008.** These new infections occur in people having casual sex and in their regular partners.

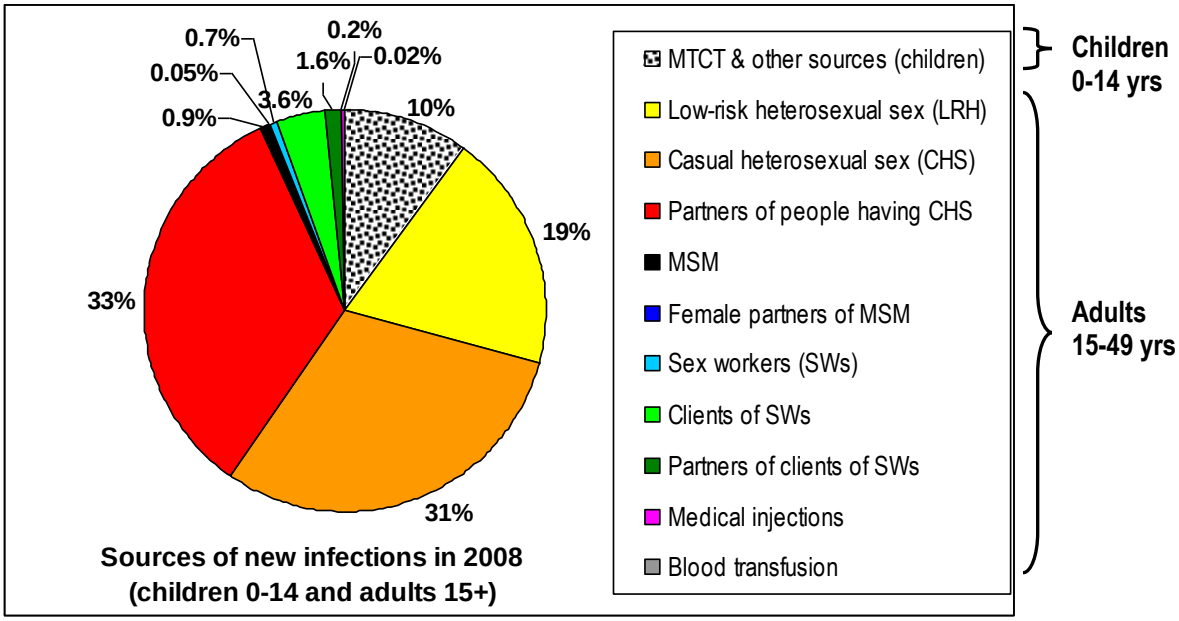
The model also predicts that **"low risk" sex between monogamous partners leads to a considerable number of new infections** (21% of all new infections in 2008).

Commercial sex seemed to be comparatively less important with an estimated 5% of all new infections arising through commercial sex – adding new infections in clients and sex workers themselves. An estimated one percent of new infections occur in MSM through unprotected anal sex.

Overall, the modelling process highlighted the need for excellent current, nationally representative biological and behavioural data to run the model. Interpretation of the obtained outputs must be done bearing in mind that there were important data gaps and that many assumptions had to be made. These model outputs therefore require triangulation with the results of the epidemiological analysis presented in this chapter.

The results from the HIV incidence modelling and those of incidence modelling with Spectrum are summarized in figure 30 for both children aged 0-14 (white section with black dots) and adults aged 15 years and older. The large contributions from casual heterosexual sex (orange and red) and low-risk sex (yellow) are evident.

Figure 30. Sources of new infections, model estimates in Zambia (2008)



Sources: Data from Spectrum 2008 projections and HIV incidence modelling

3.6. Factors impacting on heterosexual transmission of HIV

This section is largely based on data gathered in nationally representative household surveys conducted between 1992 and 2007. These surveys interviewed respondents of reproductive age and included questions about sexual behaviour and knowledge of HIV prevention. The 1992 (women only), 1996, 2001-02 and 2007 surveys were Demographic and Health Surveys (DHS), and the surveys in 1998, 2000, 2003 and 2005 were Sexual Behaviour Surveys (SBS). As stated in the KYE methodology section 2.2, the 1998 SBS was not included in time trend analyses. The two types of surveys differed in focus: the DHS covered a wider range of topics and included the questions on sexual behaviour towards the end of the survey. The SBS was solely concerned with sexual behaviour and HIV/AIDS related topics and questions about sexual behaviour were asked early in the interview. There were important differences between the surveys regarding the sampling strategy.[26] These differences between the survey samples need to be born in mind when assessing trends in sexual behaviour variables.
The analysis of sexual behavioural trends conducted within this synthesis also investigated potential reporting bias in DHS and SBS data (see **Annex 1** for details).[27]

[26] The first three surveys including both women and men (DHS 1996, SBS 1998, SBS 2000) used the same primary sampling units, based on the 1990 census. Later surveys used slightly different sampling strategies: the DHS 2001-02 and the DHS 2007 used the same procedure as the 2000 census; the 2003 SBS used PSUs of previous SBS and added additional sampling points. Sampling for the 2005 SBS added five more clusters, again using the 2000 census sampling frame, yielding a total of 105 self-weighted clusters. National response rates were generally high, but some response rates varied markedly by province.
[27] Trends in reported ages at first sex and marriage were examined and the reports over the different surveys used to assess whether there had been a change in reporting bias. The 1960-69 age cohort was used as the reference in analysis of reporting bias because they were well represented in all surveys and old enough to have experienced the events of interest in the earliest surveys.

The analysis found a dramatic change between the three surveys with men in the 1960-69 age cohort in 2001-02 reporting a much older age at first sex than in 1996. Further change was apparent between the 2001-02 and 2007 surveys but only at the younger ages (see figure 1.4 in Annex 1).

The most likely explanation for the observed effect is reporting bias (DHS are carefully sampled and are unlikely to have become unrepresentative of the national population, and population change would have to be massive to create the observed effect). Data on reported first sex among women did not show such a large change but there was some difference between the 1996 and 2007 surveys. Although age at first sex was higher in the later surveys, presumably due to reporting bias, age at first marriage had stayed the same.

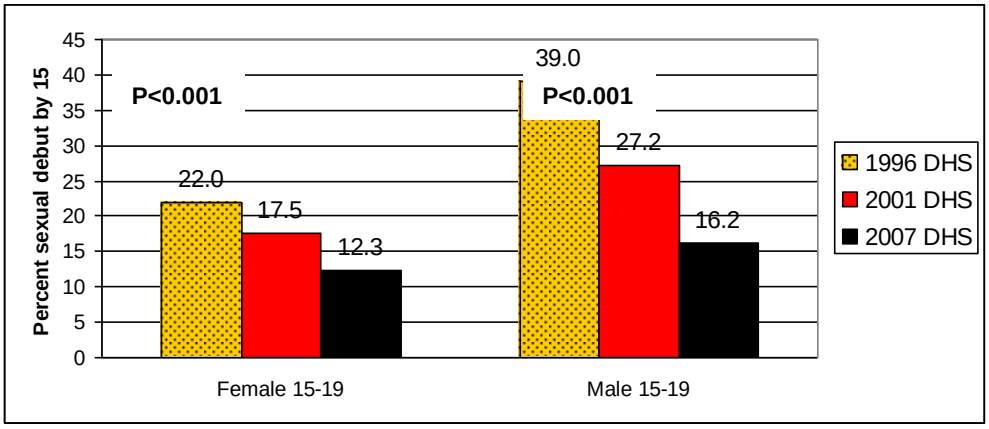
Other behavioural indicators cannot be analysed in the same way as 'age at first sex' in order to assess reporting bias, but based on this observation, it is plausible that reporting bias also affects other indicators on sexual behaviour such as sex with multiple partners, and paid sex.

3.6.1. Factors at the individual and couple level that impact the risk of sexual transmission

3.6.1.1. Sexual debut

There are signs that more young people delay sexual debut and remain sexually abstinent for longer. There was a significant decrease in the proportion of young females and males aged 15-19 years who reported having had sex by the age of 15 years over the last three DHS rounds (figure 31). When SBS data are included as well, it can be concluded that young women are less likely to report ever having had sex in the later surveys (figure 32). The pattern is not as clear for men but fewer younger men report sex in the later surveys compared to the 1996 DHS (figure 33). The difference between the DHS and SBS results is quite marked for men on this measure (see **Annex 1**). Age at first sex may now be increasing for the youngest cohort (those born 1990-4) whose experience is not yet complete. Women's reported age at first sex has been steadily increasing for each cohort since the 1950s. At any given age, an increasingly smaller proportion of women have had sex. As explained above, **it is likely that true changes in delay of first sex and primary abstinence are smaller, and that the apparent changes are, particularly in men, partly due to reporting bias.**

Figure 31. Sexual debut by age 15 years among young people aged 15-19 years in Zambia (1996-2007)



Sources: DHS reports. P-values from Gouws *et al.*, 2008.

The trend of delaying first sex is reflected in changes in *median age* at first sex among both young males and females aged 15-24 years. Between 1996 and 2007, it increased from 15.9 years to 17.9 years in young men and from 16.6 years to 17.2 years in young women (**Annex 1** table 1.1). Again, reporting bias may be partly responsible for these changes in median age.

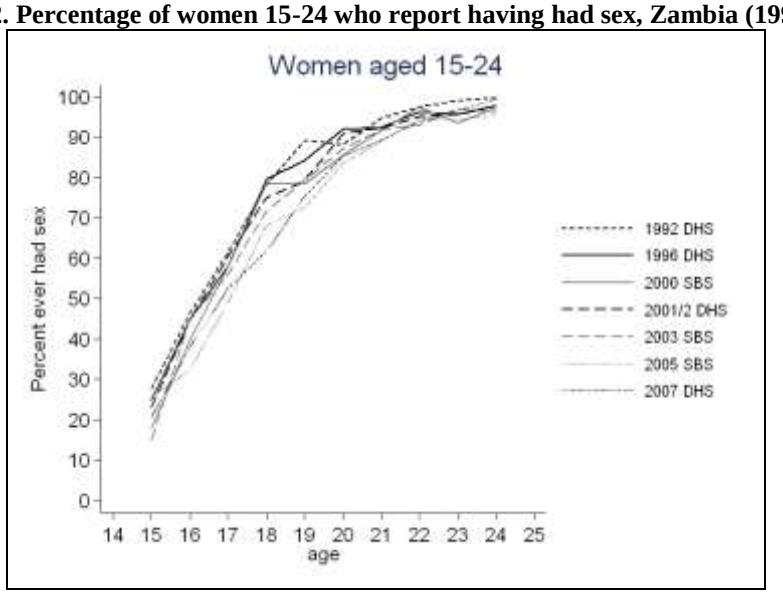
Reported sexual debut is significantly earlier in rural women aged 15-24 than in urban women (2007 DHS, table 13.16). For men, age at first sex was only slightly earlier in rural residents than in urban

residents. Since HIV prevalence is higher in urban areas, early sexual debut alone cannot be regarded as a major risk factor for HIV infection.

Sexual inception and HIV risk

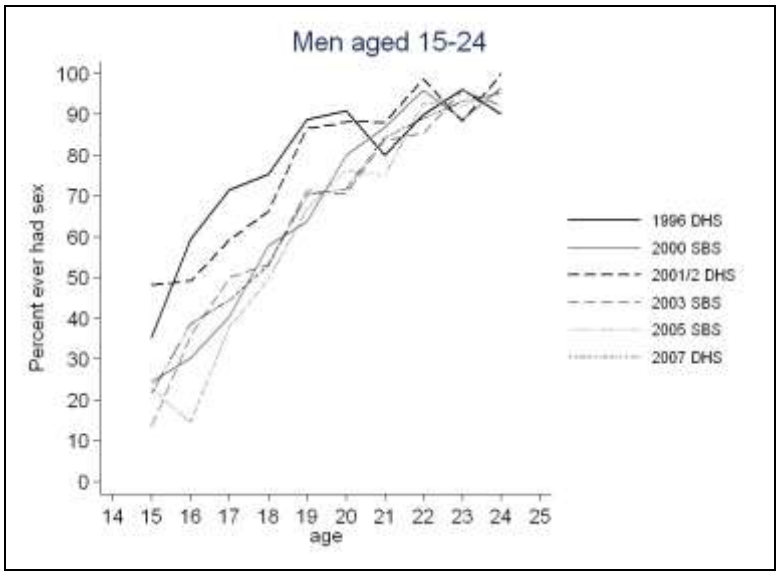
In the DHS 2007, women (15-49) who reported having had their first sexual intercourse at age 20 or later were significantly *more likely* to be HIV positive (21% HIV infected) than those who had their sexual debut under the age of 20 (18%, $p<0.05$). Among men (15-49), there was no such clear differential between early/ late debut and HIV prevalence (14% in both groups, $p=0.87$) (DHS table 14.6). **Early sexual inception alone therefore does not seem to increase the likelihood of HIV infection (the reporting bias on age at first sex observed particularly in men should not affect this conclusion).** A secondary analysis of the DHS data could further explore the relationship between early/late sexual debut and HIV infection, by looking at other variables of interest (such as religious affiliation, educational attainment, travelling and spending nights away from home).

Figure 32. Percentage of women 15-24 who report having had sex, Zambia (1992-2007)



Sources: DHS 1992, 1996, 2001-02, 2007 and SBS 2000, 2003, 2005 (analysis by E. Slaymaker).

Figure 33. Percentage of men 15-24 who report having had sex, Zambia (1996-2007)



Sources: DHS 1996, 2001-02, 2007 and SBS 2000, 2003, 2005 (analysis by E. Slaymaker).

Other findings from the literature on sexual initiation are:

Role of religious affiliation - A study involving 5,534 female respondents aged 13–20 in Lusaka Province[28] found that that affiliation with Seventh Day Adventists, Jehovah's Witnesses, and the New Apostolic Church was associated with delayed sexual initiation (Agha *et al.*, 2006). However, affiliation with the most conservative religious groups, Seventh Day Adventists and Jehovah's Witnesses, also lowered the likelihood of condom use during first sex.[29] Seventh Day Adventists were most likely to report practical concerns such as the fear of pregnancy or the desire to complete schooling as a reason for not initiating sex, by contrast, Jehovah's Witnesses were most likely to report the fear of God as the reason for not initiating sex.

3.6.1.2. Multiple and concurrent sexual partners

Two phases of HIV infection are more likely to result in HIV transmission during unprotected sexual contact, because the concentration of free virus in body fluids is high ("high viraemia"). These are the **latent phase** in the first weeks after someone has been infected (also called 'acute infection'), and the much later **phase of advanced HIV infection**. **Annex 2** provides an illustration of HIV viraemia over time in an infected person's body.

There is evidence that multiple and concurrent partnerships are linked to high HIV transmission, since people in such overlapping sexual partnerships are more likely to be exposed during the very infectious early phase soon after infection, which spreads HIV in the sexual network (e.g. Halperin & Epstein, 2004 – see illustration in **Annex 2**). In the meta-analysis by Boily *et al.* (2009), estimates of HIV transmission risk for the early and late phases of HIV infection were 9.2 and 7.3 times larger, respectively, than for the asymptomatic phase in between.

In an analysis of pooled samples from DHSs conducted in sub-Saharan Africa, Mishra & Bignami-Van Assche (2009) found that urban, more-educated, and wealthier women and men were more likely to have concurrent partnerships than their rural, less educated, and poorer counterparts. Circumcised men were also more likely to have concurrent partners than uncircumcised men. Those who had concurrent partners were more likely to report using condoms than those who did not have concurrent partners; yet only one-fifth of women and less than one-tenth of men with concurrent partners reported using condoms at last sex.

In Zambia, men consistently report much higher frequency of multiple partnerships than women. In the 2007 DHS, 20% of men aged 15-49 years said that they had had more than one partner in the past 12 months, whereas only 1.6% of women reported more than one partner in this period (DHS tables 13.8.1/2). For men, the frequency was highest in the Southern Province (31%), but there was virtually no difference between rural and urban men regarding this variable. For women, the frequency was highest in the Western Province (4.1%), and was significantly higher in urban (2.1%) than in rural areas (1.3%, $p<0.05$).

A declining percentage of adults aged 15-49 report having more than one partner (figure 32). In men, the frequency dropped from 29% (1996) to 14% (2007), and in women, it dropped from 3.6% (1996) to 1.2% (2007) – see **Annex 1** for detailed time trends.

There were decreases in the mean number of reported partners in the past year between 1996 and 2007. In men, the mean number dropped from 1.5 (1996) to 0.94 (2007), and in women, it dropped from 0.8 (1996) to 0.76 (2007) – see **Annex 1**.

Frequencies of reported extramarital sex decreased in men and women, from 19% (1996) to 13% (2007) in men, and from 1.5% (1996) to 0.7% (2007) in women – **Annex 1**.

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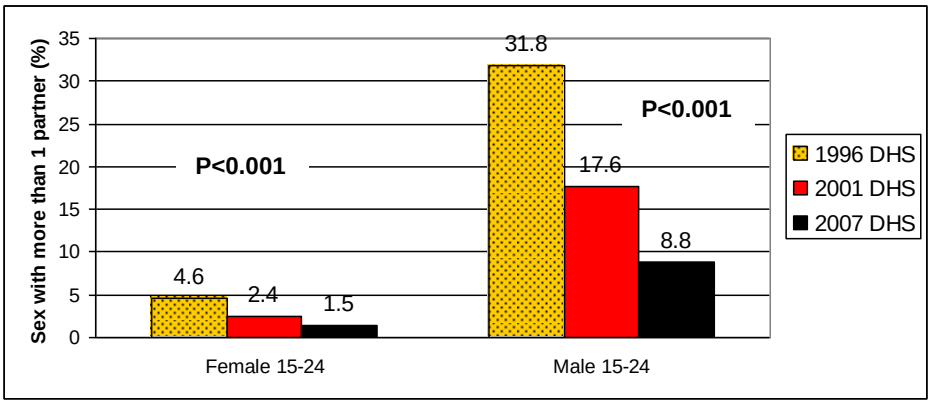
[28] Data from several rounds of the Multi-Round Survey of Zambian Youth (MSZY) survey implemented in December 2001, April 2002, August 2002, December 2002, April 2003, August 2003, and December 2003.

[29] It would hence be important to determine the effects of affiliation on other risk behaviours, such as multiple sexual partnerships, condom use with different types of partners, and secondary abstinence, and the effect at both young and older age.

Fewer young people aged 15-24 report multiple partners – see figure 34. The percentage of young people reporting multiple partners showed significant decreases in females and males between 1996 and 2007.

Figure 34. Percentage of young people aged 15-24 who report sexual intercourse with more than one partner in the past 12 months in Zambia (1996-2007)



Sources: DHS reports. P-values from Gouws *et al.*, 2008.

Multiple partners are reported less in the SBS than in the DHS, particularly by men. On the methodological differences of the two survey types, Slaymaker & Bruckner (2004) comment: *"The survey instruments were similar but not identical. It is possible that the changes were observed because respondents reacted in different ways to the different questionnaires. The DHS locates a different sample of men than the SBS, since different methods are used to select the men for the two types of survey. There may be a participation bias because agreeing to answer a survey about fertility and family formation could be easier than agreeing to a survey on sexual behaviour and HIV. On the other hand the DHS takes longer to complete, which might have deterred potential respondents".*

From many other sexual behaviour surveys, it is widely suspected that reporting of concurrency is negatively affected by social desirability or self-reporting bias (e.g. Mah & Halperin, 2007).

"It's difficult for the girl to tell you the exact number of her former boyfriends because she's afraid that you'll think that she's promiscuous" (Zambian male, 20-25 years, in Longfield et al., 2002).

"If I must have another girlfriend, I mustn't make it public" (Zambian male, 20-25 years, ibid).

In the 2007 DHS, reports of multiple partners were much lower in married than in unmarried women, but this pattern is not reflected in the 2005 SBS (Table 5). In men, there is very little difference in reported multiple partners by marital status. There is a dearth of quantitative data on current multiple partner prevalence.

Table 5: Multiple partner reporting in surveys in Zambia

	Females	Males	Source
12 month recall ('in the last 12 months')			
Married adults (F 15-49, M 15-59)	2.8%	9.6%	SBS 2005 table A.3.5.
Unmarried adults (F 15-49, M 15-59)	2.7%	7%	SBS 2005 table A.3.5.
Sexually active adults aged 15-49 yrs	1.6%	19.7%	DHS 2007 tables 13.8.1/2
Married adults 15-49 yrs	0.5%	19.4%	DHS 2007 tables 13.8.1/2
Never married adults	6.5%	19.3%	DHS 2007 tables 13.8.1/2
Adults 16-65 yrs	20.5%		CIET 2003 table 107
Current			
Married ANC clients in Chipata/ Lusaka	33%	n/a	Kankasa *et al.*, 2005 (sampling 2000-01)

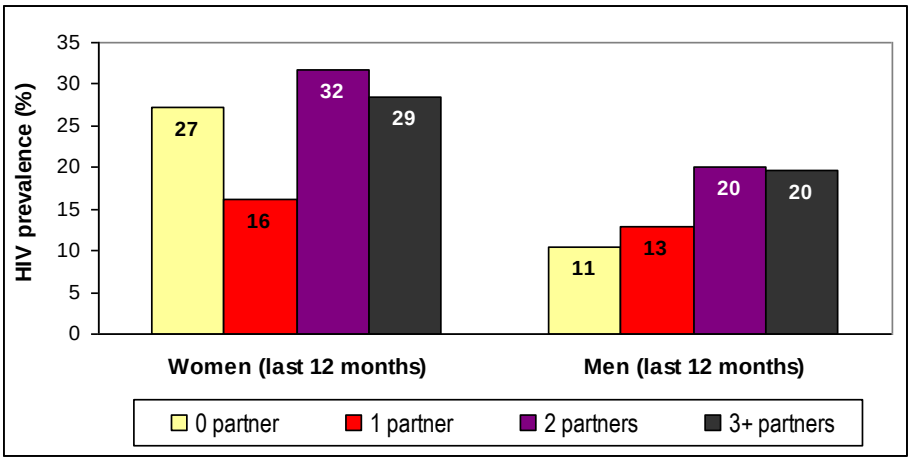
Multiple sexual partners and HIV risk

In the DHS 2007, men reporting 2 or more partners were significantly more likely to be HIV infected (20% HIV positive) than men who reported one partner (13%, p<0.00001) or no partner (11%, p<0.00001) in the last 12 months (see figure 35). In women, the lowest HIV prevalence was among those reporting one partner in the last 12 months (16% HIV positive), followed by those reporting no partner[30] (27%). Women reporting 2 partners in the last 12 months had the highest HIV prevalence (32%). The difference in HIV prevalence between those reporting one partner and those reporting 2 partners was statistically significant (p<0.001). Only three women reported three or more partners. (DHS table 14.6).

There is a linear relationship between the number of lifetime partners and HIV risk in both women and men (figure 36).

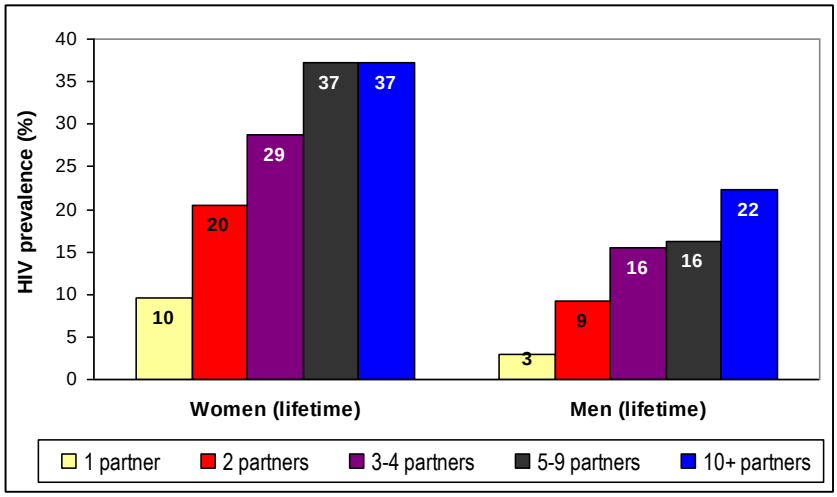
There is a strong positive association between the number of reported sexual partners and HIV infection – the risk of HIV increases with more sexual partners.

Figure 35. Number of partners in the last 12 months and HIV prevalence in Zambia (2007)



Source: DHS 2007, table 14.6

Figure 36. Number of lifetime partners and HIV prevalence in Zambia (2007)



Source: DHS 2007, table 14.6

[30] This group of 687 women is likely to have a diverse socio-demographic composition. Some women may be practicing secondary abstinence due to divorce, separation or widowhood. It may also include women who deny sexual activity because they are not married. Agha *et al.* (2006) write on **premarital sex** (summarised): Premarital sex is not tolerated among Jehovah's Witnesses. Members found guilty of serious violations of practices face being removed from membership of the congregation, and their excommunication is publicly announced to the congregation. Seventh Day Adventists are expected to shun worldly amusements and are only permitted spiritually uplifting entertainment. Premarital sex is forbidden in the church, and those found guilty have their church membership withdrawn immediately. Anyone found pregnant outside of marriage is deregistered from the congregation.

In addition the literature on multiple sexual partners, reports the following:

Extent of MCP - Results of qualitative research by Kwatu/Soul City (2008) showed that MCP were common among Zambians irrespective of age, marital status, or geographical location of residence. In agreement with a similar study (Health Communication Partnership, 2008), it was found that MCP are more common among economically empowered men and economically disempowered women, and among unmarried than married people. People experiencing sexual problems are more likely to be engaged in MCP. The DHS 2007 found that although 93% of women and 94% of men agreed that "*married men should only have sex with their wives"*, a mere 12% of women and 24% of men believed that "*most married men they know only have sex with their wives"* (DHS 2007 figure 13.1). And while 95% of women and 96% of men affirmed that "*married women should only have sex with their husbands*", only 32% of women and 35% of men believed that "*most married women they know only have sex with their husbands*". **These answers corroborate the evidence that MCP behaviours and extramarital affairs are underreported in surveys, especially by women.**

Factors leading to MCP – Respondents in the study by Kwatu (2008) identified a myriad of factors leading to or encouraging MCP behaviours:

- Mobility, providing opportunities for both partners to have other sexual relationships
- Alcohol, peer influence, upbringing, desire for luxury material possessions and the adoption of a certain lifestyle
- As a safeguard in case a partner should terminate a relationship
- Poverty and the disintegration of the family safety net (females are particularly affected as they seek support for themselves and their families)
- Some traditional cultural practices such as girls' initiation ceremonies and men having more than one sexual partner (polygynous system)
- Cultural norms that expect women to be passive sexual partners contribute to the sexual dissatisfaction of both partners in a relationship
- Attitudes around circumcision (some circumcised men believe they are protected against HIV)
- Mistrust, suspicion, misunderstandings and mistreatment in relationships, lack of sexual satisfaction (particularly in the case of married couples), as well as lack of communication
- Women wanting to get married, searching for a suitable partner
- Married men and women to have a child, in cases when couples struggle to conceive
- Those forced into marriages as a result of parental pressure or premarital pregnancies, and unhappy with their partner.

This analysis also found that women's sexual abstinence for months after child birth – a cultural practice - may be an important factor leading to men having sexual partners outside their main relationship. According to the 2007 DHS, six and twelve months after birth, 43% and 20% of Zambian women still practice **postpartum abstinence**, respectively (table 6.8). The median duration of postpartum abstinence is 3.9 months, but particularly long for mothers in Western Province at 10.3 months (table 6.9).

Based on an analysis of SBS data from 1998, 2000 and 2003, Sandoy *et al.* (2007) concluded that the most important **predictors of concurrency were early sexual debut, being married, early marriage and absence from home**.

Partner preferences - In a study in Chiawa, Bond & Dover (1997) found that there was a preference for having married women or men as girlfriends or boyfriends because they were thought to have fewer sexual partners and to be less likely to have an STD. Men also said that for married men it is safer to have a married woman as a lover, since she is less likely to tell her friends.

Risk perception - People were generally aware of HIV-related risks including the importance of preventing infection through abstinence, mutual faithfulness, and condom use. However, despite the knowledge that those involved in MCP are at high risk of HIV infection, unprotected sex is common. Some men have a fatalistic attitude about HIV, dismissing the idea of changing their sexual practices to avoid

contracting HIV. People feel protected if they use condoms, and this can result in having sex with many partners.

"Boys like myself are at risk (for STIs and HIV) because we don't want to listen and we like girls a lot. Older people that are alive today are there because they chose the right path and refrained from liking girls too much" (Zambian male, 20-25 years, in Longfield *et al.* 2002).

Risk of concurrency: *"Before I start a relationship, I have to find out about his ex-girlfriends and why they broke up and when they stopped dating"* (Zambian female, 20-25 years, ibid).

Do & Meekers (2008) concluded from the 2005 Zambia Health Communication Survey (Health Communication Partnership project) that the **underestimation of risk of HIV transmission within marital relationships by both men and women** highlighted the needs for risk communication to and between couples.

Attitudes towards MCP behaviours – Kwatu research found that people involved in MCP were envied and admired by some respondents, while others viewed them with indifference or disdain. Especially men who engage in MCP, see the fact of having multiple partners as a sign of being manly and setting an example of how a man should behave.

The practice of MCP in Zambian society is an example of how individual choices are shaped by social and cultural influences. Thus a campaign to reduce MCP will need to focus not only on individuals, but also on families, communities and policy. This may mean challenging entrenched social and cultural norms. These norms include ***seeing involvement in MCP as acceptable for men*** *and* ***regarding women who are sexually proactive as likely to be having relationships with other men****. It is also a common misconception in Zambian society that the woman is responsible if a couple is unable to conceive a child.*

3.6.1.3. Condom use

Condom use is – in Zambia and elsewhere - commonly higher with non-regular partners than with regular (primary) partners, as illustrated by Table 6 presenting data from the most recent surveys.

The table demonstrates that **condom use is higher with pre-marital, non-regular and commercial sex partners than with marital or regular partners.** In a survey in Ndola[31] involving adults aged 15-49, frequent condom use with non-spousal partners was 25% for men and 24% for women, whereas with spousal partners it was only 7% for men and 3% for women (Lagarde *et al.*, 2001a). In partnerships of very short duration (1 day or less), men were significantly more likely to use a condom (adjusted Odd Ratio 3.4, 95% CI = 1.69 - 6.97) (Lagarde *et al.*, 2001b). Women from the Bemba ethnic group were less likely to report frequent condom use with non-spousal partners compared to Nyanja women (Lagarde *et al.*, 2001b).

In a study in Chiawa on seasonal migrant workers and local residents by Bond & Dover (1997), condoms were mainly used in short-term relationships, but these relationships could quickly become regarded as steady, and condom use suspended (people defined 'steady' as not being seen with too many other men or women).

A nationally representative study among 10-19 year old adolescents (N=3,360) found that out-of-school youth were more likely to report having had **unprotected vaginal and anal sex** than in-school youth, and rural and married youth were more likely to have had this risk behaviour than their urban and unmarried counterparts (Slonim-Nevo & Mukuka, 2005).

[31] Four cities study involving Ndola, Cotonou (Benin), Yaounde (Cameroon), and Kisumu (Kenya), by the Study Group on the Heterogeneity of HIV Epidemics in African Cities.

Table 6: Population-based data on condom use with different types of sexual intercourse & partners, Zambia

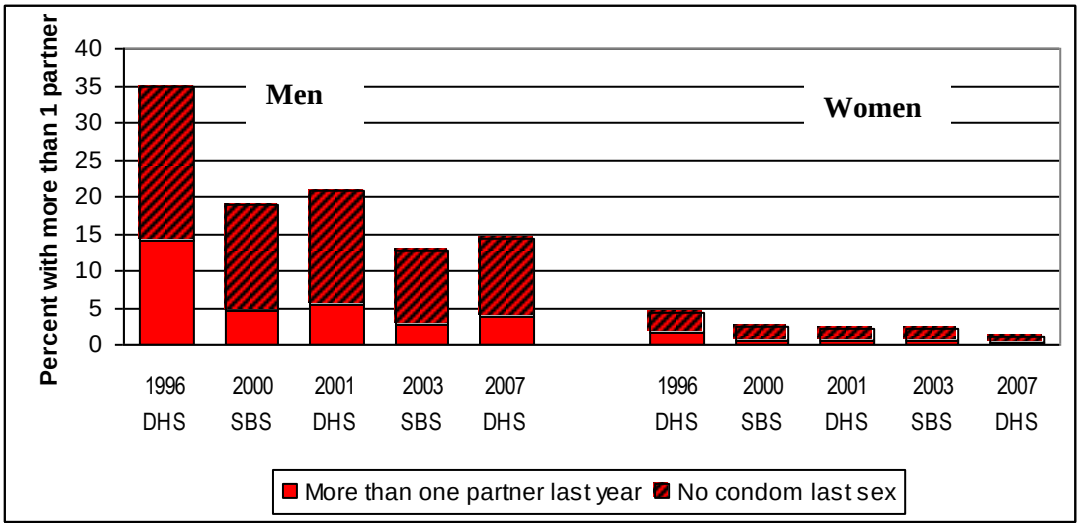
	Females	Males	Source
FIRST SEXUAL INTERCOURSE			
Youth aged 15-24 yrs	19%	23%	SBS 2005, table A.5.18
Youth aged 15-24 yrs	24%	22%	DHS 2007, table 13.17
PREMARITAL SEXUAL INTERCOURSE			
Never-married youth aged 15-24 yrs	39%	47%	DHS 2007, table 13.18
REGULAR PARTNER			
With marital partner, last sexual intercourse	5%	7%	SBS 2005, table A.3.3.
With marital partner, last sexual intercourse	7%	13%	DHS 2007
NON-REGULAR PARTNER			
Youth 15-24 yrs Reporting non-regular partner in last 12 months	26%	38%	SBS 2005, table A.5.21
Adults (F 15-49, M 15-59) Reporting non-regular partner in last 12 months	29%	38%	SBS 2005, table A.5.21
Sexually active adults aged 15-49 yrs Reporting 2+ partners in last 12 months	33%	27%	DHS 2007, tables 13.8.1/2
Sexually active adults aged 15-49 yrs Reporting higher-risk intercourse in last 12 months	37%	50%	DHS 2007, tables 13.8.1/2
Sexually active youth aged 15-24 yrs Reporting higher-risk intercourse in last 12 months	38%	48%	DHS 2007, tables 13.19.1/2
SEX WORKER (PAID SEX)			
Men 15-49 yrs reporting sex with SW in last 12 months	n/a	53%	SBS 2005, table A.3.13
Men 15-49 who report having paid for sex in last 12 months	n/a	55%	DHS 2007, table 13.9

There may be validity problems with self-reported condom use
The Ndola survey also analysed the consistency of reported condom use among married couples and found 78% concordance, i.e. husband and wife both report condom use with spousal partner (Lagarde *et al.*, 2001a). There is hence a problem of validity of self-reported condom use, which may be due to recall bias, over-reporting in the context of a survey, or reluctance to declare a risky unprotected sexual intercourse. Another study on couples published by Allen *et al.* (2003) used sperm on vaginal smears and other biological markers to validate reported condom use. It was found that at least half of unprotected contacts in discordant couples were not reported. The authors conclude that ideally, both self-report and biological markers should be used in studies (self-report measures to maximize sensitivity, and biological markers to provide an estimate of the degree of underreporting).

Reported condom use increased with all types of partners for both sexes between 1996 and 2007. This includes marital sex, sex with a non marital non cohabiting partner, and with an extramarital partner – see **Annex 1** for detailed time trends.

Reported condom use by people in multiple partnerships is still low at 33% for women and 27% for men (2007 DHS) – see figure 37. Although the proportion of people who have multiple partners and unprotected sex has decreased over the years (dashed areas), there is still a large potential for more consistent condom use in this risk population.

Figure 37. Adults 15-49 years with more than 1 partner in the past 12 months and condom use last sex in Zambia (1996-2007)



Sources: DHS and SBS reports.

Among young people reporting multiple partners, condom use at last sex increased between 1996 and 2007, from 35% to 43% in males (not significant, p=0.056) and from 23% to 42% in females (p<0.05). Given that there is frequent partner change among youth (documented by Kwatu, 2008), this is still low. Longfield *et al.* (2008) conclude in their qualitative study on "Trusted Partners among Youth" that - despite recognizing that they are at increased risk for STIs/HIV - youth have difficulty personalizing their risk for infection and often use ineffective criteria to evaluate their risk within trusted relationships. Many youth also adopt trusting one's partner as a risk reduction strategy to the exclusion of more effective methods, such as getting tested for HIV or incorporating condom use into relationships. Since youth associate condom use with a lack of trust in one's partner, use remains low within regular partnerships; however, when used with trusted partners, youth appear to negotiate condom use for pregnancy prevention rather than protection from STIs/HIV.

"I can't use condoms with my present girlfriend. I like her very much and we have sex without condoms. One day, she disappointed me because I found her with another boy. After reconciliation however, I've continued having sex with her without using condoms. This is because I still love her very much" (Zambian male, 15-19 years, in Longfield *et al.*, 2002).

Condom use and HIV risk

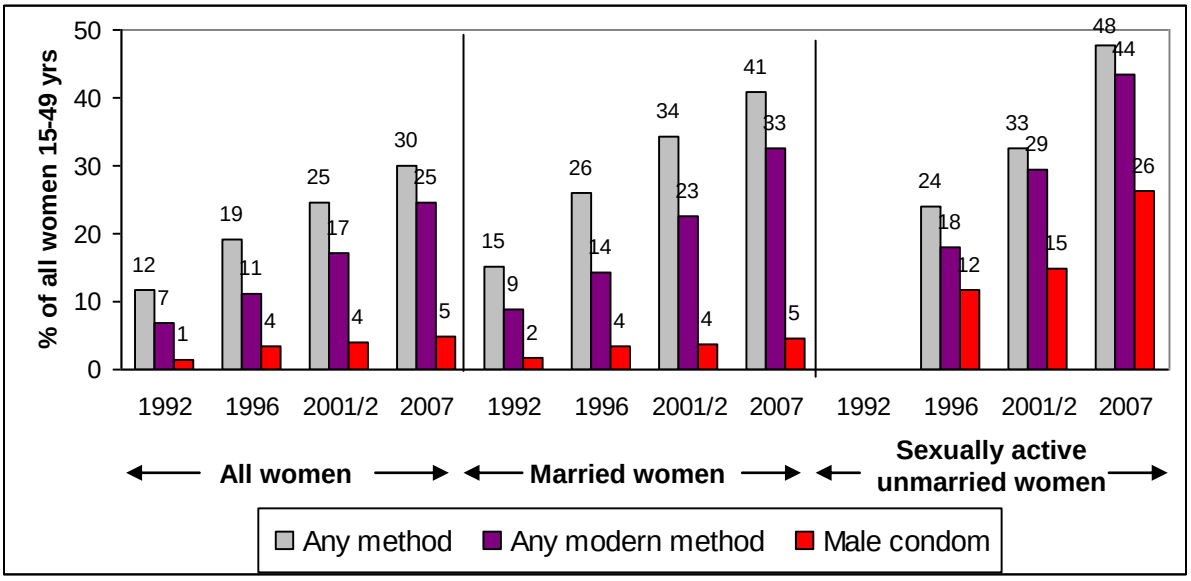
Many studies of the association between use of condoms and acquisition of sexually transmitted infections have yielded apparently **paradoxical results**. This applies to the data from the Zambian DHS 2007, in which higher HIV prevalence was recorded in women and men who ever used a condom than in those who never used a condom (note that in the DHS, a cross sectional study, it is not known if those reporting 'ever used a condom' were already HIV infected, prior to condom use or not). Equally, higher HIV prevalence was found in women and men who used a condom at last sexual intercourse, and, among men who had paid for sex in the last 12 months HIV prevalence was higher in those who had used a condom in the last act with a sex worker compared to those who did not.

Aral & Peterman (2002) explain this as follows: *"People who use condoms are found to be at least as likely to acquire infections as people who do not use condoms. People tend to use condoms with partners who they think are risky but not with partners who they consider to be safe. Consequently, increased condom use may be a marker either of increased likelihood of HIV/STI exposure, or decreased HIV/STI transmission risk".*

Condoms play an increasing but still relatively small role in contraception – see figure 38. Condom use for contraception shows increases between 1992 and 2007 in all three groups analysed (all women respondents [N=7,146, 2007], married women [N=4,402], and sexually active unmarried women [N=320]).

Among married women, condom use for contraception was higher than average in urban women and women with secondary or higher education. Among sexually active unmarried women, it was mainly the 15-19 year old women using condoms for contraception (DHS 2007, table 5.4).

Figure 38. Use of condoms for contraception by women 15-49 years in Zambia (1992-2007)



Source: DHS 2007, table 5.4. If more than one method is used, only the most effective method is considered in this figure. Sexually active unmarried women: women who have had sexual intercourse within 30 days preceding the survey.

Reproductive factors, such as the number of live births, promote condom use within marriage (Kankasa *et al.*, 2005). Therefore, condom use within marriage can be promoted when family planning is more accepted and practiced.

Further to the condom use data presented in the previous sections, the following can be summarised from the literature about factors that impact condom use levels:

- **Condom use was higher amongst partners who engage in extramarital sex -** A study in the ANC clinic in Chipata, Lusaka by Kankasa *et al.* (2005) found significantly higher use of condoms both with the husband and with other partners *among women having extramarital relations*. Factors significantly associated with condom use within and outside of marriage differed: age and number of live births were predictive of condom use within marriage, and sexual transmission knowledge outside of marriage.
- **Higher education levels and higher levels of income are positively associated with higher levels of condom use** – Kankasa *et al.* (2005) found that educational attainment (having attended school) was not effective for condom use or for gaining knowledge on sexual transmission. Regular own earning was significantly effective for condom use in both faithful ANC clients and those with extramarital affairs, irrespective of school attendance (the possibility of sex work as the source of earnings was thought to be very low). In the Ndola survey of the four cities study (by Lagarde *et al.*, 2001b), condom use with non-spousal partners was associated with higher educational level in male respondents (adjusted OR 2.94) and in female respondents (adjusted OR 4.50).
- **Condom use was lower amongst those affiliated with religious groups that do not condone condom use**[32] **-** The study reported by Agha *et al.* (2006, MSZY data on >5,500 women aged 13–20

[32] Frequencies of religious affiliations in the sample: Catholic (26%), Pentecostal (24%), Seventh Day Adventist (11%), United Church of Zambia (10%), New Apostolic (7%), Jehovah's Witness (6%), Reformed Church of Zambia (5%), Baptist (4%), Other (8%).

in Lusaka Province) found that affiliation with the most conservative religious groups lowered the likelihood of condom use at first sex. Seventh Day Adventists reported a lack of awareness of, access to, and skills in using condoms as the reasons for not using a condom during first sex, while Jehovah's Witnesses reported religious or partner-related reasons for not using a condom during first sex.

- **Female condom use remains low**[33] – A study among couples enrolled at an STD clinic in Lusaka in 1993-1994 (Musaba *et al.*, 1998) found that, when given a choice of barrier methods, couples used the female condom for approximately one quarter of coital acts over a 1-year period. Female condom use became more focused over time - as couples gained experience, attitudes toward the device became stronger and couples who disliked it discontinued use, whereas couples favouring the device increased use. The findings suggest that providing additional barrier methods, particularly female-initiated methods, will result in less unprotected coitus for some couples. A study in Lusaka in 1998 specifically looked at the re-use of the female condom, and found that a variety of different agents were used for cleaning and for re-lubrication, and that more re-users did not report any perceived problems with re-use (Smith *et al.*, 2001).
- **Negative perceptions about how condoms affect sexuality and sexual pleasure are barriers to use** – In a study in Chiawa, Bond & Dover (1997) found a number of negative attitudes and beliefs regarding condoms: They trap the semen[34]; they lessen sensitivity and it takes longer to ejaculate, reducing the number of 'rounds'; the lubrication required by condoms lessens the effects of dry sex (see below). Men appeared to have psychological anxieties about performance when using condoms. They also said that prolonged use of condoms would lead to impotence.
- **Dry sex practices are not conducive to condom use** - Several studies have documented the practise of "dry sex"[35] in Zambia (Nyirenda, 1991; Sandala *et al.*, 1995; Ashworth, 1998; Mbikusita-Lewanika *et al.*, 2009). The largest study was conducted among 809 women in Lusaka, and it was found that among those sexually active, 77% had used dry sex treatments at some point in their lives, and 67% were using them at the time of the survey (Mbikusita-Lewanika *et al.*, 2009). Among women in their 40s and among married women, close to 70% were currently using dry sex treatments. Women with little or no formal education and women from lower wealth classes, as well as those who had grown up in rural areas and those originating from the Eastern Province, were also more likely to use the practice. Ashworth (1998) found, in a rural community near Serenje, widespread use of herbs by women to dry the vagina before sexual intercourse. Of 303 respondents, 73% reported use of the practice, and many admitted that use of herbs caused vaginal soreness either always or sometimes. Mbikusita-Lewanika *et al.* (2009) also found that these vaginal treatments were not only related to sexual intercourse, but more generally to the concept of womanhood, societal expectations and self-image of women.

