

The HIV epidemic in Tanzania Mainland:

Where have we come from,
where is it going, and
how are we responding?

'Tunakotokea, tunaelekea wapi na
tunachokifanya ni nini?'

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1. Introduction

'Managing for results' is an effective principle for a country's HIV response. It can be applied by:

- Setting ambitious but realistic results to aim for in the strategy planning process and in work plans, based on the latest data on the epidemic
- Measuring prevention, treatment, care and mitigation inputs, outputs and outcomes
- Ensuring that results-based data are used for learning and decision making in managing and improving programmes– not just for reporting and accountability – *purpose of this report*.

This report, prepared by the World Bank Global AIDS Monitoring and Evaluation Team on request from the UNAIDS service, AIDS Strategy and Action Planning (ASAP), and TACAIDS, is part of Tanzania's efforts to improve the use of data for results-based management, learning and decision-making during the Joint Review. The report synthesizes, summarizes and packages data for use during the Joint Review, focusing on:

- a) The latest evidence about the HIV epidemic – prevalence trends over time and heterogeneity (Section 3)
- b) What has caused these changes in the HIV epidemic over time and in different geographic areas? (Section 4)
- c) What should be done differently to improve the HIV response in the future? (Section 5)

2. Methodology

This report was developed by Marelize Gorgens of the Global AIDS M&E Team of the World Bank and Dr Rafael Kalinga of TACAIDS. The methodology was a secondary analysis of existing data relating to HIV prevalence, incidence, HIV-related behaviours, HIV-related policies and strategies, and available information about the HIV response in Tanzania mainland, after a purposeful literature search.

Searches carried out: Searches were carried out to locate the following documents:

- Tanzania HIV and syphilis sentinel surveillance reports from the National AIDS Control Programme's website (www.nacp.go.tz)
- Other reports relating to HIV prevalence and incidence from the National AIDS Control Programme's website (www.nacp.go.tz)
- Purposive search of all known documents relating to HIV in Tanzania: UNGASS report, latest Tanzania HIV and Malaria Indicator Survey Report, Global Fund Five-Year Evaluation Report
- Search for research articles from Google Scholar (<http://scholar.google.com>) and PubMed, using the search words "HIV incidence Tanzania", and "HIV prevalence Tanzania": resulted in 563 search results, of which 81 were relevant for the analysis
- Purposive search of documents from the TAZAMA project (www.tazamaproject.org), upon recommendation of Dr G Somi, Head of Epidemiology at MoHSW's National AIDS Control Programme
- All national survey reports from Tanzania that were available on the MEASUREDHS website (www.measuredhs.com)
- Hard copies of reports provided by the UNAIDS country office

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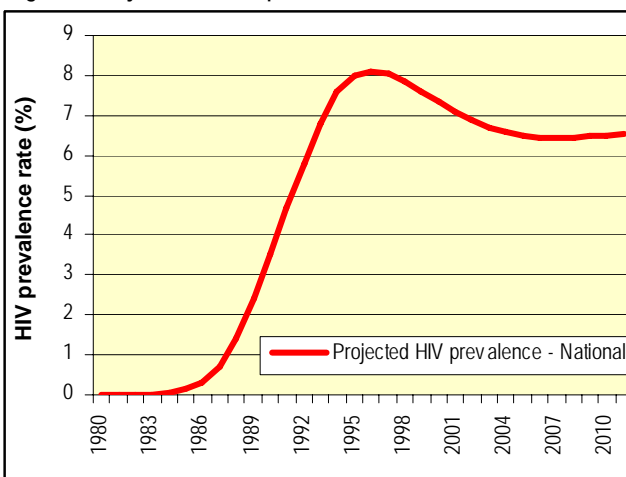
- Dr Luc Barriere-Constantin for his guidance throughout the process and Mr Fredrick Macha for his support with sourcing documents and for his peer review that led to important additions to the report(both from the UNAIDS Tanzania office)
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3. The HIV epidemic in Tanzania: 'where have we come from and where is it going'?

3.1 HIV prevalence trends over time

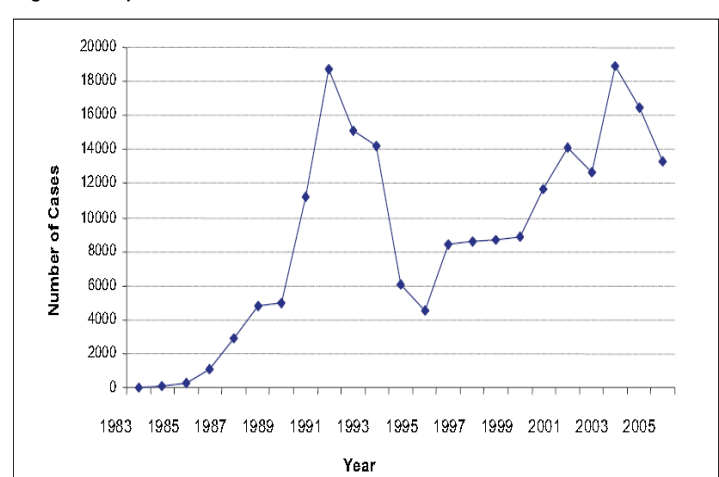
HIV prevalence has stabilized at 6 – 7% and a secondary increase in prevalence into the future is likely. National HIV prevalence, the proportion of HIV positive individuals in Tanzania, steadily increased from 1983 until 1997, when projections indicate that national adult HIV prevalence peaked at 8% (see Figure 1). After 1997, national HIV prevalence gradually fell and plateaued at about 6.4% from 2005/06. A small secondary increase in prevalence has been projected, as a result of a small increase in rural incidence and the uptake of ARV services over the last five years. It is interesting that although only around 7% of projected AIDS cases were reported through AIDS case reporting in 2000, 2003 and 2005, the trends in AIDS case reporting reflect the national HIV prevalence estimates (NACP, 2006) – see Figure 2.

Figure 1: Projected Nat HIV prevalence in Tanzania, 1980 to 2010



Source: Graph drawn by author from data in the Tanzania MOHSW NACP HIV/AIDS/STI Surveillance Report (Jan – Dec 2005)

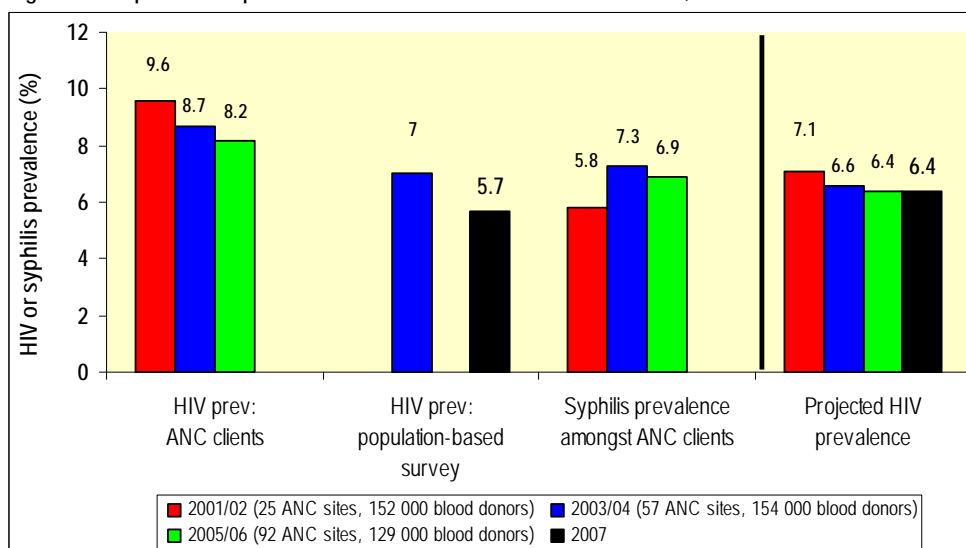
Figure 2: Reported AIDS cases in Tanzania, 1983 to 2005



Source: Tanzania MOHSW NACP HIV/AIDS/STI Surveillance Report (Jan – Dec 2005)

Recent HIV prevalence data from various sources – HIV prevalence during sentinel surveillance of pregnant women at antenatal clinics, HIV prevalence of blood donors, and HIV prevalence in 2 rounds of population-based HIV surveillance surveys – confirm the recent stabilization of HIV prevalence in Tanzania (see Figure 3).