Sexual transmission knowledge can increase condom use for HIV protection when childbearing is not expected or wanted (extramarital affairs). In comparison to education, **regular earning by a woman was significantly associated with condom use with both husband and other partner/s.**

Over the period 1992 to 2007, important positive changes have been observed in several behavioural indicators reported by adults and youth in Zambia. Survey respondents have reported a shift away from multiple partners and/or non-cohabiting partners towards just one partner, the majority of which are cohabiting. Condom users have increased as a proportion of the whole population, especially among those

[33] The female condom was introduced into Zambia on a research basis during 1995-1996 and was distributed as "Reality" brand (Smith *et al.* 2001). It was launched in 1997 for public and private sector distribution and packaged as the Care contraceptive sheath.

[34] In Chiawa, semen has a high symbolic value; potency and quality of semen are strong symbolic elements of male identity (Bond & Dover, 1997). Men take regular doses of potency medicines to improve performance and semen quality. When a boy is deemed old enough, an elder male relative will start giving him potency medicine, which is usually locally made herbal mixtures.

[35] The insertion of herbal aphrodisiacs, household detergents, and antiseptics into the vagina to dry and tighten the vagina for sexual intercourse (http://www.rho.org/html/hthps_overview.htm#drysex).

married or reporting just one partner in the last year. This is illustrated in **Annex 1** in figures 1.5 and 1.6 for young people and people of all ages.

The declines in HIV prevalence and associated changes in sexual behaviour found in the population-based surveys are consistent with changes found in selected Zambian communities (Michelo *et al.*, 2006a; Michelo *et al.*, 2006b; Sandoy *et al.*, 2007).

3.6.1.4. Male circumcision

Male circumcision (MC) offers biological protection against HIV acquisition (Bongaarts *et al.*, 1989 ; Moses *et al.*, 1990; Auvert *et al.*, 2005; Drain *et al.*, 2006, Bailey *et al.*, 2007; Gray *et al.*, 2007).

A recent **systematic review of the effectiveness and safety of MC** by the South African Cochrane Centre found a relative risk reduction of acquiring HIV of 50% at 12 months and 54% at 21 or 24 months following MC (Siegfried *et al.*, 2009). No significant differences between circumcised and uncircumcised men's sexual behaviour were found in the data from the Kenyan and Ugandan MC trials. For the South African trial the mean number of sexual contacts at the 12-month visit was 5.9 in the circumcision group versus 5 in the control group, which was a statistically significant difference ($p<0.001$). This difference remained statistically significant at the 21-month visit (7.5 versus 6.4; $p<0.01$). Incidence of adverse events following the surgical circumcision procedure was low in all three trials. The authors concluded that **there is strong evidence that medical male circumcision reduces the acquisition of HIV by heterosexual men by between 38% and 66% over 24 months** (Siegfried *et al.*, 2009).

In Zambia, few males are circumcised. According to men's responses in the 2007 DHS, only 13% of men aged 15-59 years are circumcised, leaving 87% of men uncircumcised (DHS table 13.12). Reported MC is highest in the Northwestern Province at 71% (HIV prevalence 2007: 6.9%), followed by Western Province at 40% (HIV prevalence in 2007: 15.2%). In the classification used by Drain *et al.* (2006), these MC levels would be classified as "intermediate" (20%-80%). The MC level in all the other provinces is low at 14% or less ("low" is <20% in Drain's classification). Reported MC levels are virtually the same in urban and rural areas, i.e. 13% and 12%, respectively.

HIV prevalence in circumcised men is slightly lower - the 13% of men who report being circumcised have a HIV prevalence of 10.8% and the group of uncircumcised men have a HIV prevalence of 12.5% (OR=0.85, 95% CI = 0.64-1.12) (DHS table 14.11). This bivariate analysis may be confounded, for example, in that it is not known if men who reported being circumcised were HIV infected prior to their circumcision. Furthermore, a better understanding the true effect of circumcision on HIV risk in Zambia requires multivariate analysis since some variables like higher age, higher education and urban residence are associated with both HIV prevalence and male circumcision, leading to confounding.

In Ndola, one of the sites in the four cities study (Auvert *et al.*, 2001), there was little difference in the prevalence of HIV infection among men who were circumcised (25% HIV infected) and men who were not (26% HIV infected, OR=0.95, 95%CI = 0.46-1.94), but the power of the study was very limited with only 41 men confirmed circumcised, and the design was cross-sectional. There were virtually no differences between the two groups of men in socio-economic characteristics, sexual behaviour, HSV-2 prevalence, syphilis, or in the proportion of men who reported an STI episode in the past 12 months. There was one relevant difference detected between the two groups of men – circumcised men were more often married to an HIV-infected woman than uncircumcised men.

Self-reported male circumcision is not always accurate: In the Ndola study described by Auvert *et al.* (2001), only 73% (41/56) of men who reported being circumcised were confirmed circumcised on clinical examination. Reports of not being circumcised were more accurate – 99% (448/453) of men who said that they were not circumcised were confirmed on clinical examination.

There is research evidence that acceptance of medical male circumcision is high, both in traditionally circumcising and non-circumcision areas of Zambia. Lukobo & Bailey (2007) report from qualitative research in four districts (Lusaka, Zambezi, Luanshya and Monze[36]) that *"there is no antipathy toward male circumcision and there is widespread belief that circumcision reduces risk of acquisition of STI, including HIV. Circumcision is equated with ease of maintaining good hygiene*".

According to Westercamp & Bailey (2007), **a minority of respondents are in favour of infant or early childhood MC in Zambia**. In the study by Lukobo & Bailey (2007), circumcision between the ages 7–13 years was the preferred age range for performing the MC procedure. Babies under one year of age were thought to experience excessive pain, leading to crying and fevers.

In communities where circumcision is widely practiced for cultural or traditional reasons, there is great interest in the introduction of MC services at health facilities. Luvale and Lunda boys get traditionally circumcised in male circumcision camps, *mukanda*, where they also get instruction in culture, marriage and hunting. In the same study on MC acceptability, people in Zambezi District expressed great interest in the offer of medical MC services.[37] Unlike in non-circumcising districts, charges at a health facility for medical MC services were not an impediment for Lunda and Luvale because they have always expected to pay for MC services.

There are barriers, information gaps and fears about male circumcision, particularly in non-circumcising communities. The biggest barriers to MC identified by Lukobo & Bailey (2007) were the identification of the procedure with certain ethnic and religious groups (Lunda, Luvale, Muslims and Chawa[38]), pain associated with the procedure and the healing process, length of time for healing, and cost. In non-circumcising areas, study participants said that more information about the benefits of MC would be helpful. Among the fears expressed were complications from the procedure (blood loss, local and other infections including HIV); damage to the genitals, sterility and death; men becoming more promiscuous due to the perceived protection upon circumcision; and stigma and rejection by family, friends and women.

Male circumcision and HIV risk

Zambian population level data on the relationship between reported MC and HIV prevalence need further analysis. A simple 2x2 table of the 2007 DHS data shows that HIV prevalence in circumcised men is slightly lower, but the association requires adjusting for potential confounding. In Northwestern Province, one of the two provinces with lowest HIV prevalence in Zambia (7%), reported MC is at its highest level in Zambia (71%). Almost all other provinces have low MC prevalence and varying levels of HIV prevalence. With cross sectional data, as collected in the DHS, it is not known if HIV infection or circumcision occurred first in those reporting being circumcised. The Ndola study also found lower HIV prevalence in circumcised men compared to those not, but the study lacked power to detect a significant difference. There is however overwhelming evidence from ecological and biomedical studies in many African countries that male circumcision is highly effective in reducing HIV transmission in men.

3.6.1.5. Education and HIV & AIDS knowledge

The interrelationship between education status, specific HIV & AIDS knowledge, and risk of HIV infection has been intensely researched in Sub-Saharan Africa. Inter-country comparisons have revealed that HIV and AIDS knowledge do not necessarily correlate with sexual risk taking and HIV incidence.[39]

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[36] Lusaka District: urban with a mixed population who do and do not practise MC; Zambezi District / Northwestern Province: rural, predominant ethnic groups are the Lunda and Luvale both practicing traditional MC; Luanshya District / Copperbelt: urban, ethnically diverse with the non-circumcising Lamba predominant; Monze District / Southern Province: rural, predominantly non-circumcising Tonga.

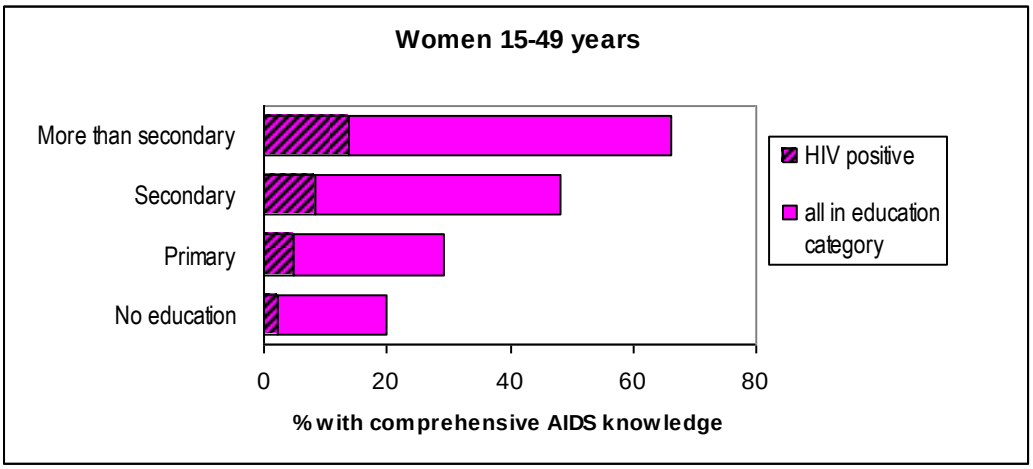
[37] A trend away from traditional and toward medical circumcision has been observed in other African communities where MC is widespread (e.g. Bungoma & Chagoria/Kenya, Mbale/Uganda, Mwanza/Tanzania) (Lukobo & Bailey, 2007)

[38] An animist group residing mostly in the eastern part of Zambia

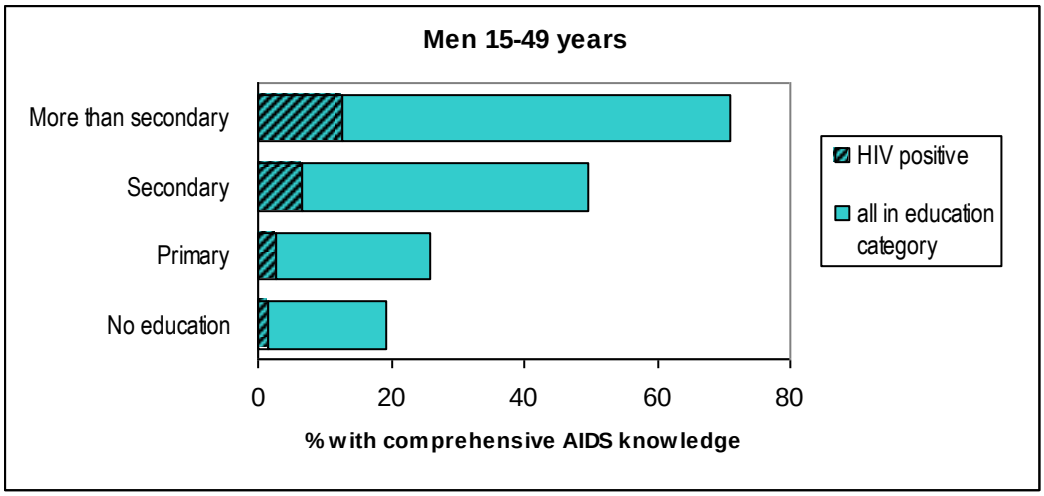
[39] For instance, in Kenya, where a 50% reduction in HIV prevalence over the last 10 years and a significant reduction in HIV incidence have been observed and it is estimated that incidence peaked in 1993 (Cheluget et al, 2006),

In Zambia, comprehensive AIDS knowledge[40] is highest in women and men with the highest school education, but HIV prevalence is also highest in these groups – see figure 39 and section 3.2.4 on "Heterogeneity by education status". **More educated people are significantly more likely to be HIV infected.** A women with higher education is significantly more likely to be HIV positive than a women with no education (OR=2.24, 95%CI =1.73-2.89). The same pattern is true for men (OR-2.56, 95%CI=1.91-3.44). Other studies had similar observations regarding education and HIV. A cross-sectional questionnaire survey among 470 pregnant women in Lusaka found that school attendance was significantly positively associated with HIV seropositivity (Kankasa *et al.*, 2005). Previous reports had also found that a woman's educational attainment was positively associated with a high prevalence of HIV infection (e.g. Fylkesnes *et al.*, 1997). These results may be confounded by age.

Figure 39. Comprehensive AIDS knowledge and HIV prevalence in different education categories in adult women and men in Zambia (2007)



Source: DHS 2007 tables 13.3.1 and 14.4.



Source: DHS 2007 tables 13.3.2 and 14.4.

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comprehensive knowledge about AIDS is relatively low at 36% (females only, Kenya 2003 DHS) when compared to Swaziland (52% females, Swaziland DHS 2006/7), but estimated HIV incidence in Swaziland is a multiple of the incidence estimated for Kenya (4% vs. 0.5%). Furthermore, fewer than 15% of Kenyans know their HIV status (Kenya DHS, 2003), compared with more than 35% of Swazis (Swaziland DHS 2006/7) – yet incidence follows a very different dynamic.

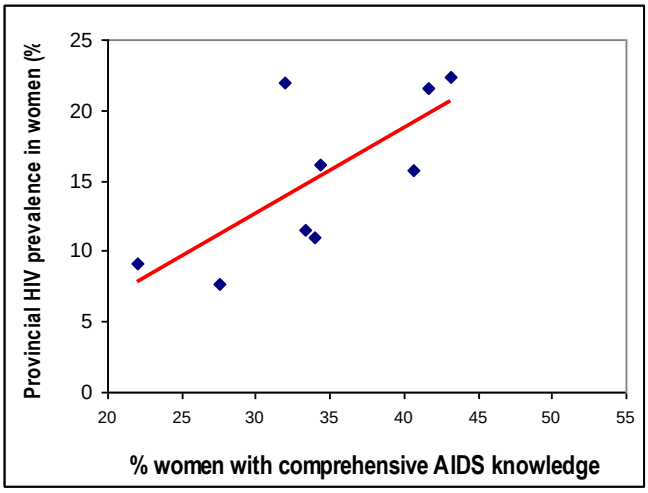
[40] In the DHS, a person is considered to have a comprehensive knowledge about HIV/AIDS when they say that use of condoms for every sexual intercourse and having just one uninfected and faithful partner can reduce the chance of getting HIV, that a healthy-looking person can have HIV, and when they reject the two most common misconceptions that HIV can be transmitted through mosquito bites and that a person can become infected with HIV by eating from the same plate as someone who has HIV.

There is a positive association between level of comprehensive AIDS knowledge in a province, and provincial HIV prevalence, particularly in women, as illustrated by figure 40a. In provinces with relatively high comprehensive AIDS knowledge in women (Lusaka and Copperbelt), female HIV prevalence is at its highest for Zambia. This pattern does not hold for Central Province, where female HIV prevalence is also very high, but AIDS knowledge is relatively low. In men, the relationship is less clear-cut and only in Lusaka Province is there both relatively high comprehensive AIDS knowledge and high HIV prevalence (figure 40b).

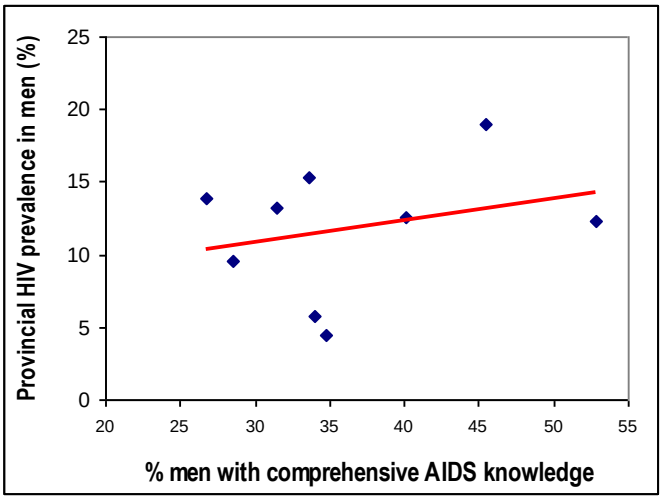
Urban-rural comparison - Comprehensive AIDS knowledge was significantly higher in urban men and women than rural men and women[41], and so was HIV prevalence (DHS 2007).

Figure 40. Relationship between comprehensive AIDS knowledge* and HIV prevalence, at provincial level in Zambia (2007)

a) Women 15-49 years



b) Men 15-49 years



Source: DHS 2007 tables 13.3.1/2 and 14.4.
* Comprehensive knowledge about AIDS means knowing that consistent use of condom during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting the AIDS virus, knowing that a healthy-looking person can have the AIDS virus, and rejecting the two most common local misconceptions about AIDS transmission or prevention.

Other local studies provide data on knowledge, risk perception, and trust between partners:

A study on knowledge and risk perception among youth indicated that sexual satisfaction, emotional fulfilment, and fear of loss override youth's risk perception for STIs/HIV and contribute to a pattern of denial (Longfield *et al.*, 2002). Rather than using appropriate criteria to evaluate their risk for STIs/ HIV, youth relied on trust as protection from infection.

"I once had a girlfriend who took long, before she gave in to my advances — about one week... Yet she gave in. I trusted her. (Zambian male, 15-19 years)."

In the study on pregnant women in Lusaka, Kankasa *et al.* (2005) found that school attendance did not increase condom use with the husband or an extramarital sexual partner. Furthermore, school attendance was not correlated with knowledge on sexual transmission of HIV, although it was correlated with knowledge of non-sexual transmission routes, such as blood and breast milk.

[41] Women - Urban vs. rural: OR=1.91 (95% CI = 1.58-2.30); Men – Urban vs. rural: OR=2.17 (95% CI = 1.80-2.61).

School education, AIDS knowledge and HIV risk

HIV prevalence is much higher in Zambians who have attended school for longer. In fact, the higher the educational attainment, the higher the risk of seropositivity. The above analyses also highlight that comprehensive AIDS knowledge does not prevent HIV prevalence reaching high levels. A possible explanation for the observed correlation is that in the provinces with higher HIV prevalence, people may be more concerned about the HIV epidemic than in provinces with lower HIV prevalence, and hence more receptive to HIV and AIDS education. Furthermore, IEC activities are more concentrated in areas of the country which are more affected by the HIV epidemic, further explaining why knowledge is higher in more affected areas (see chapter 4 for further details on IEC activities).

3.6.2. Factors at the community level impacting the risk of heterosexual transmission of HIV

This section provides the community level analysis of the epidemiology of HIV in Zambia. Community (or intermediate) level factors which are thought to be important are grouped under the headings: Marriage patterns and polygyny; Social and cultural norms; Sexual and physical violence; and Alcohol use.

3.6.2.1. Marriage patterns and polygyny

There was little change in the distribution by marital status between 1996 and 2007, except that young men appeared to be increasingly likely to marry (men in their mid- to late twenties and early thirties were more likely to be married in 2001-2002 than men of the same age group in 1996, 75% and 68%, respectively).

Marriage occurs relatively early in Zambia and all but a tiny fraction of women and men eventually marry; less than 2% of women aged 35 and older and less than 1% of men aged 45 and older had never married (DHS 2007, table 63). The proportion divorced or widowed generally increases with age. Men tend to marry at older ages than women. Marriage and cohabitation are generally considered to be primary indicators of exposure to the risk of pregnancy. In Zambia, however, many women bear children before entering a stable union. Informal relationships are common, and women may have children in the context of such unions.

Regarding polygyny (having more than one wife at the same time):

Polygynous marriages are relatively frequent in Zambia. In the 2007 DHS (table 6.2), 14% of women were in polygynous marriages (17% in 1996), and 8% of married men had more than one wife (as in 1996). By definition, more married women than men are in polygynous unions, but the 2001-02 DHS report also states that there may be a difference in classifying girlfriends, i.e., a tendency for women to report their husbands' girlfriends as wives, while their husbands do not. The prevalence of polygynous unions increased with age for women and men, and decreased with increasing education for women and men (DHS 2007).

Rural women and men were significantly more likely to be in polygynous unions (W: 19%, M: 10%) than urban women and men (W: 6%, M: 3%, DHS 2007). Provincial differences were marked: 25% of married women in Southern Province were in polygynous unions, compared with only 4% of women in Lusaka Province. Polygyny was also high in Eastern and Western Provinces, with more than 20% of married women in polygynous unions.

HIV prevalence levels in adults in polygynous unions are similar to those in non-polygynous unions. In the 2007 DHS, HIV prevalence was slightly lower among women in polygynous unions (13.5%) than other married women (14.8%, p=0.4). In men, HIV prevalence was higher in men with more than one wife (19.0%) than in men with only one wife (15.9%), but the difference did not reach statistical significance (p=0.07). At province level, there was no apparent correlation between the proportion of men with more than one wife and HIV prevalence (DHS 2007, linear regression coefficient R^2=0.04).

3.6.2.2. Cultural norms including age disparate relationships, and transactional and commercial sex

This section presents data on two closely related phenomena, age-disparate relationships and transactional relationships, which both have cultural resonance, are quasi-acceptable and create risk contexts. Kwatu (2008) reported that husbands expect their wives to comply with **cultural dictates** such as not initiating sex, but men also consider "*boring sex lives at home as push-factors for extra-marital sexual relationships*". The report also raised the issue that married women are negatively affected by some **cultural norms**, like the expectations that women not question their husbands' actions, that women serve men; that women depend on their husbands for finances, and that women not deny their husbands sex. Furthermore, women are expected to accept their husbands' extra-marital sexual affairs, respondents said, but women who have affairs themselves are condemned (Soul City, 2008). These cultural prescriptions not only discourage assertiveness or independence, but put women at risk of HIV infection.

Among the cultural practices that are considered to facilitate HIV transmission are:

- **Sexual cleansing** (most provinces) - The ritual involves a woman having sex with a member of her deceased husbands' family to purge the spirit of her deceased husband (WLSA, 2007). A woman who refuses to be sexually cleansed may be punished. There is no requirement for HIV testing prior to the cleansing. Gausset (2001) reports that people have become aware of the problem and that AIDS widows may be cleansed with herbal remedies instead of a sexual cleansing, or her blood may be tested before cleansing her sexually (the author adds that these new procedures may be shameful for the widow, as it brings into question her health and rights to a traditional cleansing). The practice has been outlawed by the Penal Code Amendment Act, but is still a source of concern.
- **Widow inheritance** (Central and Lusaka Provinces) – A practice where a member of the family of the deceased succeeds and marries or inherits the widow (WLSA, 2007). A widow who refuses to be inherited may face severe punishment and rejection by the husbands' family. If the husband died of AIDS, the man who inherits the widow is at increased risk of HIV infection.

Other cultural practices which might contribute to HIV transmission are: 1) **Dry sex** (see section 3.6.1.3); 2) **Traditional circumcision** involving sharing of blades and knives, and the initiates having sex with an elderly lady before the wound is completely healed (Northwestern Province); 3) **Premarital unprotected sex** to prove fertility of young girls (especially Western Province); 4) **Wife sharing** with kin as a sign of welcome (Southern Province); 5) **Traditional treatment of infertility** by a healer having sexual intercourse with the woman client; 6) **Unprotected sex with minors** as traditional treatment for HIV and as a remedy for becoming rich and prosperous; 7) **Separate accommodation for pubescent girls** making them vulnerable to sexual abuse (Southern Province). Furthermore, there is also anecdotal information on the practice of having sex with a pregnant women for 'ripening' the fetus with sperm, a potential reason for HIV seroconversions during pregnancy (D. Potter, pers. comm.).

Age disparate relationships

The terms 'cross-generational sex' or 'intergenerational sex' are usually used for sexual relationships where there is a 10 year age gap or more between the two partners. The term 'age-disparate relationship' is used in relationships where the age gap is more than 5 years.

Most studies on cross-generational or intergenerational sex, or age-disparate relationships, emphasize that **asymmetries within sexual relationships** cannot be understood as simply the outcome of individual behaviour or the individual attributes of those involved (Leclerc-Madlala, 2008). Rather, **these relationships are negotiated within a wider social, cultural and economic context, and reinforced by factors such as family and peer pressure, social and economic institutions, gender inequalities and power relations.**

"Then there are those where a married man, he's got a wife home and again he is indulged with an extra girlfriend within the community at the same time having another extra relationship with a school girl" (Single Urban Male, Zambia, Kwatu, 2008)

According to the 2007 DHS, 4.5% of young women aged 15-19 years had sexual relations with a man who neither was a spouse nor lived with the respondent, and who was more than 10 years her senior ("intergenerational sex"). The highest level was found in the Copperbelt Province (10.9%). These values are likely to be underestimates due to the social undesirability bias of premarital sex.[42]

While many young women may enter age-disparate relationships because of poverty or coercion, studies also reveal that **many young women play active roles in seeking and exploiting relationships with older men and do not perceive themselves as victims** (e.g. Leclerc-Madlala, 2003; Nkosana, 2006).

Young women may be powerless as regards safer sex negotiations, but they often have a high degree of control over partnership formation and choosing the number and types of partners with whom they become involved. This often gives them a false sense of being in charge. Young women perceive a range of potential benefits from age-disparate partnerships that include opportunities for finding love, companionship, a husband, sexual fulfilment, impressing peers, boosting self-esteem, finding employment, acquiring the means to pay for material goods or studies, acquiring social status or simply having fun in ways that suggest a modern lifestyle (Kwatu; 2008, Machel, 2001; Leclerc-Madlala, 2003). But young women are often simultaneously aware of dangers that include dependency and the common occurrence of unsafe sex that can result in pregnancy, STIs and HIV (e.g. Karlyn, 2005 for Mozambique). It is not uncommon for young women to judge intergenerational relationships to be "not good", and reportedly wish the benefits derived could be derived through other means (Nkosana 2006, for Botswana).

Age disparate relationships have been cited in Southern Africa as a reason behind the higher prevalence of HIV among young women than young men. This analysis has already shown that **Zambian couples with large age gaps between partners have a higher risk of being HIV positive** (section 3.2.6 on HIV prevalence in couples, figure 12). According to Leclerc-Madlala (2008), studies in Southern Africa have consistently found that the larger the age disparity, the lower the probability of safe sex.

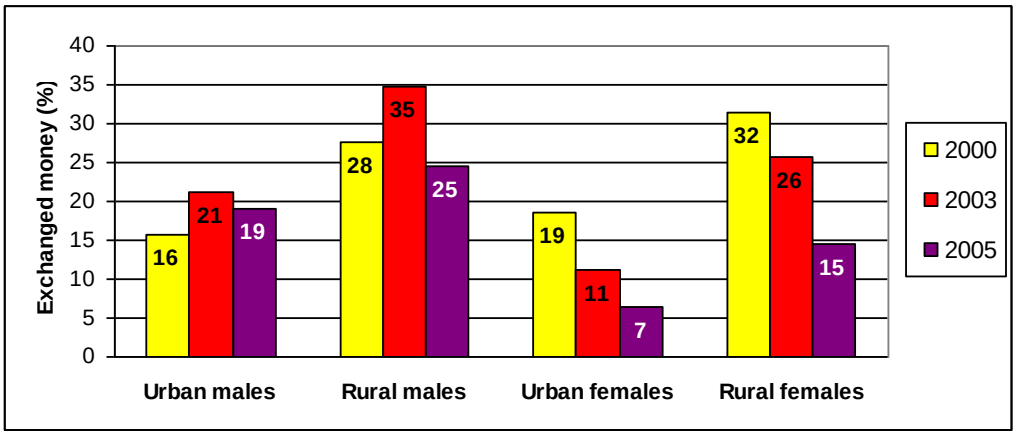
Transactional and commercial sex

Closely related to age-disparate relationships is the phenomenon of transactional sex (involving transfers of money, gifts or favours). Age disparate relationships are often also transactional, and there is a continuum between transactional and commercial sex (sex in exchange for money). The ten country report on MCPs by Soul City (2008, p14), states that *"intergenerational relationships are usually transactional*". According to Leclerc-Madlala (2008), **transactions have long been and remain an important and normative part of courtship and sexual relationships in Southern Africa**. In any quantitative assessment of the occurrence of transactional sex, it is therefore difficult to distinguish between the common "gift-giving" in sexual relationships and transactional sex.

Exchange of money is frequent in non-regular relationships. In the SBS 2005, it was found that 22% of males and 11% of females reported that money was exchanged at last sex with a non-regular partner. Percentages were higher among rural respondents (figure 41). The aspect of paying money for sex is partially attributable to poverty.

[42] In the 2007 DHS, 91% of women and 90% of men said that "Young women should wait until they are married to have sexual intercourse" (DHS figure 13.1.).

Figure 41. Exchanged money in last sexual act with non-regular partner in Zambia (2000-2005)



Source: SBS 2005, table A.3.7

The motives for transactional sex may be different in urban areas compared to rural areas. Hawkins *et al.* (2005) present narratives from young women in Maputo which suggest that multiple sexual partnerships are a norm and **a survival strategy "*in order to maintain a social identity, linked to freedom, independence, access to material goods and aspirations to achieve success and power*"**. The ten country MCP study by Soul City (2008) frequently found the same opinion among females of "*we end up having other partners as a way of getting money to buy what we want*" (p28).

In the study by Slonim-Nevo & Mukuka (2005), **9% of 10-19 year old youths reported having traded sex for food or money**. Married youth were more likely than unmarried youth to trade sex for food and money (15% vs. 8%). Rural and out-of-school youth were also more likely to report this behaviour than their urban and in-school counterparts.

In the qualitative research on MCP by Kwatu (2008), male and female participants said they would be reluctant to have a relationship with someone who had no money and that **relative wealth was a strong inducement to have a relationship with a person**.

"If a person has got money the heart goes 'incha' *(using hand to show the heartbeat)…Like with me who doesn't have the money; if I saw people with money I would follow them".* (Rural Female Youth, Zambia, Kwatu 2008)

In the same study, participants reported that people exchange **sex for 'favours'** in different contexts. For instance, an employer might promise someone employment in exchange for sex or an officer at a checkpoint would allow illicit goods to pass in return for sex. Participants said **the practice of exchanging favours for sex is very common** and they identified businessmen and businesswomen, people working in the hospitality industry, doctors, teachers, taxi drivers and musicians as some of the people likely to be involved.

In fishing communities, part of the fish trade takes place as informally institutionalized fish-for-sex transactions between women from agro-pastoralist groups and immigrant fishermen. In the fish-for-sex deals in the Kafue Flats described by Merten & Haller (2007), material gains were the main motivation for the relationship, consistent with definitions of transactional sex. In this study, none of the women reporting fish-for-sex deals referred to their activities as prostitution, but spoke instead of traditional or temporary marriage, also pragmatically referring to 'lubambo'.[43] Despite the transformation of the meaning of the term over time, 'lubambo' has maintained the idea of legitimacy of sexual transactions in particular local settings. In the Kafue Flats, 'lubambo' redefines transactional sex as a legitimate traditional practice.

[43] According to Smith & Dale (1968), it was acceptable for a married woman to have an official lover (mambakwe), who was presented to the whole community in a ceremony. '**Lubambo**', as the arrangement was called, not only legitimized and institutionalized extra-marital sexual relations, but also involved a formalized transaction of gifts, implying a commitment to maintaining the relationship. These gifts were part of a social security network.

It is difficult to find statistics on sex work or the number of sex workers. Prostitution and brothels are illegal. Tasintha, an NGO that works with sex workers, estimates that there are at least 6,000 full-time sex workers in Zambia (IOM briefing note, undated). Other studies put the figure at 24,000 (7,000 in Lusaka and 17,000 in tourist locations, major highways, and border and trading towns) (Zambian NAC, Strategic Framework 2001-2003. Lusaka: Zambia.). Chirundu at the Zimbabwean border has Zambia's most explicit commercial sex industry, and sex work is the largest source of urban informal income in Chirundu (FHI, 2005). There are about 300 resident sex workers. Approximately 200 more transient sex workers visit Chirundu at peak periods, particularly at month's end, when the border is busiest. There is no street sex work except on the main highway.

Zambian men reporting paid sex tend to have higher HIV prevalence. In the 2007 DHS, 5% of men aged 15-49 reported having paid for sexual intercourse in the last 12 months (table 13.9), and 54% of these acts were protected by a condom. Overall, 16.7% of men who had paid for sex in the last 12 months were HIV positive compared to 13.7% of men who reported not having paid for sex in the last 12 months (OR 1.26, 95%CI = 0.98-1.63) (table 14.6). 37% of all men reporting paid sex were married.

3.6.2.3. Sexual and physical violence

Sexual violence[44] and gender based violence (GBV)[45] are serious issues for human rights and public health, which disproportionately affect women and girls of all ages, from all cultures, countries and socio-economic backgrounds. These types of violence take many forms, including rape, domestic violence, forced marriage, exploitation and harassment, sexual slavery, forced prostitution, human trafficking, and genital cutting. In many societies, women are socialised to *accept, tolerate, and rationalise* such experiences and to remain silent about them. Refusing sex, inquiring about other partners, or suggesting condom use have all been described as triggers for intimate partner violence; y*et all* are intimately connected to the behavioural cornerstones of HIV prevention (e.g. Maman *et al.*, 2000). **Gender-based violence has resulted in women seeking solace, support and sex from additional partners**, while maintaining a relationship with their 'steady' partner (ten country report Soul City, 2008). Andersson *et al.* (2007) found that having multiple partners was the most consistent risk factor for domestic physical violence across eight countries analysed, including Zambia.[46]

Sexual violence against females is a problem in Zambia, and most females know the perpetrators of this violence. The SBS 2003 and the SBS 2005 included questions for female respondents about forced sex. Even though it is likely to be under-reported, obtaining information on forced sex is important because it serves as an indication of the prevalence of sexual violence in Zambia and of females' ability to refuse unwanted sex. Overall 15.1% of females reported forced sex ever. This was a slight decrease from the 16.3% of females who reported forced sex in 2003. In 2005, 17.7% of urban females and 13.7% of rural females reported forced sex. Forced sex was most commonly reported among the 20-24 year age group (18.5%). The most commonly reported perpetrators were husbands or live-in partners (67.5%). Other reported perpetrators are boyfriends (25.0%), male relatives (5.8%), former husband/boyfriend (2.5%) and stranger (1.7%). From these data, it appears that the majority of victims of forced sex know their perpetrators.

A cross-sectional survey by CIET in 2002 also assessed violence (attitudes and subjective norms, experiences and collective efficacy, Andersson *et al.*, 2007).[47] In Zambia, 56% of men and 61% of women

[44] Person has been physically forced to have sexual intercourse; had sexual intercourse because of being afraid of what the partner might do; or been forced to do something sexual found degrading or humiliating
[45] Any type of violence directed at groups or individuals on the basis of their gender
[46] Other associations included the income gap within households, negative attitudes about sexuality (for example, men have the right to sex with their girlfriends if they buy them gifts) and negative attitudes about sexual violence (for example, forcing your partner to have sex is not rape).
[47] This report concerns domestic physical violence in 20,639 adults aged 16-60 in urban and rural areas of Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe in 2002.

considered violence against women a serious problem in their community; 43% of men and 45% of women said their community can do something about violence against women.

DHS findings from 2007 also describe an accepting attitude among many women and men towards partner violence:

- A high proportion of women find wife beating justified in certain circumstances (table 16.6.1). More than three in five women agree that at least one of the specified reasons justifies wife beating. The least likely reason that justifies wife beating is burning the food (33%), followed by refusing to have sexual intercourse (36%)
- Fewer men than women age 15-49 agree that wife beating is justified for at least one of the specified reasons (49%, table 16.6.2). Rural men are more likely to agree with wife beating for one of the specified reasons than their urban counterparts (54% versus 43%). Southern Province had the highest proportion of men who say wife beating is justified for at least one of the reasons specified (65%), while Eastern has the lowest proportion (30%). Men with more than secondary education are much less likely to accept wife beating than men with no education and men with secondary or lower education).

The **national statistics on reported offences** which were handled by the Zambia Police Victim Support Unit provide the following data for 2008:[48]

- Rape (229 incidents) and attempted rape (34 incidents)
- Indecent assaults on females (140 incidents) and on males (1 incident)
- Incest (32 incidents)

Provincial data for 2008 on rape from the Police show that the majority of cases were reported either in Copperbelt (86 incidents) or in Lusaka Province (53 incidents).

In contrast to these statistics, the Zambia chapter of Young Women's Christian Association (YWCA) has reported that **their shelter recorded eight cases of rape of young girls and ten cases of rape of adult women in Lusaka every week.**[49]

It is widely believed that the number of officially reported incidents of rape and sexual violence is "the tip of the iceberg" of a much higher number of incidents of non-consensual and coerced sex occurring in the population. For instance, the prevailing cultural belief among the Lozis of Western Province is that rape is only recognized if perpetrated by more than one man. Therefore, rape by one man is not reported. Non-consensual sex in marriage and dating relationships is believed to be very common but is usually not well reported in surveys (Jewkes & Abraham, 2002).

Human Rights Watch (HRW) investigated the negative impact of gender-based human rights abuses on women's access and adherence to ART in Lusaka and Copperbelt Provinces in 2006 and 2007. Female respondents said that **domestic violence** at the hands of their husbands and intimate partners, and the fear of such violence, **had a direct, harmful impact on their ability to start and continue using ART** (HRW, 2007 p21). Women said that they were beaten, slapped, shouted at, verbally abused, and raped upon discussing HIV testing and treatment with their husbands, after disclosing their HIV status to their husbands, and as a result of visiting health facilities to collect their ART.

No data from Zambia pointing to a causal link between violence and HIV infection could be identified. There is however evidence from the SADC region that violence may increase women's

[48] The Victim Support Unit handles its data outside the Crime Statistics Office and there may be under-reporting and reporting errors in the data. The reporting systems of the Zambian Police are being consolidated and revised in order to improve access to data for decision making.

[49] "Zambia: More than 10 Girls Raped Every Week," IRIN PlusNews , November 28, 2007, http://www.worldywca.info/index.php/ywca/layout/set/print/world_ywca/ywca_news/association_news/zambia_more_than_10_girls_raped_every_week (accessed May 5, 2009).

susceptibility to HIV infection (Garcia-Moreno & Watts, 2000; Maman *et al.*, 2000 and 2002; Dunkle *et al.*, 2004). Studies carried out in Tanzania and South Africa found that sero-positive women were more likely than their sero-negative peers to report partner physical abuse. The results indicate that women with violent or controlling male partners are at increased risk of HIV infection. Dunkle *et al.* (2004) identified intimate-partner violence as an independent risk factor for HIV infection in pregnant women in Soweto, South Africa. The authors suggest that abusive men are more likely to have HIV and impose risky sexual practices on their partners.

3.6.2.4. Alcohol Use

A recent systematic review of alcohol use and sexual risks for HIV in SSA showed a consistent association between alcohol use and sexual risk taking (Kalichman *et al.*, 2007). Among people who drink, **greater quantities of alcohol consumption were associated with greater sexual risks, frequency of drinking less so**. The review also showed a clear gender difference in alcohol use and sexual risks; men were more likely to drink and engage in higher risk behavior whereas women's risks were often associated with their male sex partners' drinking.

In traditional societies alcohol use is typically managed with family and community controls embedded in the local culture, but these indigenous control mechanisms can weaken through the effect of socio-economic, political and technical changes. In Zambia, improvements in the transport infrastructure have for instance made industrially produced alcohol readily available (Colson & Scudder, 1988). Haworth (2004) provides a rich description of the consumption of homemade brewed and distilled beverages, the lifestyle of drinkers and the context of alcohol consumption in Lusaka. Several Zambian studies report alcohol use and risky behaviours under alcohol influence to be prevalent:

- **Sexual intercourse under the influence of alcohol takes place, especially in urban areas**. In 2007, 14% of 15-24 year old Zambian respondents had sexual intercourse in the past 12 months when drunk or with a partner who was drunk (DHS 2007 table 13.21). The prevalence of intercourse while drunk was particularly high among the older men in this age bracket, and was higher in urban residents, men without education, and women with higher education or higher income. In the ZSBS 2003 (p27-28), 20% of males reported that they or their non-regular partners took alcohol during the last sexual intercourse. This percentage was much higher for urban males compared to rural males. Among females, 18% reported that alcohol was involved at last sex, and the urban-rural pattern was similar. Males are usually more likely to use alcohol than females and to drink more.

- **Alcohol use increases sexual risk taking in Zambia.** Magnani et al (2000) found that among youth in Zambia, alcohol and drug use was a risk factor for having sex, having multiple sexual partners and having more than one partner during the last three months. The same study also found that alcohol consumption decreased condom use. Mukuka (2000) found that male youth (no age specified) in Lusaka were frequent customers at places that sold illicit alcohol. In a study in Lusaka among students, Mbulo *et al.* (2007) conclude that drinking behaviour, alcohol-sexual expectations, educational level and religion are associated with lower use of condoms. Significantly more college students had consumed alcohol than high school students ($chi^2 = 29.0$, $p<0.001$). The odds of college and university students engaging in unprotected sex after drinking were almost four times higher than for high schools students. The odds of students with multiple sexual partners engaging in unprotected sex after drinking were 3.6 times higher than for students with one sexual partner. *"I can't trust a girl who goes to drinking establishments. Men are a problem when they're drunk, they want to sleep with anyone they see in a dress"* (Zambian male, 15-19 years, Longfield *et al.* 2002)."

There is a body of local evidence showing that alcohol consumption leads to increased sexual risk taking which includes MCP behaviours and lower condom use. However, this analysis did not find any Zambian studies providing HIV prevalence figures in groups with different alcohol drinking habits. The relationship between alcohol consumption or drunkenness and HIV status was not analysed in the 2007 DHS.

3.6.3. Factors at the structural level influencing the risk of heterosexual transmission of HIV

Structural or macro-level factors are within the control of policy makers or market forces, but are outside the control of individuals, families or community groups. This section briefly discusses the roles of mobility and migration, gender differences, and income inequality in Zambia's HIV epidemic.

3.6.3.1. Mobility and migration

Zambia has a long history of men migrating to work, for example to large agricultural estates, and mines in the Copperbelt Province. Large mobile groups in Zambia include truck drivers, sex workers, fishermen/women and fish traders, seasonal agricultural workers, cross border traders, miners, uniformed services personnel, prisoners, and refugees. Large, labour-intensive sectors tend to employ both internal mobile workers (from other areas within the country) and cross border migrants. Sectors or types of work that generally employ high numbers of mobile and migrant workers in southern Africa are: Mining, Commercial Agriculture, Transport, Construction, Domestic Work, Military and Uniformed Services (including military personnel and immigration officials), Informal Cross-Border Trade, Fisheries, and Sex Work (OIM briefing note). Because of the often undocumented nature of many migrants and mobile workers there is has been a lack of research into these groups. But it is known from regional research that many **mobile workers and migrants form sexual networks with sex workers**, who may be full-time (professional) sex workers or women doing part-time (occasional) sex work.