Figure 3: HIV prevalence point values from different sources in Tanzania, 2000 to 2007



NOTE TO FIGURE 3:

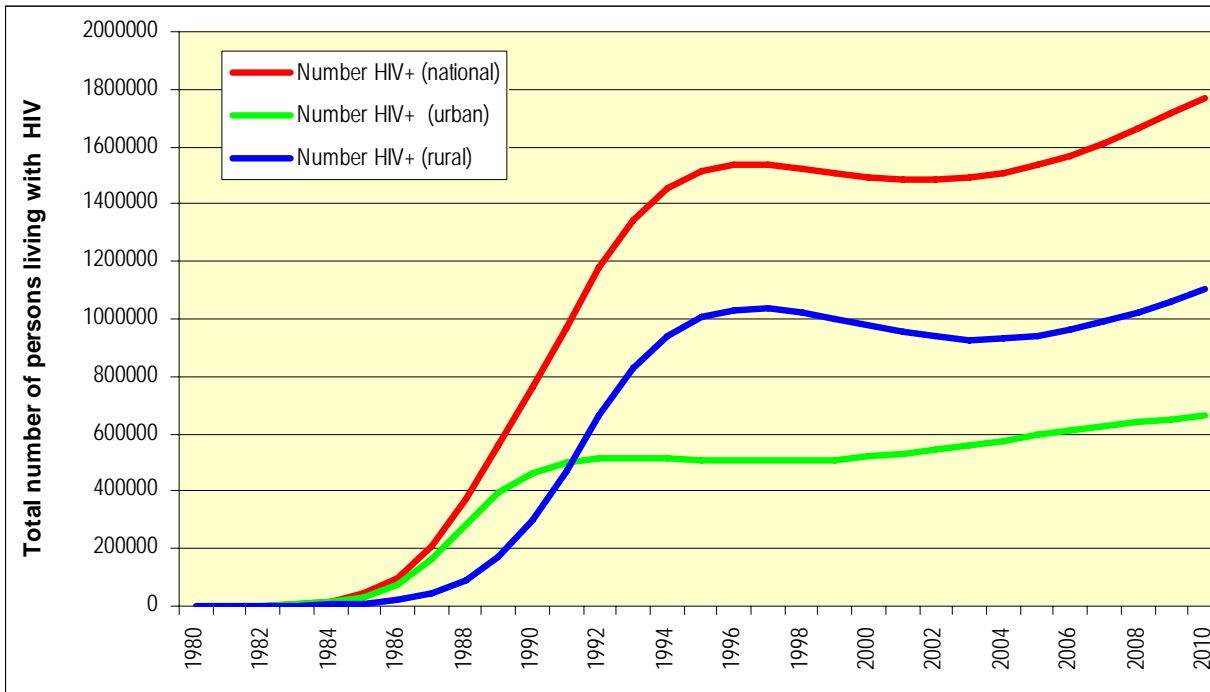
The blood donor system started changing in 2003, with Tanzania moving from a family replacement basis to a voluntary blood donor system. With this change, it was not possible ascertain trends in HIV prevalence amongst this population over time as the data sets would not be comparable. When interpreting the HIV prevalence data in Figure 3, keep in mind that there are sampling issues with each type of data:

- **ANC data:** ANC sites rapidly increased from 25 in 2001 to 92 sites in 2005, mostly with the addition of rural sites
- **Population-based studies:** Response rates for accepting HIV testing in population-based studies varied dramatically across regions (e.g. in 2003, 34% of respondents in Dar refused testing, as opposed to only 2% in Kagera). Given the HIV prevalence differences in these 2 regions, this could affect the national HIV prevalence estimates.

Sources: Drawn by author, using data from NACP 2001; NACP 2004; NACP 2005; NACP 2006; NACP 2007; THIS 2003-04; THMIS 2007-08

HIV positive persons in Tanzania were initially mostly found in urban areas, as this is where the oldest and first HIV epidemic in Tanzania unfolded. Over time, as the epidemic spread to rural areas – and due to the sheer number of persons living in rural areas (77% of the total population) – the number of persons living with HIV in rural areas surpassed the urban infections, and this trend is set to continue (see Figure 4).

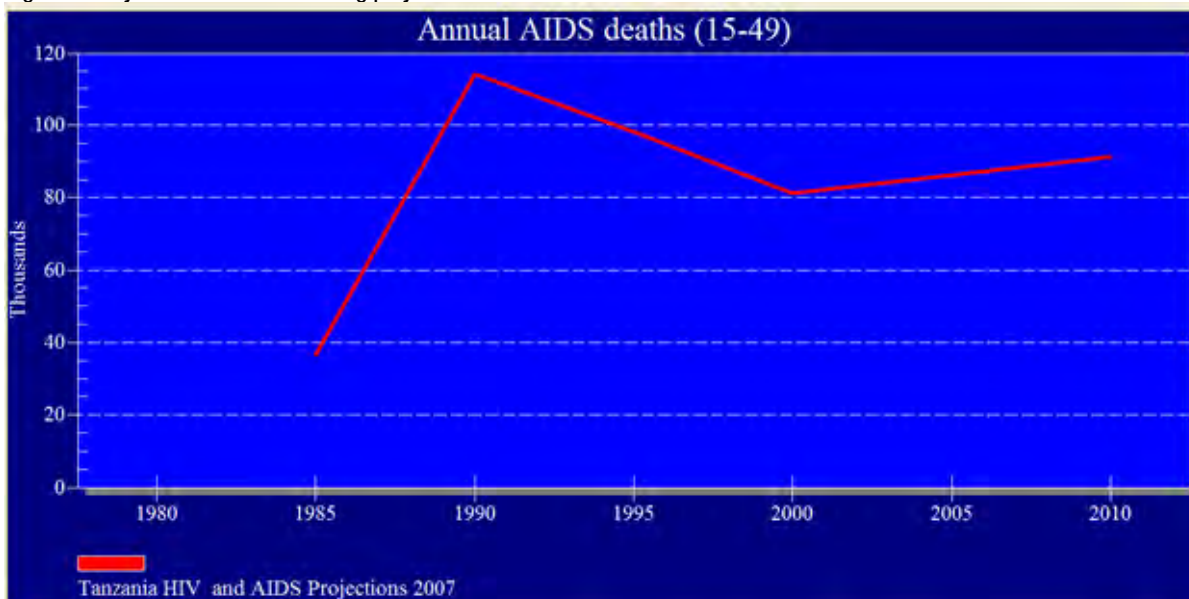
Figure 4: Number of HIV positive persons nationally, in rural areas and in urban areas in Tanzania, 1980 to 2010



Sources: Drawn by author, using HIV projections data from NACP 2005

As a result of stabilizing HIV prevalence and lack of 100% uptake in ARVs, annual AIDS deaths are projected to increase over time (see Figure 5).

Figure 5: Projected AIDS deaths, using projection data from 2008 in Tanzania



Sources: Projections in 2008, using projection data done in 2008

3.2 Heterogeneity in HIV prevalence

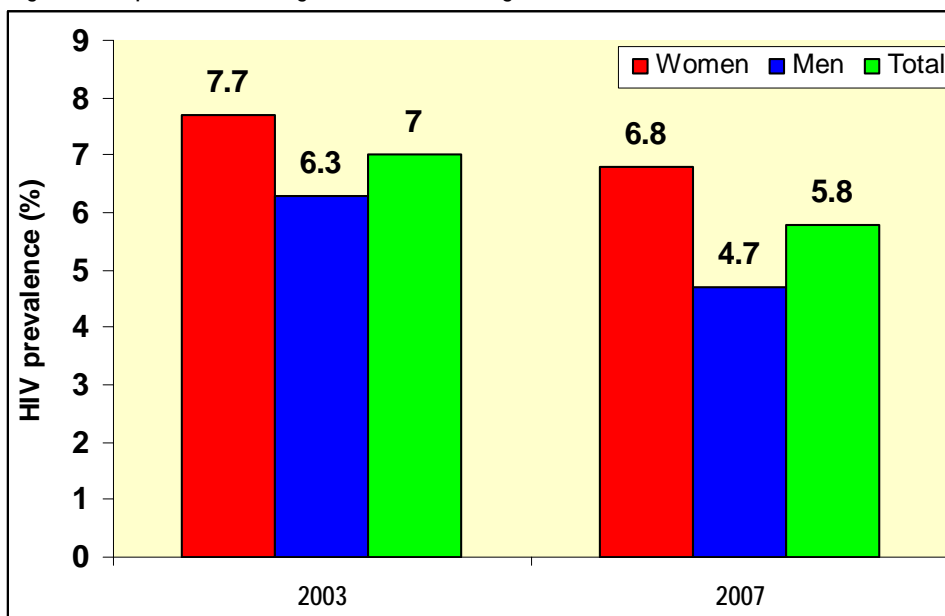
Despite the national stabilization, HIV prevalence trends in Tanzania vary dramatically across sub-populations (grouped by different characteristics) – sex, education, wealth, marital status, where they live and how mobile they are. This is called HIV ‘heterogeneity’. These differences in HIV prevalence are important to know of and understand because Tanzania may need to respond to different sub-populations in different ways.

(a) Heterogeneity amongst men, women and in different age groups

Overall, women are more likely to be HIV positive than men: In both rounds of population-based HIV testing (2003 and 2007), women were overall more likely to be HIV positive (see Figure 6). An extremely high female:male prevalence ratio has been found in Kigoma in 2007 (15:1, see section 3.2 f). There are two exceptions to this general observation of excess female HIV risk:

- i) Amongst ‘HIV-discordant couples’, there are **more male-positive-female-negative couples** than vice-versa (see Figure 7); and
- ii) Among certain **older age groups**, men have higher HIV prevalence than women, as illustrated in Figure 8. This higher risk for older males was less pronounced in the 2007 survey data, compared to the 2003 data. AIDS case reporting data reflect this higher HIV burden in males within the older age groups (see Figure 9). This trend seems to be changing over time – in 2007, women were more likely to be HIV positive in all age groups – except for men aged 34 to 39. Figure 10 depicts the changing HIV prevalence over time across all age groups and sexes.