Throughout Southern Africa, since the beginning of the century, migrant labour has been a major reason for both husbands and wives to seek sex outside marriage and has been a leading factor in the spread of STIs (e.g. Kark 1949; Hunt 1989; Webb 1994). Bond & Dover (1997) provide a description of a large commercial farm in Chiawa, Lusaka Rural Province, recruiting about 2,500 seasonal migrant workers annually. This migrant population is mostly young men, living without their spouses in camps. *"Many of the married migrants find it difficult not to strike up other sexual relationships whilst in Chiawa, and are also concerned about their wives' faithfulness in their absence. Women in Chiawa, outnumbered by men and struggling to survive in a harsh economic climate, are under exceptional pressure to have sexual relations".* The perceived significance of the migrant population in the spread of STIs and HIV in Chiawa was confirmed by the medical statistics at the nearby hospital.

Living conditions of seasonal and temporary workers provide contexts of risk. The baseline assessments carried out within the regional Partnership on HIV and Mobility in Southern Africa (PHAMSA) included 182 male seasonal and temporary mineworkers in a copper mine in Northwestern Province, and 232 seasonal workers employed in cotton ginning in Eastern Province (IOM, 2009). In the mining company, 46% of the workers lived in single sex housing, and half of the workers had home visits once a month or less frequently. In the cotton ginnery, 27% of workers lived in single sex housing. When asked, 17% of mine workers and 10% of ginnery workers reported commercial sexual relationships; 20% (mine) and 14% (cotton) reported transactional sexual relationships; and 19% (mine) and 12% (cotton) reported forced sexual relationships.

Irregular migrants[50] lack protection and are exposed to a multitude of dangers. The rapid assessments in Chirundu in 2007 and in Livingstone in 2008 showed that many migrants entering Zambia from Zimbabwe were irregular migrants, and that travelling without formal travel documents could lead to exploitation and abuse (IOM, 2008). Zambians in Chirundu and Livingstone noted several areas of social impact stemming from Zimbabwean migration, including an increase in criminal activity and in sex work. The assessment also found that migrants had little information regarding their rights and there was limited access to some health services like ART provision for non-Zambians. Female migrants involved in sex work in these border towns were found vulnerable to sexual and gender based violence. In general,

[50] People who, owing to illegal entry or the expiry of a visa, lacks legal status in a transit or host country (IOM, 2008 p3)

migrants were exposed to dangers of theft and physical abuse, often as a result of poor accommodation, and irregular migrants were found susceptible to exploitation in working environments.

Local behavioural surveillance data show high risk behaviours by long distance truck drivers and there is evidence of a link between mobility and HIV prevalence. Section 3.2.3 and figure 12 presented DHS 2007 data showing that women, and to some extent also men, who often slept away from home have higher HIV prevalence. Overall, the pattern of HIV prevalence and migration in women (DHS 2007 data) suggests that more frequent stays away from home for fairly short periods of time increase women's risk of HIV infection.

According to IRIN News[51], *"tumbling international copper prices as a result of the global economic slump have forced mining firms to cut their workforce, put expansion projects on hold, and even shut down some operations. Luanshya Copper Mine closed its operations in December 2008, resulting in over 1,700 retrenchments, while several others, including Bwana Mkubwa, have retained only enough staff to maintain their pits. In the wake of the mining sector's shrinking fortunes, households are battling to make ends meet and sex work has become a means of survival".* The report concludes that sex workers relocating from towns where mines are closing, and some females living in households of retrenched miners take up sex work for survival.

3.6.3.2. Gender based discrimination and inequality

Gender-based discrimination means that girls and women do not have the same opportunities as boys and men for education, meaningful careers, political influence, and economic advancement.[52] Many other aspects of daily life can be affected by gender-based discrimination, such as access to health care, and decision power at family and community level.

There is consensus that inequalities between males and females are a critical factor influencing the high rates of HIV in Sub-Saharan Africa (e.g. Gupta 2002, Shisana 2004). Sub-Saharan Africa is the only region in the world where more women are HIV positive than men, highlighting the vast gender disparities of the epidemic. There are important differences between women and men in the underlying mechanisms of HIV infection and in the social and economic consequences of HIV and AIDS.

These originate from biological and socially constructed gender differences between women and men. Patriarchal societies such as Zambia that socialise men to be dominant and women submissive create enormous **power imbalances within a relationship** (Fox *et al.*, 2007, Jewkes *et al.*, 2006a). This inequality influences, among many other things, the extent to which a woman is able to negotiate safe sexual practices with her partner (Zierler & Krieger, 1997, Pettifor *et al.*, 2004, Jewkes *et al.*, 2006b). Fox *et al.* (2007) showed that even when women were aware of HIV prevention, they identified unsafe sexual behaviour of their partners (i.e. multiple partners and minimal condom use) as a risk factor for HIV over which they had limited control.

Zambia's population comprises more than 70 Bantu-speaking ethnic groups of both matrilineal and patrilineal systems of descent. In the 2000 Census of Population and Housing, the ten largest ethnic groups were Bemba (18%), Tonga (13%), Chewa (7%), Lozi (6%), Nsenga (6%), Tumbuka (4%), Ngoni (4%), Lala (3%) Kaonde (3%) and Lunda (North-Western) at 3% of the total population. Bemba, Kaonde and Mambwe ethnic groups are more prevalent in urban areas. Similarly, Chewa, Nsenga, Tumbuka and Ngoni are more prevalent in urban than in rural areas of the country. In areas where social structure is traditionally polygamous, and in the patrilineal and partrilocal systems, values and norms have been developed to uphold men's privileges and constrain women's autonomy (regional research, Leclerc-Madlala, 2008).

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[51] Chingola, 26 February 2009 (http://www.irinnews.org/Report.aspx?ReportId=83161, accessed 25 March 2009.
[52] http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/REN-218125542-Q37#1

Gender discrimination has many effects ranging from denying women access to resources to denying women the right to individual identity (WLSA, 2007). According to the recent study on women's sexual and reproductive rights and HIV/AIDS by WLSA, "ultimately this leads to the violation of women's rights". Women have limited control over their sexuality, or the sexual lives of their husbands. Extramarital sex by men is tolerated in all provinces – for example, in Northern Province, there is a saying "*ubuchende bwamwaume tabonaula chupo*" (a husband's extramarital sex cannot lead to divorce). Lobola (bridal payment) perpetuates the idea that a woman is a husband's property and culturally prescribes women's lack of control over their sexual relationship. Part of the lobola is required to be returned upon dissolution of marriage and many women stay in abusive marriages because their families are unable to return the lobola. The subordinate position of women has cultural implications for their negotiation for safe sex.

Gender issues and women's rights are not seen as pressing problems that the Zambian government should address. In the Afro-Barometer survey in 2005[53], unemployment, poverty and destitution, education, as well as the food shortage were the most important problems brought up by survey participants. No respondents ranked gender issues and women's rights among the three top problems (and very few regarded AIDS as a top problem). There is hence a certain tolerance (or resignation) towards gender inequalities.

The prevailing gender attitudes and status of Zambian women can be illustrated with the following local data:

- In the CIET baseline survey (analysed by Andersson *et al.*, 2007), 34% of Zambian women and 38% of Zambian men said that in their culture it is acceptable for a man to beat his wife.
- In the 2007 DHS (table 16.4.1), it was found that among currently married women, the degree of sole decision-making[54] ranged from 14% in decisions on major household purchases to 60% for daily household purchases. In 44% of cases, the husband mainly decided large household purchases, and in 34% of cases, the husband mainly decided on the spouse's health care. More educated women and those with cash incomes had much higher levels of participation in decision making within the couple.

In 2008, Zambia ranked 106 of 130 in the global Gender Gap Index (GGI)[55] which was the second lowest rank for a Southern African country. Zambia's gender gap is considerable (score of 0.62). The only country in Southern Africa with a larger gender gap is Angola (rank 114, score 0.60). In a number of countries with relatively small gender gap scores, such as Lesotho, South Africa and Botswana, the population HIV prevalence level is very high. In contrast, Angola has the largest gender gap score and one of the lowest HIV prevalence levels in the region.

It appears that **the relationship between gender inequality and HIV prevalence is complex** and cannot be appreciated at population level simply by relating results of gender gap assessments to HIV epidemic levels. Gender roles and identities, decision making and power imbalances between sexual partners influence people's HIV risk, according to sexual behaviour data. In multivariate analysis evaluating HIV risk factors in 122 developing countries, gender inequality does not appear to be an independent risk factor for HIV prevalence (Drain *et al.*, 2004). **Local data show that there is a certain level of tolerance or acceptance towards gender-based discrimination and inequality in Zambia, and that school education and women's cash income reduces gender-discriminatory attitudes.** It seems that in Zambia and elsewhere, more educated women are more likely to have good prevention knowledge and to use prevention services, but these advantages may be cancelled out by increased sexual risk behaviours linked to, for instance, mobility, alcohol use, and a sense of empowerment.

[53] A national public attitude survey on democracy, markets and civil society, implemented from July - August 2005. Sample: nationally representative, random, stratified probability sample of 1200 Zambians. Face-to-face interviews of adults 18 years of age or older.

[54] To assess women's decision-making autonomy, the DHS sought information on **women's participation** in four different types of decisions: on the respondents' own health care; large household purchases; purchases of daily household needs; and visits to the family or relatives.

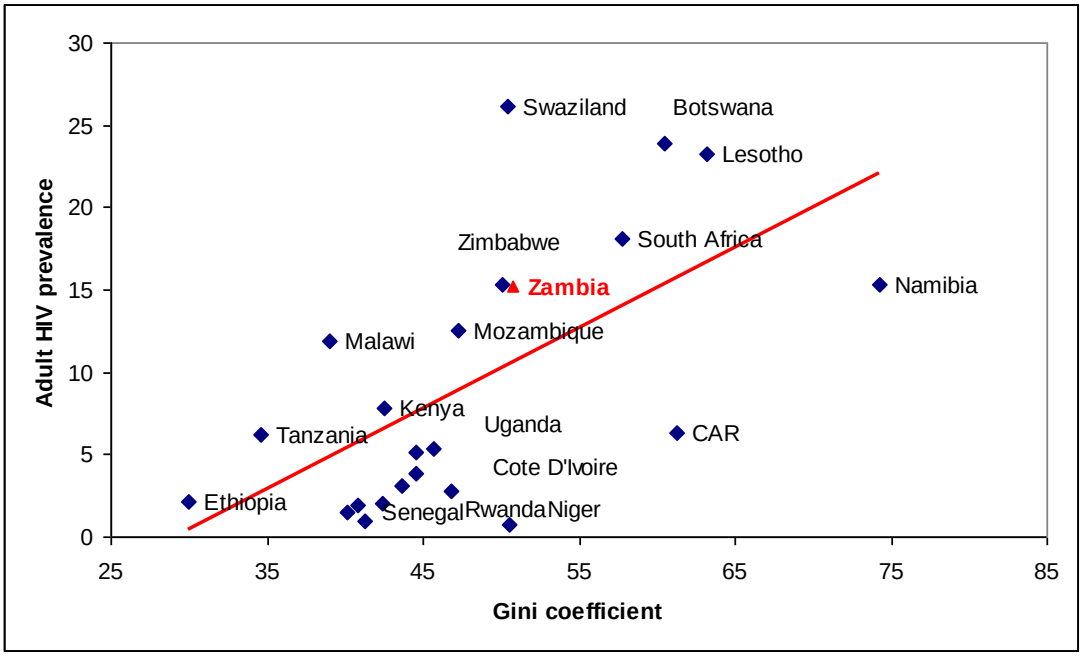
[55] The four components of the Gender Gap Index are: 1. Economic participation and opportunity, 2. Political empowerment, 3. Educational attainment, and 4. Health and survival. Gender gap 2008 data: http://www.weforum.org/pdf/gendergap/rankings2008.pdf

3.6.3.3. Income inequality

Income inequality among individuals can be expressed by the Gini coefficient and aims to quantify the income gap between those not earning at all and those earning the most. The higher – or closer to 100 - the Gini coefficient, the larger income inequality. The most recent value for Zambia's Gini coefficient is 50.8 (2007). This means that Zambia's income inequality is worse than Tanzania (34.6), Malawi (39.0), Mozambique (47.3) or Zimbabwe (50.1), but less severe than income inequality in South Africa (57.8), Botswana (60.5) and Namibia (74.3).

Fortson (2008), Mishra *et al.* (2007) and Drain et al (2004) could not find any clear link between HIV and wealth or HIV and poverty in multi-country analyses. But **income inequality has been shown to be a correlate of population HIV prevalence** (Stillwaggon, 2002; Bonnel, 2007) - see figure 42 for Sub-Saharan African countries.

Figure 42. Income inequality and HIV prevalence in Sub-Saharan Africa (2008)



Sources: Gini coefficient: http://hdrstats.undp.org/indicators/147.html; Adult HIV prevalence, 2007 estimate in 2008 UNAIDS Global Report: http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp211_234_en.pdf (for Kenya, the new DHS estimate of 7.4% was used)

Inequality in wealth or income can produce situations in which wealthy individuals "buy sex" – via transactional or commercial relationships with multiple partners – and poor or needy individuals "sell sex", as illustrated by the following statement:

And also I have seen that these people with a lot of money are the people that are spreading the disease most especially to the ladies that are poor because .. they go after money. (Urban Traditional Marriage Counsellor, Zambia, Kwatu 2008)

3.7. Other sources of new infections (transmission other than heterosexual)

3.7.1. Transmission during sex between men

Men who have sex with men (MSM) include homosexual/gay men, bisexual men, heterosexual men who engage in sex with other men (such as male sex workers), and transgendered men (Baral *et al.*, 2007). The transmission efficiency of unprotected anal sex (especially for the receptive partner) is much higher than vaginal sex (*receptive anal intercourse*: Boily *et al.*, 2009; *male-to-male*: De Gruttola *et al.*, 1989,

Vittinghoff *et al.*, 1999). Many MSM experience high levels of violence, especially sexual violence (Auvert *et al.* 2005, Onyango-Ouma *et al.*, 2005).

The majority of African MSM also have sex with women - two thirds or more, according to some studies (e.g. Caceres *et al.*, 2008; Baral *et al.*, 2009; Onyango-Ouma *et al.*, 2005). Once HIV is introduced into networks of MSM, the virus is therefore also likely to be transmitted to the men's female partners (given the typically low rates of condom use between regular partners), and subsequently to their newborn babies (van Griensven, 2007).

Baral *et al.* (2009) found in a study among MSM in Botswana, Malawi and Namibia that HIV infection levels were highest in MSM aged 30 or older (36% seropositivity) and concluded that this is not a new epidemic of HIV (other more recently emerged epidemics like in Russia are spreading more rapidly among younger MSM). In the same study, approximately one tenth of men reported injection of illegal drugs. In all three countries, the use of the internet to find male sexual partners was common with nearly half the respondents reporting using the internet for this purpose (in settings where homosexuality is criminalized and the police harass MSM, with no open venues for gay people to congregate, the internet substitutes for openly gay physical venues). Given the hidden nature of this population, the internet may represent a powerful tool in efficiently accessing and delivering HIV prevention education to these men (Johnson *et al.*, 2008).

In Zambia, the main source of data on MSM is a study among males aged 15-35 in Livingstone, Lusaka, Ndola, Kitwe and Nchelenge towns, conducted in 2004 (Zulu, 2004). Almost 3,000 interviews were conducted with *self-identified* MSM, prison inmates and ex-prisoners, and in- and out of school youth. The study had the following key findings:

- **Initiation of anal sex:** 80% of self identified MSM respondents reported initiation of male to male sex through peers and by choice. Among these, 41% reported doing it for money. 62% of respondents with prison backgrounds said they were coerced into being receptive partners for powerful and much older men while in prison. 71% of respondents with anal sex experience said that same sex boarding schools ignited anal sex practices, which was promoted by restrictions and punishment when found outside the school premises with females. 10% of respondents said it was due to fear of impregnating female partners who would suggest anal penetrative sex as an alternative to satisfy sexual desires.

  It is important to note that unprotected anal sex is also practiced by Zambian male and female adolescents: 8% of males and 6% of females aged 10-19 report this high-risk behaviour (Slonim-Nevo & Mukuka, 2005). In the same study, the practice was reported by 20% of married youth, 14% of rural youth and 10% of out-of-school youth.

- **Prevention knowledge:** HIV prevention knowledge depended on sexual orientation - among homosexual males (sex with males only), 14% and 21% mentioned abstinence and condoms, respectively. Among bisexual males (sex with men and women), 77% and 88% mentioned abstinence and condoms, respectively. 40% of respondents thought that anal sex between men is safer than having sex with a woman. All of the respondents knew about HIV/AIDS and the common modes of transmission, but the information they had was either completely wrong or inaccurate. For instance, 70% of respondents thought that they could not be infected with the virus through anal sex, because they thought the virus cannot survive in the anal acidic fluids and waste.

- **Sexual behaviours:** About 50% of respondents reported having sex with both men and women in the last twelve months. 26% are married and live with women. 34% of MSM have girlfriends and do not have sex with them, but have girlfriends to hide their sexual orientation to the community. Many MSM engage in casual, fleeting and anonymous sexual encounters. Only 2% of non-commercial MSM reported consistent condom use, which was due to the perceived low risk of HIV/STI infection in anal penetrative sex. Condom use at last anal sex with a commercial partner was only 6%.

- **Vulnerable Groups:** The survey showed that young male prison inmates are more vulnerable to HIV as they are receptive partners of older men and have sex with fellow young males mainly as a means of expressing their sense of belonging and a sense of security. 62% of prison inmate/ex-inmate respondents said they were receptive partners for a longer period of time before becoming insertive. 34% indicated that these practices did not end when they left prison.

  Zulu 2004 writes: "*Zambian society has been hostile to men who engage in same-sex behaviour, stigmatising it and treating it as sinful and criminal - in some places with severe penalties. Men will then often not choose, or have the opportunity, to be honest about the fact that they have had sex with other men. Fearing to be questioned about their sexual behaviour, they will be reluctant to report symptoms of STDs, including HIV*".

Study data used for modelling HIV incidence in MSM:

0.1% of adult men in Zambia are MSM (estimated from Zulu *et al.*, 2006: 3,000 MSM in six towns divided by 980,817 -- the total number of men between 15-49 in these towns)
0.05% of adult females are partners of MSM (assumption)
33% HIV prevalence in MSM (Zulu *et al.*, 2006)
19% STI prevalence in MSM (Zulu *et al.*, 2006)
MSM have on average 3 partners/year and 50 acts/partner/year (estimates)
6% of acts are protected (Zulu, 2004)

Male-to-male transmission – taboo and little understood, but based on the available data, sex among men appears not to be a major factor in the Zambian epidemic. The above data show that the extent of male-to-male sex is not fully understood in Zambia. The modelling had to use several assumptions and estimates due to lack of recent data. Nevertheless, it is probably correct to say that MSM behaviours are currently not a main contributor to annual HIV incidence. **For 2008, the incidence model estimated about 732 new infections (or 1% of all new infections) to occur in MSM, and about 40 new infections (0.05% of all new infections) in female partners of MSM**. A better understanding of the size of the MSM population, and their sexual practices and sexual networks is important to obtain more reliable estimates of the contribution of MSM to Zambia's HIV incidence.

3.7.2. Transmission from mother-to-child

Transmission from the mother to the child occurs in utero, during delivery and post-partum during breastfeeding. In a study conducted in Lusaka back in 1987-1989, Hira *et al.* (1989) found an overall rate of perinatal transmission of 39% and a mortality rate of infected children at 2 years of 44%. More than half of the mothers giving birth had symptoms related to their HIV positive status.

One of the key strategic objectives of national HIV prevention is prevention of mother to child transmission (PMTCT). The PMTCT programme has been implemented since 1999 – section 4.3.2 provides more programmatic detail.

In 2009, an estimated 9,196 children aged 0-14 years will be newly infected with HIV - 10% of all new infections projected for Zambia (91,877 in the total population, Spectrum projections 2008, tables 3.2 and 3.3.) The bulk of these infections occur in infants through MTCT, but a small proportion of children are expected to get infected later in childhood (see sections 3.6.4. and 3.6.5.). This 2009 level of new childhood infections is a 57% reduction of the peak level of new infections in children in 1996 (21,189). It illustrates the progress made toward reducing new paediatric infections through aggressive scale-up of perinatal HIV prevention services (see also Stringer *et al.*, 2003).

In 2009, an estimated 73,859 women will need PMTCT in order to prevent transmission of the virus to the child. An estimated 29,973 children aged 0-14 years will need ART in 2009 (Spectrum 2008 table

4.3). By end of December 2008, 6,338 children 0-14 received ART (21% of the 2009 estimated need). In addition, children are assumed to need cotrimoxazole if they are HIV positive and under 5 years of age, and all children born to HIV positive mothers need cotrimoxazole until their own HIV status is confirmed (at 18 months, unless early detection by PCT testing is available).

The Zambia 'Children with HIV Antibiotic Prophylaxis' (CHAP) Trial provided an in-depth understanding of the effectiveness of cotrimoxazole prophylaxis and ART in HIV infected children (Mulenga *et al.*, 2009; Walker *et al.*, 2006; 2007; 2009). Mulenga *et al.* (2009) report that cotrimoxazole prophylaxis was associated with lower mortality, both outside hospital (p=0.01) and following hospital admission (p=0.005). By two years, the probability of dying in hospital from a serious bacterial infection was 7% on cotrimoxazole and 12% on placebo (p=0.08). The CHAP data suggest that there is **a role for continuing the relatively inexpensive cotrimoxazole prophylaxis alongside ART** (and as recommended for children under 5 years of age in recently updated WHO guidelines).

HIV-related immune-suppression in the mother has adverse consequences for the health of infants, in addition to risks of vertical transmission. Kuhn *et al.* (2005) found in a Lusaka-based study on children born to HIV-infected mothers with advanced disease that even infants who did not become HIV positive were at high risk of mortality and morbidity during the first few months of life. Hira *et al.* (1989) found that, compared to HIV negative mothers, HIV positive mothers were 2.9 times more likely to deliver low birth weight babies.

Breastfeeding

The 2006 WHO Consensus Statement on HIV and Infant Feeding[56] recommends "exclusive breastfeeding for HIV-infected women for the first 6 months of life unless replacement feeding is acceptable, feasible, affordable, sustainable and safe for them and their infants". The 2007 DHS results show that **there has been substantial improvement in compliance with the WHO recommendations**. The proportion of children under the age of six months that are exclusively breastfed was 40% in the 2001-02 DHS and was 61% in the 2007 DHS (table 11.3). These are dramatic increases from the low levels recorded in the 1992 DHS (13%) and 1996 DHS (17%). Other improvements recorded in the 2007 DHS were: 57% of infants were put to the breast within one hour of birth (51% in 2001-02), and 93% started breastfeeding within the first day (90% in 2001-02).

The prospective 'Zambia Exclusive Breastfeeding Study' (ZEBS) by Kuhn and colleagues (2007) showed that high levels of exclusive breast-feeding (84%) in the first four to six months of life can be achieved with effective counseling of mothers. It also documented a substantial early protective role of exclusive breastfeeding against early HIV transmission: there was a **3.5–4-fold increased hazard of infant infection by age four months among infants not exclusively breastfed compared with those who were**. The study found that the vast majority (86%) of early transmissions occurred among women who had lower CD4 counts. According to Fowler *et al.* (2008), these findings suggest that increased use of HAART among lactating women with CD4 counts less than 350 cells/mm3 should substantially reduce early transmission through breast milk. The ZEBS study also allowed investigation of the role of α-defensin[57] in breastmilk. It found that α-defensin concentration was significantly associated with decreased risk of intrapartum and postnatal HIV transmission (odds ratio = 0.3, 95%CI 0.09-0.93) (Kuhn *et al.*, 2005). In another report, Kuhn *et al.* (2005) address the question of whether prolonged breast-feeding may be detrimental for HIV-positive women. The ZEBS found that although HIV-related mortality was high in untreated HIV-positive women, prolonged lactation was not associated with increased mortality.

[56] HIV and Infant Feeding Technical Consultation held on behalf of the inter-agency task team on prevention of HIV infections in pregnant women, mothers and their infants. Geneva: WHO; 2006. Available at: http://www.who.int/reproductive-health/stis/mtct/infantfeedingconsensusstatement.pdf, accessed 30 July 2008.
[57] Defensins are produced by immune cells and have potent antimicrobial activity (Kuhn *et al.*, 2005).

Do infant feeding practices vary by HIV status of the mother? (secondary analysis of 2007 DHS)

DHS data were analysed in order to better understand whether HIV positive mothers have different infant feeding practices than HIV negative mothers. Since not all HIV positive mothers were actually aware of their status, the analysis further distinguished between those HIV positive mothers who reported having been tested in the two years prior to the survey and received their results, and those HIV positive mothers who had not tested in the last two years (testing history is a proxy measure of whether the woman may know her HIV status since this information is not directly available).

Women who were HIV positive at the time of the survey (N=57) were more likely to be either exclusively breastfeeding or not breastfeeding at all compared to HIV negative women (N=424). This is based on quite small numbers but the p-value suggest this observation is unlikely to be due to chance alone (for all babies aged 0-5 months p=0.014). Women who were HIV positive and recently tested (N=35) were more likely not to be breastfeeding their infant (for infants aged 0-5 months p=0.0036). **These results could show that HIV positive mothers are receiving and following advice on infant feeing to either avoid breastfeeding altogether or to exclusively breastfeed up to 6 months.** However, the low breastfeeding reported by HIV positive and recently tested mothers may actually result from their HIV status if women who are symptomatic may get tested or have been tested more recently than other women, and may also be too ill to breastfeed.

A study in Mazabuka District in Southern Province found that social conventions and expectations of family members in this Zambian community were important barriers[58] in preventing the message of exclusive breastfeeding from being translated into practice (Fjeld *et al.*, 2008). Fathers and grandmothers tended to be less knowledgeable about the benefits of exclusive breastfeeding and often showed a negative attitude towards it. At the same time they had considerable authority over mothers and children and infant feeding decisions. **Therefore, it is important to promote exclusive breastfeeding in a way which takes into account decision-making on infant feeding at household level. Exclusive breastfeeding reduces the risks of MTCT and has other health benefits.**

3.7.3. Transmission through needle sharing during injecting drug use

The use of contaminated drug injecting equipment bears a high risk to transmit HIV, and IDU are often linked to sex work and multiple partners. Data on injecting drug use (IDU) are scarce in Southern Africa, and there is no situation analysis on IDU in Zambia. There is some evidence of **drug trafficking and seizures of heroin and other drugs** in Zambia.[59] Jones et al (2007) describe a sexual risk intervention among male drug users in Zambia (NOW Project), but provide no information on the type and frequency of drugs consumed. A study among over 1,200 street children in Lusaka assessed drug use and found that 24% of the children use drugs (Fountain of Hope, 2002). The most frequently used drugs were dagga (marijuana) and glue. Other less popular drugs included jenkem (fermented sewage), ballan (uncured tobacco), and petrol. No injectable drugs were mentioned.

On IDU, the Zambian Narcotic Drugs and Psychotropic Substances Act, Paragraph 10, reads: *"Any person who, without lawful authority, takes a narcotic drug or psychotropic substance by smoking, injecting into his body, sniffing, chewing, drinking or otherwise administering such drug or substance shall be guilty of an offence and shall be liable upon conviction to imprisonment for a term not exceeding ten years".*

[58] The barriers noted were: (1) perception of insufficient milk, (2) fear of dying or becoming too sick to be able to breastfeed, (3) convention, (4) perception of 'bad milk' and (5) lack of knowledge on the subject.
[59] Short news reports are available on the website of the Drug Enforcement Commission: http://www.deczambia.gov.zm/news.htm.

In the study on 10-19 year old adolescents by Slonim-Nevo & Mukuka (2005), 9% of respondents reported injecting drugs with needles, but the report provides no detail on the type of injected drug, frequency of injecting, or sharing of IDU equipment.

IDU is probably happening in Zambia on a small scale, but there are no data on the size of the IDU population, the frequency of drug injection or sharing of injecting equipment. Due to lack of local data, the IDU population was not included in the application of the incidence model. There was hence no estimate produced on the annual HIV incidence in IDUs in Zambia.

3.7.4. Transmission through use of unsafe (unclean) medical injections and universal precautions

Unsafe medical injections can lead to infection with HIV, Hepatitis B and C virus and other blood-borne pathogens. The large uncertainty on the risk of HIV transmission from HIV-contaminated injections makes quantification of the proportion of transmission caused by contaminated injections difficult (White *et al.*, 2007, p9794). In Zambia, disposable injection equipment has been introduced. Zambia benefited from a three-year GAVI injection safety support project in 2002-2004.[60]

In Zambia, women are more likely to have had a medical injection than men – see table 7 (DHS 2007 data). Women were about twice as likely as men to report receiving an injection from a health worker during the 12 months preceding the survey (28% and 13%, respectively). Medical injection prevalence was highest among women age 20-24 (34%), urban female residents (30%), women in Central province (33%), women with more than secondary education (36%), and women in the highest wealth quintile (33%). The highest rates among men were observed in the 15-19 age group (14%), among urban male residents (14%), in Lusaka (16%), and among men with secondary education (14%). The likelihood of receiving at least one medical injection increased with wealth quintile among men.

Table 7. Prevalence of medical infections in adults aged 15-49 in Zambia (2007)

	Received medical injection, past 12 months	Average number of medical injections per person, past 12 months	For last injection, syringe and needle taken from a new, unopened package
Women	27.9%	0.9	97%
Men	13.2%	0.6	97%

Source: 2007 DHS table 13.14

According to people's observations, **97% of recent injections among both men and women were given with a syringe taken from an unopened package** (table 7). In all subgroups, more than nine in ten syringes came from an unopened package. Four out of five injections were administered in the public health sector (mostly government health centres). 11% of women and 18% of men received their most recent injection from the private medical sector. Though uncommon (less than 1%), the nurse/health worker's office or home was cited as a source of the medical injection.

Several studies have challenged the view that sexual transmission is the main transmission pathway in African HIV epidemics, and have suggested that unsafe injections are a major source of infections. A recent study by De Walque (2008) investigated the relationship between prophylactic tetanus toxoid injections during pregnancy and HIV infection among women in nationally representative DHS data for Burkina Faso (2003), Cameroon (2004), Ethiopia (2005), Ghana (2003), Kenya (2003), Lesotho (2004) and Senegal (2005). The study found that any association between prophylactic tetanus toxoid injections during pregnancy and HIV infection disappeared after adjusting for potential confounders.

There is some evidence from Zambia that medical injections have contributed to HIV transmission. The findings come from a study among 3,160 ANC clients in Lusaka who were enrolled from 1989 to

[60] Fact sheet GAVI website: http://www.gavialliance.org/resources/Zambia_GAVI_Alliance_country_fact_sheet_June_2008_ENG.pdf)

2001 (St. Lawrence *et al.*, 2006). Medically administered intramuscular or intravenous injections in the past five years (but not blood transfusions) were overwhelmingly correlated with HIV prevalence, exceeding the contribution of sexual behaviours in a multivariable logistic regression (demographic variables, sexual behaviours, and substance use were parcelled out of the variance in the regression equation). Within the sample, 63% of the women had received an IV or IM injection and this was associated with a 2.6-fold greater likelihood of being HIV positive. The authors comment that *"future research would, hopefully, find lower associations of HIV with medical injections since we would expect to see a decrease in iatrogenic transmission as use of disposable syringes increased"*.

Data retained for modelling of HIV incidence through medical injections:

100% of Zambian adults have received a medical injection in the past 12 months (default from UNAIDS 2007, manual for the model application)
14.3% HIV prevalence (=adult population HIV prevalence)
One injection per year on average; 93% of injections are free of HIV (CSO, 2005)

Medical injections are, since the introduction of disposable injection equipment, not expected to contribute much to the HIV transmission in Zambian. Based on the above data and the incidence modelling (see section 3.5), it is estimated that in 2008, about 124 new infections (0.2% of all new infections) arose from unsafe medical infections in modern health care settings. A strong and ubiquitously applied monitoring system for the supply, correct use and safe disposal of disposable injection equipment is essential to contain the risk of HIV transmission via this pathway.

Other potential transmission pathways are linked to the sharing of sharp instruments - blades, needles and knives which are immediately re-used on another person without being sterilized. This may apply to tattooing (e.g. in prisons), scarification practices (e.g. in traditional medicine), shaving (e.g. barbers) and cuts (e.g. gang style initiations). In a survey of HIV seroprevalence and risk behaviours in Zambian prisons by Simooya & Sanjobo (2002), it was found that 17% of prisoners had been tattooed in prison, and 63% reported sharing razor blades.

Traditional socio-cultural practices, which involve exchange of saliva and other bodily fluids, may harbour some risk of HIV transmission. Wojcicki *et al.* (2007) reported that the use of saliva in healing, a common practice throughout sub-Saharan Africa, is also practiced in Zambia, mainly by traditional healers and mothers. The process may involve scarification of tissue and application of dry powders or other substances mixed with saliva. The same report also describes the use of semen and vaginal fluid on children who have been tattooed or scarified. The simultaneous occurrence of tattooing and exposure to semen or vaginal fluids may put children at risk for HIV infection.

3.7.5. Transmission through transfusion of HIV positive blood products

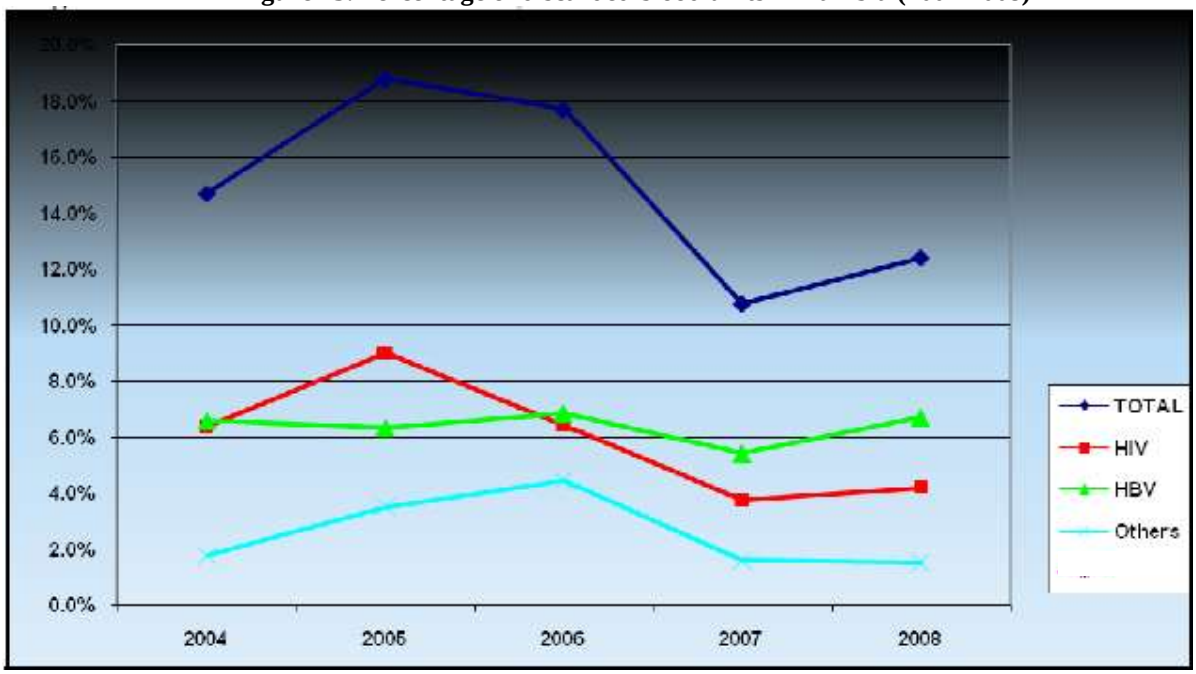
Infectivity estimates for transfusions of infected blood or blood products are much higher than for other modes of HIV transmission due to the far larger viral dose per exposure than for other routes (Baggaley *et al.*, 2006). The Zambia National Blood Transfusion Service (ZNBTS) has been screening blood and blood products to reduce HIV transmission through contaminated blood and blood products since 1988 (NAC, 2001). According to the national HIV/AIDS policy objectives on safe blood, government commits to screening all blood and to selective recruitment of donors to minimise the number of discarded units.

According to the UNGASS Report 2006-07 (NAC/MOH, 2008), **100% of blood units are screened for HIV in a quality assured manner by the Zambia National Blood Transfusion Services** (ZNBT) under the Ministry of Health**.** Zambia has nine screening centres country-wide of international standards, subjected regularly to internal and external[61] quality assurance inspections. The total number of blood units donated and screened for HIV in a quality assured manner nationwide in 2007 was 68,265 units, and in 2008 it was 82,527 units (ZNBTS, 2009 p7). The programme is prone to resource constraints due to exchange rate losses, which resulted in low blood collection (54,783 units) in 2006.

[61] External quality assurance is provided by the Royal College of Pathologists of Australia

Screening for HIV, Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) is mandatory. Figure 43 shows the prevalence of these blood pathogens in the blood units.

Figure 43. Percentage of discarded blood units in Zambia (2004-2008)



Source: ZNBTS 2009, p16. 'Others' is a category for hepatitis C virus and syphilis.

Data retained for modelling of HIV incidence through blood transfusions:

0.05% of women and 0.04% of men have received a blood transfusion in the past 12 months (Zambia Blood Bank Services, 2007)
4% HIV prevalence (ZNBTS 2009)
One blood transfusion per year on average
96% of blood transfusions are free of HIV (UNAIDS, 2007)

Blood transfusions seem to be responsible for a tiny fraction of new infections in Zambia. Based on the above data and the incidence modelling (see section 3.5), it is estimated that in 2008, only about 16 new infections (0.02% of all new infections) arose from blood transfusions contaminated with HIV. There may be occasions where unscreened, HIV contaminated blood is transfused in emergency situations, but this is not documented. Since all infections transmitted through blood transfusion are preventable, the performance of the blood screening programme needs to be optimal in order to prevent all infections via this transmission pathway.

3.8 KYE Synthesis: A Summary

HIV prevalence in the general adult population was 14.3% in 2007, and 16.6% in ANC clients in 2006-07. Estimated HIV prevalence has peaked at 16% in adults in the mid-1990s and has stabilised at 14-15%. In children aged 0-14 years it peaked in about 2004 and follows a downward trend since.

HIV prevalence levels in ANC clients have recently started to decline, especially in pregnant women aged 15-19 and 20-24 years. Between the 2004 and 2006-07 ANCSS, 15 ANC sites (71%) showed a decrease in HIV prevalence and 6 ANC sites (29%) showed an increase.

The peak number of annual AIDS-related deaths among adults was in 2003 (66,272 deaths). AIDS-related mortality has dropped thereafter with the increasing access to ART (219,576 adults and children with

advanced HIV infection receiving ART by end 2008). Estimated AIDS-related mortality in children up to 14 years peaked in 2003 (14,681 deaths) and decreased thereafter (7,282 deaths estimated for 2009). This decline is a combination of lower fertility and the effect of the PMTCT programme.

HIV prevalence in adult women is significantly higher than in men (16.1% vs. 12.3%). Above 40 years of age, HIV prevalence in women is significantly lower than in men. The female-to-male prevalence ratio for youth aged 15–24 dropped from 3.7 in 2001-02 to 1.6 in 2007.

Provincial prevalence levels range from 7% to 21% (2007). The Northern and Northwestern Provinces have the lowest HIV prevalence levels (<7%), whereas Lusaka, Central and Copperbelt Provinces have HIV prevalence levels of 17% or above. The prevalence differential between residents of urban and rural areas is highly significant (19.7% vs. 10.3%). ANCSS site-specific prevalence levels vary by a factor of 10 between 3.1% in Kasaba/Luapula and 31.2% in Matero/Lusaka. The estimated proportion provinces have of the total number of PLHIV in Zambia varies between 3% (Northwestern) and 20% (Lusaka). DHS 2001-02 and 2007 data suggest that the urban epidemic is contracting significantly (particularly in urban men), but this does not apply to the rural epidemic.

Significantly higher HIV prevalence levels are found in: Women often spending the night away from home compared to women staying at home; Men and women with higher education compared to those with no or little school education; Urban couples compared to rural couples; and Couples with large age gaps compared to couples with partners of similar ages.

HIV incidence in adults aged 15-49 years, estimated by Spectrum model, has halved since 1990 and is at a stable level of about 1.6% in 2009 (2% in women, 1.2% in men). In 2009, an estimated 82,681 adults get newly infected with HIV (59% of women, 41% of men), which translated into 226 new adult infections per day. Although HIV incidence has stabilised, the absolute number of new HIV infections increases due to Zambia's expanding population. In children aged 0-14 years, the number of new infections has gone down dramatically since its peak level of 21,189 in 1996. This is a combined effect of decreasing incidence in women and the introduction of the PMTCT programme. The estimated number of new infections in children in 2009 is 9,196, translating into 25 new infections per day.

The UNAIDS HIV Incidence Model was used to estimate incidence in different exposure groups (for 2008): The model predicted that the largest contribution to total annual HIV incidence came from individuals whose partners have casual heterosexual sex (37% of total annual incidence), followed by those individuals reporting casual heterosexual sex (34%), those reporting low risk heterosexual sex i.e. mutual monogamy (21%), and clients of female sex workers (4%). One percent of new infections was predicted to occur in MSM through unprotected anal sex.

Analysis of behavioural indicators suggests that over the period 1992-2007, important positive changes have been observed in several indicators in adults and youth. Survey respondents have reported a shift away from multiple partners and/or non-cohabiting partners towards just one partner, the majority of which are cohabiting. Condom users have increased as a proportion of the whole population, especially among those married or reporting just one partner in the last year. There are signs that more young people delay sexual debut and remain sexually abstinent for longer. The indicators of sexual behaviour analysed in this report (like sex with multiple partners, or paid sex) may be affected by reporting bias.

Male circumcision is at 13% (2007 DHS), but much higher in Northwestern (71%) and Western Provinces (40%). HIV prevalence in circumcised men is slightly lower than in those not (10.8% vs. 12.5%, association requires multivariate analysis), but there is conclusive evidence from the region that MC is effective in reducing HIV transmission. Acceptance of medical MC is high, both in traditionally circumcising and non-circumcision areas of Zambia.

Comprehensive AIDS knowledge is highest in women and men with the highest school education, but HIV prevalence is also highest in these groups. These findings may be confounded by age. In addition, HIV prevalence is much higher in Zambians who have higher school education.

There are cultural practices that are considered to increase people's HIV risk are: Sexual cleansing, widow inheritance, dry sex, traditional male circumcision, premarital unprotected sex to prove fertility of young girls, wife sharing with kin as a sign of welcome, traditional treatment of infertility by a healer (sex with the woman client), unprotected sex with minors as traditional treatment for HIV and as remedy to become prosperous, as well as separate accommodation for the pubescent girl child (rendering the child vulnerable to sexual abuse).

Transactional and intergenerational sex have been assessed and are – despite presumed underreporting - seen as key contributors to the HIV epidemic. Commercial sex is not well quantified and prostitution is illegal, contributing to the clandestine conduct of the business. Sexual violence and alcohol abuse have been described in the literature and are regarded as important factors in the social epidemiology of HIV in Zambia.

Structural factors in the HIV epidemic are migration and mobility, gender based discrimination and inequality, as well as income inequality.

Transmission other than heterosexual also contributes to new HIV infections:

- Male-to-male transmission - probably not a main contributor to annual HIV incidence
- Vertical transmission – responsible for about 10% of all new infections
- Transmission through injecting drug use – not quantified due to lack of data
- Transmission through medical injections -contributing about 0.2% to annual incidence
- Transmission through sharing of sharp instruments – not quantified due to lack of data
- Transmission through unsafe blood transfusions – responsible for very few new infections (potential transmission in emergency transfusions of unscreened blood not included)

CHAPTER 4. "Know Your Response" Synthesis

4.1. HIV prevention policy context

HIV and AIDS has been a public health issue in Zambia since the early 1980s. In recognition of this problem, the GRZ initiated a national response and created a body mandated to implement programmes to prevent and control the further spread of HIV in the population. With the assistance of the World Health Organisation (WHO), the **National AIDS Prevention and Control Programme** (NACP) was established in 1986 (NAC, 2001).