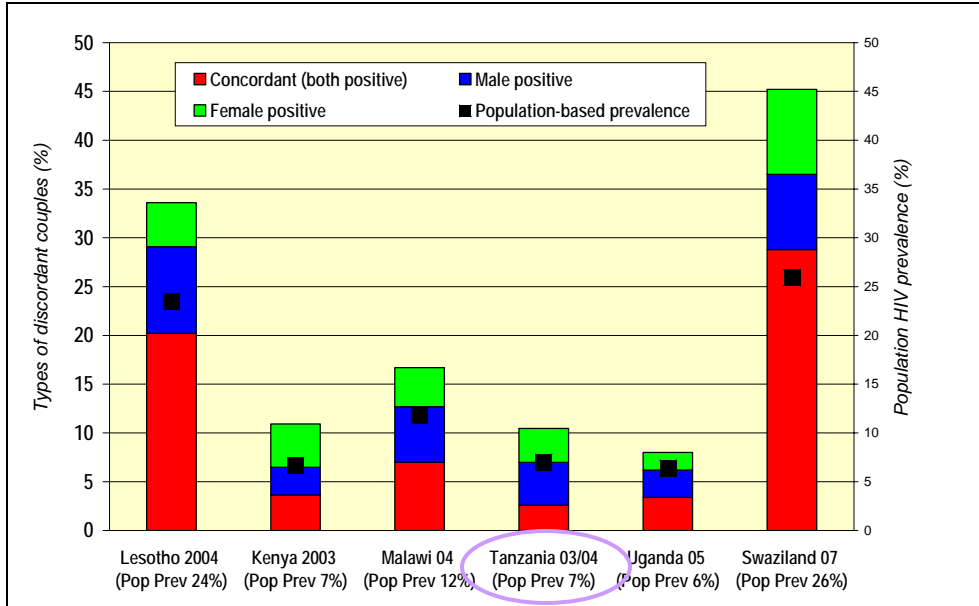
Figure 6: HIV prevalence amongst men and women aged 15 - 49 in Tanzania, 2003 and 2007



NOTE TO FIGURE 6:
Female:male ratio in 2003: 1.2 : 1
Female: male ratio in 2007 1.4: 1
This correlates with the AIDS case reporting ratio (F:M HIV prev) of 1.2 : 1
Using EPP, a F:M ratio for new infections was predicting for 2005 (see Section 3.3 on incidence)

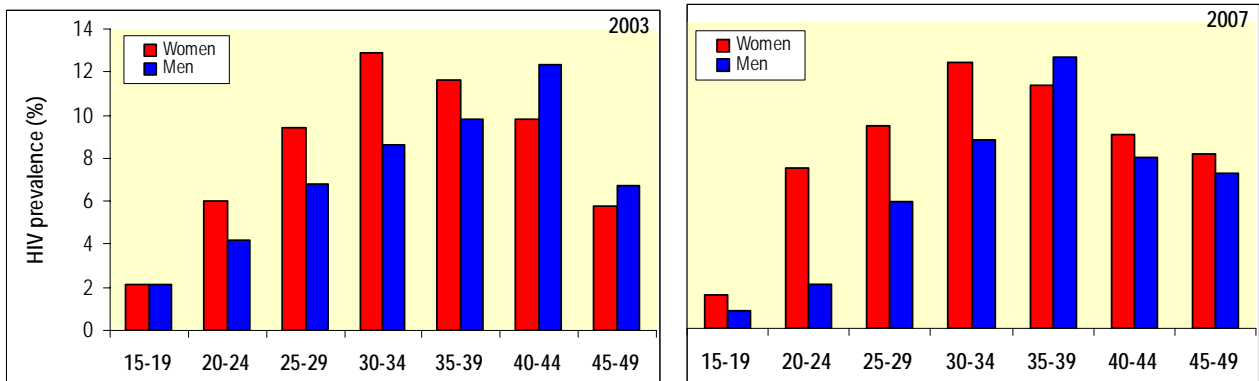
Sources: Graph drawn by author, using data from THIS 2003-04 and THMIS 2007-08

Figure 7: Patterns of HIV prevalence amongst discordant HIV couples in East Africa



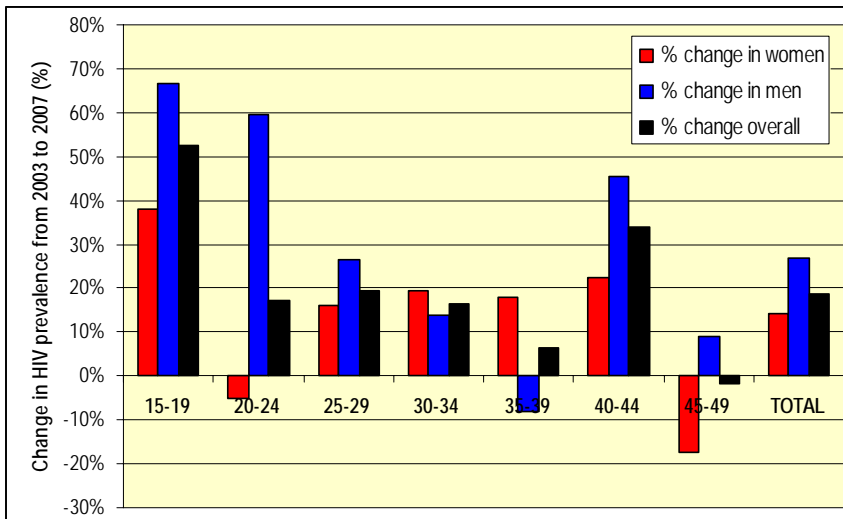
Sources: Graph drawn by author, using data from DHSs from Lesotho (2004), Kenya (2003), Uganda (2005)

Figure 8: HIV prevalence by age group in Tanzania, 2003 and 2007



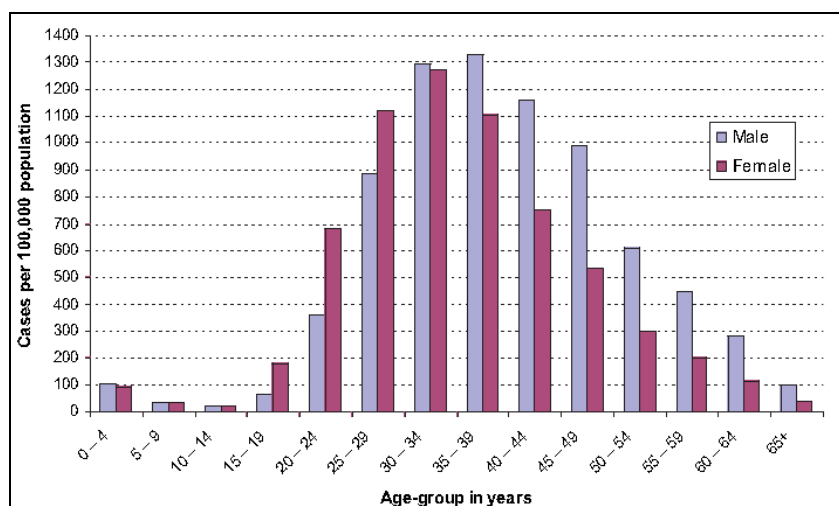
Sources: Graph drawn by author, using data from THIS 2003-04 and THMIS 2007-08

Figure 9: Changes in HIV prevalence over time (between 2003 and 2007) amongst men and women of different ages, Tanzania



Sources: Graph drawn by author, using data from THIS 2003-04 and THMIS 2007-08

Figure 10: AIDS case rates for cumulative AIDS cases by age and sex, Tanzania, 1987 – 2005



Sources: Graph 1.2 from NACP (2007)

Community-level HIV prevalence and incidence studies in Tanzania confirm this trend: these studies suggest that HIV prevalence and incidence in urban areas, especially amongst young people, is declining:

- Kwesigabo et al., 2005 found that in the Kagera region, reductions in HIV incidence and prevalence (both statistically significant) was most pronounced in younger women;
- Jordan-Harder found decreasing prevalence in Mbeya region amongst women aged 15 to 24 – Msuya et al had the same finding for a study in an Moshi urban district;
- Wambura et al. (2007) found in an open cohort study over a ten year period in Mwanza city (Tanzania's second-largest city) that "HIV spread is continuing in rural areas, suggesting a need for more intensive HIV prevention efforts and ARVs. The leveling off in prevalence is attributable to a combination of high mortality among HIV-infected persons" and a slight decrease in incidence in roadside villages (amongst men and women, but most pronounced amongst women of younger ages.

(b) Heterogeneity across education levels

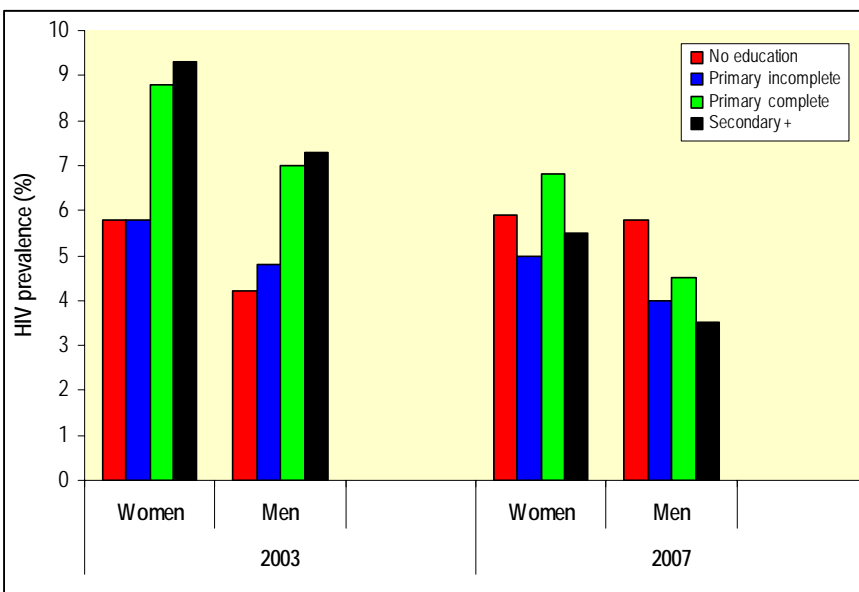
Patterns of HIV by education level seem to be changing. Up to 2004, at the population level, persons with higher education were more likely to be HIV positive – see Table 1. However, the latest population-based HIV surveillance survey (THMIS 2007-08) showed, for the first time at population level, that HIV prevalence was lower amongst educated than uneducated persons. The difference was larger amongst men (see Figure 11) and is consistent with recent research findings in Kilimanjaro Region that show an inverse relationship between HIV infection and education in 2005, compared to 1991 when higher education levels were associated with increased prevalence (Mmbaga et al, 2006):

Table 1: HIV prevalence and education levels in Tanzania – an inverse relationship beginning to form?

Education level	HIV prevalence 2001/2002 sentinel surveillance	HIV prevalence 2003/04 sentinel surveillance	THIS 2003-04	THMIS 2007-08
None	6.4	5.2	5.3	5.9
Primary incomplete	10.2	9.3	5.3	4.5
Primary complete	n/a	n/a	7.9	5.8
Secondary+	n/a	n/a	8.2	4.3

Sources: NACP, 2002; NACP, 2005; THIS 2003-04; THMIS 2007-08

Figure 11: Changing patterns between HIV prevalence and education levels, Tanzania, 2003 and 2007

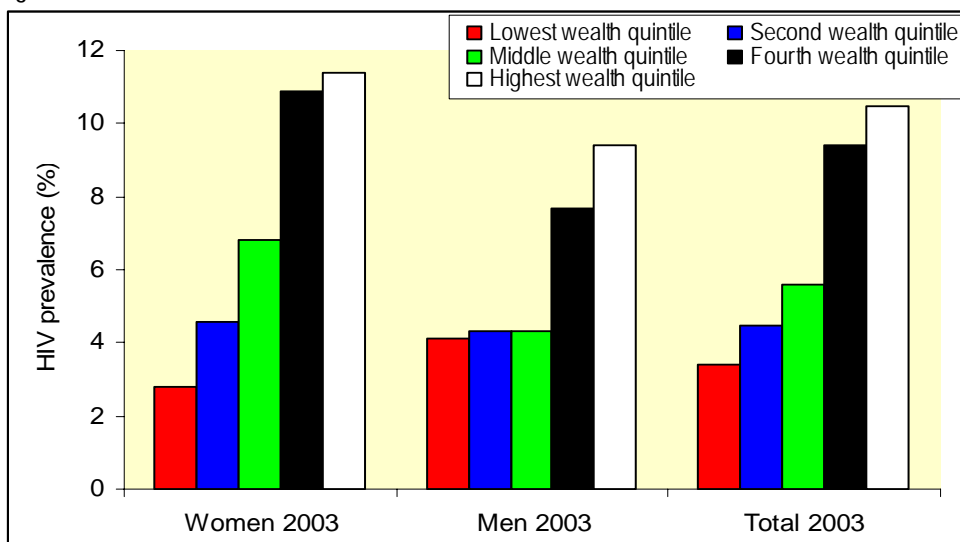


Sources: Graph drawn by author, using data from THIS 2003-04 and THMIS 2007-08

(c) Heterogeneity across relative levels of wealth

Keep in mind that the data presented in Figure 12 is from 2003, and wealth and education are quite strongly correlated, so the wealth-HIV pattern may have changed (HIV prevalence by wealth for 2007 was not yet available at the time this analysis was done). In Tanzania, **more wealthy persons are more likely to be HIV positive** (see Figure 12), which is in line with the recent research finding by Mishra et al (2007) that HIV infection does not disproportionately affect the poorer in sub-Saharan Africa. This is also supported by the numerous findings (from THIS 2003-04, Bloom et al., 2002) that support the notion that employed persons, mobile persons, and persons with higher levels of economic activity are more likely to be HIV positive. This pattern has been consistent over time, and is supported by research about HIV, mobility, levels of education and levels of wealth (Kwesigabo et al. 2005, Mmbaga et al). In Figure 12, is a standard term used in the DHS. It is calculated by using data from the DHS on the household's socioeconomic status, and is a proxy for long-term standard of living of the household.

Figure 12: HIV and levels of wealth, Tanzania, 2003



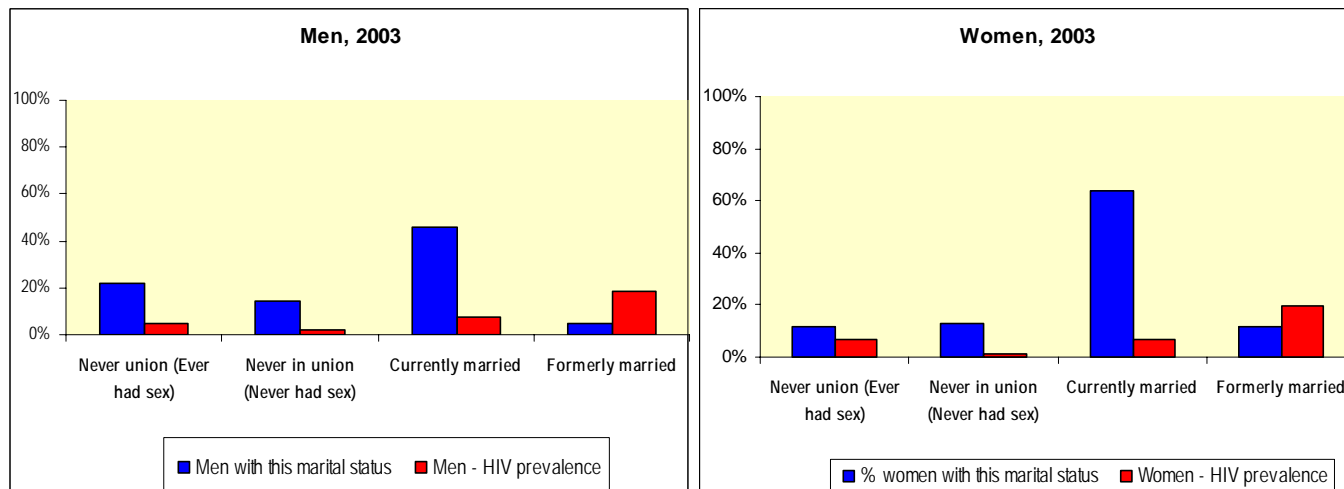
Sources: Graph drawn by author, using data from THIS 2003-04

Keep in mind that the data presented in Figure 12 is from 2003, and wealth and education are quite strongly correlated, so the wealth-HIV pattern may have changed (HIV prevalence by wealth for 2007 was not yet available at the time this analysis was done).

(d) Heterogeneity relating to marital status

HIV prevalence is highest amongst those who are currently or formerly married (see Figure 13). AIDS case reporting confirms the observation that more HIV prevalence amongst married than unmarried persons (NACP, 2006).

Figure 13: Percentage men and women by marital status and HIV prevalence, Tanzania, 2003



Sources: Graph drawn by author, using data from THIS 2003-04

(e) Geographic heterogeneity: Residence

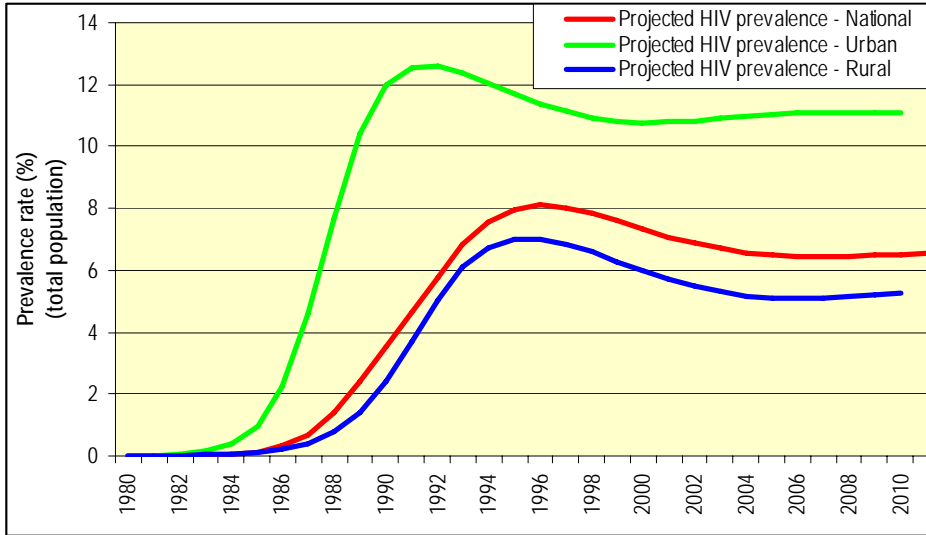
HIV prevalence in urban areas is much higher than in rural areas: According to population-based estimates, HIV prevalence in urban areas has been almost twice as high as in rural areas, as Table 2 summarises. Further, the **urban HIV epidemic is comparatively older** in Tanzania (see Figure 14 showing that the urban epidemic curve peaked earlier than the rural epidemic curve (Somi et al., 2006)) and has shown recent **signs of contracting** (see Figure 15). Figure 14 also suggests exceptionally high transmission intensities in areas of high mobility (average HIV prevalence in roadside ANC clinics at 15% and in border area ANC clinics at 20%).