In **1987**, an emergency **Short Term Plan** was developed to ensure the safety of blood and blood products in the country, followed by the **1988-1992 Mid-Term Plan** (NAC, 2001). In 1993, a second **medium-term plan (1993-98)** was launched. It acknowledged that the government's initial response to HIV had been inadequate and purely biomedical, with no intersectoral coordination or collaboration. The 1990s saw an increase in the number of players in the fight against HIV and AIDS. Non-governmental organisation (NGOs), community based organisations (CBOs) and faith based organisations (FBOs) partnered with government to fight the epidemic, and address gaps in the national response. In the late 1990s, the government consulted with a wide range of stakeholders to analyze its response to HIV/AIDS.[62]

In 2000, Zambia established the **National HIV/AIDS/STD/TB Council** (NAC) to serve as the single, high-level institution responsible for national and technical leadership, strategic management, and effective coordination of all government and civil interventions. A committee of cabinet members guides the council and informs the Head of State on important matters concerning HIV and AIDS in the country. In November 2002, the Zambian Parliament passed a National AIDS Bill, which, among other things, makes the NAC a legal body that may solicit funding.

In 2002, the **National HIV/AIDS Intervention Strategic Plan (NAISP) 2002-2005** was developed. The goal of the NAISP 2002-2005 was to reduce HIV/STI transmission among Zambians and reduce the socio-economic impact of HIV/AIDS. The Plan had eight strategic objectives, six principally focused on different strategic interventions to reduce transmission and provide treatment, care and support to people living with HIV and AIDS, and two cross- cutting objectives to improve the enabling environment for a coordinated and sustainable response. The NAISP was accompanied by a **National Monitoring and Evaluation Plan** for programmes implemented during the same period. The period 2002-2005 was marked by the development of institutional structures and instruments such as policies, guidelines, procedures and tools (see table 8).

In 2003, the Government launched the **National Decentralisation Policy**, planned to be implemented over 10 years (2003-2012). This has brought in another dimension to the organization and management of services in Zambia, with major implications for planning, resource allocation, human resource management and accountability, because the overall decentralization policy calls for channelling and control of resources through the Local Authorities at district level. The Policy aims to devolve responsibilities to the district level, with provincial level management providing the necessary intermediate level of programme management, coordination and supervision of district authorities.

[62] Among its key findings were: 1) There was no high-level political commitment to and advocacy for HIV/AIDS prevention and care measures; rather, technical and line ministry officials were the most vocal and active with regard to HIV/AIDS. 2) There was no strategic management of the HIV/AIDS program at central level. Also, despite Zambia's process of decentralization and health sector reform, district health systems were underutilized in the national response. 3) There was no framework for analyzing HIV/AIDS in the context of macroeconomic policy. 4) HIV/AIDS planning was not informed by gender analysis. 5) The medium-term plans had a blanket approach and were not tailored to different populations. 6) There was no mechanism to evaluate programme implementation or impact. 7) Intragovernmental collaboration was highly fragmented. 8) Key policy barriers persisted, for example the ban on distributing condoms to prisoners and the prohibition on refugees' access to public health care facilities. 9) There was limited involvement of the private sector (Garbus, 2003).

In 2005, the **National HIV/AIDS Policy** was launched to provide policy directives and guidelines for the national response.

The **National HIV and AIDS Strategic Framework 2006-2010** (NASF)[63] was developed with input from some sectors of civil society. There was greater awareness of the urgent need to address the differences within the generalized epidemic, in order to reach people most in need of services, and to prevent new infections more effectively. The NASF was costed with specific budgets for ministerial sectors -- notably health, education, military, police, women and youth, and several key partners aligned and harmonised their HIV and AIDS programmes to the NASF.

HIV is clearly articulated in the **Fifth National Development Plan** as well as other plans and policies. Table 8 presents a summary of the policy framework relevant to HIV prevention in Zambia.

Table 8. Selected national instruments addressing HIV prevention, Zambia (2009)

Legislation / Policy Instrument	Approval
Constitution of Zambia – Provides overall protection of human rights. In the process of being reviewed to remove discriminatory laws and provide for, among other things, more gender equality clauses	1991, under review
Laws	
Marriage Act, Chapter 50 of the Laws of Zambia	1996
Penal Code, Chapter 87 of the Laws of Zambia & Penal Code Amendment Act No. 15	2005
Employment Act, Chapter 268 of the Laws of Zambia	1996
Industrial and Labour Relations Act, Chapter 269 of the Laws of Zambia	1996
Minimum Wages and Conditions of Employment Act, Chapter 276 of the Laws of Zambia	1996
Public Health Act, Chapter 295 of the Laws of Zambia	1996
Nurses and Midwives Act, Chapter 300 of the Laws of Zambia	1996
Termination of Pregnancy Act, Chapter 304 of the Laws of Zambia	1996
Citizens Economic Empowerment Act - prohibits HIV-based discrimination in the citizen economic empowerment at workplaces	2006
Disabilities Act - prohibits discrimination	1996
Sexual Offences and Gender Violence Bill	In draft
Bill on Blood Transfusion Services	In draft
National Plans	
2030 Vision	2006
Fifth National Development Plan (FNDP) 2006-2010	2006
United Nations Development Assistance Framework 2007-2010	2006
Policies and Strategies	
Information Policy – for gender responsive information and against stereotyping	1996
Science and Technology Policy - addressing gender equity and equality issues in tertiary education	1996
National Education Policy – issues of gender equal access to enrolment, completion, SRH and female empowerment	1996
National Gender Policy – addresses gender mainstreaming in the public sector, discrimination of females, GBV, HIV, health, and other issues	2000
Decentralisation Policy – for strengthening of local government to facilitate more effective citizen participation in governance issues	2002

[63] The NASF 2006-2010 is a multi-sectoral plan with six themes: 1. Intensifying prevention of HIV and AIDS; 2. Expanding treatment, care and support for people living with HIV and AIDS; 3. Mitigating the socio-economic impact of HIV and AIDS; 4. Strengthening the decentralised response and mainstreaming HIV and AIDS; 5. Improving the monitoring of the multi-sectoral response; and 6. Integrating advocacy and coordination of the multi-sectoral response.

Legislation / Policy Instrument	Approval
National Cultural Policy – addressing equal participation of women and men in development while preserving and promoting culture. Review underway in order to incorporate better gender and HIV/AIDS.	2003, under review
National Agricultural Policy – for HIV awareness in agricultural programmes and gender equality and equity in resource allocation and access to agricultural services.	2004
National HIV/AIDS/STI/TB Policy – operationalised through the NASF 2006-2010	2005
Public Service Training Policy – has incorporated HIV and gender aspects	2005
National Child Policy – promotes a rights-based approach to programming, gender equality and non-discrimination	2006
Population Policy – promotes integration of population variables (family planning, gender, HIV) into development planning and programme implementation	2007
Reproductive Health Policy – addresses issues of maternal mortality, gender, HIV and others	2008
Lands Policy – stipulates allocation of 30% of titled land to women	In draft
National Blood Policy	In draft
Alcohol Policy	In draft
National HIV/AIDS Communication Strategy	2005
National HIV and AIDS Strategic Framework (NASF) 2006-2010	2006
National Strategy for the Prevention of HIV and AIDS	2009
National HIV and AIDS Commodity Security Strategy	In draft
Guidelines and Protocols	
Antiretroviral Therapy for Chronic HIV Infection in Adults and Adolescents	2007
Integrated Management of Childhood Illnesses Guidelines (including HIV & malaria)	2004
Sexually Transmitted Infections Treatment Guidelines	
National Protocol Guidelines for the Integrated Prevention of Mother-To-Child Transmission of HIV	2009
Infant and Young Child Feeding Guidelines	
National HIV Counseling & Testing Guidelines	2006
Guidelines for the accreditation of sites for provision of antiretroviral therapy	2006
Post-Exposure Prophylaxis Guidelines	
National Guidelines for Blood Screening, Storage, Distribution & Transfusion	
Infection Prevention and Injection Safety Guidelines	
Guidelines on employment, HIV/AIDS and human rights in Zambia	2001

At the international level, Zambia has ratified several key instruments (NAC, 2009), for instance:

The Convention on the Elimination of All Forms of Discrimination against Women[64] - adopted by the GRZ in 1985. The government has taken a number of policies, legislative and administrative measures to address human rights of women (e.g. promotion of school enrolment of girls). However, several laws are still discriminatory, for instance article 23 of the constitution, which allows discriminatory practices in divorce, death and property devolution.

The Convention on the Right of the Child[65] – ratified in Zambia in 1991. A number of provisions have been incorporated into national laws, for instance, corporal punishment of children has been outlawed, and stiffer penalties on defilement have been introduced. One of the gaps is the lack of a clear definition of sexual exploitation of children which happened for instance in child prostitution.

[64] The CEDAW, adopted in 1979 by the UN General Assembly, is often described as an international bill of rights for women. Consisting of a preamble and 30 articles, it defines what constitutes discrimination against women and sets an agenda for national action to end such discrimination.

[65] The CRC, adopted by the UN in 1989, sets out the full range of children's human rights in 54 articles and 2 Optional Protocols

The Beijing Declaration and Platform for Action[66] – adopted by the GRZ in 1995. Zambia has been implementing six areas of concern which include poverty, education, gender-based violence and HIV/AIDS. Although there has been progress in the social, economic and political empowerment of Zambian women, many improvements are still urgently required (e.g. maternal mortality, reproductive rights, protection against sexual abuse, access to higher education, etc.)

The Millennium Development Goals[67] **-** adopted in 2000. According to NAC (2009), Zambia is likely to achieve most of the MGDs, including the one on HIV/AIDS (Have halted by 2015 and begun to reverse the spread of HIV/AIDS).

The Maseru Declaration on HIV/AIDS[68] **-** adopted in 2003. Zambia has been translating this into national practice through the HIV/AIDS strategic framework. There has been promotion of access to care, treatment and support, ARVs are free.

African Charter on Human and People's Rights[69] – ratified in 2006. Most of the provisions are not yet translated into national laws. The process of drafting a bill on gender based violence began in 2008.

SADC Protocol on Gender and Development[70] – signed in 2008. Zambia is in the process of drafting legislation to deal with all cases of gender based violence.

Strategic framework for the HIV prevention response in Zambia

"Intensifying prevention" is one of the six thematic areas of focus in the 2006-2010 NASF.[71] Under the new HIV prevention strategy (NAC, 2009), there are four priority prevention areas:

1. **Prevention of sexual transmission of HIV**
2. **Prevention of mother-to-child transmission (PMTCT) of HIV**
3. **Counselling and testing**
4. **HIV prevention in health care setting, including post-exposure prophylaxis (PEP)**

This was justified by the results of the Zambian Mid-Term Review of the NASF 2006-2010 conducted in 2008, as well as emerging evidence on the epidemiology of prevalent and incident infections (DHS 2007 data, ANCSS 2006, incidence modelling outputs, etc.). Prevention through blood safety is merged as being part of prevention in the health care setting. While widely accepted that there are high risks in transmission

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[66] The Declaration, adopted in 1995, embodies the commitment of the international community to the advancement of women and to the implementation of the Platform for Action, ensuring that a gender perspective is reflected in all policies and programmes at the national, regional and international levels.

[67] The 8 MDGs have been adopted by the international community as a framework for development activities of over 190 countries in ten regions; they have been articulated into over 20 targets and over 60 indicators.

[68] This Declaration, signed by member states of the SADC in 2003, outlines 5 priority areas requiring urgent attention and action and specifies strategies through which to address them (Prevention & social mobilisation; Improving care, access to CT, treatment & support; Accelerating development & mitigating the impact of HIV/AIDS; Intensifying resource mobilisation; and Strengthening institutional and M&E mechanisms.

[69] Also known as the Banjul Charter, this international human rights instrument aims to promote and protect human rights and basic freedoms in Africa. It affords women broader protection against gender violence and sets forth the reproductive right of women to abortion after rape or due to medical risks of the pregnancy.

[70] The Protocol is a legally binding agreement compelling SADC Member States to hasten efforts towards gender equity in the Region. It calls for far reaching changes and includes timelines for these goals. Included in these goals is the inclusion of gender equality and equity in National Constitutions, the repeal of all discriminatory laws, and work towards the continental goal of 50% women in political and decision making positions by 2015.

[71] *The prevention theme has eight areas of focus*: 1. Prevent sexual transmission of HIV with a special emphasis on youth, women and high risk behaviours; 2. Prevent mother to child transmission; 3. Prevent HIV transmission through blood and blood products; 4. Prevent HIV transmission in health care and other care settings and promote access to post exposure prophylaxis treatment; 5. Improve access to and use of confidential counselling and testing; 6. Mitigate stigma and discrimination against HIV; 7. Prevent HIV transmission through intravenous drug use; and 8. Support development and participation in HIV vaccine clinical trials.

through blood or contaminated materials in a health care setting, these events are relatively rare in Zambia. Similarly, CT is an important point of entry for counselling for behaviour change, as well as for a point of entry into treatment, but CT was viewed as lower priority than prevention of sexual transmission and MTCT. Prevention of transmission through IDU has been minimised in this strategy due to the small size of the problem in Zambia. It was however agreed that more research is needed on IDU and also MSM. The new prevention strategy (NAC, 2009) contains, apart from the traditional objectives on HIV and AIDS service delivery, also objectives regarding **alcohol and substance abuse**, as well as on the **integration of prevention with other services**.

Zambia has developed a culture of **annual joint programme reviews** to reflect on the implementation of the national AIDS strategic frameworks. The last review carried out in 2008 showed that NASF objectives and strategies require refinement and that additional strategies are needed to address the epidemic in a more comprehensive way. In response, the NAC published a Supplement to the NASF in January 2009. According to the NAC, this is the **first time that Zambia is effectively using review data to re-programme a strategic AIDS document**. At the conceptualisation of the NASF 2006-2010, no core strategies were included to address the high risks of multiple and concurrent sexual partners, discordant couples, male-to-male sex, injecting drug use and wilful transmission of HIV. Also not included in the NASF were male circumcision, enforcement of guidelines and standards for blood safety in some private, mission and public health facilities as well as screening of blood within the window period.

Multisectorality of the HIV response

Zambia has adopted a policy of multi-sectoral collaboration in the response to HIV and AIDS. At the national level, partners are organised using self-coordinating groups, theme groups, sector advisory groups, partnership forums, co-operating partner groups, and the UN Joint Team. Line ministries have HIV and AIDS focal point persons. At sub-national level, partnerships are organised through the Provincial AIDS Task Forces (PATFs), District AIDS Task Forces (DATFs) and the Community AIDS Task Forces (CATFs) which are part of the Provincial Development Co-ordination Committees (PDCC), the District Development Co-ordination Committees (DDCC) and Neighbourhood Health Committees (NHCs) respectively. The role of these partnerships is to ensure effective planning and co-ordination of budgeting and implementation of the multi-sectoral response. The JAPR 2008 highlighted a lack of clarity on the roles of DACA, PATF and DATF members, and on how the focal points in Government Ministries fit into the picture, and suggested that these positions be regularised and integrated within the government structures.

The multisectoral strategic approach is supported by several theme groups with multi-sectoral membership based on mandates, interest and technical expertise (UNGASS report, 2008). Those with direct relevance to HIV prevention are:

- The **Prevention Theme Group** focuses on issues relating to prevention in the national response to HIV and AIDS with specific focus on counseling and testing (CT), PMTCT, safe blood, workplace programmes and prevention of sexual transmission of HIV.
- The **Advocacy and Coordination Theme Group** addresses the Joint Financing Arrangement (JFA) for NAC and resource tracking functions and links them to resource generation and allocation through advocacy. It also addresses policy and the regulatory environment to ensure that appropriate advocacy is conducted to support policy transformation.
- The **Decentralization and Mainstreaming Theme Group** supports the multi-sectoral response by monitoring and providing technical inputs for public, private and civil society sector initiatives and mainstreaming of the HIV response across all sectors.

Selected policy issues

1. Protection and human rights

Zambia has laws and regulations in place to protect vulnerable populations (women, youth, prison inmates, migrants and mobile populations). However, this does not extend to **legal protection of PLHIV against**

discrimination.[72] According to the Zambia AIDS Law Research & Advocacy Network (ZARAN, pers. comm.), there is not currently any legislation which overtly bans discrimination based on actual or perceived HIV status. The Employment Act says that people cannot be discriminated against based on social status, but that was then clarified in the courts to define social status as economic status. The Constitution has a discrimination clause, but it does not even refer to social or health status, so, in effect, the law is unclear (at the time of writing, there were a couple of cases pending which will test these laws).

Some laws present obstacles to effective HIV and AIDS prevention, treatment, care and support for vulnerable population sub-groups, such as the laws on homosexuality[73], prostitution and injection drug use (UNGASS report 2008). The Supplement to the NASF 2006-2010 (NAC, 2009 p4) states that laws governing MSM and IDU practices should be reviewed to allow adequate provision of services to these risk groups and their partners.

Promotion of human rights is explicitly mentioned in the National AIDS Policy. However, **there are no clear mechanisms for recording, documenting and addressing cases of discrimination experienced by PLHIV at a national level**. In practice, some services for the protection of women and children are provided by the Victim Support Unit and some civil society organisations, notably Legal Aid, Legal Resources Foundation (LRF), ZARAN, Women and Law in Southern Africa (WILSA), and Women in Law and Development in Africa (WiLDAF). Some legal support for HIV and AIDS case work is provided by ZARAN and the Legal Resources Foundation. Zambia has a Human Rights Commission in place but according to the NCPI report 2007, funding, relevance and credibility remain a challenge.

2. Universal access

The policy framework is supportive of universal access to prevention, treatment, care and support, for women and men, as well as some of the most-at-risk populations. With the Annual Action Plan for 2008, access targets were developed for all four areas, and the costing of the 2009 Work Plan was informed by the universal (80%) scale up target. Budget allocations have been revised accordingly.

3. HIV testing

The national policy on HIV testing and counselling stipulates that the service be free of cost for users (WHO, 2009), and encourages provider-initiated CT (which is an important entry point to treatment). The National AIDS Policy prohibits HIV screening for general employment purposes. This does not apply to the military, where mandatory HIV screening is done at recruitment and only HIV negative recruits are accepted in the service. This has led to controversy since the testing and exclusion are – according to ZARAN[74] – violations of the applicant's rights to work, non-discrimination, equality before the law, and liberty. Also, the Zambian Constitution annuls any acts which are discriminatory in themselves or their effect.

4. HIV education in school

HIV education is part of the curriculum for primary and secondary school and in teacher training. By 2005, 60% of schools had teachers who had been trained in life skills education and taught it during the last year at school. Mpofu *et al.* (2008) used concept mapping[75] to construct the components and content of a locally

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[72] Zambia's general anti-discrimination legislation is contained in Article 23 of the Republican Constitution. However, the grounds listed do not provide sufficient protection against HIV-based discrimination. The Industrial & Labour Relations Act and Disabilities Act prohibit discrimination. There have been efforts around HIV legal reform by the Labour movement and ZARAN, the Zambia Law Development Commission (ZLDC) and the Support to the HIV and AIDS Response in Zambia Project (SHARe). These include an audit of all legislation with a bearing on HIV with a view to making recommendations for law reform as well as working with members of the Zambian Judiciary.

[73] An overview on the laws covering homosexuality is provided at: http://www.mask.org.za/index.php?page=zambia

[74] http://uniformservices.unaids.org/%5Ccountry%5CAfrica%20and%20the%20Middle%20East%5CZambia%5CArticles%5C2003-03-04%20The%20Zambia%20Defence%20Force%20HIV%20Policy%20on%20Mandatory%20pre-recruitment%20Testing.pdf

[75] Concept mapping is an inductive, qualitative approach for describing programmes from the viewpoint of the participant. It builds into programme development consumer worldviews by mapping their contextual understanding of health within the cultural milieu (Mpofu *et al.*, 2008)

developed, evidence based HIV/AIDS curriculum for use by secondary schools. The mapping yielded 6 clusters and their content items: 1. Life skills education (18 items), 2. Sexuality and reproductive health (10 items), 3. Treatment, care and support (13 items), 4. Counselling (12 items), 5. Basic facts about HIV and AIDS (11 items), and 6. Dissemination of information about HIV/AIDS (11 items). The authors concluded that these locally constructed components for an HIV/AIDS curriculum overlap those promoted by public health programmes in the country and internationally. The authors conclude that such a curriculum would be responsive to local culture and to ongoing or existing health education initiatives in Zambia.

5. Sectoral and workplace policies and strategies

Within decentralisation and mainstreaming, more than 3,700 workplaces, including line ministries, have developed workplace policies and programmes for HIV/AIDS (JAPR, 2008). By 2008, 22 line ministries had HIV/AIDS budget lines and full time focal point persons. The police and prisons are developing HIV and AIDS policies and strategic plans while the military has a policy but no strategic plan. The JAPR 2008 highlighted that **HIV/AIDS policies and strategies have so far focused on the formal sector**, yet an estimated 65% of workers are in the informal sector in Zambia. Furthermore, workplace programmes are more visible at the national than sub-national level with a lack of resources flowing to the sub-national level. Workplace policies were not effectively disseminated and translated into programmes.

A study by Rosen *et al.* (2007) on small and medium-sized enterprises (SME) and large companies in Zambia[76], South Africa, Uganda, Kenya, Ethiopia and Rwanda showed how varied the impact of HIV/AIDS is on private companies. In the Zambian companies, the average cost per employee lost to AIDS varied from 0.9 to 3.6 times the average annual compensation of the employee affected. Labour cost increases were estimated at 1.3–10.8%. ART at a cost of US$360/patient per year (all companies) was found to have positive financial returns for most but not all companies. Managers of SMEs reported low AIDS related employee attrition, and did not consider HIV/AIDS a pressing issue (AIDS was estimated to increase the average operating costs of SMEs by less than 1%). SMEs lacked the resources and sense of urgency to develop HIV/AIDS programmes. Overall, **very little seemed to be known about the effectiveness of workplace HIV prevention interventions.**

The Zambia Business Coalition on HIV/AIDS was launched in 2000 and its main activities are communication, advocacy and programme support (ZBCA, 2006). The Comprehensive HIV/AIDS Management Programme (CHAMP) has been conducting workplace and outreach programmes with a number of private sector firms including HIV prevalence surveys and other assessments (e.g. as an implementing partner in PHAMSA, see IOM, 2009). The Zambia AIDS Workplace Partnership (ZAWP) plays a supportive role in the private sector for instance by contributing to the development of the directory on private sector HIV/AIDS programmes (NAC, 2007).

6. Ethics in research

HIV/AIDS research protocols involving human subjects need to be reviewed and approved by the Research Ethics Committee. This Committee also has a role in promoting the rights of participants in research. Given the increase in AIDS-related research on human subjects in Zambia, there is a need to strengthen this committee (UNGASS Report 2008).

The UNGASS monitoring system uses the "**National Composite Policy Index**" (NCPI) to assess progress in developing and implementing national AIDS policies and strategies. An NCPI assessment was conducted in the latter part of 2007 in Zambia – see Table 9 for ratings in different policy areas. Scores in all areas of policy improved between 2005 and 2007. Lowest ranks were obtained in 2007 in human rights in relation to HIV, law enforcement, and civil society participation.

[76] Zambian companies included the tourism sector (Livingstone District) and commercial agricultural companies (Central Province and Lusaka District)

Table 9. Policy areas and NCPI rating in Zambia (2005, 2007)

Areas of policy	Rating* 2005	Rating* 2007
1. Strategy planning efforts in the HIV and AIDS programmes	6	8
2. Political support for the HIV and AIDS programmes	5	7
3. Policy efforts in support of HIV prevention	5	8
4. Efforts in the implementation of HIV prevention programmes	5	8
5. Policies, laws and regulations in place to promote and protect human rights in relation to HIV and AIDS	4	5
6. Efforts to enforce the existing policies, laws and regulations in relation to human rights and HIV and AIDS	3	5
7. Efforts to increase civil society participation	4	5
8. Efforts in implementing HIV treatment, care and support services	4	6
Total score (out of 80 possible)	**36**	**52 (+44%)**

Source: NCPI Report, 12th June 2007.
* Scores used were 0 (poor) to 10 (good)

In summary, it can be said that Zambia has developed a **legal and policy framework which is supportive of the country's HIV prevention response**. Although improvements are still required in several areas, there are many achievements that give strategic direction to prevention, protect vulnerable populations, ensure free HIV prevention and treatment services, and provide implementers with guidelines and protocols to standardise the quality of interventions.

Since Zambia is facing a heterogeneous HIV epidemic, one of the most important policies is the **decentralisation policy**. Structures at decentralised levels need to have the mandate, decision-making authority and resources to spearhead a local and tailored HIV response which takes into account the local epidemiology as well as the local service delivery capacity.

4.2. Strategic information for prevention

A number of M&E system assessments have been undertaken in the past few years: the Zambia Country Report on M&E of the multi-sectoral AIDS response (2008), the Zambia Country Experiences on HIV M&E (2007), the Global Fund Assessment (2005), the Joint Mid-Term Review, (2008), and very recently the M&E status review (NAC, 2009). These have each revealed a number of weaknesses in the national HIV/AIDS M&E system, but also demonstrated that Zambia has developed a **good and functional HIV M&E system with many strengths** such as well formulated guidelines, availability of functioning M&E structures, commitment, funding, availability of M&E reference materials, and a committed technical working group (NAC, 2009).

Zambia is a signatory of the commitment to the "Three Ones Principles" (UNAIDS, 2005) and NAC's institutional capacity has been strengthened to this effect (staff numbers doubled between 2005 and 2007 [NAC 2009 table 8]). NAC strives towards a fully functional country-level monitoring and evaluation (M&E) system. Between 2006 and 2008, programme activity and financial monitoring systems were developed and human capacity built at central and sub-national coordinating structures. The country developed the **2006-2010 M&E Plan** in order to track and measure the implementation of the NASF 2006-2010. The M&E Plan includes a data collection and analysis strategy, biologic and behavioural surveillance, a well-defined standardised set of indicators, guidelines and tools for data collection, a strategy for assessing quality and accuracy of data, and a data dissemination and use strategy. The M&E plan has been budgeted. There is a **central national database** for NAC's management information system

called NACMIS, which includes information about the content, target populations and geographical coverage of programmatic activities, as well as their implementing organizations.

The **M&E Directorate of the NAC** is charged with the task of co-ordinating all HIV and AIDS M&E initiatives in the country. The Directorate is supported by the **M&E Theme Group** which addresses strategic objectives related to monitoring, evaluation, research and information sharing. These include preparation of quarterly and annual reports as well as operational, behavioural and clinical research (including allopathic medicine, traditional medicine and vaccine development), and oversight of the NAC Resource Centre. There are civil society representatives and PLHIV in the working group to ensure that the M&E system is responsive to needs; that decision making includes all constituencies; and that issues affecting PLHIV are raised and fed into plans.

Programme activity monitoring: Clinical and non-clinical data are collected. The non- clinic data system is called the **National Activity Reporting System** (NARS), in which data are collected through the National Activity Reporting Forms (NARF) and the Country Response Information System (CRIS, which is mainly used for UNGASS reporting). Clinical data include the **Health Management Information System** (HMIS) and the **SmartCare patient information system,** an electronic medical records tracking system. The Global Fund review cited problems of incomplete reporting and lack of information in the data collected through HMIS. The same review, however, praised the quality of the Smart care patient level information system.

The NARF captures programme data on output indicators from all districts and provinces.[77] There have been great improvements in data submission rate and quality, but M&E capacity at community level is still a constraint despite capacity building efforts which included data use (NARF report Q2, 2008). Other challenges are the incomplete harmonisation between the NAC M&E system and the HMIS of the MoH (NCPI report 2007). Despite considerable efforts to harmonise M&E systems, a multiplicity of data collection formats still exist within the public sector and in the public and private sectors (NAC, 2009 p15). Equally, there is an urgent need to move towards more gender-sensitive monitoring of service coverage and use, and to evaluate gender-based inequity in access to HIV and AIDS services.

According to the NAC (2009, Prevention strategy p14), human resource limitations affect the capacity to monitor and evaluate activities. This is most acute at the level of rural health centres where the average vacancy rate was recently reported to be 72% compared with 29% in urban health centres and 52% in hospitals (MOH/NAC, 2008). To address this, the MOH Human Resources Strategy was launched in September 2008.

Surveillance: Zambia has a remarkable experience in conducting nationally representative household surveys – eight surveys were carried out in 15 years (four Demographic and Health Surveys in 1992 [women], 1996, 2001-02 and 2007, and four Sexual Behaviour Surveys in 1998, 2000, 2003 and 2005). The surveys interviewed respondents of reproductive age and included questions about sexual behaviour and knowledge of HIV/AIDS prevention. The two last DHSs were bio-behavioural with an HIV testing module. The second major source of surveillance data is the periodically implemented HIV sentinel surveillance of pregnant women which started in 1990 and has been conducted seven times since. The two surveillance activities provide key strategic and modelling data. The recent M&E status assessment (NAC, 2009) identified as key weaknesses the poor dissemination of results, lack of regular data validation, lack of data on HIV incidence and inadequate staffing. Furthermore, it commented that the system is centrally run and lacks ICT technology and M&E expertise especially at the provincial and district levels. The MoH, in collaboration with the NAC, WHO and UNAIDS, has been generating **estimations and projections** for

[77] The NARF are submitted quarterly to the District AIDS Task Forces (DATF) through the District AIDS Coordinating Advisor (DACA). The aggregated information is then submitted to the Provincial AIDS Task Force through the Provincial AIDS Coordinating Advisors (PACA). The PATF submits the consolidated NARF data to the NAC each quarter.

the purpose of planning, project design, resource allocation, target setting and M&E.[78] The coverage of key interventions is monitored by gender, geographic area (national, provincial, district), and population-subgroup (sex workers, uniformed personnel, prisoners, refugees, women, orphans and vulnerable children).

Research: NAC recently developed and launched a national HIV and AIDS research strategy with a research agenda (NAC, 2009). While a lot of research has been done, the studies seem to have been carried out without any national strategic direction or policy framework in the past. NAC has established a **research unit** which is mandated to provide guidance and to oversee different HIV research activities in the country. Current HIV and AIDS research seems to be confined to certain geographic areas, and there is a lack of programme evaluations in certain intervention areas (e.g. ART survival, MTCT, life skills). The M&E system assessment (NAC, 2009) also comments on the limited access to research information, and the lack of a fully fledged research committee at NAC.

Zambia has hosted a number of **biomedical studies and trials** of regional importance, for instance:

- The **four cities study (Ndola, Kisumu, Yaounde, Cotonou) on the heterogeneity of HIV epidemics in Sub-Saharan Africa** (Auvert *et al.*, 2001a/b; Buve *et al.*, 2001; Ferry *et al.*, 2001; Glynn *et al.*, 2001; Lagarde *et al.*, 2001a/b/c; Weiss *et al.*, 2001; Hargreaves 2002; Glynn *et al.*, 2003; Glynn *et al.*, 2004; Gabrysch *et al.*, 2008).

- The **Children with HIV Antibiotic Prophylaxis Trial** (CHAP) a randomized double-blind trial of daily cotrimoxazole prophylaxis in HIV-infected children after infancy (Chintu *et al.*, 2004; Mulenga *et al.*, 2007; Walker *et al.*, 2006; 2007; 2009).
- The **Zambia Emory HIV Research Project** (ZEHRP), a cohort study recruiting couples at a couple VCT centre from 1994 to 1998 in Lusaka (Allen *et al.*, 2007; Coldiron *et al.*, 2007; Chomba *et al.*, 2008; Kempf *et al.*, 2008; Stephenson *et al.*, 2008a/b). The project also made preparations to become a vaccine trial site.
- The prospective **Zambia Exclusive Breastfeeding Study** (ZEBS), a randomized trial evaluating the efficacy of short-duration exclusive breast-feeding as a strategy to reduce postnatal HIV transmission while preserving the other health benefits of breastfeeding (Thea *et al.*, 2004; Kuhn *et al.* 2005a/b; Sinkala *et al.*, 2007; Kuhn *et al.*, 2008)
- Evaluation of **suitability for a microbicide efficacy trial** of a site in Lusaka (Kapina *et al.*, 2009)

Important **operational research studies** have been conducted by the Centre for Infectious Disease Research (CIDRZ) in Lusaka, particularly pertaining to the PMTCT programme (e.g. on successes and challenges in the early phase of the PMTCT programme in Lusaka, Stringer *et al.*, 2003; on strategies to meet the human resource needs of the PMTCT programme, Chi *et al.*, 2005; on the effectiveness of PMTCT in Lusaka, Stringer *et al.*, 2005; on the acceptability of expanded PMTCT services, Chi *et al.*, 2007; and on monitoring PMTCT programme effectiveness in resource constrained settings, Stringer *et al.*, 2008). Furthermore, among others, the feasibility and outcomes of rapid scale-up of ART were studied (Stringer et al 2006), and the response to NNRTI-based ART among women with prior exposure to single-dose Nevirapine (Chi *et al.*, 2007).

Zambia also has an intense collaboration on **epidemiological studies and the interpretation of HIV prevalence data** with the University of Bergen, Norway (Fylkesnes *et al.*, 1997; Fylkesnes *et al.*, 1998; Fylkesnes *et al.*, 2001; Dzekedzeke *et al.*, 2006; Michelo *et al.*, 2006a/b; Sandoy *et al.*, 2006; Sandoy *et al.*, 2007; Michelo *et al.*, 2008; Sandoy 2008; Sandoy *et al.*, 2008).

[78] In 2008, epidemiological models were fitted with data that were available from intervention programmes, national surveillance systems, demographic and health surveys, and research studies by the end of 2007. Earlier, epidemiological models used data available from September 1997, December 1999 and December 2002 (MOH 2008 projections report).

Financial and resource tracking: The first NASA was conducted in 2007-2008 and covered the years 2005 and 2006. The NASA process revealed that different organisations had different reporting systems and some systems could not fully satisfy NASA data requirements. Some institutions could not disaggregate data to the level required by the NASA. Beneficiary populations were sometimes not easily classified into the NASA standard groups, and age and gender specific data were frequently not available due to weak primary data collection. Furthermore, a few partners were reluctant to release expenditure data. Despite all these challenges, the implementation of the first NASA is considered a milestone in strengthening national coordination and harmonisation. Nevertheless, according to the NAC (2009, Prevention strategy p13), the existing national tracking mechanisms remain ineffective in monitoring and evaluating utilisation of resources, and there is weak leadership for prioritising and mobilising resources for prevention programmes.

Data use: In the past, M&E data have been used for allocating resources, programme and project design, advocacy, policy development and better targeting of resources (NCPI report 2007). According to the NAC, **data use culture still needs to be strengthened, and there are challenges concerning the availability of data, reporting channels, duplication, insufficient technical capacity, and poor analysis, interpretation and dissemination of data**. Data use and information sharing are more limited at sub-national levels (provincial, district and community) (NAC, 2009 p15). There is a renewed commitment within the NAC and the MoH to make documenting and dissemination of best practices an integral part of the monitoring system.

Overall, **M&E efforts in the HIV/AIDS programme were rated 5 (out of 10) in 2005 and 8 in 2007** (NCPI report 2008), reflecting great improvement.

4.3. HIV prevention programmes

This section is structured according to the eight areas of focus presented in the NASF 2006-2010. It is based on the review of recent activity monitoring data and data on AIDS spending.

4.3.1. Prevention of sexual transmission of HIV (with a special emphasis on youth, women and high risk behaviours)

According to the new HIV prevention strategy, to ***"Intensify and accelerate prevention of sexual transmission through targeted communication and mobilisation for social and behaviour change and clinical interventions"*** is the first of four strategic objectives with several related core strategies.

Behaviour change communication including partner reduction

From the start of the national HIV response, messages were meant to inform the public on the dangers of HIV, that it is mainly transmitted sexually and only changes in behaviour will ensure survival of the population. Strategic objectives of behaviour change communication (BCC) have including promoting sexual abstinence among youth, faithfulness in marital or stable unions, and condom use during sexual intercourse. Messages on faithfulness implicitly aimed at partner reduction among men and women with multiple sexual partners. With increasing awareness in the Southern African region about multiple and concurrent partners as a driving force of the HIV epidemics, ***"Reduction of Multiple and Concurrent Sexual Partnerships"*** has been highlighted as a core strategy in Zambia's new National Prevention Strategy (NAC, 2009, core strategy #1.1).

The NARF monitoring system does not provide data on the nature of behaviour change communication (aims, messages, targets, geographic focus, etc.). It does however provide data on IEC print materials (which cover the prevention of sexual transmission, but also other topics):
In 2008, a total of 216,628 pieces of IEC materials were printed, and a total of 707,163 pieces were distributed across all provinces (NARF summary report 2008).

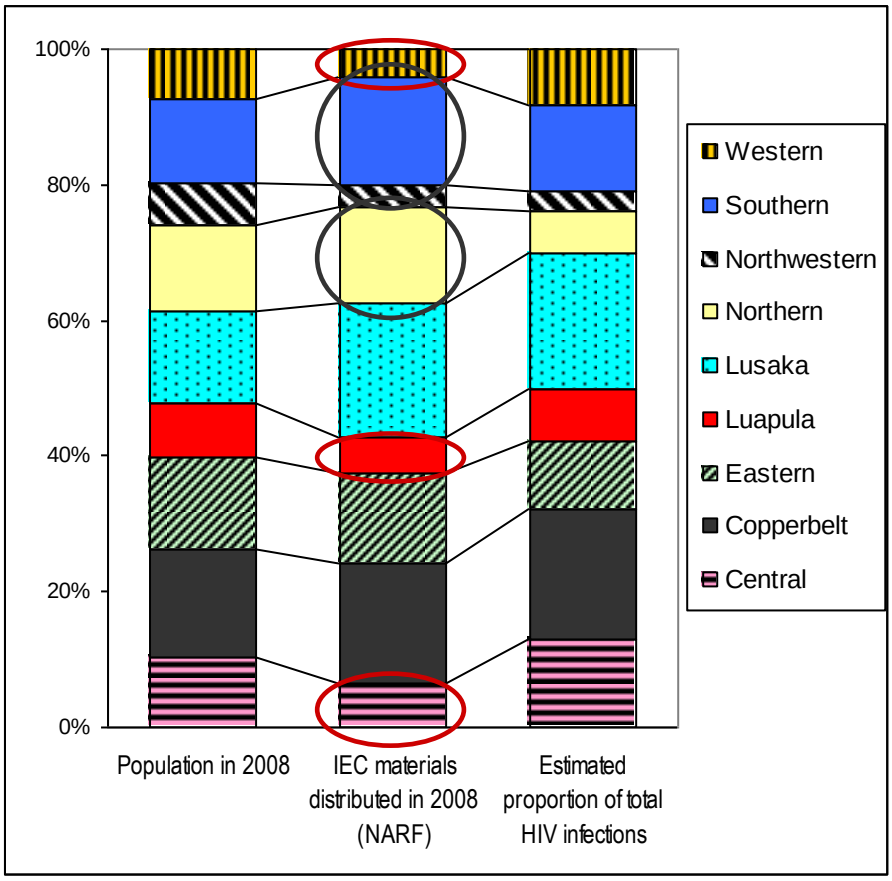
The NARF also documents that **2,673 male and 1,691 female employees were trained in 2008 to provide HIV behaviour change services to fellow employees** (including peer educators, counsellors). According to the JAPR 2008 report, **8,183 female and 16,252 male employees were reached through workplace programmes in 2008** (NAC, 2009).

Current key issues and challenges concerning IEC are, according to the MOH (2009):

- Audience specific, culturally sensitive and linguistically appropriate IEC materials and interventions are inadequate
- There is inadequate sensitisation of communities to fully utilise HIV/AIDS services.
- There is no IEC programme targeted specifically at HIV/AIDS service providers.
- Forecast and supplies of IEC materials are insufficient.

Figure 44 shows an analysis of the number of IEC print materials distributed (NARF 2008 data), the provinces' population size and the provinces share of total HIV infections. Based on the available data, it can be concluded that the allocation of IEC materials to the provinces is quite similar to their share of infections. There is a slightly disproportionate allocation of IEC materials to the Northern and Southern Provinces, and Central, Luapula and Western Provinces receive comparatively fewer materials.

Figure 44. Provinces' population size, total IEC print material distributed and HIV infections in Zambia (2008)



Sources: Population in 2008 from CSO website (http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf), data on distribution of IEC materials from NARF summary report 2008, estimated proportions of total HIV infections estimated based on 2007 HIV prevalence data (DHS) and population size data from CSO.

Among the BCC interventions which were externally evaluated is the **Kwatu Programme,** which used a multi-media "edutainment" strategy to encourage adoption of healthy behaviours among Zambian adults and youth (CIET/Kwatu, 2009). It integrated health and development issues into radio and television drama series and full colour, easy to read booklets. Reach of the Kwatu Programme was extensive and awareness

of the Kwatu brand was high. Behaviour change evaluated in respect to condom use[79] and HIV testing[80] in 2007 against the baseline values of 2002 suggested positive changes among those exposed to the programme. An assessment by Van Rossem & Meekers (2007) looked at the reach and effect of selected **radio and television programmes about family planning, HIV/AIDS and socially marketed condoms**. They found positive changes among those exposed to the programmes regarding condom use.[81]

Prevention for youth

The KYE synthesis section 3.2.1 noted the large difference in HIV prevalence between young women and young men (females aged 15-19 and 20-24 years have significantly higher HIV prevalence than their male age peers). The analysis of programmatic responses for Zambian youth found little evidence of gender disaggregated programme data or gender targeting in the prevention responses.

The Zambian youth has been a primary target population during all phases of the National AIDS Programme with the conviction that the rate at which new cases occur in young people will determine the future course of the HIV epidemic. One of the principal strategies for the prevention of sexual transmission of HIV has been to advocate delay in sexual debut among young people and abstinence. The reasoning behind this was that delay in sexual debut would provide opportunities for further education of young people on safer sex practices and HIV prevention, and that with increased age and knowledge, young people would be in a better position to make informed decisions about sex and HIV prevention. Sex education and HIV/AIDS are now part of primary and secondary school curriculum. Family Health Education is also conducted for school drop-outs and out-of school youth by the Ministry of Sport, Youth & Child Development. Youth Friendly Health Services were established in 50 districts and are being expanded to cover all the health centres. The new Prevention Strategy intends to "***Scale-up evidence-based prevention for young people***" (core strategy 1.2)

The NARF system reports that **141,984 males and 135,998 females aged 15-24 years received life skills-based HIV education including through peer education in 2008** (NARF summary report 2008).

Figure 45 presents a comparison between the number of 15-24 year old youth who received life skills based HIV education in 2008 (NARF 2008 data), the provinces' population size and the provinces share of total HIV infections. The data show more life skills-based HIV education in Northwestern and Southern Provinces than their share of youth infections, and less in Central and Northern Provinces.