Table 2: HIV Prevalence and Residence, Tanzania 2003 and 2007

	% population who live in this location	% HIV+ (2003-04 THIS)	% HIV+ (2007-08 THMIS)
Urban	23%	10.9%	8.7%
Rural	77%	5.3%	4.7%

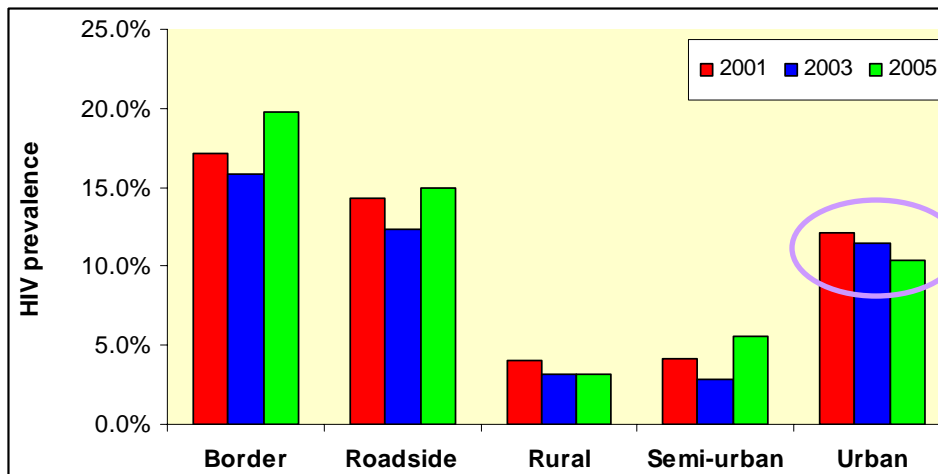
Sources: THIS 2003-04; THMIS 2007-08

Figure 3: Projected HIV prevalence over time in Tanzania, 1980 to 2010



Sources: NACP 2005 HIV estimates and projections

Figure 4: HIV prevalence amongst women at ANC sites by location of ANC site, Tanzania, 2001 to 2005



NOTE TO FIGURE 15:

'Roadside' refers to those ANC sites that are in clinics that are close to major trading towns or transport routes in Tanzania.

'Border' refers to the ANC site located in Kyela, on the border with Zambia

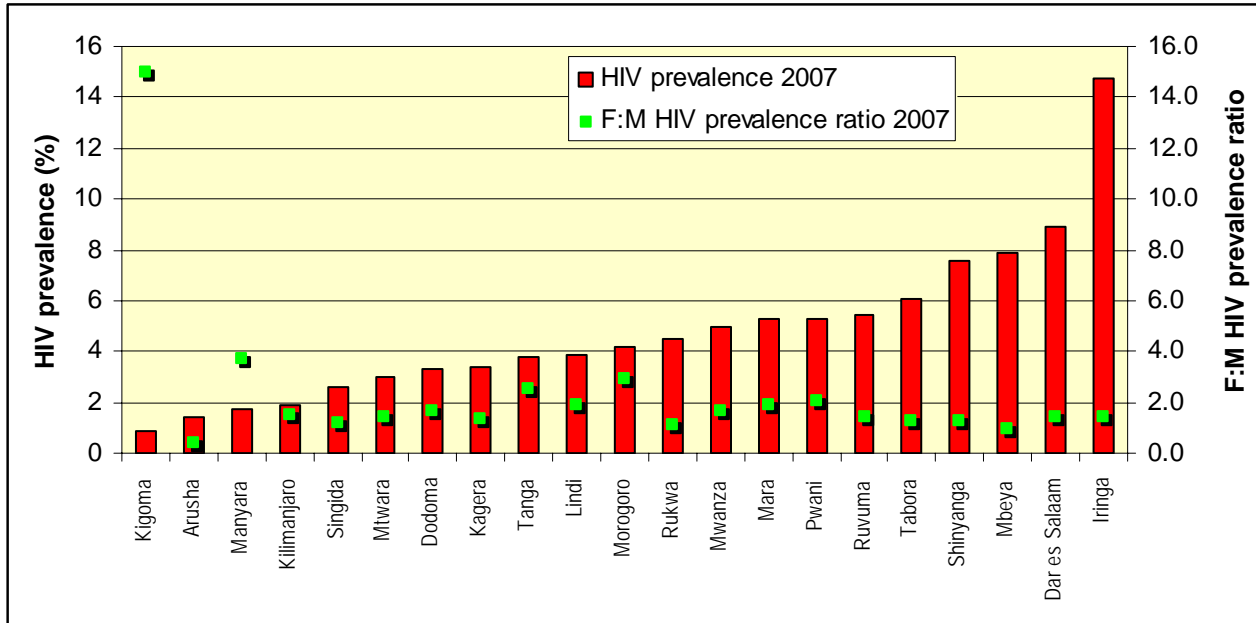
Sources: NACP, 2002; NACP, 2005; THIS 2003-04; THMIS 2007-08

(f) Geographic heterogeneity: Administrative regions

There is great regional heterogeneity with adult HIV prevalence ranging from 1% to 15%. There are large differences across the 21 regions in Tanzania – some regions are primarily rural, others are primarily urban; some regions have high circumcision rates, others do not. There are very large differences in HIV prevalence levels across the regions, as Figure 14 shows, with HIV prevalence ranging from 1% in Kigoma Region to 15% in Iringa Region in 2007.

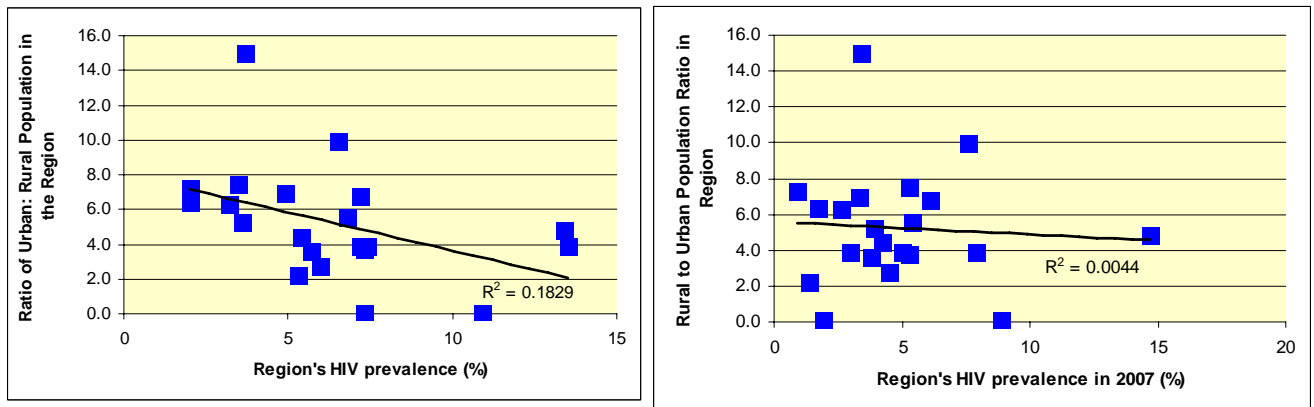
In Table 3, key characteristics of each region have been summarised, and Figures 16 to 19 explore the relationship between HIV prevalence and some of these characteristics. They show, for example, an inverse relationship between the rural:urban population ratio of a region (the higher this ratio, the more rural a region) and HIV prevalence. Figure 17, for example, shows the change in HIV prevalence in a region (+ change = decline; - change = increase in prevalence) being strongly associated with the rural:urban population ratio, meaning that larger reductions in HIV prevalence have occurred in more urbanized regions.

Figure 16: HIV prevalence in regions in Tanzania, 2007



Source: Graph drawn by author using data from THMIS, 2007

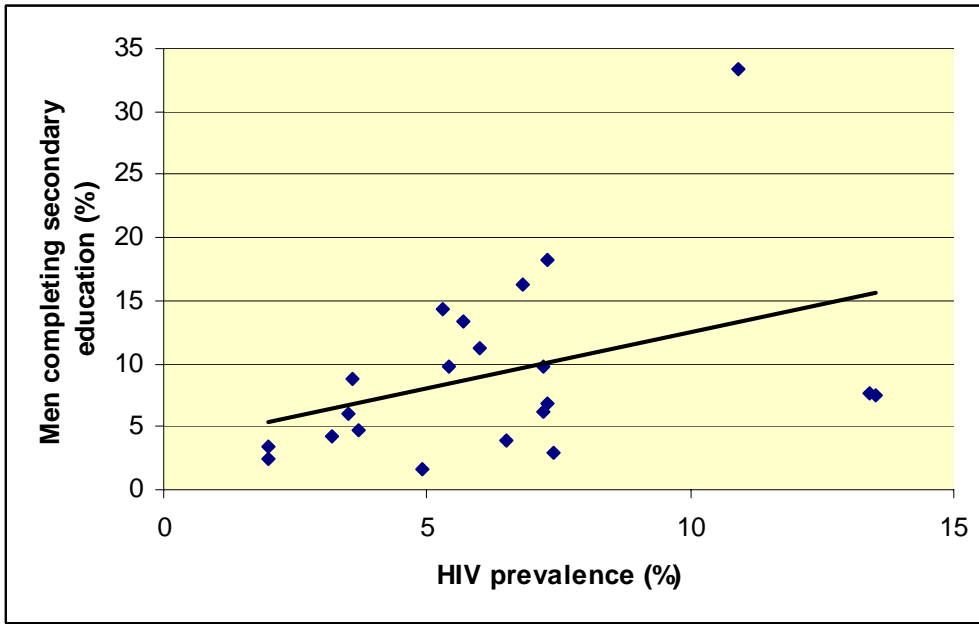
Figure 17: Rural:urban population ratios and HIV prevalence in regions in Tanzania, 2003 and 2007