Evaluation data: A theoretically informed **media campaign** was designed by youth in Zambia to encourage their peers to adopt risk-reduction practices (Underwood *et al.*, 2006). The **Helping Each other Act Responsibly Together** (HEART) campaign, implemented jointly by Population Services International (PSI) and the Johns Hopkins University Center for Communication Programs (JHU/CCP), conveyed information for young people aged 13-19 years about STI and HIV transmission and prevention, and promoted abstinence, a return to abstinence, or consistent condom use as viable risk-reduction practices. The baseline survey was in 1999, follow-up data were collected in 2000. The positive correlations between

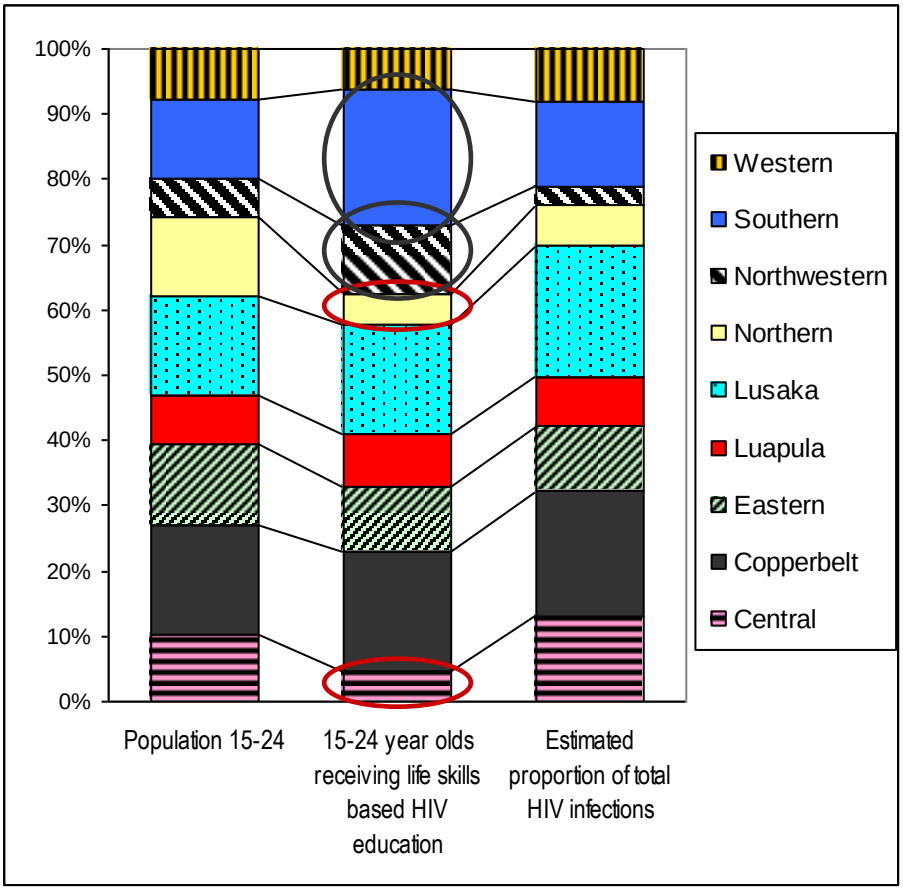
[79] In 2007, 14% of adults who were exposed to Kwatu always used a condom with a regular partner every time they had sex compared with 7% of those who were not exposed. Exposure to Kwatu had an association with always using a condom with a non-regular sexual partner: 41% of those who were exposed to Kwatu always used a condom with a non-regular partner compared to 24% of those not exposed.

[80] In 2002, 10% of males and 9% of females had gone for an HIV test in the past year. In 2007, 29% of males and 42% of females had gone to test for HIV in the past year. Similarly, in 2002, 17% of males and 15% of females asked their partners to go for an HIV test, increasing to 41% of males and 46% of females in 2007.

[81] Those who were exposed to radio and television programs about family planning and HIV/AIDS were more likely to have ever used a condom (OR = 1.16 for men and 1.06 for women). Men highly exposed to *Maximum* condoms social marketing communication were more likely than those with low exposure to the program to have ever used a condom (OR = 1.48), and to have used a condom at their last sexual intercourse (OR = 1.23).

HEART campaign viewership and HIV risk reduction practices[82] demonstrate that mediated messages can influence adolescents. The evaluation of the **Kwatu multi-media edutainment** (CIET/Kwatu, 2009) found positive changes in youth in discussing HIV and AIDS[83], prevention knowledge[84] and misconceptions[85]. A study on young men's sexual health in Chiawa in the Zambezi valley concluded that *"messages must aim to change dominant local sexual norms that perpetuate risky sexual practices. Young men's sexual behaviour is related to their perception of 'manhood' or what constitutes a 'real man'. The sexual perspective, largely constructed around the notion of sexual ability and potency, can have implications for sexual risks"* (Ndubani *et al.*, 2003).

Figure 45. Provinces' population of 15-24 year olds, youth receiving life skills based HIV education and HIV infections in Zambia (2008)



Sources: Population in 2008 from CSO website (http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf), data on youth aged 15-24 receiving life skills based HIV education from NARF summary report 2008, estimated proportions of total HIV infections estimated based on 2007 HIV prevalence data (DHS) and population size data from CSO.

[82] Compared with non-viewers, campaign viewers were 1.6 times more likely to report primary or secondary abstinence and 2.4 times more likely to have ever used a condom. The odds ratio of condom use during last sex was 2.1 for respondents who recalled at least three television spot advertisements.
[83] In 2007, 83% of youth who were exposed to Kwatu said they had discussed HIV and AIDS, compared with 65% who were not exposed.
[84] 72% of youth exposed to Kwatu and 60% of those who not exposed said abstinence prevents HIV infection. Of youth who were exposed to Kwatu, 53% said always using a condom can prevent HIV infection. Youth exposed to Kwatu (82%) were also more likely to say that HIV infected persons taking ARVs can live longer compared to those who were not exposed to Kwatu (70%).
[85] In 2007, 14% of youth who were exposed to Kwatu compared to 29% of those who were not exposed wrongly believed they get infected by eating with a person infected with HIV.

Male circumcision

The epidemiology of male circumcision (MC) in Zambia is described in section 3.6.1.4. The **prevalence of MC is low in Zambia except in North-Western province.** Lukobo & Bailey (2007) provided research evidence that **acceptance of medical MC is high in Zambia, both in traditionally circumcising and non-circumcision areas** (see section 3.6.1.4 for further detail), if it is made safe, affordable and available. There are however **cultural norms which may act as obstacles,** especially in traditionally non-circumcising communities. MC is identified with certain ethnic and religious groups (Lunda, Luvale, Muslims and Chawa). And as with every surgical intervention, there are fears of pain, blood loss, and complications in the healing.

Evidence on costs and benefits of MC makes clear that MC should be a core prevention strategy in Sub-Saharan Africa. Since MC is a one-time-only procedure, it could be very cost effective; one study estimates that in Gauteng Province, South Africa, the **cost per HIV infection averted could be as low as US$181**, based on a cost of $47 per procedure (Setswe, 2009). The same source reports model predictions for sub-Saharan Africa, according to which the lowest cost per HIV infection averted by MC in the next ten years would occur if the **target circumcision age group were 25-34 year-olds**. This is the male age range with the highest immediate HIV risk and somewhat older than the WHO recommended target group (12-30 year-old males). Results from extended 42 month follow-up of participants in the MC trial in Kisumu, Kenya, showed a **65% protective effect of MC against HIV acquisition in young men** (ibid). The Kisumu trial also attempted to gauge the effect of MC on sexual pleasure and performance. They found no appreciable difference between circumcised and uncircumcised men in reports on various measures of sexual function and satisfaction of female partners (Bailey *et al.*, 2007). Cochrane Collaboration independently assessed data from trials in South Africa, Uganda, and Kenya between 2002 and 2006 that enrolled 11,054 males (Siegfried *et al.*, 2009). Reviewers said that **research on the effectiveness of male circumcision for preventing HIV in heterosexual men is conclusive.** They concluded that no further trials are required to establish that HIV incidence is reduced in heterosexual men for at least the first two years after circumcision.

Recent evidence from Uganda's Rakai trials suggests that male circumcision works for the prevention of HSV-2 and human papilloma virus (HPV) infections (Tobian *et al.*, 2009). At 24 months of follow-up of two interventions groups (immediate MC or MC 24 months after trial start), the MC group had significantly lower levels of HSV-2 seroconversion and of high-risk HPV genotypes. These findings further underscore the potential public health benefits of the MC procedure.

The new Prevention Strategy plans to "***Strengthen and scale-up male circumcision services as part of the national comprehensive prevention package and as part of comprehensive male reproductive health services"*** (core strategy 1.3)".

Zambia is one of the countries leading the region in the roll-out of adult male circumcision. In 2006, supported by UNAIDS and WHO, most sub-Saharan African countries with low MC prevalence and high HIV prevalence started preparing to implement medical adult MC. Zambia decided not to wait for the results of the Ugandan and Kenyan trials, integrating MC in its national plan in the beginning of 2006 (Auvert *et al.*, 2008). To date, over one hundred doctors have been trained and more than 15,000 men have received medical male circumcision.[86] It is believed that this service should be as near to the community as possible, yet conducted in a sterile environment by trained medical professionals.

Significant work remains in building capacity and scaling-up a comprehensive MC intervention while maintaining the quality of clinical services and risk reduction counselling. MC indicators need to be integrated in the current NARF and HMIS M&E systems. More health workers need to be trained in performing this procedure, particularly if more demand for the service is created from health promotions. Zambia offers MC services in the context of comprehensive male reproductive health services, which

[86] Society for Family Health (2700 circumcisions), Dr. Kasonde Bowa (UTH – 3200 circumcisions, district and private hospitals- approximately 4000 circumcisions), by Feb 2009 (NAC 2009 p6).

include counselling and screening for other male health risks. It is recognised that mechanisms aimed at scaling-up MC should emphasise the importance of partner reduction, consistent and correct use of condoms, effective management of STIs, and abstinence, where relevant.

Male and female condoms

Data on condom use with different partners and long-term trends in condom use are presented in section 3.6.1.3. Correct and consistent condom use has stayed low with regular partners and has increased with non-regular partners, but remains insufficient.

Condom promotion and distribution has been part of the national HIV response over many years, and both male and female condoms have been available through different outlets such as health facilities, workplaces and through social marketing. IEC has played a major role in highlighting the importance of *correct and consistent* condom use to prevent HIV and STIs. Condom use messages have focused on the adult population, especially men and FSWs. Some religious and conservative groups in Zambian society have not been supportive of condoms as an HIV prevention strategy in the past, arguing that condoms promote promiscuity. The new Prevention Strategy aims to "***Make affordable quality male and female condoms widely acceptable, available and accessible throughout the country"*** (core strategy 1.4).

The NARF monitoring system reports that there were **15,252 condom service outlets providing condoms to end users in 2008** and that **5,936,750 male condoms and 369,465 female condoms were distributed in 2008** (NARF summary report 2008, private sector data not included).
The HMIS reports that **7,616,668 male condoms and 73,320 female condoms were distributed by the public health sector in 2008** (NARF summary report 2008, private sector data not included).

Figure 46 provides some comparisons between the provinces' population size, total condoms distributed in 2008 (male and female condoms, reported via HMIS and NARF) and their share of total HIV infections. It suggests that condom distribution in Southern Province is very high relative to the province's population size and share of all HIV infections in the country. In contrast, condom distribution in Eastern and Western Province are relatively low.

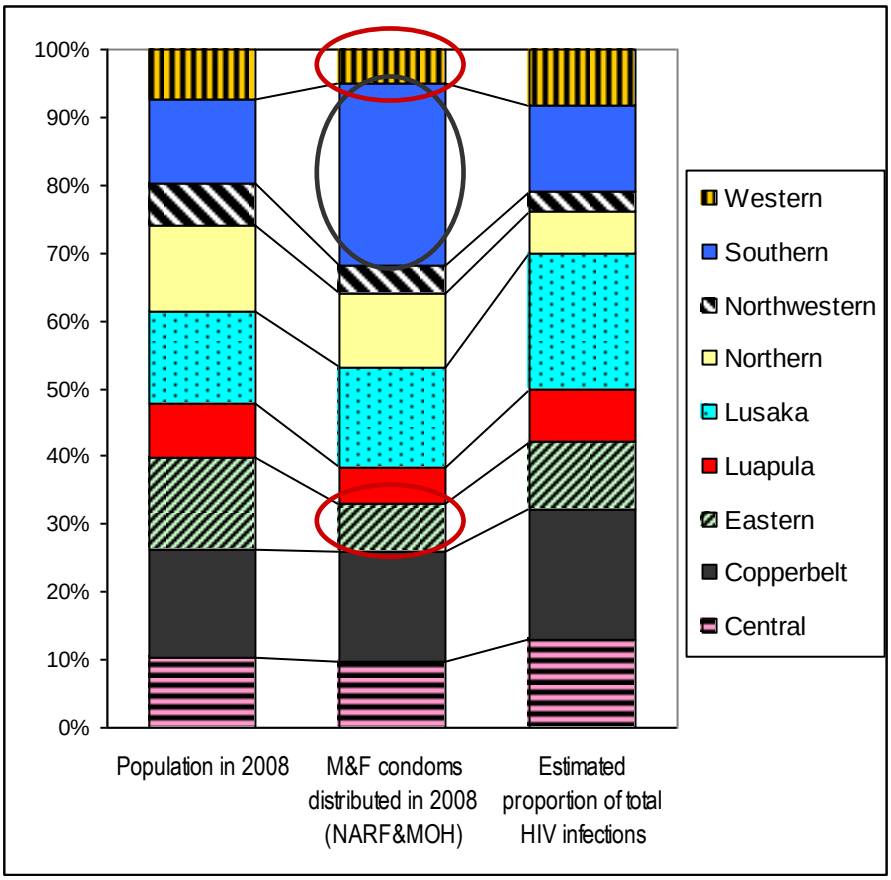
Society for Family Health (SFH) is the key organization focusing on **social marketing and sales of condoms** in Zambia. It currently distributes *Maximum Classic* and *Maximum Scented* male condoms and *Care* female condoms through pharmacies, drug stores, beauty salons, VCT centres and in collaboration with NGOs and other partners. Condom use is promoted through intensive mass media and interpersonal communications, as well as radio and television. The condom social marketing programme was initiated in Zambia at the end of 1992 and donor-subsidized condoms were made available through the Zambian commercial sector (Agha & Kusanthan, 2003). These condoms were available in the market for one-tenth of the price of commercial condoms. In particular, the intervention focused on making condoms available in 'non-traditional' outlets such as kiosks and groceries where condoms were previously not sold.

The Zambia Urban Sexual Behaviour and Condom Use Survey 1999 evaluated condom access in urban Zambia. It was found that 39% of commercial outlets in urban Zambia stocked social marketing condoms in 1999. More than 30% of groceries and kiosks stocked social marketing condoms. Consumer access to condoms (walking time to a condom source) was greater for poorer than wealthier respondents. **Stocking of non-traditional outlet types commonly found in low-income areas helped to reduce socioeconomic inequities in condom access** (Agha & Kusanthan, 2003). Van Rossem & Meekers (2007) found that reproductive health and social marketing campaigns in Zambia reached a large portion of the population and had a significant impact on condom use. Their results suggested that communication campaigns using radio are more effective than those using television, and that the specific constraints that prevent females from using condoms should be addressed in programmes.

In 2008 a **Logistics System Assessment and Stock Status Survey** was conducted to provide the MOH, USAID/Zambia, and other stakeholders with information on the availability of family planning (FP)

commodities and logistics information at district and health facility levels (Ali *et al.*, 2008). **Male condoms were found in all facilities at all levels on the day of visit** (stock-out was common for most other FP products). Around 70% of health facilities and over 80% of District Health Offices (DHOs) were using stock cards to manage male condoms and other FP commodities. Over 50% of the DHOs had more than 6 months stock on hand for male condoms, whereas 25% of health facilities had less than a month of stock. When looking at historic data, the majority of facilities had at least one stock-out of condoms, although some condoms are supplied through essential drug kits. This highlights that the condoms facilities receive in the kits are not sufficient for an uninterrupted supply.

Figure 46. Provinces' population size, total condoms distributed and HIV infections in Zambia (2008)



Sources: Population in 2008 from CSO website (http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf), male and female condom distribution data from NARF summary report 2008 (excluding private sector data), estimated proportions of total HIV infections estimated based on 2007 HIV prevalence data (DHS) and population size data from CSO.

Diagnosis and treatment of sexually transmitted infections

STIs are still a major public health problem in Zambia -- up to 10% of all out-patient attendances at health institutions are related to STIs (CBoH Syndromic Guidelines). Gonorrhoea, syphilis and chancroid are among the most common STIs. Chlamydia trachomatis, trichomonas vaginalis and yeast infection of candida albicans are common in female patients, while men often experience inflammation of the glans penis (balanitis) and foreskin (posthitis). STI treatment protocols and guidelines have been revised and are being used as reference materials by health facilities. Free treatment of STIs is offered at all government clinics and health centres, complemented by efforts to raise community awareness of the dangers of STIs, especially during pregnancy.

The HMIS reports that **3,170 service providers were trained in diagnosis and treatment of STIs according to national guidelines in 2008** (NARF summary report 2008)

The new Prevention Strategy plans to *"**Strengthen and scale-up activities on prevention and management of sexually-transmitted infections**"* (core strategy 1.5). Whether and to what extent STI treatment impacts HIV transmission has been the subject of recent debate internationally. Five of six trials

of treatment of bacterial STIs in Africa did not have any effect on HIV incidence (Gray & Wawer, 2008), and two trials on HSV-2 suppression on HIV acquisition were similarly discouraging (Cohen, 2008). This recent evidence suggests that the presence of STIs should be regarded as an indicator of unsafe sex, rather than as a risk factor for HIV acquisition. Grey & Wawer (2008) further comment:

"Control of STIs provides important benefits for public health and individuals, and should unquestionably be provided and promoted for this reason. However, the hypothesis that control of STIs can prevent the spread of HIV in populations has been extensively tested and is not supported by evidence …. We are concerned that this policy will not decrease HIV incidence in general populations and might divert scarce resources from other proven efficacious interventions".

4.3.2. Prevention of mother to child transmission

Some aspects of mother-to-child transmission of HIV have already been presented in section 3.6.2. Zambia first piloted the PMTCT programme in 1999. The programme expanded rapidly in the country due to support and commitment of the government and its development partners. Financial, material and technical support have been provided for training and human capacity building, materials and equipment for rapid and accurate testing and provision of drugs. By 2004, the programme had expanded to 74 health facilities in four provinces (GFATM evaluation, 2008). The programme was initially based on a monotherapy of nevirapine, but was later changed to include Zidovudine (AZT), though not all clinics are offering the more efficacious Zidovudine regimen. The programme has since been rolled out to all nine provinces and 72 districts of Zambia. By 2005, 19% of all facilities were offering one or more component of PMTCT. The availability of testing services varied from a low of 8% in Luapula and Northern Provinces to a high of 41% in Western Province. In addition, 62% of hospitals offered PMTCT services. Rural-urban differentials in the provision of HIV testing and PMTCT services were still stark with only 12% of rural health centres offering HIV CT compared to 47% of urban health centres. With the continuing increase in PMTCT service delivery, equity in access to services has dramatically improved. There has been a significant increase in health facilities offering PMTCT from 568 facilities in 2006 to 706 in 2007, and 936 by December 2008.

A multi-country assessment of the costs and feasibility of the scaling-up of PMTCT and paediatric treatment modelled the resource needs for 2007-2015 in Zambia and six other SSA countries and compared the results with the AIDS budgets and health workforce in each country (Nakakeeto & Kumaranayake, 2009). Three of the seven countries (Zambia, Burkina Faso and Rwanda) were predicted to have sufficient AIDS funding, but only Zambia was predicted also to have sufficient human resources to scale up the interventions by 2010 and sustain them to 2015.

The PMTCT and paediatric HIV care programme in Zambia takes a **comprehensive strategic approach to HIV prevention in infants based on the four-pronged WHO-promoted PMTCT approach**: primary prevention of HIV among women of child bearing age; prevention of unwanted pregnancies among HIV positive women or women of unknown status; prevention of HIV transmission from infected mothers to their babies; and care and support to HIV infected families (HIV prevention strategy 2009). The Government, in collaboration with various stakeholders, supports the following PMTCT activities:

- counselling and testing, including couple counselling;
- prophylactic ARV treatment;
- male involvement;
- screening and treatment for STIs;
- community mobilisation and adherence support follow-up;
- referral for CD4 count; infant feeding, and family planning;
- follow up of mother-infant pair;
- cotrimoxazole prophylaxis for child health;
- training community volunteers and health care providers;
- development and distribution of IEC materials; and,
- condom promotion and distribution.

The new HIV Prevention Strategy has one strategic objective and four core strategies for PMTCT:

Strategic objective 2: Scale-up access to and use of PMTCT services

Core Strategy 2.1: Strengthen programme management and co-ordination of PMTCT services at health facility and community levels

Core Strategy 2.2: Strengthen provision of comprehensive PMTCT and paediatric HIV prevention services, including primary prevention of HIV, primary prevention of unwanted pregnancy, prevention of transmission from mother to child, and strengthening referral networks for care, support and treatment.

Core Strategy 2.3: Increase demand and uptake for PMTCT Services

Core Strategy 2.4: Increase male involvement in PMTCT services

In 2008, 3,538 professional health providers and 2,434 lay/community health providers (including traditional birth attendants) were trained to provide PMTCT services (NARF summary report 2008).

The human resource capacities at facility and community levels are critical to meet the current and future needs of PMTCT services (see also Nakakeeto & Kumaranayake, 2009), and the MoH has introduced direct entry into midwifery training and embraced public-private partnership for training for nurses and other health personnel.

By end 2008, 936 ANC facilities provided PMTCT services (Global form, WHO, 2009). All 936 provided CT, CD4 testing (on site or through referral) and ART (WHO, 2009).

The scaling-up of PMTCT services resulted in an increase in pregnant women completing prophylaxis from 25,600 in 2006 to 41,286 in 2008 (figure 42). According to the latest projections, there were 84,568 women eligible for PMTCT (MOH 2009 - PMTCT projections using 2008 data). **This represents a PMTCT coverage of those eligible for PMTCT of 49%** (41,286 treated / 84,568 eligible).

In 2008, about 22% of pregnant women receiving drug regimens for PMTCT had single dose treatment, 22% received dual ART, 5% triple ART and 6% HAART (MOH 2009 - PMTCT projections using 2008 data).

The GFATM evaluation in 2008 assessed quality aspects of PMTCT services:

Availability of basic elements for provision of quality PMTCT services such as commodities, guidelines, systems, and trained staff was inadequate. Among 162 ANC clinics offering PMTCT services in 9 districts assessed in 2008, only 6.2% had all basic elements of infrastructure, staff, guidelines, equipment, supplies and registers available in order to offer quality services, and three of the nine districts did not meet the requirements at all (GFATM, 2008). Overall, 19% of all sites had the appropriate infrastructure, 83% had the staff, 48% had the guidelines, and 38% had the equipment and the supplies. Katete and Mpulungu had poor infection control facilities and electricity provision. The availability of staffing was variable across all districts with highest levels in some of the rural districts i.e. Mpulungu, Sesheke and Nchelenge. Kapiri Mposhi had the lowest level. Katete and Mpulungu had very high levels of availability of the guidelines. The distribution of equipment and supplies was particularly good in Nchelenge and Mpulungu. The National HIV and AIDS commodity security strategy 2009 – 2010 of the MOH should help to redress these resource constraints.[87]

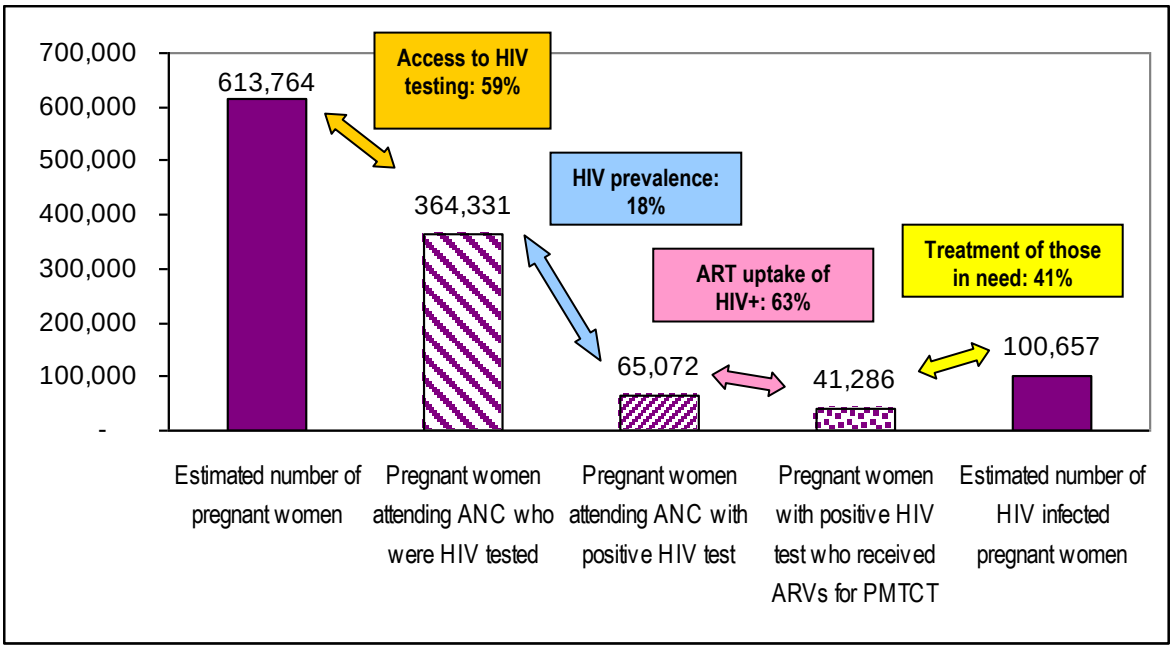
In the GFATM evaluation, no data were reported on adherence to services provided, which concerns the number of infants born from HIV+ women who received recommended prophylaxis of all pregnant

[87] The proposed strategies for overcoming these shortfalls are: 1. Ensure the uninterrupted availability of PMTCT commodities; 2. Improve physical infrastructure and quality of MCH services to improve the uptake of HIV and AIDS services; 3. Increase access to early infant diagnosis (PCR) to ensure broader PMTCT commodity coverage; 4. Ensure dissemination, implementation and the enforcement of the national treatment guidelines.

women who are HIV positive. However, routine monitoring of the PMTCT programme provides data which can be presented as the "ANC cascade" (figure 47):

According to the available data, **access of pregnant women to CT within the PMTCT services is 59%, and access to ART of pregnant women diagnosed HIV positive is 63%** (Global form, WHO 2009). The same source also reports that in 2008, only 20,407 male partners of 491,234 ANC clients attending knew their status (4%).

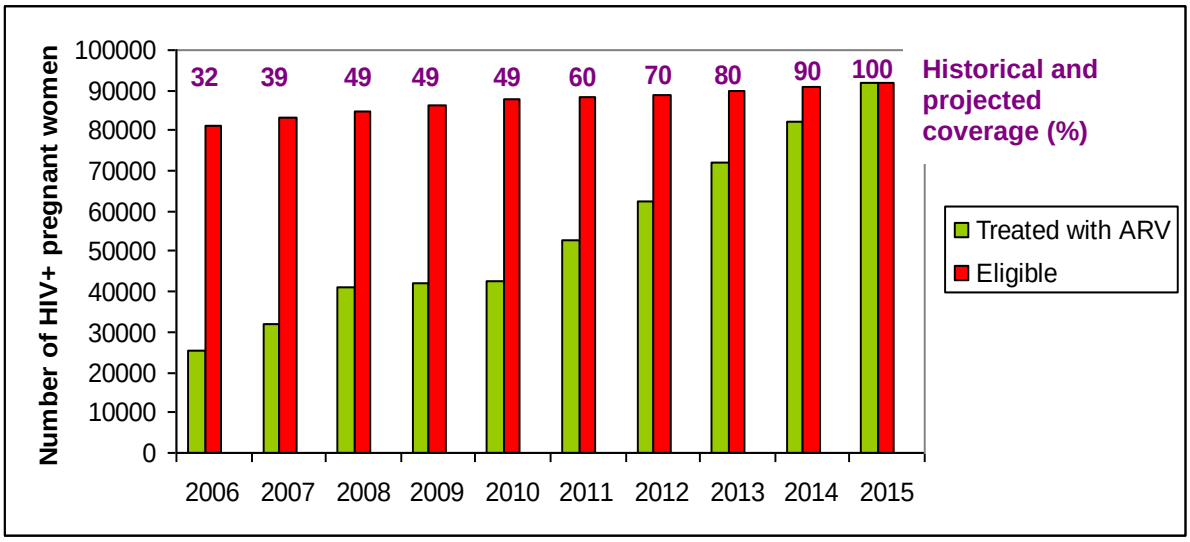
Figure 47. ANC cascade for pregnant women in Zambia (2008)



Source: WHO (2009) – Monitoring and reporting on the health sector response to HIV/AIDS

In order to plan for universal access to PMTCT by 2015, Zambia has calculated annual scale-up figures for treatment of HIV positive pregnant women, taking into account that the number of eligible women increases every year slightly due to population growth (figure 48). In this "universal access" scenario, it is projected that by 2010, single dose treatment will have been phased out, and that by 2015, 80% of women will be on dual ART and 20% on HAART.

Figure 48. Historic and projected ARV prophylaxis for HIV positive pregnant women in Zambia (2006-2015)



Source: MOH 2009 - PMTCT projections using 2008 data.

Provincial variations in use and scaling-up of PMTCT services:

The DHS 2007 provides data on pregnant women counselled and tested for HIV (DHS table 13.11, includes 2,631 women who gave birth in the two years prior to the survey). Since PMTCT coverage has increased so rapidly, these data would have changed significantly for more recent pregnancies. However, these 2007 data suggest that **PMTCT uptake was historically low in Central and Southern Provinces compared to the high HIV prevalence levels in women in these provinces in 2007.**

Site growth between 2007 and 2008 has been highest in Luapula Province (+228%, from 29 to 95 PMTCT sites) leading to 70% of health facilities offering PMTCT services in this province at the end of 2008. PMTCT scale-up during this period was also strong in Northwestern and Northern Province (+184% and +112%, respectively), but at the end of 2008, still only 35% and 27% of all health facilities offered PMTCT in these two provinces.

The key prerequisite for high utilisation of PMTCT services is pregnant women successfully accessing ANC. In Zambia, the proportion of pregnant women who receive ANC from a skilled provider is high overall at 94% (DHS 2007 table 9.1), and exceptionally high in Lusaka Province at 99.7%. But in some provinces, the scale up of PMTCT has an **additional challenge posed by the lower proportions of pregnant women accessing skilled ANC provision**: 84% in Western Province, and 85% in Northwestern Province. Central and Eastern Province also still need promotion and strengthening of ANC use with 91% and 92% of women receiving skilled ANC care.

The HMIS provides the following PMTCT data on infants for 2008:

It is estimated that in 2008, a total of 6,756 HIV infections in infants were averted through the PMTCT programme (Working document NAC, 2009). In 2007, this figure was 5,341, and in 2006, a total of 3,425 infant infections are estimated to have been averted.

24,026 infants born to HIV-infected mothers received ARV prophylaxis (Global Form, WHO 2009). This is 28% of all HIV-exposed infants.

19,040 infants born to HIV positive mothers started on cotrimoxazole prophylaxis within two months of birth (WHO, 2009). This is 22% of all HIV-exposed infants.

20,774 infants born to HIV positive mothers received an HIV test in their first 12 months (WHO, 2009). This is 24% of all HIV-exposed infants.

Potter *et al.* (2008) investigated the effect of introducing PMTCT research and/or interventions into 22 antenatal clinics in Lusaka at different times. The study outcomes included documented rapid plasma reagin (RPR) testing for syphilis and, in RPR-positive women, penicillin treatment for syphilis. The study suggested that **the simultaneous operation of PMTCT research and service programmes in ANC clinics was associated with improved antenatal RPR screening and treatment**, therefore providing a broader antenatal care impact.

A workforce study conducted in 2003 by Huddart *et al.* (2004) determined whether Zambia would have sufficient staff to be able to scale up VCT, PMTCT and ARV treatment to reach its targeted numbers of clients. It provided valuable guidance on the human and financial resource requirements for providing quality VCT, PMTCT and ART services. As already mentioned in section 4.2, important operational research and analysis has been conducted by the CIDRZ on the PMTCT scale-up starting in Lusaka District and expanding into all provinces of the country (Chi *et al.*, 2005 & 2007; Stringer *et al.*, 2003). As a PMTCT service provider, CIDRZ implements and scales up comprehensive PMTCT services, including training, renovation of counselling spaces and mentoring. CIDRZ has also supported the roll out of a more efficacious ARV regimen.

The need to address the broader reproductive health issues of people affected by HIV has gained increasing recognition in Zambia, in particular the **prevention of unintended pregnancies among HIV positive women**. Reynolds *et al.* (2008) estimated the number of HIV-positive births currently prevented by

contraceptive use in Zambia and the first year cost savings if unintended and unwanted HIV-positive births were prevented via contraceptive use rather than PMTCT services. **The annual number of unintended HIV-positive births averted in Zambia by contraceptive use was estimated at 12,823. Contraception is therefore already having an important effect on reducing the number of infant HIV infections**. The minimum annual cost savings of preventing just the unwanted HIV-positive births was US$806,950. The authors conclude that the contribution of family planning could be strengthened by additional efforts to provide contraception to HIV positive women who do not wish to become pregnant, and that effective contraception could be provided at lower cost than PMTCT services.

On the recent **scaling up of paediatric AIDS care** in Zambia by the MoH, Bolton *et al.* (2007) comment: Several key factors contributed to its success, namely the early and explicit government commitment to paediatric AIDS care in Zambia, including early guideline establishment, procurement of paediatric drug formulations, and establishment of a centre of excellence for paediatric HIV training and referral at the University Teaching Hospital; the decision to decentralize care allowing HIV positive children to be treated by non-physician clinicians in primary health centres has increased reach; and partnerships with donor organizations and service providers which have allowed an exceedingly under-resourced health care system to develop high-quality and effective AIDS treatment services for a large number of children in Lusaka.

4.3.3. Prevention of HIV transmission through blood and blood products

Some aspects of blood safety in Zambia have already been presented in section 3.6.5. Since 1988, the **Zambia National Blood Transfusion Service** (ZNBTS) has been screening blood and blood products to reduce transmission of HIV through contaminated blood and blood products. According to the national HIV/AIDS policy objectives on safe blood, government commits to screening all blood for HIV, syphilis, hepatitis B virus and hepatitis C virus. Quality control and assurance checks are conducted at blood banks across the country to ensure adherence to standards and guidelines for safe blood practices. Other national strategies for improving the safety of blood and blood products include:

- Recruitment, care and safety of blood donors (including targeting repeat negative donors)
- Handling, transportation and storage of blood, blood products and human tissue
- Preparation, storage and handling blood components
- Appropriate use of blood and blood products
- Appropriate use of human tissue and tissue products
- Continuous improvements in technology and methodology for detecting potentially infected blood units and blood products

"***Blood safety and blood products***" features in the new HIV prevention strategy as core strategy 4.4.

Country-wide there are nine screening centres of international standards, and 117 blood transfusion service outlets (NAC 2009 HIV prevention strategy). To ensure safe storage of collected blood, all 9 provincial hospitals now have large special blood refrigerators. About 81 small refrigerators have also been procured for storing blood at district level and in selected private institutions.

According to the UNGASS report, **100% of transfused blood units are screened** (ZNBTS 2009, p6). There may be some undocumented transfusion of unscreened blood in emergencies. By 2008, 710 individuals had been trained on blood safety. The national need for safe blood is 100,000 units. In 2008, a total of 82,527 units of blood were collected and screened for HIV, HBV and HCV using the WHO standard (ZNBTS, 2009). This leaves a 20% gap towards meeting the national need for blood. In 2008, 12.4% of all collected blood units had to be discarded due to transfusion transmitted infections.

Regarding commodities for blood safety, the **priority issues** are, according to the MOH (2009): 1. The supply chain for blood safety is highly dependent on donor funding and there is limited government support through the drug supply budget line (DSBL); 2. There is a need to upgrade the semi-automated ELISA systems to fully–automated ones to improve the quality of testing (the blood safety laboratories are

organised in a two-tier throughput system, and the high throughput centres use fully-automated immuno-analysers, while 7 centres use semi-automated ELISA systems); 3. There is a need to rigorously manage service contracts with vendors to ensure continuous operation of the instruments and timely provision of reagents; and 4. Blood storage and distribution, as well as maintenance of the cold-chain for blood safety commodities remain major priorities. Further challenges are the under-developed supply chain systems, and inadequate human resources for blood donor mobilisation and testing. The National HIV and AIDS commodity security strategy 2009 – 2010 will try to redress some of these issues (MOH, 2009).[88]

The benefits of HIV screening of blood transfusion were assessed in Monze District Hospital in 1991 (Foster & Buvé, 2005). HIV prevalence among donors was 15.9, and the cost per case of HIV infection prevented was US$31.62. The HIV infections prevented by screening were mostly in children under 5 years (59%) and in women (31%). An estimated 3,625 undiscounted healthy years of life were saved, at a cost of US$1.32 per year of life saved.

Van Hoogstraten *et al.* (2000) describe three separate studies carried out at St. Francis' Hospital in Katete designed to quantify the potential impact of a few simple measures to reduce the risk of HIV infection through blood transfusion in a district hospital: (1) selection of blood donor sub-populations; (2) improving the sensitivity of locally used rapid antibody assays for the detection of HIV in donor blood; and (3) preventing unnecessary blood transfusions. The authors concluded that proper selection of blood donor groups and correct use of non-expired HIV tests may decrease the risk of iatrogenic HIV transmission. Stricter indications for blood transfusions did not seem to substantially reduce the number of transfusions (some reduction may be achieved by introducing normovolaemic haemodilution, and prevention of malaria-induced anaemia in children to decrease the number of transfusions).

In a population where blood transfusion is common due to severe anaemia, haemorrhage and trauma, and where HIV in the general population and among potential blood donors is high, safe blood and blood products are important prevention strategies.

4.3.4. Prevention of HIV transmission in health care and other care settings and promote access to post exposure prophylaxis treatment

Some data on medical injections and universal precautions are presented in section 3.6.4. The new HIV prevention strategy puts much emphasis on HIV prevention in health care settings with the following strategies:

Strategic objective 4: Integrate prevention in all aspects of care at all health care settings

Core Strategy 4.1: Institutional and human capacity development for HIV prevention in the health care setting, with a focus on infection prevention and injection safety
Core Strategy 4.2 Systems strengthening
Core Strategy 4.3: Provide PEP for health care workers and victims of sexual abuse
Core Strategy 4.4 Blood safety and blood products *(see section 4.3.3.)*
Core Strategy 4.5 Community engagement and empowerment

Issues of injection safety (IS) and infection prevention (IP) are considered to be critical elements in Zambia's HIV prevention. **Unsafe injections** result when injections are given with used syringes or needles that are not sterile; when poor injection technique is used, such as recapping of used needles or use of contaminated multi-dose dilutants or reconstituted drugs; or when sharps are improperly discarded. **Unnecessary injections** result when an injection is not medically indicated, or is given instead of more

[88] The proposed strategies are: 1. Inclusion of blood supply commodities under the DSBL; 2. Strengthen the supply chain to ensure adequate blood commodities and consumables are available at blood transfusion centers and service delivery points (SDPs); 3. Improve storage and cold chain infrastructure at SDPs; 4. Quantify and promote the rational use of blood products at SDPs; 5. Develop human resource capacity and improve methodologies for blood donor mobilisation and counselling, blood collection and testing for HIV and other transfusion transmissible infections; and 6. Link equipment maintenance and service contracts with reagent purchase.

appropriate alternatives such as a tablet. The main commodities required are auto-disable (AD) syringes for injections and immunisations to prevent re-use, sharp boxes, and the provision of gloves and other protective equipment to prevent accidental exposure to HIV infection. National capacity building among health workers on the **safe use of needles, syringes and sharp instruments** to prevent HIV and other infections has been conducted countrywide.

Current infection prevention (IP) and injection safety (IS) activities focus on:

- policy and guidelines development and implementation;
- capacity building and training;
- procurement of commodities;
- implementation of post-exposure prophylaxis (PEP);
- behaviour change;
- community mobilisation;
- waste management; and
- monitoring and evaluation.

IP/IS activities in Zambia also include work with communities and their leaders to foster behaviours that reduce the risk of medical transmission of HIV, including reducing provider and consumer bias for injections and staying away from clinical waste disposal sites.

The HMIS reports that in 2008, **327 service providers were trained in standards for infection prevention and health care waste storage and disposal** (NARF annual summary 2008).

By end 2008, **6,207 traditional healers had been trained in infection prevention and use of sharp instruments according to national standards.**

By end 2008, **21% of health facilities (332 of 1,563) offered PEP services on site** (WHO, 2009)

PEP concerns health care workers accidentally exposed to HIV and individuals who have experienced sexual assault or abuse. The offer of post-exposure ART is still limited and requires further expansion to health facilities (NAC 2009, HIV prevention strategy). Where it is available, it is often poorly accessed due to lack of awareness of its existence and the stigma attached to using PEP services. There is awareness of the importance of targeting non-clinical or traditional care settings with information on universal precautions, infection prevention and PEP.

4.3.5. Improvement of access to and use of confidential counselling and testing

Zambia has been expanding the provision of counselling and testing (CT) services since 1999. By 2005, over 500 VCT centres existed countrywide. According to the 2005 HIV/AIDS Service Provision Assessment Survey (MOH, 2006), HIV testing was available in 44% of health facilities nationwide. The availability of testing services varied from as low as 20% in Luapula to as high as 60% in Copperbelt Province (ibid). More than 90% of hospitals had HIV testing services. Rural-urban differentials were observed in the availability of HIV testing - only 25% of rural health centres had HIV testing services compared to 88% of urban health centres.

Recently observed increases in VCT uptake have been linked to the requirement for accessing free ARV treatment and AIDS care. In 2007, the 30th of June was declared by the government as national VCT day in order to encourage the general population to take an HIV test. Counselling and testing has been scaled-up focusing on:

- development of guidelines, including quality assurance/improvement;
- training;
- establishing logistics for HIV commodity procurement;
- community mobilisation;
- promotion of couple CT, family-based CT, workplace CT;
- PCR test for children under eighteen months; and
- development and distribution of BCC/IEC materials.

In March 2006, new national HIV CT guidelines were issued calling for routine, opt-out HIV testing, and use of finger prick testing when appropriate in all clinical and community based service settings. These guidelines encourage use of rapid HIV tests, and emphasise that testing be routine, but voluntary and based on informed consent.

In the new HIV prevention strategy, counselling and testing (CT) is a strategic objective accompanied by four core strategies:

Strategic objective 3: Scale-up access to and use of CT services

Core strategy 3.1: Build institutional and human resources capacity to provide quality CT services

Core strategy 3.2: Scale-up access to CT services

Core strategy 3.3: Community mobilisation for the promotion and delivery of CT services

Core Strategy 3.4: Conduct targeted SCC/BCC/IEC interventions to increase demand for CT

The HMIS reported that **by end 2008, a total of 1,563 health facilities provided HIV counselling and testing services,** of which 1,471 were public and 92 private facilities (WHO 2009 Global form). According to the HMIS, by end 2008, **3,827 professional providers and 3,081 lay/community providers were trained to provide VCT services**.

A total of 511,266 people aged 15 years and older received HIV CT during 2008 and know their results, of which 84% were females and 16% were males (WHO 2009 Global form) – see figure 40 for provincial figures on VCT use.

The GFATM evaluation in 2008 assessed several quality aspects of CT services:

1. Availability of basic elements for provision of quality CT services such as commodities, guidelines, systems, and trained staff. Among 241 CT sites in 9 districts assessed in 2008, only 5.4% had all basic elements of infrastructure, staff, guidelines, equipment, supplies and registers available in order to offer quality services (GFATM, 2008). Overall, 17% of all sites had the infrastructure, 77% had the staff, 42% had the guidelines, and 57% had the equipment and the supplies. Most facilities had adequate water supply and infection control facilities to provide quality CT services. The best capacity to provide quality CT was found in Mwinilunga and Kitwe.

2. Adherence to CT services as a measure of service quality (percentage of CT clients that complete the CT process and receive post-test services of all clients provided with HIV pre-test counselling). The results showed that adherence steadily increased from 2003 (53% completed CT process) to 2006 (97%) (2007 data were incomplete). All provinces had recorded increases in the proportion of clients collecting results and attending post-test services (GFATM, 2008).

No data were available on the quality indicators relating to referral (percentage of HIV positive CT clients who were referred for other services, and percentage of ART clients that were referred through HIV CT services).

Regarding **commodities for CT services**, some of the key challenges noted by the MOH (2009) are: Limited physical space at counseling sites, high attrition rate for CT counsellors, incomplete consumption data for HIV test kits, insufficient coordination of test kit procurement and distribution, poor distribution of facilities offering CT services, and inadequate funding and implementation of the quality control programme for rapid testing. The National HIV and AIDS commodity security strategy 2009 – 2010 tries to respond to these challenges.[89]

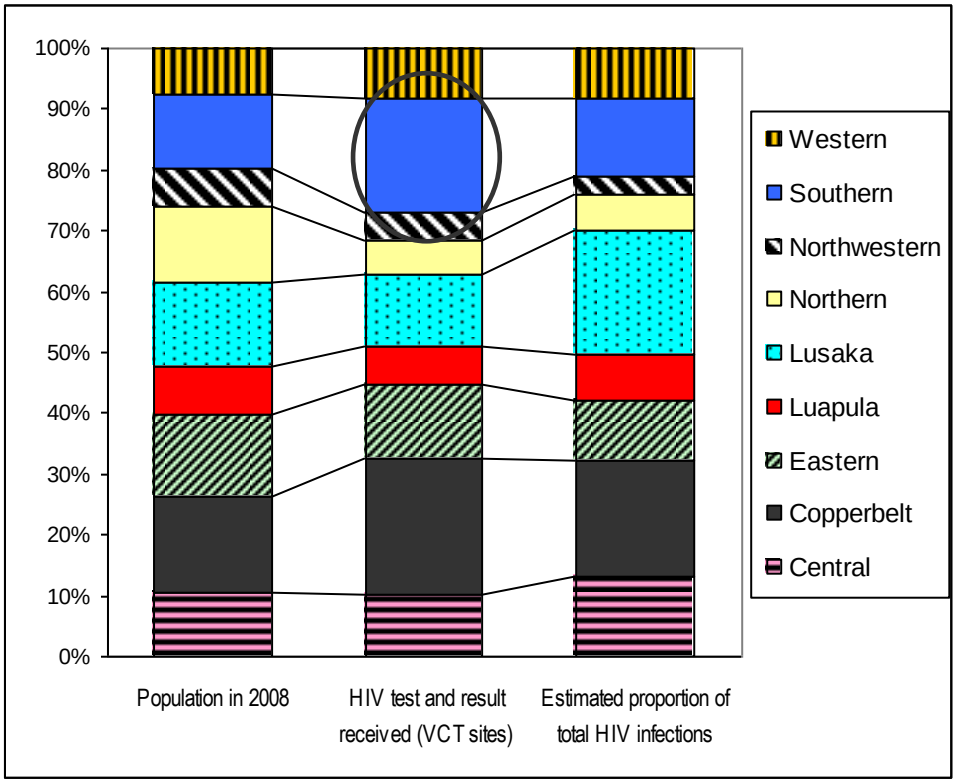
[89] Proposed strategies are: 1. Strengthen the supply chain to ensure adequate commodities at service delivery points for HIV testing; 2. Ensure adequate and sustainable funding commitment from GRZ and partners for HIV tests; 3. Harmonise procurement of commodities with the national supply chain system; and 4. Develop human resource capacity in HIV testing.

Figure 49 depicts province level data on CT in relation to population size and HIV infections. It appears that CT provided within VCT services has comparatively more users in Southern Province, but overall the figures of CT users compared to population size and HIV levels were very well balanced.

In 2007, 15.4% of people aged 15-49 had received an HIV test in the last 12 months and knew their results (DHS 2007). More women, at 18.5%, were reported to have received an HIV test and know their results than men, at 11.7%. The 15-19 years age group accounted for the smallest percentage accessing the service with only 10.2% reported having tested for HIV and knowing their results. Wealthier and more educated men and women were significantly more likely to have tested for HIV in the past 12 months. Married people were more likely to have taken an HIV test in the past 12 months than never married people, but less likely than divorced, separated or widowed people. The 2005 SBS reports fear of stigma and discrimination as one of the reasons for people not seeking to know their HIV status.

There is evidence from other settings that "prevention with positives" (PwP) counselling delivered to either groups or individuals by care provider and/or other clinic staff can effectively reduce HIV transmission risk behaviours (Gilliam & Straub, 2009). The same authors emphasize that in PwP counselling, if specific methods like motivational interviewing are expected from staff, formal training is essential. Although there is still a lack of data on relative efficacy, the authors conclude that a brief counselling intervention delivered within the context of a routine medical visit by any member of the health care team is less expensive than interventions that are lengthy and include multiple sessions.

Figure 49. Provinces' population size, VCT-related HIV tests and HIV infections in Zambia (2008)



Sources: Proportions of total HIV infections were estimated based on the population by province (CSO website: http://zamstats.websitedesign.co.zm/media/projected_mid-year_population.pdf) and 2007 DHS HIV prevalence data. Proportions of all HIV tests were calculated based on HMIS data on VCT clients tested for HIV and receiving their result

4.4. Funding for HIV prevention programmes

The results of the National AIDS Spending Assessment (NASA) presented in this section cover the period 2005-2006. The assessment was conducted in 2007-2008 to identify and measure the resources by source,

agent, provider and beneficiary based at the central level and in selected districts. Data collection covered domestic spending on HIV and AIDS and external aid for HIV and AIDS (including funds channelled through the government) but did not cover the business sector or out-of-pocket/household expenditures by members of the public and families affected by HIV and AIDS. In addition, the NASA did not explore the effectiveness of spending, bottlenecks, financial management systems, or absorptive capacity issues in detail. Nor did the assessment examine the quality of services provided or the outputs and impact of spending.

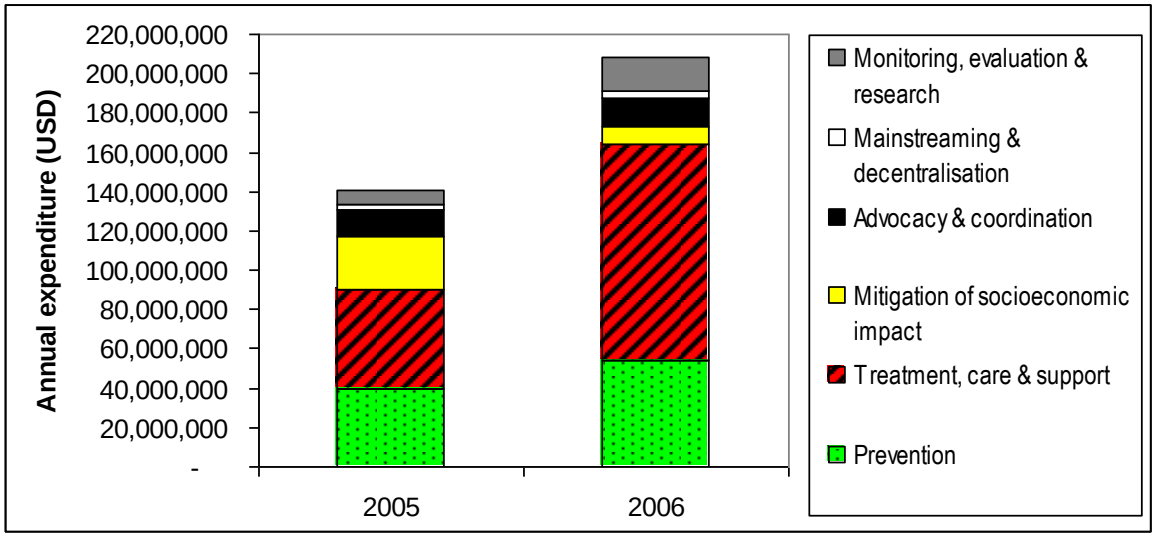
Overall funding for HIV and AIDS

Zambia experienced a 20% increase in resource allocation to HIV and AIDS activities from $196 million in 2005 to $235 million in 2006. Of the total allocation, **actual expenditure was 72% ($141 million) in 2005 and 88% ($208 million) in 2006**. This represented a 48% increase in actual spending from 2005 to 2006 indicating an improved absorptive capacity for HIV and AIDS funding during this period. The public contribution to the total was 4% in 2005, and 14% in 2006; Zambia's HIV and AIDS response was predominantly donor funded. External funding was dominated by three main sources, the Global Fund to Fight HIV and AIDS, Tuberculosis and Malaria (GFATM), the World Bank Multi-country AIDS Programme (MAP), and the US Government President's Emergency Plan for AIDS Relief (PEPFAR).

Significant changes were seen in the disaggregated HIV and AIDS data on expenditure by funding source between 2005 and 2006. Public spending increased from 4% to 14% of the total expenditure on HIV and AIDS, bilateral funding increased from 46% to 56% and International NGOs (INGO)[90] increased from 4% to 5%. Multilateral funding decreased from 46% to 26%.

Between 2005 and 2006, prevention spending increased in absolute terms, proportionally with the increase in overall spending: $39,344,478 (28% of total HIV/AIDS expenditure) in 2005, and $54,161,434 in 2006 (26%). Treatment, care and support saw a significant rise in expenditure increasing from $50,784,104 (36%) in 2005 to $109,630,004 (52%) in 2006. Expenditure for impact mitigation decreased significantly from $27,374,195 (10% of total expenditure) to $9,060,892 (5%) in 2006. Advocacy and coordination slightly increased in amounts but decreased proportionally from $13,327,501 (10%) to $14,487,461 (7%) in 2006. Monitoring, evaluation and research increased from $7,296,803 (5%) in 2005 to $16,914,297 (8%) in 2006. The share for mainstreaming and decentralisation remained consistent at 2% of total spending in 2005 ($2,439,883) and 2006 ($3,664,957). The amounts are depicted in figure 50.

Figure 50. Annual expenditure by spending category (US$), Zambia (2005-2006)



Source: NAC (2009). NASA report p54.

[90] INGOs are non-profit organisations including foundations such as Gates Foundation and head bodies of global NGOs such as Action Aid, Red Cross etc.

Funding for HIV prevention

For the two years combined, prevention was the second largest share of expenditure at 27% (US$ 93,505,912). Between the two years, the share of funds going into prevention dropped slightly from 28% to 26%, chiefly due to rapidly increasing expenditure for treatment, care and support, as demonstrated by the analysis of actual expenditure versus planned expenditure. **In 2006, actual prevention expenditure was 79% of planned expenditure according to the NASF 2006-2010** (the NASF estimated US$ 68,300,000 for intensifying prevention; actual expenditure was US$54,161,434). "Expanding treatment, care and support" spent 134% of the planned amount, and "integrating advocacy and coordination" spent 123% of the planned amount. "Mitigation", "decentralisation and mainstreaming", and "monitoring, evaluation and research" all spent far less than planned (22%, 35%, and 13%, respectively).

In 2005, 84% of prevention expenditure came from external funding sources, and in 2006, this increased to 97%. The NASA may have underestimated certain expenditures by the government especially in the areas of human resources and infrastructure, however, government funding of the prevention response appears to be low based on available data.

In 2005, prevention spending was mainly for BCC activities, PMTCT, VCT, blood safety and STI control. No spending was reported for activities targeting MSM and IDU. Public expenditure focused mainly on PMTCT, universal precautions and safe medical injections while external expenditure covered some prevention activities for CSW, blood safety and VCT.

In 2006, within the new NASF of 2006-2010, PMTCT activities received the biggest share of prevention spending (28%) – see table 10. VCT received 15%, BCC 12% and community mobilisation 12%. Some activities received very small amounts, for instance blood safety (0.6%), injection safety (0.4%) and sex worker programmes (0.005%). Unlike in 2005, IDU programmes received some funding in 2006.

Table 10. Breakdown of prevention expenditure in Zambia (2006)

	Total (US$)	Percent
Prevention of mother-to-child transmission	14,924,465	27.6
Voluntary counselling and testing	8,298,787	15.3
Prevention activities not elsewhere classified	7,388,669	13.6
Communication for social and behavioural change programmes	6,353,408	11.7
Community mobilisation	6,075,197	11.2
Antiretroviral prophylaxis for HIV-positive pregnant women and newborns	2,719,429	5.0
Prevention of HIV transmission aimed at persons living with HIV	2,346,287	4.3
Prevention - Youth in school	1,674,833	3.1
Public and commercial sector condom provision	1,384,666	2.6
Prevention programmes in the workplace	1,372,943	2.5
Prevention - Youth out-of-school	502,889	0.9
Blood safety	319,630	0.6
Prevention, diagnosis and treatment of sexually transmitted infections	233,429	0.4
Pregnant women counselling and testing	220,000	0.4
Safe medical injections	210,000	0.4
Programmatic interventions for injecting drug users (IDUs)	117,144	0.2
Programmatic interventions for vulnerable and special populations	16,972	0.03
Programmatic interventions for sex workers and their clients	2,686	0.005
Total	54,161,434	100

Source: NAC (2009). NASA report p59.

Cost-benefit of private sector HIV programmes - A cost-benefit analysis of HIV workplace programmes[91] by CHAMP (2007) showed net benefits for workplace programmes in 7 of the 8 companies examined. On average, these net benefits amounted to US$47 per employee for the year 2006. The overall financial benefits of running an HIV workplace programme outweighed programme costs by three times on average. The cost of treating an undiagnosed employee was estimated to be 7 times more expensive than treating someone diagnosed with HIV. It also showed that extending workplace programmes to include non-permanent employees and the local community provides additional gains. On average, the net benefits of including temporary workers in a scheme averaged US$32 for each seasonal worker. The research also showed that companies with programmes that had been running longer enjoyed large benefits than those which had new programmes, i.e. benefits of an HIV workplace programme accumulated over time.

Beneficiary populations[92] of prevention spending – the NASA report does not provide prevention specific data on beneficiary populations. Across all intervention categories and for the two years combined, the majority of spending was for PLHIV (59.8%) followed by 27.2% for the general population and 10.3% for vulnerable populations (see Table 11 and footnote). Another 2.4% was spent on accessible populations and only 0.3% on MARPs.

Table 11. Expenditure according to beneficiary groups, US$ (2005 and 2006)

	Beneficiary Population					
	PLHIV	**MARP**	**Vulnerable Populations**	**Accessible Populations**	**General Population**	**Total**
2005	78,692,841	920,133	13,526,997	2,869,715	44,511,313	140,520,999
2006	129,621,376	94,940	22,402,220	5,466,005	50,324,703	207,909,244
Total	208,314,217	1,015,073	35,929,217	8,335,720	94,836,016	348,430,243
	59.8%	**0.3%**	**10.3%**	**2.4%**	**27.2%**	

Source: NAC (2009). NASA report p82.

4.5 KYR Synthesis: A Summary

HIV prevention policy context

Zambia has developed a legal and policy framework which is supportive of the country's HIV prevention response. The major instruments within the HIV prevention policy context are: National HIV/AIDS/STD/TB Council, National Decentralisation Policy 2003-2012, National HIV/AIDS/STI/TB Policy 2005, National HIV and AIDS Strategic Framework 2006-2010, Fifth National Development Plan 2006-2010, National HIV/AIDS Communication Strategy 2005, Population Policy 2007, Reproductive Health Policy 2008, National Strategy for the Prevention of HIV and AIDS 2009, and National HIV and AIDS Commodity Security Strategy (in draft). Since Zambia is facing a heterogeneous HIV epidemic, one of the most important policies is the decentralisation policy. Structures at decentralised levels have been put in place to coordinate the local HIV response.

[91] Four of the companies are in the mining sector and based primarily in the Copperbelt, the other three are agricultural firms located around the country.

[92] NASA categories of beneficiary populations: Most at risk populations (MARPs): Drug users & sexual partners, sex workers & clients, men who have sex with men (MSM). Other key populations at high risk: orphans and vulnerable children (OVCs), children born or to be born of HIV-positive mothers, internally displaced people (IDPs), refugees, mobile populations & migrants, prisoners, truck drivers & transport workers, prisoners, people affected by violence & trafficking, youth at social risk, street children, youth-out-of school, partners of people living with HIV (PLHIV). Specific accessible populations: Children and youth in school, sexually transmitted infections (STI) and sexual and reproductive health (SRH) clinic clients, students, military, policy & other uniformed services, factory workers, health care workers (NASA classification tables and definitions, UNAIDS 2007, p24-25).

Despite several important instruments against discrimination and protection of human rights, there is no legislation which overtly bans discrimination based on actual or perceived HIV status. There are also some laws that present barriers to HIV prevention like those concerning homosexuality, prostitution and IDU.

Implementers of biomedical interventions (PMTCT, CT, PEP, STI treatment, ART, blood safety, injection safety, universal precautions), have been provided with guidelines to standardise the quality of interventions.

Strategic information for prevention

Zambia is a signatory of the commitment to the "Three Ones" and between 2006 and 2008, both programme activity and financial monitoring systems have been developed as well as human capacity at central and sub-national coordinating structures. There is a central national database for NAC's management information system, which is populated with data, and the MOH manages monitoring data within its HMIS and the SmartCare patient information system.

The country has regularly implemented nationally representative surveys, and HIV/AIDS research ranges from clinical trials to operational and epidemiological research. The first AIDS spending assessment covered 2005 and 2006. Data use and information sharing still need to be strengthened, especially at provincial, district and community level.

HIV prevention programmes

In 2008, a total of 707,163 pieces of IEC material were distributed across all provinces, 4,364 employees were trained to provide HIV BCC to fellow employees, and 24,435 employees were reached through workplace programmes.

141,984 males and 135,998 females aged 15-24 years received life skills based HIV education in 2008. Sex education and HIV/AIDS are now part of primary and secondary school curriculum. Youth Friendly Health Services were established in 50 districts.

To date, over one hundred doctors have been trained in male circumcision, and more than 15,000 men have received medical MC. Significant work remains in building capacity and scaling-up a comprehensive MC intervention.

In 2008, 15,252 condom outlets provided condoms to end users, and 13.55 million male condoms and 442,785 female condoms were distributed. Condom supply to the facilities is good with occasional stock-outs only.

In 2008, 3,170 service providers were trained in the diagnosis and treatment of STIs.

By end 2008, 936 health facilities offered PMTCT services. In 2008, 3,538 professional health providers and 2,4,34 lay/community health providers were trained to provide PMTCT services. 41,286 pregnant women completed prophylaxis (49% coverage of those eligible for PMTCT). The annual number of unintended HIV-positive births averted in Zambia by contraceptive use was estimated at 12,823. Contraception is therefore already having an important effect on reducing the number of infant HIV infections.

By 2008, 710 individuals had been trained on blood safety. In 2008, a total of 82,527 units of blood were collected and screened for HIV, HBV and HCV using the WHO standard. All transfused blood units were screened (100%).

In 2008, 327 service providers were trained in standards for infection prevention and health care waste storage and disposal. By end 2008, 6,207 traditional healers had been trained in infection prevention and

use of sharp instruments according to national standards, and 21% of health facilities offered PEP services on site.

By end 2008, a total of 1,563 health facilities provided HIV CT, and 3,827 professional providers and 3,081 lay/community providers were trained to provide VCT services. A total of 511,266 people aged 15 years and older received HIV CT during 2008 and know their results, of which 84% were females and 16% were males.

Funding for HIV prevention programmes

Zambia spent $141 million in 2005 and $208 million in 2006 on HIV/AIDS activities, and most of these funds come from external sources (GFATM, World Bank MAP, and PEPFAR). Over the two years combined, prevention expenditure was the second largest expenditure at 27% (US$ 93,505,912). Between the two years, the share of funds going into prevention dropped slightly from 28% to 26%, due to rapidly increasing expenditure for treatment, care and support. In 2005, prevention spending was mainly for BCC activities, PMTCT, VCT, blood safety and STI control. In 2006, within the new NASF of 2006-2010, PMTCT activities received the biggest share of prevention spending (28%). VCT received 15%, BCC 12% and community mobilisation also 12%. Some activities received very small amounts, for instance blood safety (0.6%), injection safety (0.4%) and sex worker programmes (0.005%). Across all intervention categories and for the two years combined, the majority of spending was for PLHIV (60%), followed by 27% for the general population and 10% for vulnerable populations. Another 2.4% were spent on accessible populations and only 0.3% on MARPs.

CHAPTER 5. Linking the Response to the Epidemic

5.1. Are Zambia's HIV prevention policies and strategies based on the latest available evidence and global best practice?

STRENGTHS

1. The country has a results-based approach to HIV prevention, evidenced by the new HIV prevention strategy. Zambia has just developed its first-ever national HIV prevention strategy through a participatory and consultative process of many stakeholders, including government, co-operating partners, NAC, UK Department for International Development (DFID), United Nations family, the United States Government (USG), and civil society. In the development of the strategy, the country attempted to understand the drivers of the epidemic, national "Think Tank" meetings were held, and data were collected from various sources, such as key informants, direct observations, field visits and literature review. The process of strategy development also included identification of gaps and challenges in prevention and looked at effectiveness and coverage of current prevention efforts. The prevention strategy calls for improved donor and implementer co-ordination to avoid duplication and partner competition. This includes redirecting current funding and activities to increase efficiency, effectiveness and ensure equity in national coverage of HIV and AIDS services.

2. The new HIV strategy is a major step towards conceptualising HIV prevention at several levels, addressing both proximate and distal determinants of the epidemic. The strategy document talks about a "paradigm shift in HIV prevention". Among the underlying factors of the HIV epidemic which have been included in the strategy are alcohol consumption and substance abuse. Therefore, one of the core strategies is to "address the role of alcohol and substance abuse in HIV transmission through a comprehensive response that combines individual, community and environmental approaches". Local studies like the one published by Gabrysch *et al.* (2008) on the importance of community-level factors compared to individual-level factors in determining HIV infection in young women in Ndola are supportive of this wider, more integrated view of addressing the HIV epidemic. The NAC and its partners should continue to analyse the epidemiology of HIV at different levels of aggregation and disentangle the risk factors at the different levels. This will help to identify the populations and individuals most at risk, and to understand the reasons why they are at risk, in order to design the most appropriate interventions and prevention measures (some interventions addressing more distal determinants probably need to be addressed by other agencies with the respective mandates).

3. The new HIV strategy pursues the ideas of integration of HIV prevention into other service areas. In the process of HIV strategy development, it was found that there are inadequate linkages and integration, for instance of PMTCT in reproductive health and ART services. The new strategy intends to promote integration and linkage of HIV prevention with other service areas (strengthen links with school health services and integrate family planning, STI & HIV and AIDS services; expand integration of PMTCT with antenatal, family planning and other MCH related activities; and integrate couple counselling and testing in family planning and male reproductive health services).

4. Zambia has a multi-sectoral approach to prevention, care, support and mitigation, evidenced by the National AIDS Strategic Framework 2006-2010. Multi-sectoral and inter-sectoral collaboration as well as community participation are regarded as important elements of a strategic prevention response (UNAIDS, 2005). International guidance has been followed regarding broadening sectoral participation in the response against HIV and AIDS. Theme groups promote ownership and active participation in the multisectoral response: The Advocacy and Coordination Theme Group (supporting policy processes), the Decentralization and Mainstreaming Theme Group and the M&E Theme Group each have multi-sectoral membership and mandates within the multi-sectoral response. The multi-sectoral structures at the provincial and district levels further translate this approach (however, several provincial multisectoral M&E groups require strengthening). This positive evolution of a multi-sectoral approach needs to be accompanied by the establishment of better systems for information sharing and coordination across the

various sectors and decentralization levels. In the NCPI assessment for UNGASS 2007, Zambia's effort to increase civil society participation was rated only 5 out of 10.

5. Guidelines for biomedical interventions such ART, CT and blood transfusion are based on local evidence as well as international best practice. Actual delivery of the biomedical services may not be optimal, but in principle, these programmes are based on the latest international standards and guidelines help to standardise the quality of HIV care. The following protocols, guidelines and policies can be highlighted for being based on local evidence and international best practice:

- Antiretroviral therapy for chronic HIV infection in adults and adolescents (2007) – the new protocols are based on evidence from documented long term studies, experiences of a large number of clinicians both local and international, global recommendations from WHO and other international research institutions.
- The national HIV CT guidelines (2006) – integrating new insights, call for routine, opt-out HIV testing, and use of finger prick testing when appropriate in all clinical and community based health service settings, which allows non-medical staff to conduct HIV testing. The guidelines promote the use of rapid HIV tests, and emphasise that testing be routine, but voluntary and based on informed consent.
- National blood transfusion policy – based on international recommendations, the policy supports mandatory screening for HIV and other blood-borne viruses of all blood destined for transfusion or manufacture of blood products, and of donors of bodily fluids or body parts (e.g. artificial insemination, corneal grafts and organ transplant).

6. Government, in collaboration with key partners, has disseminated the biomedical guidelines and made them accessible. The web-based HIV Guide[93] presents the Zambian national guidelines in easily accessible electronic format, while it benefits the reader with a wealth of additional technical information and references on topics related to HIV/AIDS care and treatment. This electronic guide was developed with the assistance of Jhpiego, Point of Care-Information Technology (POC-IT) Center, and Johns Hopkins University School of Medicine (JHU SOM), with funding from the U. S. President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention.

WEAKNESSES

7. There are some laws that present obstacles to effective HIV prevention for vulnerable populations such as the laws on homosexuality and sex work. Brothels and MSM are illegal in Zambia, and the clandestine nature of sex work hampers effective implementation of prevention programmes with sex workers. Concerning MSM, legislation to decriminalise homosexuality is urgently needed. This would for instance facilitate condom distribution in prison. Another human rights issue is the mandatory HIV screening in the military service at recruitment, despite the National AIDS Policy prohibiting HIV screening for general employment purposes. In the military, only HIV negative recruits are accepted in the service, which is unconstitutional and a violation of the applicant's rights to work, non-discrimination, equality before the law, and liberty. In the NCPI rating in 2007, the item "policies, laws and regulations in place to promote and protect human rights in relation to HIV and AIDS" was only given a score of 5 out of 10.

8. Lack of collection and evaluation of HIV prevention impact data, nor quality assessments for many HIV prevention programmes. This study found that data on the impact of the prevention activities is scarce, although for the scaling-up of working prevention approaches, this would be required to make informed decisions. Equally, data on the quality of prevention programmes was not readily available. More analysis of intervention quality and impact is needed if Zambia wants to maximise the utilisation of the prevention services offered and the health gains of these services to the population.

[93] http://www.zambiahivguide.org/index.html. The HIV Guide is also available on a CD ROM and in a version for PALM handheld devices. Contact information for inquiries: Jhpiego Zambia, 8 Ngumbo Road, Long Acres, PO Box 36873, Lusaka, Zambia, or by phone +260 (1) 256255 / 6 / 7.

5.2. Do HIV prevention policies and programmes respond to the key drivers of the epidemic?

In accordance with other assessments (rapid assessment of HIV epidemic drivers by Jackson [2007], think tank meetings, epidemiological literature), this study identified multiple concurrent partnerships (MCPs) in combination with low and inconsistent condom use as the main behavioural factors in the epidemic, with the epidemic potential chiefly determined by the low level of male circumcision, as well as the extent of mobility of the population and a range of underlying social and cultural factors.

Driver 1: Multiple and concurrent sexual partners
Multiple and concurrent partner (MCP) behaviour is prevalent among all sexually active age groups, and specific communication on the risks related to multiple partners, sexual concurrency and networks, extramarital relationships, secondary partners in transactional and age/wealth disparate relationships is weak. Frequencies of reported multiple partnerships vary between surveys but are at about 2-3% for females and about 10-20% for males for 12 month recall periods. DHS 2007 data suggest that among women aged 15-19, 5% reported having had more than one partner in the past 12 months, and among never married women, the figure was 7%. MCP frequency is substantially higher in urban females overall, and may be particularly high in *young urban females* (DHS data not disaggregated). This fits with the steep increase in HIV prevalence in ANC clients aged 15-19 and 20-24 years. MCP frequencies in females are known to be underreported due to social desirability bias, and this is corroborated with local data from qualitative research which found that MCPs are common among Zambians irrespective of age, marital status, or geographical location of residence. The DHS 2007 found that a mere 12% of women and 24% of men believed that "*most married men they know only have sex with their wives"* and only 32% of women and 35% of men believed that "*most married women they know only have sex with their husbands*". Qualitative research in Zambia showed that unsatisfactory sex lives within marriage (with married women's sexuality constrained by norms) are a main reason for extramarital partners. The incidence model estimates that in 2008, about 71% of new infections arose through casual heterosexual sex behaviours, of which some are in people having multiple and sometimes concurrent partners. There is evidence that partner reduction is happening with declining frequencies of reported multiple partner behaviours in men and women, indicating that risk perceptions and norms regarding multiple partners can change.

Driver 2: Low and inconsistent condom use
Condom use has not risen enough to significantly impact HIV transmission. Programmes need to do more to tap the unrealised potential of condoms to prevent sexual transmission of HIV and STIs, and prevent unwanted pregnancy in HIV-positive women. The 2007 DHS found that in extramarital relationships, 42% of women and 56% of men used a condom. In paid sex acts, 55% of men used a condom (ibid). The majority of people reporting multiple partners did not use a condom at last sex. Condom use data in young people with multiple partners suggest that condom use increased between 1996 and 2007, demonstrating that increases in condom use can be achieved. Evidence from local anthropological research on condoms and sexuality indicates that condom promotion needs to take into account the specific concerns, beliefs and anxieties of men and women regarding condoms. On the condom provision side (2008 data), it seemed that condom distribution in Southern Province was much higher (compared to the province's population size and its share of all HIV infections in the country) than for instance in Western and Eastern Province. The condom programme needs to focus where uptake and impact are greatest, such as in sex work, casual sex, discordant couples and prevention with positives.

Driver 3: Low levels of male circumcision in most provinces
Although the HIV prevention strategy says that "Zambia is one of the countries leading the region in the roll-out of adult male circumcision", even so, this analysis found that scaling up of MC deserves more urgency. Three randomised MC trials in Kenya, South Africa and Uganda were terminated early due to highly preventive effect more than two years ago. In Zambia, 87% of men are uncircumcised, and only Northwestern Province has an intermediate level of MC of 71% (and only 7% HIV prevalence). The recent systematic review on the effectiveness and safety of MC by the South African Cochrane Centre found a

relative risk reduction of acquiring HIV for men of 50% at 12 months and 54% at 21 or 24 months following MC (Siegfried *et al.*, 2009). No significant differences between circumcised and uncircumcised men's sexual behaviour were found in the data from the Kenyan and Ugandan MC trials. Incidence of adverse events following the surgical circumcision procedure was low in all three trials. Male circumcision has also been shown in trials to prevent HSV-2 and HPV infection (Tobian *et al.*, 2009).

In the Zambian DHS 2007 data, circumcised men were 15% less likely to be HIV positive (OR=0.85 – the association requires adjusting for confounding to be properly understood, and there is evidence from Ndola that more men may report being circumcised than actually are i.e. false positives weaken the observed association between MC and HIV). MC is not currently reported in the HMIS and NARF systems and the 15,000 medical MCs reported by SFH, UTH and other hospitals may to some extent be normal MC procedures (to keep up the current level of MC about 11,000 teenage boys need to be circumcised every year). Accelerating the implementation of a comprehensive MC intervention package should be given top priority.

Driver 4: Mobility and labour migration

Zones and sub-populations with high mobility are known, but not enough prevention activities are strategically placed and offering adapted HIV services to these populations. For those sub-populations in formal employment requiring absences from home (such as truck drivers and other transport workers), there is further scope to lobby employers for complementary risk reduction measures. There is a great need to effectively target international migrants (miners, long-distance truckers, traders, etc.) and other populations with high mobility or who stay away from home for extended times (men in uniform such as police and military forces, factory workers, boarding school students, fisherfolk, etc.). Regional research shows that these sub-populations and their left-behind regular partners are pre-disposed to MCP behaviours and often report poor access to HIV services. Migrants often feel lonely and strike up relationships, often in bars under the influence of alcohol. Provinces with highly mobile populations and many labour migrants – Lusaka and Copperbelt Provinces – have the highest HIV prevalence levels in the country. The DHS 2007 showed that women who stay away from home overnight more often have higher HIV prevalence. Infection levels in urban women are exceptionally high (23% HIV positive), and it is likely that mobile lifestyles and labour migration are at the root of sexual risk behaviours leading to some of these HIV infections.

Driver 5: High risk behaviours among sex workers and in male-to-male sexual relationships

Brothels and MSM are illegal. Commercial sex is driven "underground". The number and size of prevention activities addressing sex work is insufficient and most do not include clients of sex workers. Although most sex acts with clients are probably protected, there is still a high level of unprotected sex with clients (for better fees, under alcohol influence, etc.) and steady boyfriends of sex workers. The incidence model estimates that in 2008, almost 7% of all new infections arise from sex work (in sex workers, clients and regular partners of clients). Policies and programmes are also inadequate to address the specific needs of men who have sex with men (MSM). This is partly due to a lack of data on this population to advocate for and mobilize resources since data on population size, HIV prevalence, risk behaviours and sexual networks are very limited. MSM behaviours are linked to male prostitution, sex in detention and boarding schools, violence and coercion of men, and a low risk perception of anal sex.

Driver 6: Vertical transmission from mother to child

One out of 10 new HIV infections occurs in children aged 0-14 years, and the bulk of these are vertical transmissions from mother-to-child. PMTCT access and coverage has greatly improved in the last few years with significant reductions in children born HIV positive. The service should be expanded even more to ensure universal access: In 2008, of all pregnant women in the country, 59% were tested for HIV during their pregnancy, and of all those testing HIV positive, 63% received ARV treatment. This means that in 2008, 41% of all HIV positive pregnant women in Zambia received ARVs to reduce the risk of PMTCT. Zambia has built up PMTCT services within a few years and has achieved commendable results, including the PMTCT service capacity built at facility level and in the community sector, innovative partnerships with the private sector, and decentralisation of paediatric AIDS care. It has also been shown in Lusaka clinics that the introduction of PMTCT services has lead to broader improvements in antenatal care.

Vertical transmission still needs to be curbed further. To this effect, reproductive health counselling and family planning to prevent unintended and unwanted pregnancies among HIV positive women has been shown effective internationally, and there is further scope in Zambia to reduce vertical transmission more through such interventions.

There are a range of other drivers, vulnerability and risk factors at the couple, community and macro levels, which all contribute to people's vulnerability to HIV infection. Local and regional evidence point to the following as important:

- Low levels of accurate risk assessment: 60% of new sexually transmitted infections are estimated to happen in relationships which are viewed as 'safe', among mutually monogamous couples (21%), partners of individuals having casual sex (37%), and partners of sex worker clients (2%)
- Abuse of alcohol
- Gender inequality, gender identities and beliefs about male sexuality
- Intimate-partner violence and sexual coercion
- Behaviours such as age-disparate relationships and transactional sex which have cultural resonance
- Taboos and barriers regarding couple communication about sex

These more distal, underlying factors are crucially important in shaping the epidemic dynamics and individuals' vulnerability and risk contexts. They are best addressed in a multi-sectoral fashion, with sectoral leadership according to comparative advantage and mandate. For instance, economic inequality requires first and foremost fiscal, macro-economic, and income-generating interventions, which are best developed and lead by the institutions with the respective mandates. However, because the underlying factors (drivers) are highly relevant to HIV prevention success, the National AIDS Council (NAC) and the Health Sector might be involved in advocacy in support of strategic partnerships to jointly work towards a more conducive environment for HIV prevention. This means that the NAC would be a "broker", not an implementer, of such programmes addressing the distal underlying factors of the HIV epidemic.

Most drivers of the HIV epidemic are underpinned by social and cultural norms. This had been shown for multiple partner behaviours, low condom use, male circumcision, alcohol use, intimate-partner violence and sexual coercion, gender inequality, constraints in expression of sexuality in marriage, intergenerational and transactional relationships, and communication about sexual matters. A shift in emphasis from changing individual sexual behaviour to changing social norms is therefore indicated.

5.3. Is funding for HIV prevention allocated to where it is most needed?

1. A considerable proportion of HIV expenditure is for prevention. According to the National AIDS Spending Assessment (NASA) 2005-2006, 27% of funding was spent on HIV prevention. This compares well with other countries in the sub-region.[94] However, this share of the budget is under threat. Between 2005 and 2006, the prevention share of total expenditure dropped slightly from 28% in 2005 to 26% in 2006. The main reason is the increasing need to fund the scaling up of care and treatment services – in 2006, the expansion of treatment, care and support required 134% of the planned amount. Importantly, the balance between prevention, treatment and care expenditures may be different in the different provinces, but this was not reported within the NASA. In future, treatment costs will steadily increase, not only because of the Government's commitment to increase ART quality and coverage (universal access agenda), but also because the total number of people in need of ART will increase substantially.[95] High ART coverage will in turn impact infectiousness of sexually active people with advanced HIV infections and therefore help prevent new HIV infections (Cohen *et al.*, 2007; Boily *et al.*, 2009).

[94] Lesotho: 10% (2006/07), Swaziland: 17% (2007/08), and Kenya: 24% (2006/07) spent a smaller percentage on prevention; Uganda (33% in 2006/07) and Mozambique (34% in 2006) spent a higher percentage.
[95] For instance, the Spectrum projections of 2008 show an increase in the number of adults in need of ART from an estimated 302,238 in 2008 to an estimated 494,913 in 2015.

Rosen *et al.* (2005) write that "*the question facing African governments and societies is not whether to ration ART, but how to do so*". The report compares economic efficiency and social equity of both explicit and implicit rationing in a context where there are limited financial and human resources to provide ART. It highlights that governments can take one of two courses: ration deliberately, on the basis of explicit criteria, or allow implicit rationing to prevail. It warns that implicit rationing is not likely to maximize social welfare, nor does it allow for transparency and accountability in policy making, and the paper motivates for public participation, policy analysis, and political debate in the countries affected. The more effective prevention is now, the smaller the future unmet need for treatment will be.

2. In 2006, expenditure for communication for social and behaviour change was low at 3% of total spending. BCC programmes received merely 12% of prevention spending, whereas PMTCT activities received 28% (plus 5% for antiretroviral prophylaxis for HIV-infected pregnant women and newborns), VCT 15%, and community mobilisation 12%. Some activities received very small amounts, like the sex worker programmes (0.005% of prevention spending). In view of the epidemiological evidence and the need to curb the transmission of HIV through behaviour change, it is important to invest more in behavioral and social change communication (BCC and SCC) programmes, particularly on partner reduction, the underlying social and cultural norms of MCP behaviours, and communication regarding male circumcision. BCC and SCC need to be participative and empowering in order to achieve sustained behaviour change. Resources need to be allocated to monitoring and evaluation (M&E) and operational research within BCC/SCC programmes to understand processes at community level and behaviour change outcomes. Activity monitoring data need to be used to direct investment to certain provinces or areas which are underserved. For instance, in 2008, IEC materials were distributed at a disproportionate level in Northern and Southern Provinces, and Central, Luapula and Western Provinces received comparatively few materials. Life skills-based HIV education was comparatively more practised in Northwestern and Southern Provinces, and less in Central and Northern Provinces. Such service data – with outcome data – must be used to redirect resources and efforts at sub-national level.

Expenditure for BCC and SCC may also be under threat within the prevention budget: PMTCT expansion requires substantial funding to further improve on the 41% of those in need treated.

3. Injection safety, universal precautions and blood safety are supported and continued commitment is required to prevent HIV transmission within the health care services. According to the estimated incidence data – using the best available input data – incidence attributable to unsafe medical injections and to transfusion of unscreened blood is relatively small, but might increase if these programmes became under-resourced. Analysis of routine service data suggests that prevention of HIV transmission in health care settings is receiving the necessary financial support, although the NASA was not able to confirm this (blood safety 0.6%, injection safety 0.4% of prevention spending). The prevention of HIV transmission through blood and blood products and prevention of HIV transmission in health care settings are prominent strategies in the new prevention strategy.

4. VCT roll-out is a national priority, but VCT programmes have not been proven by any local or regional research – on a population level – to contribute to reductions in either HIV prevalence or incidence. In 2006, VCT interventions received 15% of prevention funding and the introduction of rapid HIV testing was strongly promoted. However, the only randomised controlled trial on VCT methods showed a negative behavioural outcome for persons who test HIV negative using the rapid test method (compared to the older ELISA test for which one had to wait a week to obtain the results, see Corbett *et al.*, 2007). Zambia needs to evaluate the impact of VCT service use on sexual behaviours of different types of clients (youth, married couples, discordant couples, etc) and whether any behavioural changes are sustained over time (resulting in fewer new infections), in order to justify the roll-out of VCT *as a prevention intervention* (clearly, CT is essential in identifying people who need treatment and to identify discordant couples). VCT might become more effective as a prevention tool if enhanced with effective PwP efforts.

5. Resource tracking data from the NASA suggest that some populations may not benefit from adequate resource allocation. Unfortunately, data on prevention spending per type of beneficiary (or

spending patterns in specific geographic areas) were not available in the NASA report. Therefore, it was not possible to draw conclusions about HIV prevention spending on programmes for specific target audiences. But the analysis of total AIDS expenditure in 2005 and 2006 did show that "most at risk populations" (sex workers and clients, men who have sex with men, drug users and sexual partners) received a very small share of all expenditure -- 0.3%. Equally, "specific accessible populations" (children and youth in school, STI and SRH clients, students, military, police and other uniformed services, factory workers, health care workers) received a comparatively small amount of total spending -- 2.4%. Overall, analysis of the programmatic and spending data suggested that resources may be allocated on the basis of equal distribution and "national equity" rather than on the basis of need, burden of disease, and population distribution.

6. According to the NAC, the existing national tracking mechanisms are not effective in monitoring and evaluating the utilisation of resources. Furthermore, there is weak leadership in prioritising and mobilising resources for prevention programmes. The NASA process demonstrated the strong need to institutionalize resource tracking of HIV expenditure from source to provider in Zambia, in order to be able to report on HIV spending and strengthen programme evaluation. The NASA highlighted again the problem regarding disbursement rates: Of the total allocation, actual expenditure was 72% in 2005 and 88% in 2006. Important issues that need addressing in the NASA process are (i) the problems with reporting disaggregated figures in the NASA data collection in a situation in which services have been integrated and expenditure is directed at whole packages of different interventions; (ii) greater advocacy to all Ministries, Departments and Agencies on the importance of resource tracking, and to funding recipients and international organisations for regular financial and programme activity monitoring; (iii) streamlining financial disbursement and standardizing reporting mechanisms; and (iv) enforcement of the NAC coordinating mandate.

A review of data on HIV prevention resource allocation from several countries including Zambia by Bautista-Arredondo *et al.* (2008) demonstrated that **HIV prevalence often bears little relation to a country's allocation of prevention resources among different interventions**. For instance, in the comparison of three countries with generalized high-level epidemics (Uganda, Mozambique, Zambia), Zambia allocated 40% to VCT and 5% of its prevention budget to IEC, whereas Mozambique allocated less than 5% to VCT and nearly 50% to IEC. The review found evidence of three distinct sources of inefficiency in the allocation of HIV prevention resources: **inefficiency in the mix of interventions selected; inefficient targeting of key populations; and technical inefficiency in the production of HIV prevention services**. The authors propose that more work be done on evaluation of the efficiency of HIV prevention programmes, including cost-effectiveness (the choice of the mix of interventions); targeting (the choice of the mix of target populations); and technical efficiency (the delivery of prevention services at least cost), since there are almost no data on the performance of prevention campaigns around the world along each of the three dimensions.

CHAPTER 6. Recommendations

This analysis has highlighted the **urgency to more effectively prevent new infections** in Zambia. This urgency will only increase, as the number of people on lifelong treatment increases (and treatment costs increases).

Most funds for the prevention response come from external donors, and the country is therefore **heavily reliant on continuous and successful mobilisation of external resources**. With the world in economic crisis[96], and **escalating AIDS treatment costs** in Zambia, there is a risk that less funding may be available for HIV prevention in the near future. "Making HIV money work better" is hence a priority for the country's prevention response.

Prevention programmes need to be bold and strategic in their approaches and very well-monitored and evaluated to know their impact. Only prevention programmes which are known to work and which address epidemic drivers should be taken to scale. While translating the HIV Prevention Strategy into actions, policy makers, implementers and development partners need to continuously look out for **innovation in HIV prevention** in Zambia and the sub-region – Zambia's mature and persistent HIV epidemic does need '*more and different*', not just '*more of the same'*.