Source: Graph drawn by author using data from THIS, 2003-04; National Tanzania Housing and Population Census; THMIS, 2007

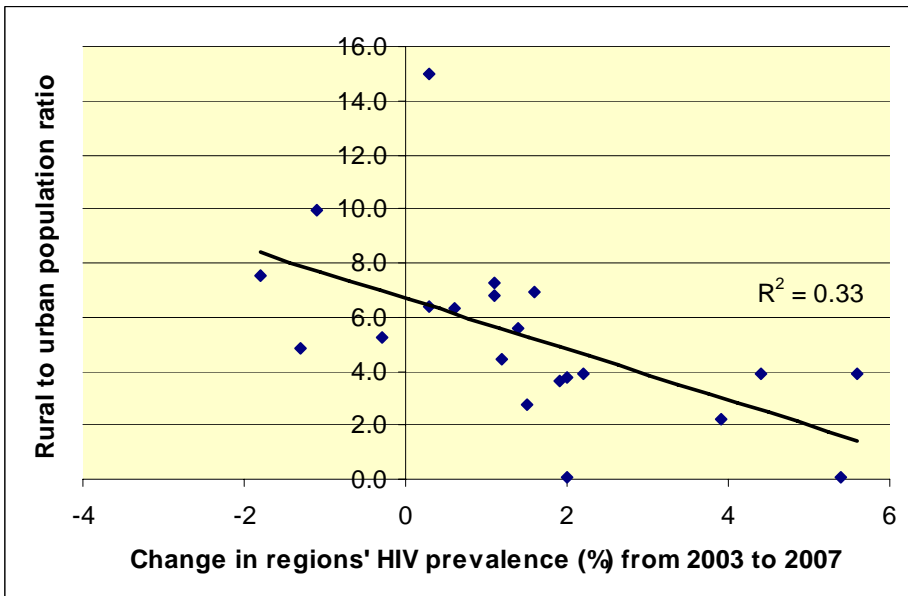
The association is not as strong in the 2nd graph, although it remains statistically significant ($p = 0.0001$ in 2003 $p = 0.07$ in 2007). This shows how the relationship between prevalence and education levels may be changing over time, as the epidemic matured). Alternatively, this could also be because the epidemic began in urban areas and then spread into rural areas - education is only one factor correlated with urban/rural residence.

Figure 18: Percent of men that have completed secondary education and HIV prevalence in regions in Tanzania, 2003



Source: Graph drawn by author using data from THIS, 2003-04; National Tanzania Housing and Population Census; THMIS, 2007

Figure 19: Changes in HIV prevalence (from 2003 to 2007) and rural:urban population ratio (2003) in regions in Tanzania



Source: Graph drawn by author using data from THIS, 2003-04; National Tanzania Housing and Population Census; THMIS, 2007

Multiple regression of the factors in Table 3 shows that the following factors remained statistically significant over time in terms of changes in trends being associated with changes in prevalence, and that in the case of the R: U population ratio, the significance was smaller in the 2007 survey round of the study. It was also interesting to note that HIV prevalence values was not statistically significantly associated with levels of higher risk HIV behaviour:

	p-value 2003	p-value 2007
% men circumcised	0.00022	0.009984
R:U population ratio	0.000144	0.073274
% women that relies on someone else to make decisions about earnings	0.001635	0.021204
Two or more partners in 2007: women	DNP	0.961192
Higher risk sex in 2007: women	DNP	0.551926
Two or more partners in 2007: men	DNP	0.915819
Higher risk sex in 2007: men	DNP	0.823157
Paid sex amongst men: 2007	DNP	0.103618
Medical injections: 2007 - women	DNP	0.170183
Medical injections: 2007 - men	DNP	0.165441
Comprehensive knowledge 2007 amongst youth: women	DNP	0.793249
Comprehensive knowledge 2007 amongst youth: men	DNP	0.991629
% of women who had sex before age 15: 2007	DNP	0.452584
% of men who had sex before age 15: 2007	DNP	0.514748
% of never married women who have never had sex: 2007	DNP	0.15969
% of never married men who have never had sex: 2007	DNP	0.241246

DNP = data not presented in 2003 THIS report

Table 3: HIV prevalence and other relevant characteristics in regions in Tanzania

Region Name	HIV prevalence 2003	refusal rates 2003	HIV prevalence 2007	refusal rates 2007	F:M HIV prevalence ratio 2003	F:M HIV prevalence ratio 2007	% men circumcised	Women – completed secondary education	Men – completed secondary education	F:M population ratio	R:U population ratio	Not employed in the 12 months preceding the survey - women	Not employed in the 12 months preceding the survey - men	% women that rely on someone else to make decisions about earnings
Arusha	5.3	14.6	1.4	19.2	1.2	0.4	96.2	17	14.3	1.0	2.2	28	12	20.1
Dar es Salaam	10.9	30.2	8.9	19.1	1.3	1.4	97.9	23.6	33.3	1.0	0.1	48.5	24.3	2.5
Dodoma	4.9	13	3.3	9.2	0.7	1.7	96.9	3.1	1.7	1.1	6.9	9.4	6.3	3.2
Iringa	13.4	15.3	14.7	5.5	1.0	1.4	37.7	6.6	7.7	1.1	4.8	13	6.3	5.7
Kagera	3.7	2.3	3.4	1.6	0.9	1.3	26.4	2.2	4.8	1.0	15.0	8.5	7.1	27.7
Kigoma	2	5.9	0.9	2.7	1.1	15.0	68.4	3.8	2.5	1.1	7.3	11.9	22.4	34.8
Kilimanjaro	7.3	20.1	1.9	4.2	1.0	1.5	97	16.2	18.2	1.1	0.1	24.2	23	6.8
Lindi	3.6	11.9	3.9	2.6	1.0	1.9	93.3	4.5	8.8	1.1	5.2	9.1	7.9	29.3
Manyara	2	3.7	1.7	11.3	1.1	3.7	97.3	3.8	3.4	0.9	6.4	21.2	6.9	49.6
Mara	3.5	24	5.3	4.9	1.8	1.9	89	8	6	1.1	7.5	13.5	12.4	3
Mbeya	13.5	6.5	7.9	5.7	1.3	0.9	34.4	4.6	7.5	1.1	3.9	9.4	14.3	5
Morogoro	5.4	11.2	4.2	12.7	1.6	2.9	93.1	7.8	9.7	1.0	4.4	12.2	14.9	5.7
Mtwara	7.4	6	3	6.9	0.9	1.4	97.7	2.5	3	1.1	3.9	6.1	15.6	14.8
Mwanza	7.2	12	5	13.2	0.9	1.6	54.1	5.5	9.8	1.0	3.9	10.3	21.3	45.3
Pwani	7.3	6.7	5.3	12.9	2.7	2.1	96.9	3.3	6.8	1.0	3.7	18.6	21.3	7.5
Rukwa	6	3.1	4.5	11.1	1.2	1.1	31.4	5.1	11.2	1.6	2.8	5.7	17.7	27.7
Ruvuma	6.8	9.7	5.4	5.8	0.9	1.4	68.9	10.8	16.3	1.0	5.6	11.9	23.7	11.2
Shinyanga	6.5	31.8	7.6	7.2	1.4	1.2	26.5	2.3	3.9	1.1	9.9	10.3	13.9	5.1
Singida	3.2	5.5	2.6	5	2.0	1.2	90.9	4.6	4.3	1.1	6.3	11.3	14.6	10.1
Tabora	7.2	7.8	6.1	4.9	2.0	1.3	42.8	2.7	6.2	1.0	6.8	16.2	11.4	9.7
Tanga	5.7	6	3.8	9.3	2.3	2.5	95	8.7	13.3	1.1	3.6	17.3	22.2	4.5

(See Annex A for a map of all regions in Tanzania)