Overall recommendations

- **Prioritise and target evidence-based programmes for specific populations that will avert the highest number of new infections over the shortest period of time**
- **Implement programmes sustainably to excellent quality and equity**
- **Measure rigorously to determine programme effectiveness and efficiency**

The following detailed recommendations are organised, within each of these clusters, by enabling environment-type and programmatic-type recommendations:

6.1. Prioritise and target evidence-based programmes for specific populations that will avert the highest number of new infections

ENABLING ENVIRONMENT RECOMMENDATIONS

1. Amend laws that criminalise and discriminate against 'high risk' populations. The new HIV prevention strategy specifies as "vulnerable groups" children, OVC, youth, women, persons living with disability and prisoners, and as "high risk groups" sex workers, IDUs and MSM. Laws that criminalise and discriminate against high risk groups should be changed, as they form a barrier against service delivery.

2. Improve HIV prevention programme coordination at national and decentralised levels. This could be done by appointing a National Prevention Specialist to coordinate evidence-based and targeted prevention interventions, and ensure quality of implemented prevention interventions. With the ongoing decentralisation of the HIV response, national coordination and management of the entire prevention response is required. In an epidemic with such a high degree of provincial heterogeneity, decentralised data-informed planning, monitoring & evaluation, research and implementation coordination are

[96] *The International Monetary Fund estimated in January 2009 that world economic growth will fall from 5.2% in 2007 to just 0.5% in 2009 (UNAIDS, 2009). Growth in emerging and developing economies is expected to slow from 8.3% (in 2007) to 3.3% (in 2009). Low-income countries will suffer from a reduction in employment and remittances which will have a severe effect on poverty and on household capacity to meet health expenditures. At the same time, low-income countries will have less revenue and that will limit their ability to expand social-sector spending. In brief, each funding source is vulnerable to the impact of the economic slowdown.*

prerequisite to an effective response. Civil society participation and information flow both need to be improved in order to arrive at a response which is based on local needs, local delivery capacity, local burden of disease and cost-effectiveness.

3. Improve the *quantity, efficiency* and *sustainability* of HIV prevention funding.

- QUANTITY: More funds must be spent on prevention, in particular on programmes to prevent sexual transmission – including male circumcision – since this mode of transmission remains the principal source of new infections in Zambia. Given the lack of evidence of counselling and testing as being effective for prevention, in future, funds spent on HIV counselling and testing should be equally 'divided' between prevention and treatment categories, to ensure a true reflection of the level of spending on prevention.

- EFFICIENCY: The scarce resources for HIV prevention should be used in the most efficient way. In the past, funds allocated for programmes were sometimes lost or otherwise not used due to disbursement delays and insufficient absorptive capacity [the NASA, for example, showed that there has been under-spending for prevention (more funds budgeted for than used), while allocations for AIDS treatment were overspent due to higher-than-anticipated treatment uptake]. Every prevention programme implementer should critically investigate whether it is using its HIV prevention funding most efficiently, and the NAC should carry out periodic efficiency assessments of selected prevention programmes.

- SUSTAINABILITY: The funding from the Global Fund to Fight HIV and AIDS, Tuberculosis and Malaria (GFATM), the World Bank Multi-country AIDS Programme (MAP), and the US Government President's Emergency Plan for AIDS Relief (PEPFAR) is not guaranteed in the long-run (the MAP has come to an end, for example, and will not be renewed). At a time of global financial crisis, economic downturn and uncertainty regarding long-term funding, the Zambian prevention response is too highly dependent on the fluctuations of donor funds. Long-term financial scenario planning is therefore needed, to ensure that funding alternatives are fully investigated and that funding for HIV prevention is increasingly sustainable (at least for the duration of the new HIV prevention strategy).

PROGRAMMATIC RECOMMENDATIONS

4. Target services to specific sub-populations in the general population in specific geographic areas based on data and evidence. Zambia has sufficient epidemiological, behavioural and socio-cultural data to better target its prevention activities, as follows:

Prevention programme	**Priority target populations (in order of importance and focus)**
Male circumcision programme	HIV negative young men (ages 15 to 24), HIV negative older men (older than 24), male infants
Individual behaviour change communication programme	Couples [Spouses, co-habilitating couples, and informal couples (person with concurrent partner and his/her partner)], youth, mobile populations, MSM
Communication programme on social and cultural norm strengthening and change	Opinion leaders in the community ('leader' is used in both a formal and non-formal sense here and includes all those people who establish and cement social norms through their own actions and words, including religious leaders, traditional leaders, and youth peer group leaders)
PMTCT programme	All pregnant women and their partners
Condom promotion programme	Youth, people who have casual sex, mobile populations, sex workers, MSM, discordant couples
Counseling and testing programme	Couples in urban areas, individuals who visit health facilities, individuals who request the service

5. Improve dedicated service delivery to marginalised ('high risk', as per prevention strategy definition) populations. Given the time needed to change laws that discriminate against these populations, service provision (including registration and medical monitoring of sex workers through services adapted to suit their needs) to marginalised populations (sex workers, men having sex with men and drug users) should be rolled out.

6. Focus and innovate *voluntary* HIV counselling and testing services, and expand *provided-initiated* HIV counselling and testing. Recognising that counselling and testing is not effective as a prevention strategy, couples need to know their HIV status so that they can be referred to appropriate services, and so that they can negotiate and agree on risk reduction strategies. *Focusing* voluntary HIV counselling and testing services towards all kinds of couples[97], especially in urban areas ('couples' include the concurrent partner/s of a person, not just the marital/regular/spousal partner) is recommended. Specifically:

- Government and community leaders must endorse CVCT
- Expand training for counsellors in CVCT techniques and counseling messages about HIV discordance, in order to provide services which are adapted to couples
- Use CVCT contacts for condom promotion, especially for discordant couples
- Enhance community mobilization to encourage couples to be tested for HIV together
- Collaborate with community-based implementers to increase men's uptake of counselling and testing
- Assure quality of the diverse counselling and testing activities (VCT, provider initiated CT, diagnostic CT)

Innovation in HIV prevention is also needed to ensure greater efficiency. This will include investigating the ethical and practical considerations in promoting the use of HIV self test kits (available at pharmacies, with appropriate messaging around confirmatory tests), using social marketing approaches.

Provider-initiated counselling and testing (PITC) is an efficient strategy for rapidly *expanding* the percentage of persons who know their HIV status (Botswana's coverage more than quadrupled in the 4 years since PITC was introduced), and should be routinely available in every health facility.

6.2. Sustainably implement effective prevention programmes to excellent quality and equity

7. Rapidly roll-out an integrated and comprehensive male circumcision programme. It has been estimated that for every four MC procedures performed in Zambia, one HIV infection would be averted (Williams *et al.*, 2006) – a very cost effective intervention (Klausner *et al.*, 2008; Potts *et al.*, 2008; Weiss *et al.*, 2008; Wilson & Halperin, 2008). Although progress has been made (the new HIV prevention strategy is planning for comprehensive male circumcision services, and draft guidelines have been developed), more needs to be done. This synthesis strengthens the argument that Zambia should give utmost priority to the rapid roll-out of an integrated and comprehensive male circumcision intervention package, which would include demand creation, supply creation, quality counselling, addressing cultural norms, and reassuring the Zambian population that such procedures will always remain voluntary.

8. Adapt and deliver – to scale and to exceptional quality – behaviour and social change communication programmes. In the Zambian context, quality programmes would entail focusing on:

- Positive local cultural and social norms that should be strengthened;
- Recognition and assessment of risk in so-called "low risk" relationships – in regard to multiple partner behaviours, concurrency, couple discordance, extramarital relationships, transactional relationships and age/wealth disparate relationships;
- The behavioural "triggers" (e.g. alcohol, peer pressure) for risk behaviours, in order to help people to avoid or manage them;

[97] *This fits with international guidance towards increased involvement of men in the HIV response, for instance through "PMTCT-Plus" programmes that include couple counselling*

- The *advantages* of mutual sexual faithfulness (less stress; fewer sexually transmitted infections; less expensive; less deception; less intimate partner conflict, jealousy and domestic violence; happier family, etc.);
- The engagement of political, community and religious leaders (opinion leaders) and positive role models in BCC/SCC campaigns and activities;
- The active involvement of the faith-based society in the implementation of programmes;
- Harmonised, simple, branded (like the "Trusted partners"[98] or "One Love"[99] campaigns) and actionable messages the audience can relate to, informed by formative research and tested with different audiences including members of associations of people living with HIV, delivered through a variety communication channels (mass media, interpersonal communications, and digital strategies, etc.), for improved efficiency, coverage, repetition and reinforcement; and
- Efforts to strengthen relationships amongst couples, and in families – especially in light of oscillatory labour-related migration patterns.

9. Roll-out efficient and comprehensive PMTCT, integrated with other health services, to every woman of reproductive age and her partner. With 10% of incident infections occurring in children, there is a clear need to implement a comprehensive PMTCT. Although the 'testing and treatment' prongs of Zambia's PMTCT has been scaled up massively, limitations exist: not all clinics offering PMTCT services offer the more efficacious ART regimens (some clinics still only offer single dose nevirapine); male involvement is low, and provision of family planning services to avoid unintended pregnancies is not yet rolled out or integrated. In addition to implementing Zambia's stated intention of focusing on all four prongs, Zambia's PMTCT programme should:

- Educate pregnant women about the increased risk of HIV acquisition during pregnancy[100]
- Provide breastfeeding counselling in order to achieve high levels of exclusive breastfeeding in the first 4-6 months of life
- Integrate PMTCT, sexual reproductive health and family planning services to prevent future unintended pregnancies among HIV-positive mothers, and HIV-positive women of reproductive age.

10. Initiate, revitalise and scale-up innovative prevention programmes for mobile populations. Being apart can cause one or both persons in a relationship to have higher-risk sexual behaviours, multiple or concurrent sexual partners. Whereas the pattern of oscillatory migration is structural, economically-driven and will not change in the near future, prevention efforts for such mobile persons can be scaled up.

Such programmes should be *implemented in geographic areas* where there is likely to be a concentration of mobile persons (e.g. industrial sites employing blue collar workers, agricultural companies employing seasonal workers, the mining areas and large construction sites, border areas and truck stops), and be *innovative* (for example, by providing simplified and low-cost ways of sending remittances back home, reducing the need for month oscillatory movements back home). Prevention programmes should include peer education, condom promotion and distribution, tailored sexual health care and changes in social norms (of what is acceptable sexual behaviours when being separate from one's partner).

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[98] Zambia Trusted Partners Campaign: http://misaccess.psi.org/bcc_catalog/web/Content259.html

[99] A southern African campaign in 9 countries: Lesotho, Malawi, Mozambique (to be launched during 2009), Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. http://www.onelovesouthernafrica.org/

[100] Regional evidence on elevated HIV incidence during pregnancy demonstrates the importance of protection of pregnant women from primary HIV infection. Gray *et al.* (2005) found that women in Rakai, Uganda had a significantly increased risk of HIV acquisition during pregnancy compared with breastfeeding or other women after adjustment for behavioural and socio-demographic factors; Rehle et al (2007) reported an estimated HIV incidence of 5.2% in South African women during pregnancy; Taha *et al.* (1998) reported from urban Malawi a 2.2 fold higher rate of HIV incidence during pregnancy than in the post-partum period.

6.3. Monitor and measure better to determine impact and cost-effectiveness

11. Obtain evidence about prevention programmes (where knowledge gaps exist), and share available evidence. The synthesis has pointed to knowledge gaps that can be addressed by focusing on collecting the following evidence:

EVIDENCE TO UNDERSTAND THE CONTEXT

- Determine the prevalence and nature of cultural practices that need to be reinforced or changed (e.g. using existing culturally-accepted avenues of sex education (aunties and grandmothers as part of pre-marital education))
- Quantify the kinds of sexual practices in Zambia, including size estimations of sub populations with specific sexual practices

EVIDENCE ABOUT PROGRAMME EFFICIENCY AND EFFECTIVENESS

- Determine which SCC interventions work (and how best to implement them) to either reinforce protective social norms, or change social norms that lead to higher risk behaviour or practices
- Determine 'leakages' and the 'broken links' in the national PMTCT service supply chain system so as to improve programme efficiency
- Evaluate comparable HIV prevention programmes to assess efficiency, and develop guidelines on efficient prevention programme implementation
- Estimate the cost effectiveness (estimated number of infections averted, and cost per infection averted) of HIV prevention interventions in Zambia for which cost effectiveness data are not available (e.g. BCC/SCC programmes, programmes for mobile populations, and programmes for marginalised populations)
- Evaluate the extent to which targeting was done appropriately

Such evidence, as well as more routine surveillance and data from the M&E system should be *easily accessible* to facilitate data use and evidence-based planning. Sharing available evidence could be done by establishing a web-based documentation centre where literature like the one collected for this analysis is centralised, searchable and downloadable. Such a centre needs to be set up in close collaboration with the Ministry of Health, the Central Statistics Office, academic research institutions and other key partners.

12. Obtain and use HIV incidence data. This will entail efforts to:

- Create HIV incidence literacy amongst the HIV community in the country
- Estimate, every year, the number of new HIV infections every year
- Use incidence data, not prevalence data, to estimate HIV prevention programme effectiveness
- Advocate for improved ways of measuring HIV incidence
- Develop more effective ways to measure infections averted from all prevention programmes

13. Improve system, organisational and human capacity to collect, analyse, interpret and use HIV programme related data at provincial and district level, and plan accordingly. Zambia has a functioning national M&E system and many research studies have been conducted, predominantly in Lusaka. Programme planners at decentralised level need to be able to interpret the locally collected data, calculate access and coverage figures, triangulate programmatic, surveillance and research data, identify data gaps and recommend local research studies to improve the understanding of the local HIV situation.

14. Improve and link programme monitoring, demand monitoring, and financial monitoring. The Zambian epidemic is geographically highly heterogeneous and better information needs to be available at the coordination level on expenditure by area and by beneficiary population.

PROGRAMME MONITORING: The national HIV routine monitoring system (with the NARF forms) need to be adapted to ensure that comprehensive data about all prioritised HIV prevention interventions are implemented.

SUPPLY MONITORING: Data about those who need HIV prevention services need to be estimated and/or collected (as appropriate for different target populations) to ensure equitable focus in HIV prevention programmes and distribution of funding for HIV prevention programmes.

FINANCIAL MONITORING: Financial information should be provided by all implementers on a regular basis within the NARS in order to enable assessment of programmatic implementation relative to expenditure (unit costs) and allow data about programme efficiency.

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ANNEX 1.
Analysis of trends in sexual behaviour in Zambia 1992-2007

(by Emma Slaymaker, April 2009)

This annex provides an update to the analysis published by Slaymaker & Buckner in 2004 entitled "Monitoring trends in sexual behaviour in Zambia, 1996-2003" (Sex Transm Infect 80, suppl II:ii85-ii90)

Data available

There are eight surveys available for Zambia, four Demographic and Health Surveys (DHS) and four Sexual Behaviour Surveys (SBS). The earliest DHS (1992) did not include men. Numbers of respondents used in this analysis are given in table 1.1. There are slight discrepancies between the ZSBS reports and this analysis in the numbers of respondents due to the identification of some duplicate records in the datasets.

Table 1.1. Numbers of male and female respondents by survey in Zambia

	Number of men	Number of women	Syphilis testing	HIV testing
DHS				
1992	-	7,060	No	No
1996	1,849	8,021	No	No
2001-02	2,145	7,658	linked	unlinked
2007	6,500	7,146	linked, 1/3 HH	linked, all HH
SBS				
1998	not used	not used		
2000	1,534	1,801	No	No
2003	2,147	2,324	No	No
2005	2,044	2,167	No	No

Methods

Datasets were obtained and recoded for all surveys except the 1998 SBS. This was known to be markedly different to the others both in the questionnaire used and in the results obtained, which were outliers in the previous analysis (Slaymaker & Buckner, 2004)

Data were combined in one file, including survey design information. All surveys were stratified into urban and rural areas within each province (18 strata). The SBS surveys are self-weighting. The DHS oversampled in some strata and a sample weight was used for analysis. The clusters in the 1996 and 2000 surveys were census supervisory areas based on the 1990 census. In the later surveys census enumeration areas were used, based on the 2000 census.

The SBS sample frame was derived from the 1996 DHS and in 2000 used 80 of the same PSU as the DHS. These PSU were identified and matched across the surveys for analysis.

All analysis was done in Stata 10 using Stata's complex survey commands.

Various indicators of sexual behaviour were tabulated and compared by survey and definitions of these are given in Table 1.2..

Table 1.2. Definitions of the indicators included in the analysis

	Indicator	Denominator	Numerator
1)	**Ever had sex**	All respondents	Those who reported having had sex
2)	**Ever had sex, ages 15-24**	All respondents aged 15-24	Those who reported having had sex
3)	**Had sex in last year**	Respondents who had had sex	Those who had had sex in last 12 months
4)	**Had first sex by age 15**	All respondents	Those whose 1st sex was age 14 or less
5)	**Young, single people who had pre-marital sex last year**	All never married respondents aged 15-24	Those who reported having had sex
6)	**Sex with non-cohabiting partner in last year (higher risk sex)**	All respondents who had sex in last 12 months	Those who reported having had sex with a non-cohabiting partner
7)	**More than 1 partner in last year**	All respondents	Those who had sex with 2 or more partners in last year
8)	**Mean number of partners in last year**	All respondents	Reported number of partners in last year 0 to maximum reported
9)	**Mean number of partners in lifetime**	All respondents	Reported number of partners in lifetime 0 to maximum reported
10)	**Extra-marital sex in last year**	All married respondents	Those who reported sex with a non-cohabiting partner in last year
11)	**Condom used at most recent marital sex**	All married respondents who had sex with spouse in last year	Those who used a condom at last sex with their spouse
12)	**Sex with non-cohabiting partner in last year and no condom used on most recent occasion**	All respondents	Those who had sex with a non-cohabiting partner in the last year and did not use a condom on the most recent occasion
13)	**Condom used at most recent sex with non-cohabiting partners**	Respondents who reported sex with a non-cohabiting partner in last year	Those who had sex with a non-cohabiting partner and used a condom on the most recent occasion
14)	**Sex with more than one partner in the last year and no condom used at most recent sex**	All respondents	Those who had sex with more than one partner in the last year and did not use a condom on the most recent occasion
15)	**Condom used a most recent sex with extra-marital partner**	All married respondents who reported a non-marital partner in the last year	Those who used a condom with the non-cohabiting partner on the most recent occasion

A series of multivariate logistic regression models were fitted for: the proportion of young people who had ever had sex, the proportion who had sex by age 15, the proportion who reported more than one partner in the last year and did not use a condom at their last sex and the proportion who reported a non-cohabiting partner and did not use a condom at last sex with that partner. Covariates were year of survey, age, education, urban residence and marital status.

Trends in ages at first sex and marriage were examined in detail and the reports over the different surveys used to assess whether there had been a change in reporting bias. Birth cohorts were defined based on reported age at the time of the survey. Ten year birth cohorts were used for the analysis. The 1960-69 cohort was used as the reference in analysis of reporting bias because they were well represented in all surveys and old enough to have experienced the events of interest in the earliest surveys.

Ages at first sex and first marriage were reported in whole years, which is a crude measure when looking at trends over time. The distribution was smoothed by adding a random fraction of a year to each person's reported age at first sex/marriage, to account for the time between their birthday and the date of first sex/marriage. With this approach it is possible to estimate summary measures for the population in increments of less than one year. Ten replications of the dataset were created using different simulations of the random fraction and the Stata command ***micombine*** was used for the formal comparisons of trends in ages at first sex and marriage[1]. Age to event analysis (i.e. survival prior to sexual debut or first marriage) was used to summarise the median ages.

[1] Royston P (2007). Multiple imputation of missing values: further update of ice, with an emphasis on interval censoring. *The Stata Journal*; 7(4):445-464.

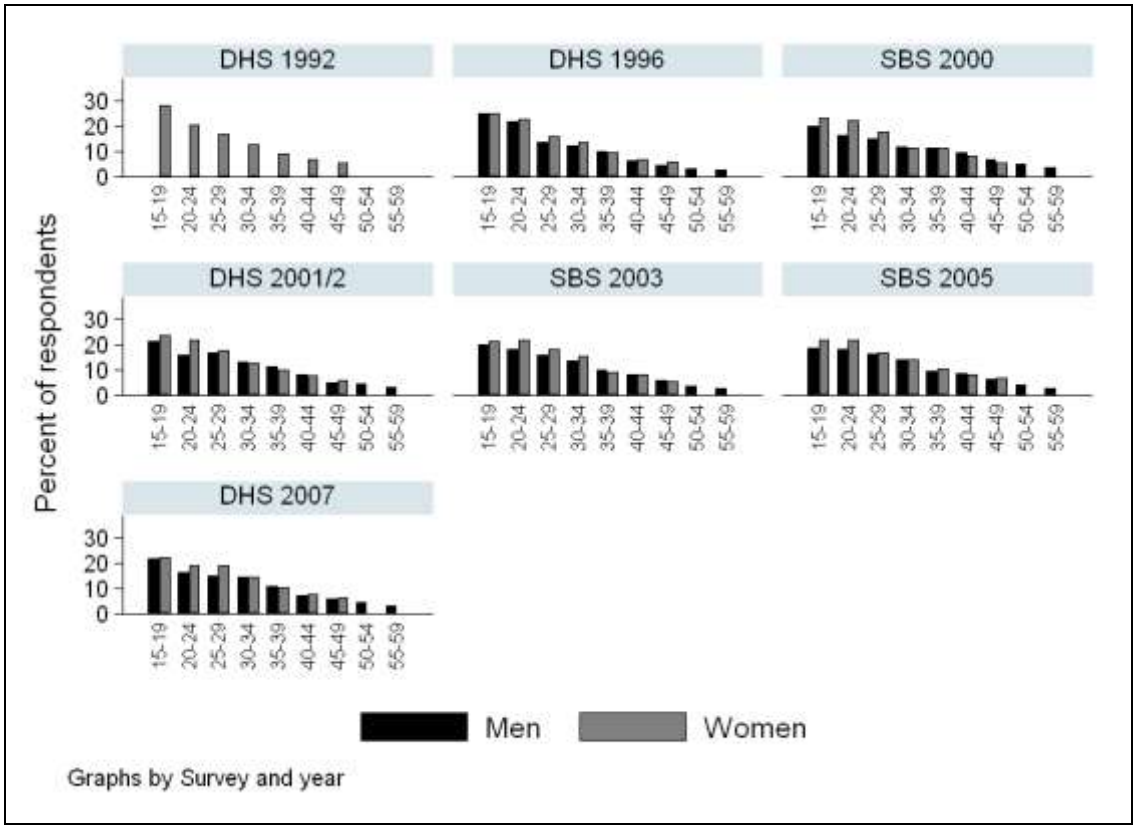
Curves, plotting the cumulative proportion of those who have had sex/ been married at any given age, are used to display the patterns of sexual debut and first marriage[2]. Cox regression models (accounting for the survey) were used to look for changes in the median age at first sex by birth cohort.

Results

Age and sex distribution of respondents

The distribution of respondents by age group was compared across surveys for men and women and between the DHS and SBS (figure 1.1.). Formal comparison showed a difference in the composition of the samples across the six surveys for both sexes and a difference between the SBS and DHS but inspection of the distributions shows that this is minor.

Figure 1.1. Distribution of respondents by age, sex and survey in Zambia



Age at first sex

The proportion of young people who reported having had sex in different surveys is shown in figure 1.2. by single year of age. Women are less likely to report having had sex in the later surveys. The pattern is not as clear for men but fewer younger men report sex in the later surveys compared to the 1996 DHS. The difference between the DHS and SBS results is quite marked for men on this measure.

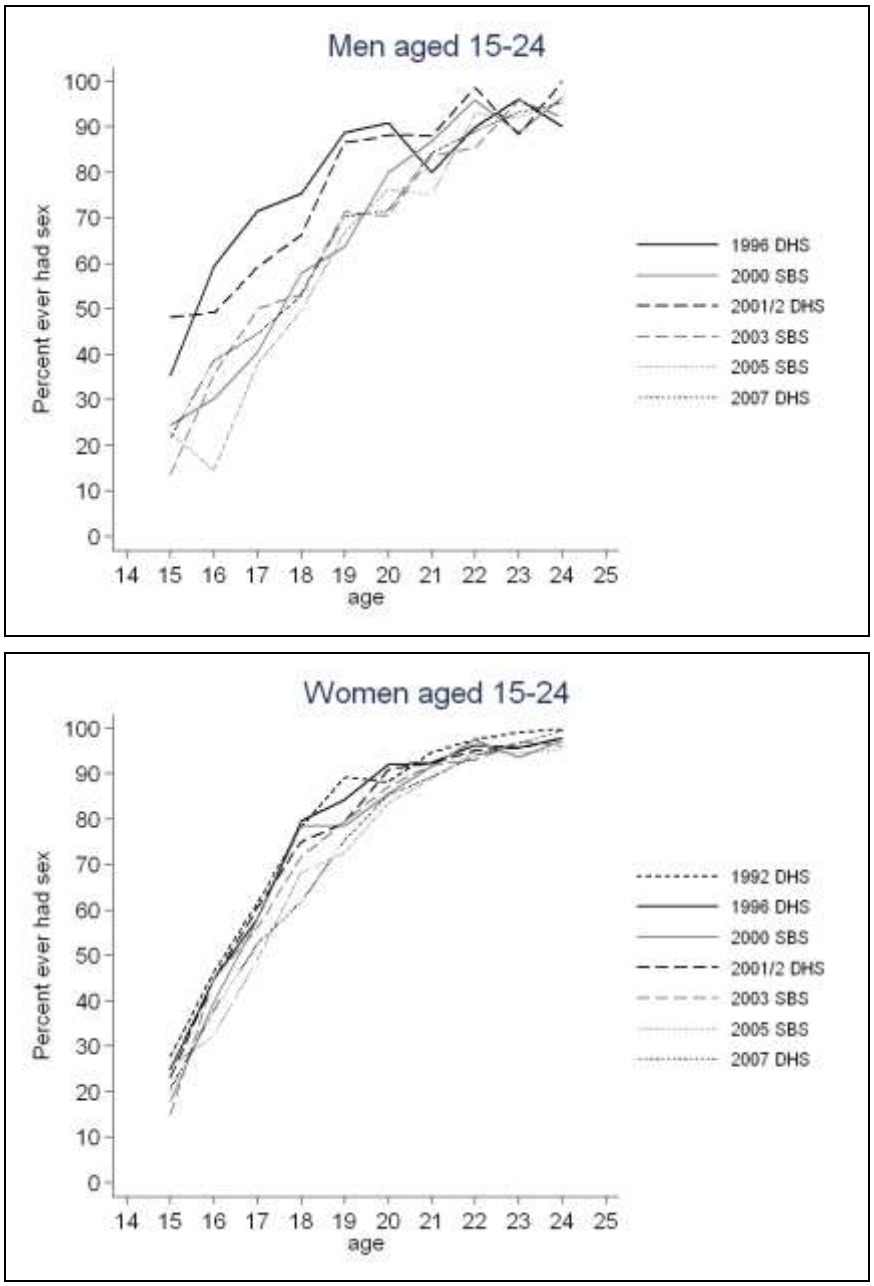
The lifetable median ages for first sex reported in each survey suggest a trend towards a later age at first sex for both men and women (table 1.3).

[2] Zaba B, Pisani E, Slaymaker E, Boerma JT (2004). Age at first sex: understanding recent trends in African demographic surveys. *STI*; 80(Supplement II):ii28-ii35.

Table 1.3. Lifetable median ages at first sex reported by men and women in Zambia

Year	Ages 15-49		Ages 15-24	
	Men	**Women**	**Men**	**Women**
1992		16.39		16.59
1996	16.22	16.44	15.89	16.57
2001	17.05	16.78	16.75	16.91
2007	17.88	17.11	17.89	17.21

Figure 1.2. Proportion of 15-24 year olds who had had sex by single year of age in the different surveys, based on status at time of survey in Zambia



The surveys were carried out just a few years apart which makes it harder to see trends because few respondents move from one age group to the next between surveys. Since age at first sex is a measure

that does not change over the course of a person's life it is clearer to look at trends over time by year of birth.

Figure **1.3.** shows data from all the DHS and compares respondents by year of birth (in 10 year groups) it is clear that there was a fall in men's age at first sex, comparing those born in the 1950s to the later cohorts. The graph shows that, at all ages, fewer men in the 1950s had had sex compared to the later cohorts. AFS may now be increasing for the youngest cohort (those born 1990-2) whose experience is not yet complete. Women's age at first sex has been steadily increasing for each cohort since the 1950s. At any given age an increasingly smaller proportion of women have had sex.

Figure 1.3. Cumulative proportion of respondents who had had sex by age, based on age at first sex reported in all surveys, by birth cohort in Zambia

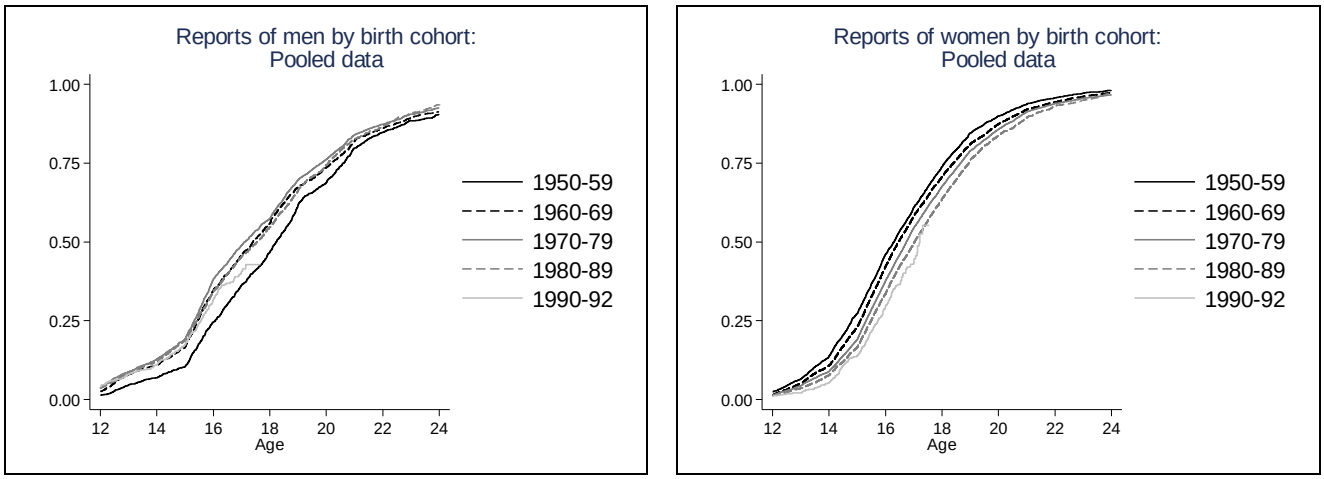


Figure 1.4. is based on the age at first sex reported by people born between 1960 and 1969 in the different surveys. Different respondents were interviewed in each survey so there will be some difference in the results from each time point. However since each survey should accurately represent the experience of the 1960-69 cohort there should be no significant difference in the results. A difference could only arise in three ways: 1) some surveys are not representative of the population of Zambia at that moment in time; 2) the population changes such that people with a particular age at first sex become less common (e.g. those who had early sex die young); 3) reporting bias.

Figure 1.4. Cumulative proportion who had had sex by single year of age for men and women born 1960-69 and year of survey in Zambia (1996, 2001-02, 2007)

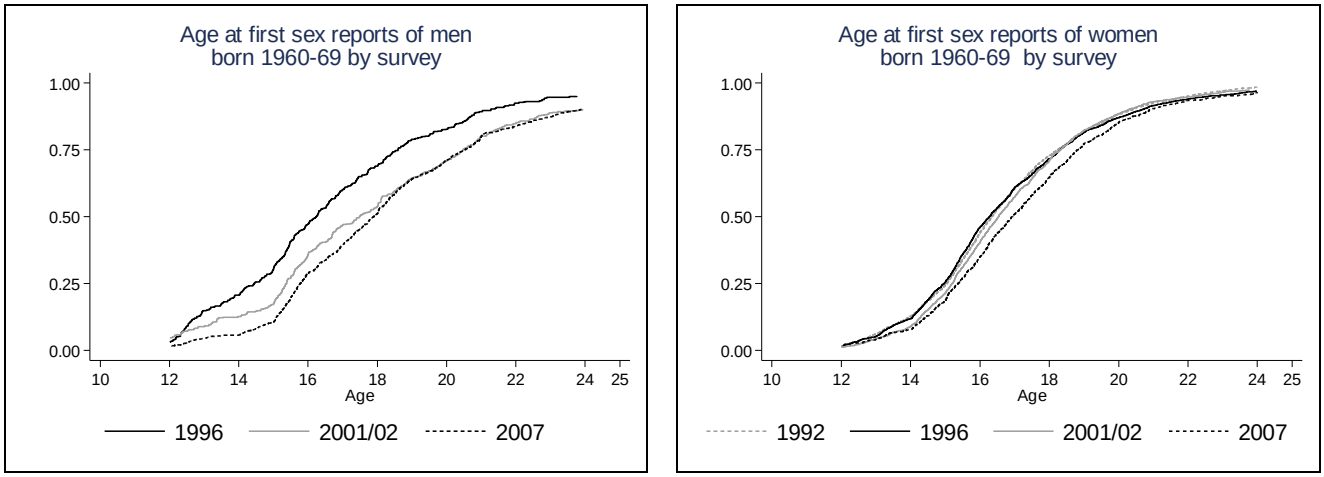


Figure 1.4 shows the proportion of respondents estimated to have had sex by age for men and women born between 1960 and 1969. Data from each DHS are shown separately. The lines should lie very

close together if the data are true and accurate and there have been no major changes in the population.
The graph for men shows a dramatic change between the three surveys. Men in 2001-02 were reporting a much older age at first sex than in 1996. Comparing the 2001-02 data to the 1996 data it appears that fewer men had had sex between the ages 12-24. Further change is apparent between 2001-02 and 2007 but only at the younger ages.

Reporting bias is the most likely explanation for the observed effect. DHS are carefully sampled so are unlikely to have become unrepresentative of the national population. Population change would have to be massive to create the observed effect.

The data for women do not show such a large change but there is still a difference apparent between the 1996 and 2007 surveys.

If other measures do not show the same effect this provides circumstantial evidence for reporting bias as the most likely explanation.

Table 1.4 shows the median ages at first sex and marriage reported by the men in the 1960-69 cohort in the three different surveys. Trends are clearer using the DHS data and, although age at first sex is higher in the later surveys, age at first marriage has stayed the same. This suggests that reporting bias is the reason for the difference in ages at first sex reported in the different surveys. It is not possible to know which, if any, of the surveys provided the most accurate estimate for age at first sex.

Table 1.4. Median ages at first sex and marriage reported by men and women born in 1960-69 in three different DHS in Zambia (1996, 2001-02 and 2007)

Year of survey	Approx age of 1960-69 cohort	Median age at first sex		Median age at first marriage	
DHS		**Men**	**Women**	**Men**	**Women**
1992	23 - 32	-	16.32	-	17.99
1996	27 - 36	16.23	16.28	23.28	17.98
2001-02	32 - 41	17.49	16.54	23.04	17.59
2007	38 - 47	17.89	16.93	23.24	17.78
SBS					
2000	31 - 40	18.02	17.51	24.63	19
2003	34 - 43	17.94	17.25	24.79	18.91
2005	36 - 45	18.80	17.77	25.09	21.64

Trends in indicators

The indicators defined in Table 1.2. were calculated for men and women from each survey where possible.

The point estimates from the DHS and SBS are quite different. In the previous analysis the trends between surveys of the same type were largely consistent. The addition of a new SBS and DHS has altered this. The trends observed in the previous DHS have continued whereas the 2005 SBS shows little or no decline for most of the indicators. Reporting of risk behaviours in the SBS was lower than in the DHS at all times, so perhaps initial underreporting in the SBS has changed over time to a more truthful reporting of lower levels of risk behaviour. Alternatively the earlier DHS may have been the more truthful with increasing levels of non-disclosure in successive surveys leading to similar levels of risk behaviour being reported in the 2005 SBS and 2007 DHS. The samples of the two types of survey may be different. Although the broad characteristics of the two samples are similar the type of respondent willing to answer a survey on fertility and family formation may be different to one who will participate in a survey on sexual behaviour. The length of the DHS compared to SBS questionnaires, and the large number of more neutral questions that precede the DHS section on sexual behaviour, may increase rapport with the interview and facilitate more accurate reporting.

The trends observed in the DHS data are largely a continuation of the trends identified in the publication by Slaymaker & Buckner 2004.

Ever had sex

The percentage of the population that has ever had sex fluctuates between 80% and 90% in all surveys with no obvious trend. For those aged 15-24 at survey, there is some evidence for a recent decrease in the percentage who have ever had sex. Compared to earlier surveys of the same type the latest SBS (2005) and DHS (2007) both found a lower percentage who reported having had sex.

This decline over time is confirmed by the logistic regression model in table 1.5. Both men and women in later surveys are less likely to have had sex than their counterparts in the earlier surveys. There are other factors associated with sexual experience: rural residents are more likely to have had sex than young people living in urban areas. Women with primary school education were more likely to have had sex than women with no education, though there are few women with no education..

Sex before 15

The proportion who report having had sex before the age of 15 shows a decline over time in the DHS data (steeper for men than women) but no trend is evident in the SBS data. This may be because the reporting bias thought to have emerged in DHS over time was already present in the 2000 SBS leading to more consistent reporting of early sex by the respondents to the three SBS included here. The regression model in table 1.7 confirms the trend over time observed in the DHS data. The odds of reporting sex by age 15 are 0.92 times lower for men and 0.95 times lower for women with every year passing since 1996. Other factors are associated with early sex: It is more likely among those with no education and among rural residents. There is little difference between men and women in these associations (though the prevalence of sex before 15 is different). Women who have been married are twice as likely to report early sex than women who have never been married.

Pre-marital sex

The proportion of young, never married respondents who reported pre-marital sex in the year before the interview has declined over time for men and women in the DHS but not the SBS.

Sex with non-cohabiting partners

The proportion reporting higher risk sex in the last year (any sex with a non-cohabiting partner) has declined over time in the DHS but not in the SBS. In the DHS data there has been a bigger decrease for men that for women.

More than one partner

The DHS data also show a decrease in the proportion reporting having had more than one partner in the last year. This proportion has halved for men (from 29% in 1996 to 14% in 2007) and reduced by a third for women (from 3.6% in 1996 to 1.2% in 2007). According, there is a decline over time evident in the mean numbers of partners reported by men in the DHS. There is also a striking contrast between the mean numbers of lifetime partners reported by men and women in both the 2005 and 2007 surveys.

Extra-marital sex

Fewer married men and women in the 2007 DHS report having had extra-marital sex in the year before the survey compared to the 1996 and 2001-02 DHS. Fewer men, but more women, report extra-marital sex in the 2005 SBS compared to the 2000 and 2003 surveys.

Condom use

Condom use with non-marital partners has increased since 1996. The trends in the DHS data are clear, but those from the SBS data are less obvious. Reported condom use in 2005 was lower than in 2003 but these are likely to be chance fluctuations since the confidence intervals around the measures of condom use are wider than those for other indicators (because the denominator for those indicators is restricted to respondents who had sex with a particular type of partner in the year before the survey).

Higher risk sex and condom non-use

The proportions of the total population having higher risk sex (with non-cohabiting partners or with multiple partners) without always using a condom show a marked and sustained decline over the three DHS whilst little trend is evident from the SBS.

Multiple partners and no condom use

The odds of reporting more than one partner in the last year and not using a condom at last sex have fallen over successive surveys (table 1.8). With every year since 1996 the odds of reporting this behaviour are reduced by 0.92 for men and 0.9 for women. Women show an age effect with those in their 20s most likely to report having had more than one partner and not using a condom at last sex whereas men of all ages are more likely to report this compared to 15-19 years olds. Married men are most likely to report multiple partners & no condom last time (polygamy is included as multiple partners) but married women are the least likely. Rural men are more likely than urban men to report multiple partners and no condom last time.

Sex with non-cohabiting partners without condom use

There is a slightly smaller decline over time in the odds of reporting sex with non-cohabiting partners without using a condom on the most recent occasion (table 1.9). With each year since 1996 the odds of reporting sex with a non-cohabiting partner without using a condom are 0.94 times lower for men and 0.92 times lower for women. Rural residents are more likely to report this, and there is a decreasing trend with more education, particularly for women. The youngest respondents are the least likely to report this, and the peak is in the mid-20s. Married men and women are the least likely to report sex with a non-cohabiting partner.

The regression models, which include the SBS data, confirm the trends observed in the DHS data. This may be because other changes in the SBS data over time confounded the univariate results and masked a decrease over time or simply because the larger sample size of the DHS has outweighed the SBS in the regression model.

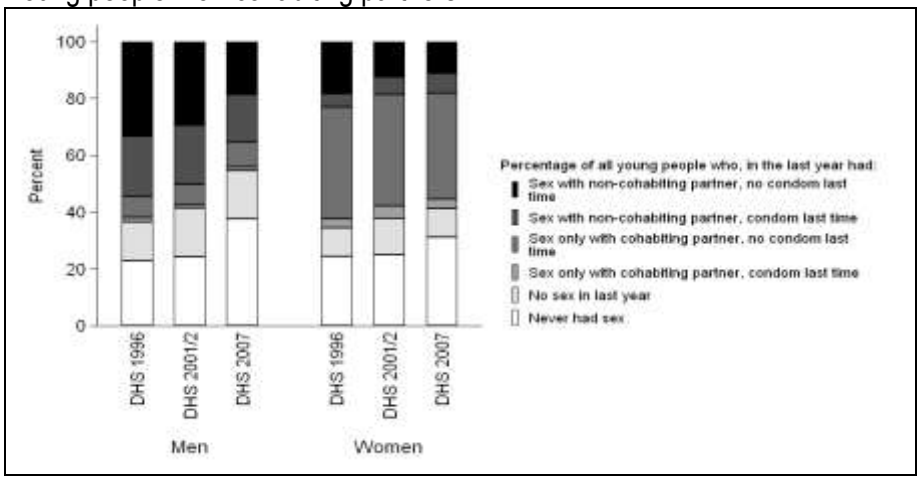
The stacked bar graphs (1.5 and 1.6) show clear trends over time towards less risky behaviour using both the measures based on multiple partnerships and on sex with non-cohabiting partners. These graphs, based on all respondents and all respondents aged 15-24, classify each person based on their behaviour in the year before the survey. By including everyone in the figure it is possible to see the combined effects of the different behaviour changes- no sex, fewer partners/ fewer non-cohabiting partners, and condom use. Although the trends in indicators of the separate components of behaviour change are largely encouraging the story that emerges from combining all of them is more convincing. Survey respondents have reported a shift away from multiple partners and/or non-cohabiting partners towards just one partner, the majority of which are cohabiting. Condom users have increased as a proportion of the whole population, especially among those married or reporting just one partner in the last year, something that is seen more clearly here than from the individual indicators since the number of people in this group has also grown in size over time, diluting the increase in condom users

Table 1.5. Estimates of selected indicators by survey and sex

Indicator	sex	1992	1996	2000	2001	2003	2005	2007
1) Ever had sex	Men	-	89.0 (87.3-90.8)	86.7 (84.9-88.4)	90.6 (89.2-91.9)	85.4 (83.5-87.2)	84.8 (83.1-86.6)	85.1 (83.8-86.3)
	Women	87.9 (86.9-88.9)	88.2 (87.4-89.1)	87.5 (85.8-89.3)	88.2 (87.1-89.2)	88.1 (86.7-89.5)	86.8 (85.0-88.6)	86.7 (85.4-87.9)
2) Ever had sex, ages 15-24	Men	-	77.1 (73.7-80.5)	64.5 (60.8-68.1)	75.8 (72.6-79.1)	63.9 (59.9-67.8)	61.4 (57.6-65.2)	62.3 (59.7-65.0)
	Women	75.3 (73.4-77.1)	75.7 (74.1-77.3)	73.9 (70.5-77.3)	74.9 (73.0-76.9)	74.0 (71.0-77.0)	70.2 (66.2-74.1)	68.9 (66.2-71.5)
3) Had sex in last year	Men	-	89.9 (88.2-91.6)	86.8 (85.1-88.6)	89.1 (87.4-90.9)	84.5 (82.4-86.6)	88.8 (87.1-90.5)	87.4 (86.2-88.7)
	Women	92.1 (91.3-92.9)	86.8 (85.9-87.6)	82.6 (80.1-85.1)	83.4 (82.4-84.5)	81.8 (79.6-84.0)	83.5 (81.4-85.6)	85.7 (84.6-86.8)
4) First sex before age 15	Men	-	29.6 (27.2-32.0)	14.8 (13.2-16.5)	19.3 (17.3-21.4)	15.4 (13.8-16.9)	9.6 (8.0-11.2)	13.2 (12.2-14.2)
	Women	-	24.0 (22.9-25.1)	14.0 (12.1-15.9)	19.7 (18.6-20.8)	14.5 (12.8-16.1)	12.6 (10.8-14.4)	15.4 (14.3-16.5)
5) Pre-marital sex last year	Men	-	57.2 (52.6-61.6)	35.3 (31.1-39.5)	51.7 (47.5-55.9)	33.8 (29.1-38.5)	34.5 (30.4-38.7)	37.6 (34.7-40.4)
	Women	-	36.4 (33.9-39.0)	26.1 (22.1-30.0)	31.5 (29.1-33.8)	28.6 (24.2-32.9)	25.4 (20.7-30.2)	28.8 (26.1-31.4)
6) Had a non-cohabiting partner in last year	Men	-	49.6 (46.7-52.4)	28.9 (25.9-32.0)	42.4 (39.6-45.1)	29.3 (26.7-31.9)	27.3 (24.4-30.3)	35.0 (33.2-36.8)
	Women	-	23.5 (22.1-24.9)	15.6 (12.8-18.4)	17.6 (16.2-19.0)	15.8 (13.5-18.2)	15.6 (13.3-17.9)	16.9 (15.6-18.2)
7) Sex with more than 1 partner in last year	Men	-	29.0 (26.4-31.6)	16.6 (14.5-18.7)	20.7 (18.8-22.7)	12.8 (11.1-14.5)	13.7 (11.8-15.5)	14.2 (13.0-15.3)
	Women	-	3.6 (3.1- 4.0)	2.1 (1.4- 2.7)	2.1 (1.7- 2.5)	2.1 (1.5- 2.8)	2.5 (1.8- 3.2)	1.2 (0.9- 1.5)
8) Mean number of partners in last year	Men	-	1.5 (1.3-1.6)	1.0 (0.9-1.1)	1.2 (1.1-1.4)	0.87 (0.83-0.9)	0.97 (0.91-1.02)	0.94 (0.91-0.97)
	Women	-	0.8 (0.79-0.83)	0.74 (0.71-0.78)	0.79 (0.75-0.83)	0.74 (0.72-0.77)	0.76 (0.73-0.79)	0.76 (0.74-0.77)
9) Mean number of lifetime partners	Men	-	-	-	-	-	4.62 (4.28-4.97)	5.08 (4.79-5.36)
	Women	-	-	-	-	-	1.85 (1.73-1.98)	1.72 (1.66-1.77)
10) Extra-marital sex in last year	Men	-	19.2 (16.6-21.9)	11.6 (9.4-13.8)	20.0 (17.5-22.4)	8.6 (6.7-10.5)	8.3 (6.5-10.1)	13.3 (12.0-14.5)
	Women	-	1.5 (1.1- 1.9)	1.7 (0.8- 2.6)	1.8 (1.4- 2.3)	1.5 (0.9- 2.2)	2.4 (1.4- 3.4)	0.7 (0.4- 1.0)
11) Condom used at most recent marital sex	Men	-	7.9 (5.9- 9.9)	6.3 (4.7- 7.9)	9.5 (7.7-11.3)	8.1 (6.3- 9.9)	6.5 (5.1- 8.0)	12.8 (11.4-14.2)
	Women	-	5.0 (4.3- 5.8)	4.5 (3.1- 5.8)	7.6 (6.6- 8.6)	7.4 (6.0- 8.9)	4.6 (3.5- 5.8)	6.8 (6.0- 7.7)
12) Had non-cohabiting partner in last year & no condom used on the most recent occasion	Men	-	23.6 (21.5-25.7)	13.3 (11.3-15.3)	19.4 (17.4-21.3)	12.4 (10.7-14.2)	12.6 (10.6-14.5)	13.1 (12.0-14.1)
	Women	-	14.5 (13.5-15.4)	7.6 (6.0- 9.1)	8.7 (7.9- 9.4)	7.5 (6.3- 8.7)	8.0 (6.5- 9.4)	7.9 (7.2- 8.5)
13) Condom used at most recent sex with non-cohabiting partner	Men	-	40.5 (36.9-44.0)	39.1 (33.7-44.6)	43.6 (39.3-47.9)	41.6 (36.6-46.6)	39.0 (33.5-44.5)	49.8 (47.0-52.7)
	Women	-	19.8 (17.4-22.3)	33.0 (25.5-40.5)	33.3 (29.8-36.8)	34.6 (28.3-40.9)	29.3 (22.5-36.2)	37.4 (33.8-41.1)
14) Sex with >1 partner in the last year and did not use a condom at most recent sex	Men	-	21.0 (18.9-23.2)	14.0 (12.0-16.1)	15.4 (13.8-17.0)	10.2 (8.7-11.8)	11.1 (9.4-12.8)	10.3 (9.3-11.3)
	Women	-	2.9 (2.5- 3.3)	2.0 (1.3- 2.6)	1.6 (1.3- 1.9)	1.6 (1.0- 2.2)	1.9 (1.2- 2.6)	0.8 (0.6- 1.0)
15) Condom used at last sex with extra-marital partner	Men	-	47.3 (40.0-54.6)	39.4 (30.5-48.4)	44.6 (38.1-51.0)	46.9 (37.2-56.6)	47.4 (37.0-57.9)	55.8 (50.8-60.7)
	Women	-	35.9 (25.7-46.1)	16.7 (1.5-31.9)	30.4 (18.7-42.1)	30.0 (8.4-51.6)	13.3 (-0.6-27.2)	42.2 (17.8-66.7)

Figure 1.5. Proportions of young people and the total sample who reported sex with cohabiting and non-cohabiting partners in the last year, further subdivided by condom use on the most recent occasions with each type of partner.

Young people: non-cohabiting partners



All ages:: non-cohabiting partners

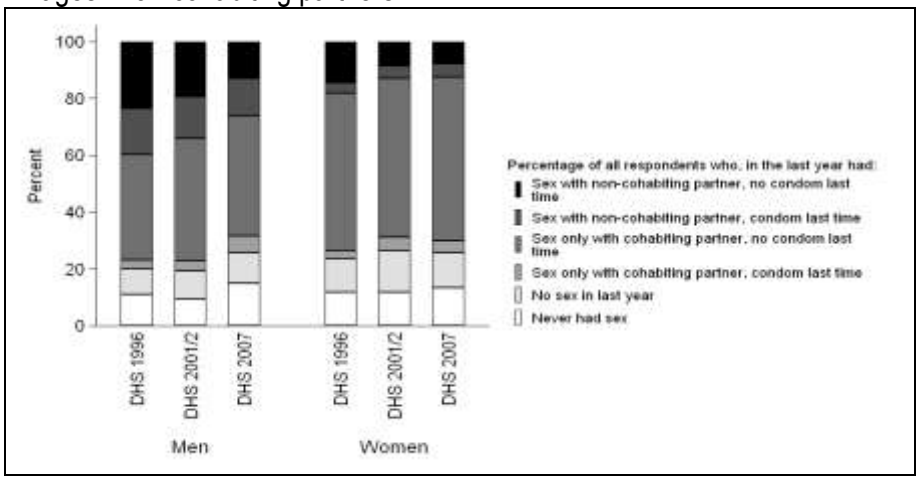
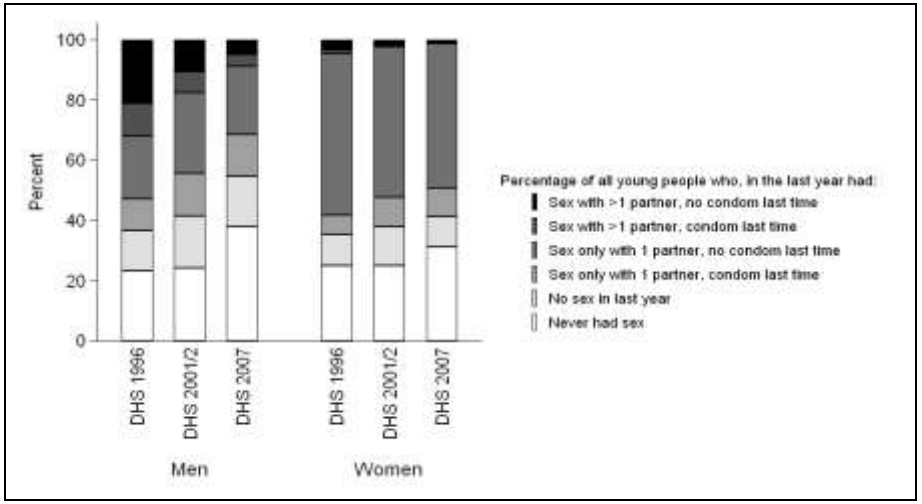
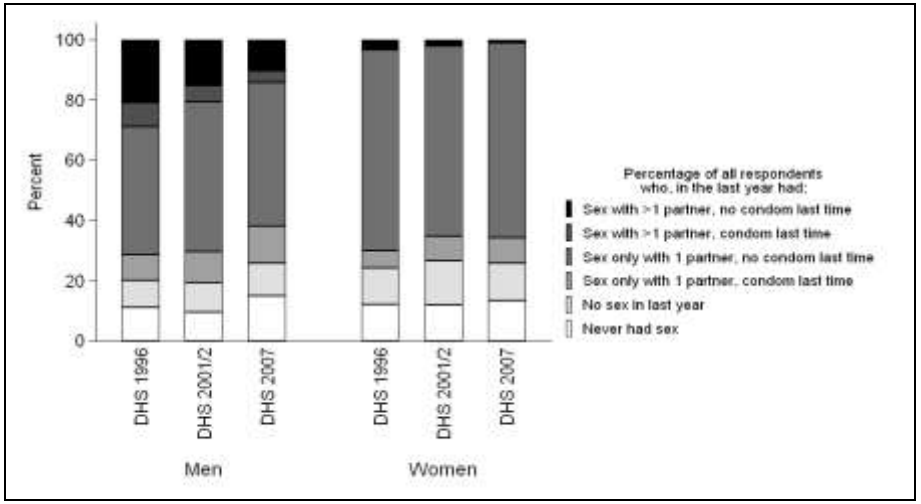


Figure 1.6. Proportions of young people and the total sample who by number of partners in the last year and condom use at last sex.

Young people: ABC



All ages: ABC



Regression models

Table 1.6. Logistic regression model: young people who have ever had sex.

	Men				Women			
	Adjusted OR	p-value	lower ci	upper ci	Adjusted OR	p-value	lower ci	upper ci
Survey year	0.93	0.000	0.91	0.95	0.97	0.000	0.96	0.99
15-19	1				1			
20-24	4.80	0.000	4.13	5.58	4.80	0.000	4.19	5.50
No education	1				1			
Primary	0.92	0.612	0.65	1.28	1.23	0.056	0.99	1.53
Secondary	1.08	0.666	0.76	1.53	1.17	0.184	0.93	1.47
Higher	0.67	0.253	0.34	1.33	0.95	0.796	0.62	1.44
Urban resident	1				1			
Rural resident	1.21	0.021	1.03	1.43	1.28	0.000	1.13	1.45
Never married					1			
Married/cohabiting					4459.45	0.000	625.35	31800.96
Formerly married					620.75	0.000	87.63	4397.21
Number of observations	5331				16414			

Table 1.7. Logistic regression model: First sex before 15 years of age.
Denominator: all respondents

	Men				Women			
	Adjusted OR	p-value	lower ci	upper ci	Adjusted OR	p-value	lower ci	upper ci
Survey year	0.92	0.000	0.90	0.93	0.95	0.000	0.94	0.96
15-19	1				1			
20-24	0.89	0.111	0.77	1.03	0.70	0.000	0.62	0.78
25-29	0.74	0.001	0.62	0.89	0.64	0.000	0.56	0.73
30-34	0.68	0.000	0.56	0.83	0.70	0.000	0.61	0.80
35-39	0.70	0.001	0.56	0.87	0.68	0.000	0.59	0.79
40-44	0.51	0.000	0.40	0.65	0.67	0.000	0.58	0.78
45-49	0.44	0.000	0.34	0.59	0.83	0.018	0.71	0.97
50-54	0.34	0.000	0.25	0.46				
55-59	0.26	0.000	0.17	0.40				
Never married	1				1			
Married/cohabiting	1.03	0.731	0.88	1.19	2.09	0.000	1.86	2.35
Formerly married	1.00	1.000	0.79	1.27	2.31	0.000	2.02	2.64
No education	1				1			
Primary	0.93	0.394	0.78	1.11	0.79	0.000	0.72	0.86
Secondary	0.94	0.541	0.78	1.14	0.40	0.000	0.35	0.45
Higher	0.54	0.000	0.41	0.72	0.11	0.000	0.07	0.16
Urban resident	1				1			
Rural resident	1.25	0.000	1.11	1.41	1.13	0.005	1.04	1.24
Number of observations	16104				29004			

Table 1.8. Logistic regression model: More than one partner in last year and no condom use on the most recent occasion. Denominator: all respondents

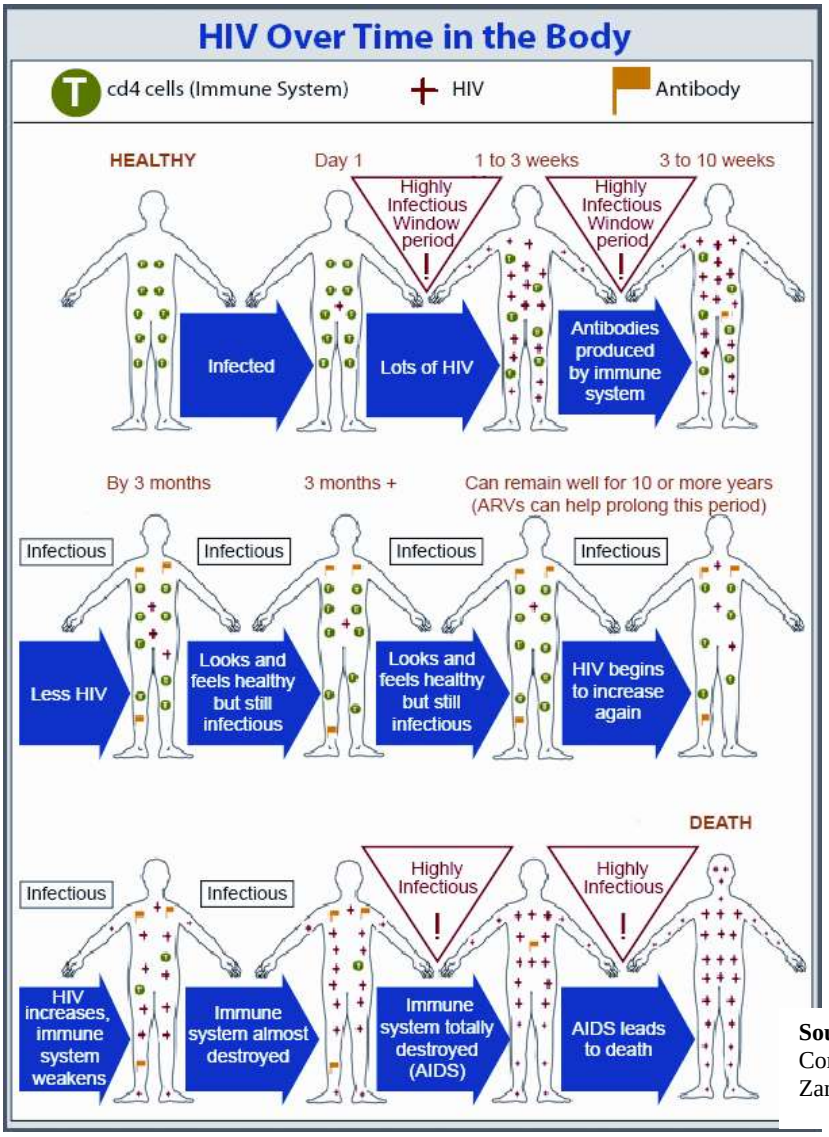
	Men				Women			
	Adjusted OR	p-value	lower ci	upper ci	Adjusted OR	p-value	lower ci	upper ci
Survey year	0.92	0.000	0.91	0.94	0.90	0.000	0.88	0.93
15-19	1				1			
20-24	1.59	0.000	1.30	1.95	1.31	0.070	0.98	1.75
25-29	1.69	0.000	1.33	2.14	1.15	0.443	0.80	1.66
30-34	1.72	0.000	1.33	2.23	1.03	0.900	0.68	1.56
35-39	1.65	0.000	1.26	2.16	0.91	0.683	0.59	1.42
40-44	1.63	0.000	1.24	2.15	1.09	0.726	0.67	1.78
45-49	1.55	0.004	1.15	2.09	0.53	0.024	0.30	0.92
50-54	1.24	0.215	0.88	1.73				
55-59	0.96	0.840	0.66	1.40				
Never married	1				1			
Married/cohabiting	2.12	0.000	1.75	2.57	0.44	0.000	0.32	0.61
Formerly married	1.72	0.000	1.30	2.26	1.46	0.037	1.02	2.09
No education	1				1			
Primary	1.02	0.876	0.84	1.23	1.35	0.054	0.99	1.82
Secondary	0.87	0.199	0.71	1.08	0.85	0.390	0.59	1.23
Higher	0.67	0.008	0.49	0.90	0.53	0.133	0.24	1.21
Urban resident	1				1			
Rural resident	1.32	0.000	1.15	1.52	1.12	0.334	0.89	1.40
Number of observations	16125				28789			

Table 1.9. Logistic regression model: Sex with a non-cohabiting partner in last year and no condom use on the most recent occasion. Denominator: all respondents

	Men				Women			
	Adjusted OR	p-value			Adjusted OR	p-value		
Survey year	0.94	0.000	0.93	0.96	0.92	0.000	0.91	0.94
15-19	1				1			
20-24	1.79	0.000	1.57	2.05	1.79	0.000	1.57	2.05
25-29	2.17	0.000	1.79	2.62	1.77	0.000	1.51	2.08
30-34	1.80	0.000	1.44	2.24	1.66	0.000	1.36	2.03
35-39	1.42	0.005	1.11	1.81	1.30	0.020	1.04	1.62
40-44	1.41	0.022	1.05	1.88	1.29	0.039	1.01	1.65
45-49	1.20	0.261	0.87	1.66	0.63	0.002	0.47	0.84
50-54	0.91	0.653	0.62	1.36				
55-59	0.58	0.036	0.35	0.96				
Never married	1				1			
Married/cohabiting	0.18	0.000	0.15	0.21	0.02	0.000	0.02	0.03
Formerly married	1.26	0.037	1.01	1.57	1.00	0.952	0.86	1.15
No education	1				1			
Primary	1.06	0.595	0.86	1.30	1.06	0.448	0.91	1.24
Secondary	0.72	0.004	0.58	0.90	0.73	0.001	0.61	0.88
Higher	0.42	0.000	0.29	0.61	0.60	0.001	0.45	0.80
Urban resident	1				1			
Rural resident	1.21	0.007	1.05	1.39	1.43	0.000	1.28	1.61
Number of observations	16153				28982			

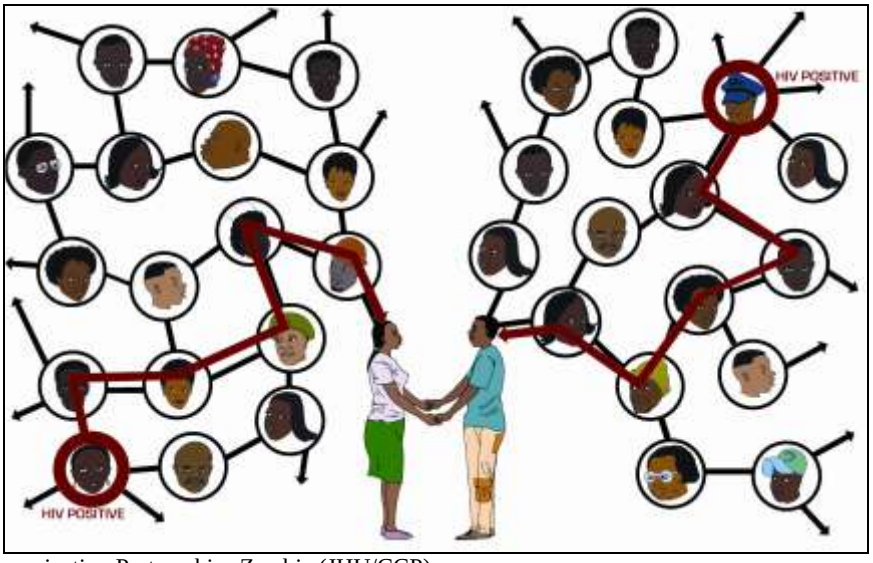
ANNEX 2. Illustrations on sexual networks and HIV viraemia

Figure 2.1. Illustration of HIV viraemia



Source: Health Communication Partnership- Zambia (JHU/CCP)

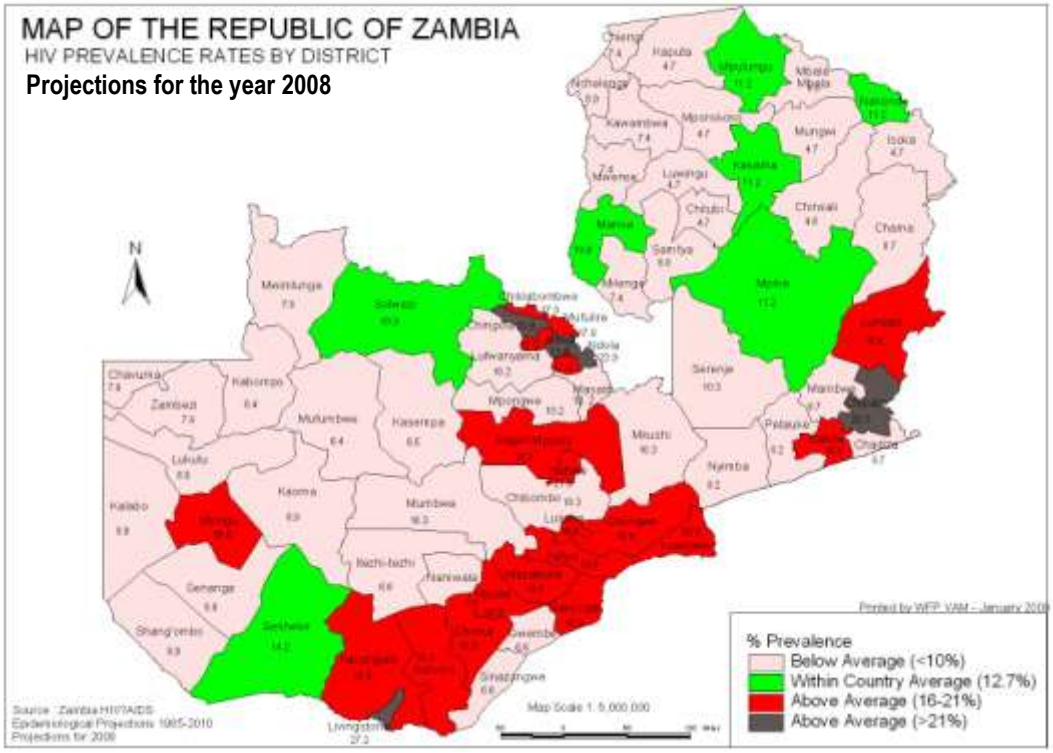
Figure 2.2. Illustration on sexual networks



Source: Health Communication Partnership- Zambia (JHU/CCP)

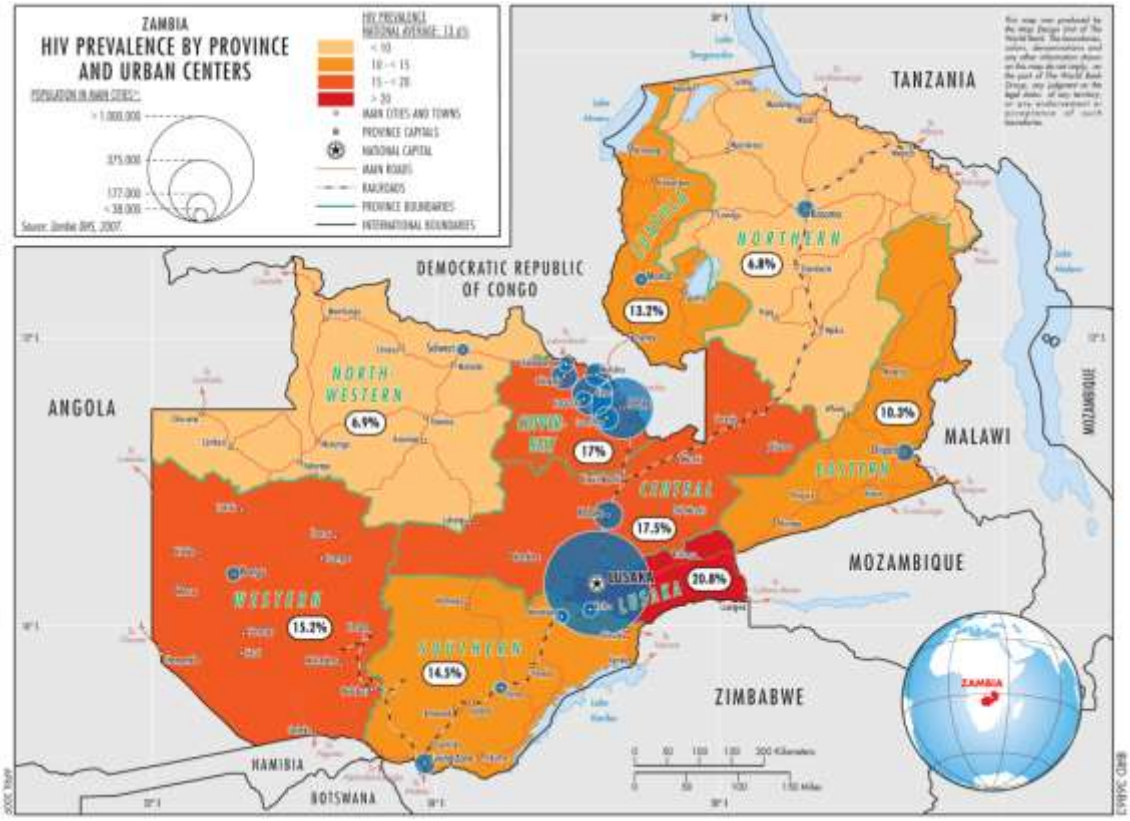
ANNEX 3. Maps on HIV prevalence in Zambia

Figure 3.1. HIV prevalence by district in Zambia (projections for 2008)



Source: Zambia HIV/AIDS Epidemiological Projections

Figure 3.2. Map of Zambia: HIV prevalence by province and urban centres



Source: World Bank Map Design Unit

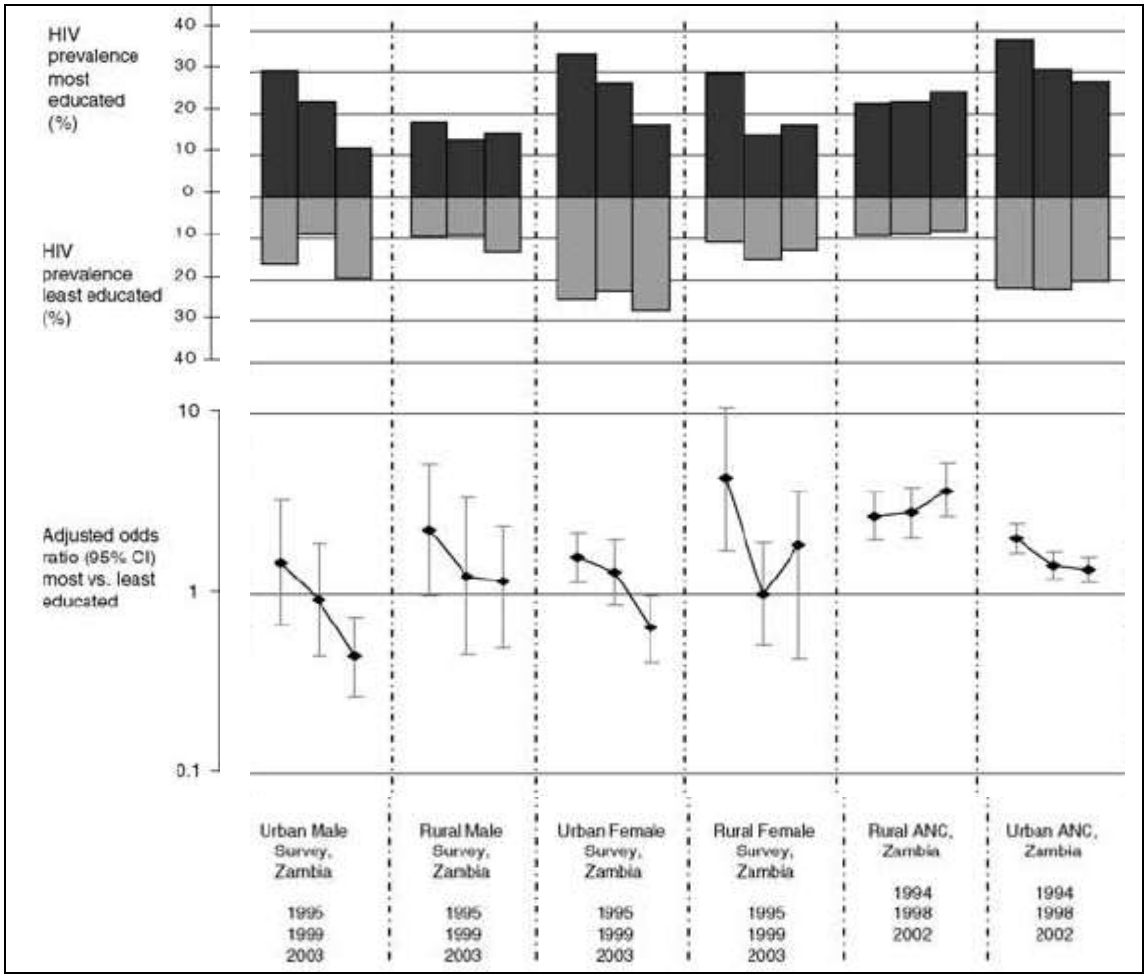
ANNEX 4. Time-trends in the association between educational attainment and risk of HIV infection in Zambia

Hargreaves et al. (2008) analysed data from three serial population-based HIV surveys conducted in 1995 (n = 3158), 1998 (n = 3757) and 2003 (n = 4775) in Kapiri Mposhi and Chelstone, Lusaka using stratified random-cluster sampling method. All household members aged 15–59 in the selected clusters were invited to participate in the study. In the SEAs, a personal structured interview was carried out with all eligible and willing household members in order to collect information on socio-demographic and behavioural characteristics. Information on people who were not found in the subsequent survey was collected. At the end of the interview the participants were asked to provide a saliva sample for HIV testing. Age-stratified analysis of these data found the following (see also figure 4.1):

Among Zambian antenatal clinic attendees aged 15–24 years, there was a higher risk of infection among the most educated in rural and urban areas in 1994, 1998 and 2002 compared to the least educated women.

In the population-based surveys, educational attainment was not associated with risk of infection among rural males aged 15–24 years in any year. Among urban males, there was no association in 1995 and 1999, but **by 2003 there was a lower risk of infection among the most educated.** Among Zambian females from urban areas, there was no association among younger women in 1995 and 1999, whereas **by 2003 a lower risk was seen among the most educated women aged 15–24 years**. In rural Zambia, there was no association among younger women in 1995 and 2003, but a higher risk of infection among the most educated women in 1999.

Figure 4.1. Time-trends in the association between educational attainment and risk of HIV infection in Zambia (1994-2003)



Source: Modified from figure 1 in Hargreaves et al., 2008.

ANNEX 5. Application of the HIV incidence model

This annex is an extract of a consultancy report on the application of the Incidence Model by Mubiana Macwan'gi (Institute of Economic and Social Research University of Zambia) and Bernard Phiri (National Science and Technology Council) of June 2008.

a. Operational definitions

Adults: Males and females aged between 15 to 49 years

Blood Transfusion: Adults who received a blood transfusion in the previous year

Casual Heterosexual Sex: Those who have more than one partner in the last year, or who have had sex with a non-regular, non- cohabiting partner

Clients of Sex Workers: Adults who go to sex workers for sex

Female Partners of Men who have sex with Men: Female sex partners to men who also have sex with other men

HIV Incidence: Total number of new HIV infections occurring in the population in a year

HIV Prevalence: Indicates the cumulative number of new and old HIV infections in the population in a year.

Injecting Drug User : Adults who inject intoxicating drugs intravenously

Low Risk Heterosexual: Include adults in mutual monogamous or serial monogamous couples where the only risk is through discordancy

Medical Injections: Adults who receive medical injections

Men who have sex with Men: Includes men who have sex with other men but also have sex with females

No Risk: Adults who are not at risk of HIV, they don't inject drugs and are not involved in any sexual activity

Partners of Casual Heterosexual Sex: The regular sex partners of those who have casual heterosexual sex

Partners of Clients of Sex Workers: The other (non-commercial) sex partner of clients of sex workers

Partners of Injecting Drug User: Sex partners of Injecting Drug User

Sex Workers: Adults whose main source of income is commercial sex

Number of Acts of Exposure/Partner/Year: The number of sex acts with each partner per year

Percentage of Acts Protected: The percentage of sex acts in which condoms are used correctly (where mode of transmission is sexual)

b. Adult risk behaviour groups

The adult population in Zambia is currently estimated at 5,536,481 (CSO Population Projections 2005). Forty-nine percent of this population is male of which 12.7% are circumcised (ZDHS 2007). Table 5.1. shows that slightly over a third (38%) of adult males are in the Casual Heterosexual Sex (CHS) risk group, while the corresponding proportion for females is 16%. Further, the table shows that the No Risk group account for 26.9% males and 25.7% females. Low Risk Heterosexual (LRH) accounted for 19.9% males and 24.3% females. The population of Partners of CHS was 12.7% males and 30.7% females and that of Clients of Female Sex Workers (Clients FSW) was 3.0%. Partners of Clients of FSW was 1.8%. Other adult risk behaviour groups (MSM and their partners, FSW, Blood Transfusions) accounted for 1% or less and there was no Zambia-specific data on Injecting Drug Use (IDU).

Table 5.1. Distribution of adult population with risk behaviour in Zambia (2008)

Adult Risk Behavior	*% Males*	*% Females*	*Source*
Casual Heterosexual Sex	38.0	16.9	ZDHS 2007
No risk	26.9	25.7	ZDHS 2007
Low-Risk Heterosexual Sex	19.9	24.3	ZDHS 2007

Partners of Casual Heterosexual Sex	12.2	30.7	UNAIDS 2007
Clients of Female Sex Workers	3.0	-	Regional
Men who have Sex with other Men	0.10	-	Zulu P.K 2004
Blood Transfusion	0.04	0.05	Zambia Blood Bank Services 2007
Partners of Clients of Female Sex Workers	-	1.8	BBSS 2005
Female Sex Workers (FSW)	-	0.6	WHO 2006
Female Partners of Men who have Sex with other Men	-	0.05	Zulu P.K 2004
Medical Injections	100.0	100.0	UNAIDS 2007
Injecting Drug Use	0*	0*	UNAIDS 2007
Partners of Injecting Drug Use	0*	0*	UNAIDS 2004

- = Not Applicable, * = No Zambia-specific data in all literature reviewed

c. Prevalence of HIV and STI in adult risk behaviour groups

The prevalence of HIV among the adult risk behaviour groups ranged from 68% among FSW to 0% in the No Risk Group (Table 5.2). HIV prevalence for the Clients of FSW is 39%, MSM 33% and CHS 24% while Blood Transfusion was 4%.

No Zambia-specific data was available for the partners for CHS, partners of clients of FSW and female partners of MSM. Therefore based on the fact that these groups are having sex with high risk populations and what is obtaining in the region, their HIV prevalence was assumed to be slightly above that which was in the general population (14.3%). It was assumed to be 16.1%. Similarly, HIV prevalence for LRH and Medical Injections was also not available, therefore guided by the above assumption it was assumed to be around the national average 14.3%.

FSW also had the highest (50.1%) prevalence of STI followed by MSM, 19.0% and Clients of FSW was estimated at 9.0% while CHS and LRH was estimated at 7% and 4% respectively. The model did not require STI prevalence for the partners for CHS, partners of clients of FSW and female partners of MSM therefore these were not included.

Table 5.2. HIV and STI prevalence in adult risk behaviour groups in Zambia (2008)

Adult Risk Behaviour	*Prevalence of HIV*	*Source*	*Prevalence of STI*	*Source*
Female Sex Workers	68.70	WHO 2006	50.1	FHI 2006
Clients of Female Sex Workers	39.0	Assumption & Regional	9.0	FHI 2005
Men who have Sex with other Men	33.00	Zulu PK 2004	19.0	Zulu P. K 2004
Casual Heterosexual Sex	24.0	ZDHS 2007	7.0	ZDHS 2007
Partners of Casual Heterosexual Sex	16.1	Assumption & Regional	-	-
Partners of Clients of Female Sex Workers	16.1	Assumption & Regional	-	-
Female Partners of Men who have Sex with other Men	16.1	Assumption & Regional	-	-
Low-Risk Heterosexual Sex	14.3	Assumption	4.0	ZDHS 2007
Medical Injections	14.3	Assumption	-	
Blood Transfusion	4.00	UNAIDS 2007	-	-
No risk	0.00	UNAIDS 2007	0.0	UNAIDS 2007
Injecting Drug Use	0*	UNAIDS 2007	0*	UNAIDS 2007
Partners of Injecting Drug Use	0*	UNAIDS 2007	0*	UNAIDS 2007

- = Not applicable
* = No Zambia-specific data in all literature reviewed

d. Sexual behaviour among risk groups

Three sexual behaviours that contribute to generation of HIV incidence are considered in this section (i) the Number of Sexual Partners per Year (ii) the Number of Acts of Exposure per Partner per Year and (iii) Percent of Acts Protected. Table 5.3. reveals that FSWs are the most sexually active group, each with an average of about 104 partners per year (BBSS 2006) followed by their clients with 16 partners per year. The rest of the groups had partners less than 3.

The LHS and the partners of CHS had the highest Number of Acts of Exposure per Partner per Year (104). Partners of FSW and Female Partners of MSM had the same Number of Acts of Exposure per Partner per Year, 70, and MSM had 50. The rest had 5 or below.

Percentage of Acts Protected among Medical Injections and Blood Transfusion behaviour risk groups, refers to percentage of use of a new injection equipment in the case of medical injections, 93% (CSO 2005) and the percentage of screened blood for HIV before transfusion, 96% (UNAIDS 2007). Percentage of Acts Protected for sexual behaviour groups (i.e. FSW and their clients) refers to consistent and correct condom use and ranged from 43% among CHS (ZDHS 2007) and 52% among the Clients of FSW. It is worth noting that consistent condom use was higher among FSW and their clients than in the other sexual behaviour risk groups.

Table 5.3. Behaviours among risk groups in Zambia (2008)

Adult Risk Behaviour	*# partners/yr*	*# acts of exposure/partner/yr*	*% acts protected*
Female Sex Workers	104	4	50
Clients of Female Sex Workers	16	5	52
Men who have Sex with other Men	3	50	6
Casual Heterosexual Sex	2	70	43
Partners of Casual Heterosexual Sex	1	104	6
Partners of Clients of Female Sex Workers	1	70	9
Female Partners of Men who have Sex with other Men	1	70	6
Low-Risk Heterosexual Sex	1	104	6
Medical Injections	1	1	93
Blood Transfusion	1	1	96
No risk	0	0	N/A
Injecting Drug Use	*	*	*
Partners of Injecting Drug Use	*	*	*

- *= No Zambia data in all literature reviewed*

e. HIV incidence pattern

The distribution of HIV incidence in adult risk behaviour groups is shown in figure 22 in the main report. Estimated HIV incidence is highest (37.3%) among Partners of CHS followed by CHS (34%). Estimated HIV incidence among the LRH's was 21% while that of Clients of FSW was at 4%. Other risk groups had HIV incidence of <1% and as expected there was no HIV incidence in the No Risk group. Table 5.4 provides further detail on the total number of people in each risk group, the number of new infections estimated for 2008 and the incidence per 100,000.

Table 5.4. HIV incidence data in adult risk behaviour groups in Zambia (2008)

Adult Risk Behaviour	*Number with risk behaviour*	*Incidence*	*% of incidence*	*Incidence per 100,000*
Sex workers	16,609	557	0.75	3,352
Clients	83,047	2,997	4.04	3,609
Partners of Clients	48,998	1,341	1.81	2,737
MSM	2,768	732	0.99	26,450
Female partners of MSM	1,384	40	0.05	2,906
Casual heterosexual sex	1,519,764	25,222	33.96	1,660
Partners CHS	1,186,745	27,500	37.03	2,317
Low-risk heterosexual	1,223,839	15,734	21.19	1,286
No risk	1,456,095	-	0.00	-
Medical injections	5,536,481	124	0.17	2
Blood transfusions	2,792	16	0.02	569
Total adult population	5,539,249	74,263		1,341

The *Know Your HIV and AIDS Epidemic* model has a sub-model aimed at generating HIV Incidence by age and sex in three behaviour risk groups, the CHS, Partners of CHS and LRH. To do this analysis the following specific variables were needed to populate the sub-model:

- Number of people in Risk Group
- HIV Prevalence

- STI Prevalence
- Proportion of Partners Age 14-25
- Proportion of Partners Age 25+
- Number of Partners Age 14-25
- Number of Partners Age 25+
- Number of Partners per Year
- Number of Acts of Exposure per Partner per Year
- Percentage of Acts Protected

This analysis revealed that data on number of the adult people in the three risk behaviour groups was available. However data on prevalence of HIV and STI among the three risk behaviour groups was not disaggregated by sex and age and in general data on the other seven variables was also not available. In view of this, the sub-model on HIV Incidence to reflect age mixing could not be populated using Zambia-specific data.

f. Discussion

Key results of this work show that distribution of the adult risk behaviour in concentrated among four risk behaviours; the highest is male CHS 38% and females16.9% and their partners 12% for male and 31% for females. And No Risk and LRH behaviour groups ranged from 20% to 26% and the proportions for males and females were about the same. It is also worth noting that the number of No Risk behaviour group was unexpectedly high (26%). It is therefore important to understand in detail the behaviour of these groups so that efforts could be undertaken to minimize the proportion of the adult population in the high risk behaviour groups and maximize the adult population in the No Risk/LRH behaviour groups.

The prevalence of HIV and STI was highest among FWS, 69% and 50% respectively. This is despite high condom use assumed to 50%. This could be explained partially by the fact that the number of sexual partners and high risk sexual acts in this population in very high predisposing them to HIV and STI. And also this raises issues on the accuracy of self reported behaviour i.e. condom use among the risk behaviour groups. This study also observed that HIV and STI are high among MSM, 33% and 19% respectively.

Most important this study show that the highest expected HIV incidence is among the partners of CHS (37%) followed by the CHS (34%). The essential question that needs to be answered is why are the most expected HIV cases likely to happen in the partners of CHS? One explanation is that condom use among this group in very low, only about 6%. Further the majority of this group (31%) are females who socio-culturally, have low capacity to negotiate for safer sex especially within marriage. In addition, according to the model, the transmission per act of male to female is higher than female to male. Another explanation could be that since HIV prevalence is high (24%) among CHS therefore, they are an ‘agent’ of infection to their regular partners especially if the sexual acts are not protected.

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