Region Name	/Mining activity ¹	Border / transport port town	F:M HIV prevalence ratio 2003	F:M HIV prevalence ratio 2007	Change in prevalence from 2003 to 2007 (positive change = reduction, - change = increase)	Other research results
Arusha	Yes	Tourism mainly	1.2	0.4	3.9	No studies with prevalence or incidence data found
Dar es Salaam	No	Yes	1.3	1.4	2	Several studies pointed to the prevalence of HIV amongst IDUs, and studies have been done to support these findings (Ross et al 2007; Williams et al 2007). Studies have also shown that HIV prevalence has decreased over time (Urassa et al. 2001)
Dodoma	No	No	0.7	1.7	1.6	No studies found
Iringa	No	Yes	1.0	1.4	-1.3	No studies found
Kagera	Yes	Yes	0.9	1.3	0.3	Sexual-related behaviours amongst bar and hotel workers have positively changed (more condom use, fewer concurrent or multiple partners, and reduced cultural practices that may have facilitated HIV transmission) (Tao et al. (2003)). Lugalla et al. (2007) confirmed these findings for the general population in Kagera region Kwesigabo et al showed that in the early stages of the epidemic, HIV incidence reduced amongst women of younger ages in urban areas, but less so in rural areas Watson-Jones et al found that HIV prevalence amongst female bar workers, women who work at truck stops were higher than in the general population. Mwaluko et al 2003 noted the consistent high patterns of HIV prevalence and that reductions were most visible in urban areas, and that the gap between urban and rural prevalence levels were decreasing
Kigoma	Yes	No	1.1	15.0	1.1	No studies found
Kilimanjaro	Yes	Tourism mainly	1.0	1.5	5.4	HIV prevalence amongst female bar and hotel workers was high (19%) and increased with age, number of sexual partners, and levels of condom use (Ao et al.), whereas a study in a rural village in the region (Oria) showed lower prevalence (5.6%), but higher prevalence amongst women than men. Trends in condom use and multiple sexual partners changed over time. Mmbaga et al showed that educated men and women were most likely to have changed their behaviour. In another stud, Mmbaga et al also showed how behavioural trends have changed: younger men and women were most likely to change their number of sexual partners, and use condoms, whereas older men had not reduced their number of partners, but did use more condoms. Msuya et al suggest the same findings: HIV prevalence has decreased over time, and the decline was greatest amongst women aged 15 to 24.
Lindi	No	No	1.0	1.9	-0.3	No studies found
Manyara	No	No	1.1	3.7	0.3	Yahya-Malima et al found that HIV prevalence was more likely if you were a member of a fishing community, and in a separate study that HIV prevalence was the highest amongst rural females.
Mara	Yes	No	1.8	1.9	-1.8	Watson-Jones et al found that HIV prevalence amongst female bar workers, women who work at truck stops were higher than in the general population. Reports also suggest that mining activity is increasing in the region.
Mbeya	Yes	Yes with Zambia	1.3	0.9	5.6	Riedner et al. (2007) found HIV prevalence of 68% amongst female bar workers, and Jordan-Harder noted the declines in prevalence between 1994/5 and 2000 for women in the age group 15 to 24
Morogoro	No	No	1.6	2.9	1.2	No studies found
Mtwara	No	No	0.9	1.4	4.4	No studies found
Mwanza	Yes	Tourism	0.9	1.6	2.2	Reduction in incidence in roadside villages, especially amongst younger women, but increase in incidence amongst women in rural areas (Wambura et al., 2007). Watson-Jones et al found that HIV prevalence amongst female bar workers, women who work at truck stops were higher than in the general population. Matasha et al (1998) found revealing data about the sexual behaviour of young people: Eighty per cent of PS boys and 68% of PS girls were already sexually active; the corresponding figures were 89% for SS boys and 48% for SS girls. Vaginal sex was the most common first sexual act reported by SS pupils, but 40% of PS pupils reported orogenital sex and 9% of PS pupils reported anal sex as their first sexual act. Almost half of PS

¹ 'YES' included where the Tanzanian Revenue Authority (TRA) indicated 'mining' as a major industry in the region – as per their website <http://www.tra.go.tz/regions.htm>

Region Name	/Mining activity ¹	Border / transport port town	F:M HIV prevalence ratio 2003	F:M HIV prevalence ratio 2007	Change in prevalence from 2003 to 2007 (positive change = reduction, - change = increase)	Other research results
						girls have had sex with adults, including teachers and relatives. 'Forced sex' was reported by nearly half of PS and SS girls
Pwani	No	No	2.7	2.1	2	No studies found
Rukwa	No	No	1.2	1.1	1.5	Jordan-Harder et al. (2003) noted the increase in prevalence in this region
Ruvuma	No	No	0.9	1.4	1.4	No studies found
Shinyanga	Yes	No	1.4	1.2	-1.1	Watson-Jones et al found that HIV prevalence amongst female bar workers, women who work at truck stops were higher than in the general population.
Singida	No	No	2.0	1.2	0.6	Yahya-Malima et al found that HIV prevalence was more likely if you were a member of a fishing community, and in a separate study that HIV prevalence was the highest amongst rural females.
Tabora	Yes	No	2.0	1.3	1.1	No studies found
Tanga	No	No	2.3	2.5	1.9	No studies found

(g) Heterogeneity related to migration

Although data on HIV and migration are not available at a population level (data about migration are collected in the DHS, but have not been analysed by migration status), several community-level studies have shown that numerous aspects of migration – being separated from one’s spouse (both the traveler and the one staying behind), the frequency of travel, and duration of time away from home - impact on sexual risk behaviours. A study in Kisesa found that high levels of short and long term mobility and being close to the trading centre were significantly associated with increased HIV incidence (Boerma et al., 1999, 2002). Another study in Kisesa (Kishamawe et al.) found that:

- “Overall, whereas long-term mobile men did not report more risk behavior than resident men, significantly more short-term mobile men reported having multiple sex partners in the last year².
- In contrast, long-term mobile women reported having multiple sex partners more often than resident women (6.8 versus 2.4%; $P = 0.001$), and also had a higher HIV prevalence (7.7 versus 2.7%; $P = 0.02$).
- In couples, men and women who were resident and had a long-term mobile partner both reported more sexual risk behavior and also showed higher HIV prevalence than people with resident/ short-term mobile partners.
- Remarkably, risk behavior of men increased more when their wives moved than when they were mobile themselves”.

Vissers et al. (2008) found that risky sexual behaviour in Arusha, Tanzania, occurred more often in mobile, co-resident men, and in women living apart from their husbands, who infrequently see them, than in men and women who are separated for long periods of time. Mobility is, however, not always associated with risky behavior: one study in Arusha, for example, found that Maasai men do not have sex when they travel to towns on business (Coast et al. 2006) – Clift et al. (2003) supported this finding: they found that migrant mine workers in the north western part of Tanzania had lower HIV prevalence levels than the general population in the same areas.

(h) Heterogeneity in specific sub-populations

Specific sub-populations in Tanzania, such as fishing communities, females affected by sexual and domestic violence, military, truck drivers, and sex workers have a disproportionately high HIV burden (Fraser et al., 2008). Behavioural surveillance amongst refugees and surrounding populations by the GLIA and UNHCR (2005), and research by Tanaka et al. (2008) both noted that specific HIV-related behaviours had the potential to put refugees at increased risk of infection, but that the surrounding population can also have increased higher risk behaviour that put the refugee population at risk.

Commercial sex in Tanzania: Although the extent of commercial sex is not known, it is known that there are various forms of transactional sex taking place in Tanzania: the lines between transactional sex and female sex work is blurred. Many of the women who have had sex in return for gifts, money and the like would not classify themselves as sex workers. Desmond et al. (2005), for example, found in a mining town in northwestern Tanzania that “many types of women were found to receive payment for sex, distinguished by permanency of residence, age, relationship status, accommodation and income-earning activity”, and that such activities were most likely to take place in towns – “as a result of the economic opportunities available there (in contrast to the poverty of surrounding areas), which were often accessed by offering sex in exchange for money or gifts”. These findings were confirmed by Watson-Jones et al, (2006) who found that HIV prevalence amongst female bar workers, women who work at truck stops were higher than in the general population. Clift et al found great variation in HIV prevalence in two mines in the Lake zone – 42% of female recreational workers were HIV positive, 6% of male mine workers, 16% of male community members and 18% of female community members. Similar findings were evidenced in Moshi: bar and hotel workers had HIV prevalence of almost 4 times that of the general population (26% (Kapiga et al., 2006) vs 7%).

² Within the context of the research study, the following definitions of ‘short term mobile’ and ‘long term mobile’ were used: A person was considered to be *short-term mobile* if he or she had slept outside the household at least once the night before one of the five demographic rounds, and considered to be *long-term mobile* if he or she had been living elsewhere at least once. Residents were all people that did not sleep outside the household nor lived elsewhere at the time of the demographic rounds.

Anal sex: Another form of sexual behaviour that carries an increased risk for HIV transmission, is anal sex (often, but not exclusively, practiced by men having sex with men). Although data on anal sex in Tanzania was scarce, some data emerged:

- Kesheni et al (1998) reported that in their survey, the responses to questions about anal sex was too infrequent to include in the analysis. This is not surprising, given the highly secretive nature of the activity – a study of MSM in Malawi (bordering southern Tanzania) found that 31% of MSM reported fear of sexual orientation disclosure and discrimination (Ntate et al 2008), and that 91% kept their sexual orientation a secret from family members and friends.
- Makwagile et al (2001) reported, in a study of 1423 youth attending a youth health clinic the following anal sex activity: “penile-anal sex by 3.4% and 5.1% of males and females, respectively (p = 0.56). Homosexual practice was reported by 2.3% of the males”.
- Matasha et al (1998) found that amongst primary school pupils, 9% had reported anal sexual activity, even at this young age.
- Hoffman et al (2004) found, in focus group discussions with women who are part-time sex workers that “anal sex is also practised and the pay is much higher than for vaginal sex”.

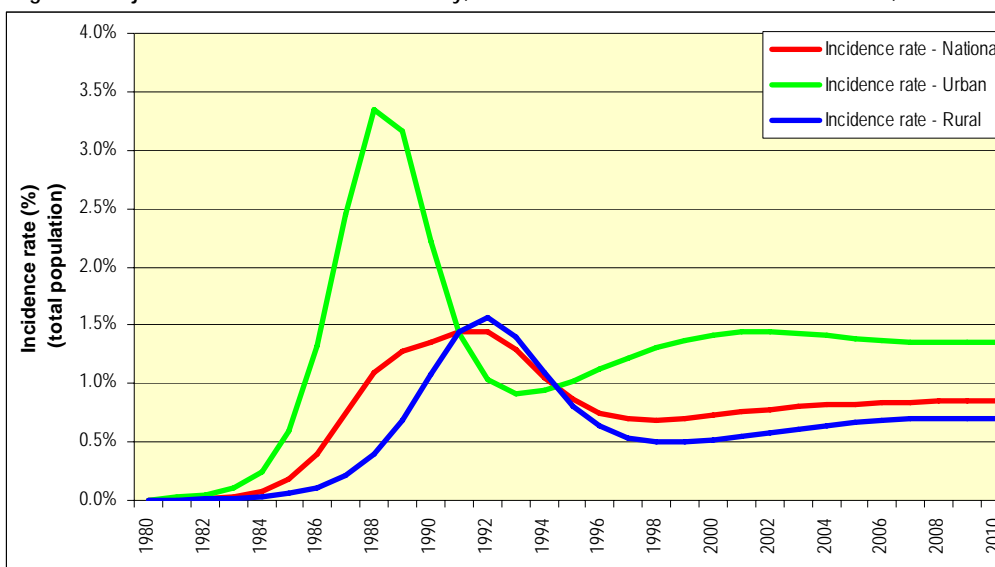
In a recent study in Zanzibar, HIV prevalence amongst men having sex with men was found to be much higher than that of the general population (11% compared to 0.6% in the general population). Given the extent of tourism-related migration between Zanzibar and mainland Tanzania, a study to look at the prevalence of anal sex practices, and HIV prevalence amongst those who practice anal sex, is important to understand.

3.3 HIV incidence trends over time

HIV incidence rates³ have, according to estimates and projections, evolved in the following ways (see Figure 20 and Figure 21):

- Urban incidence peaked in the late 1980s at about 3.4%, declined steeply to about 1% and is now presumed to have stabilised at about 1.4%;
- Rural incidence peaked approximately 4 years later in the early 1990s at about 1.5%, declined to about 0.5% thereafter, and has increased to a secondary plateau at about 0.7%.;
- National incidence peaked at about 1.5% and is estimated to be at a stable level of 0.8%-0.9% in 2008.

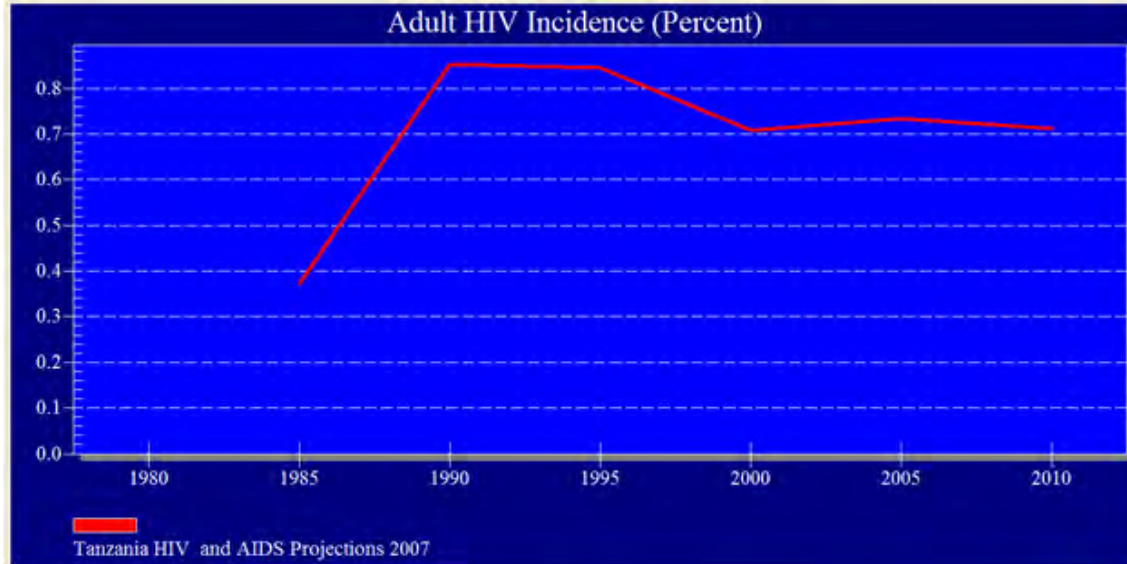
Figure 5: Projected HIV incidence rate nationally, in rural areas and in urban areas in Tanzania, 1980 to 2010



Source: Graph drawn by author, using data from HIV projections in 2005 (in NACP, 2005)

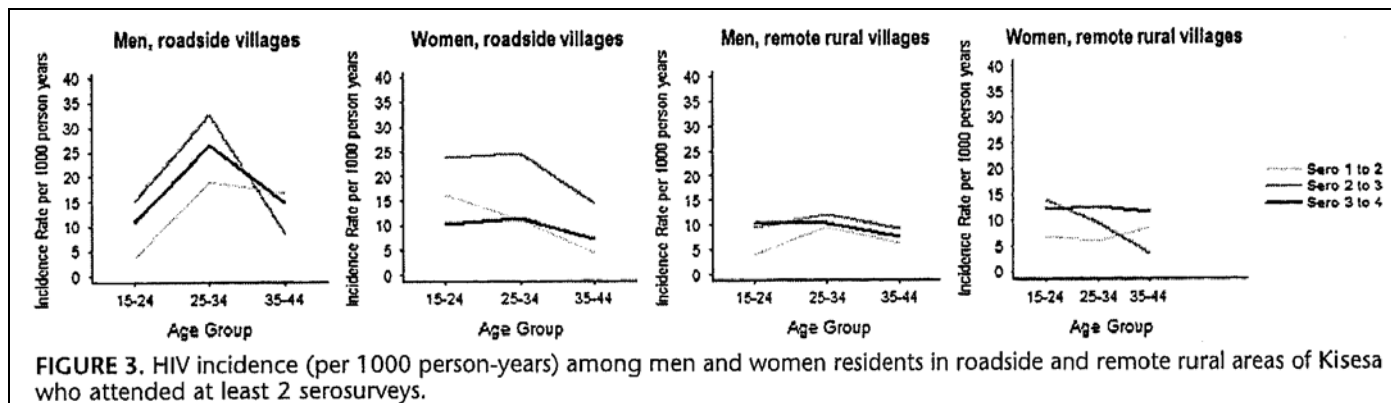
³ Proportion of HIV negative individuals who become HIV positive over a period of time (usually 1 year) – e.g. 1% annual incidence = 1 person out of 100 HIV negative persons gets infected over a 1-year-period.

Figure 6: HIV incidence projection in 2008



Source: NACP, 2008 (incidence projections using Spectrum and EPP)

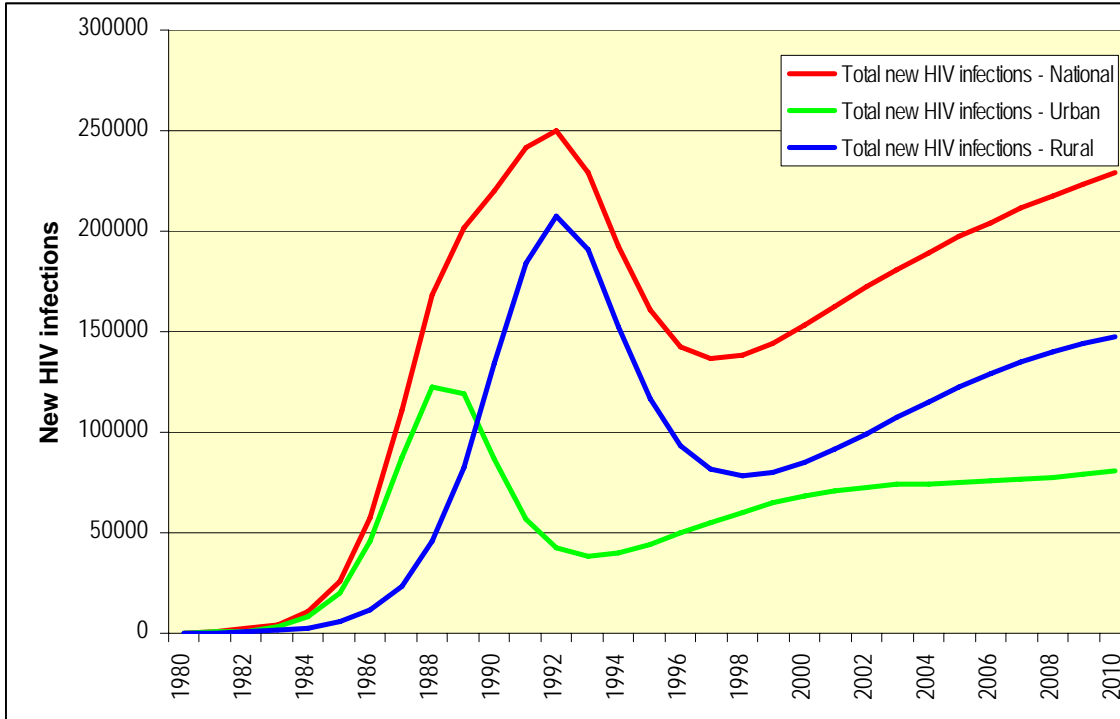
Community-level studies confirm these national level estimated findings: HIV incidence in urban areas increased before it did so in rural areas. Whilst incidence in urban areas has stabilized or fallen (especially amongst younger women), there is an increase in incidence in more rural areas (especially amongst women) (Wambura et al., 2007). It is important to understand whether HIV prevention messages are reaching these populations, and why incidence in rural women is increasing – is it because of increased higher risk sexual behaviour, or because these women are becoming the sexual partners of men from roadside villages?



Source: Wambura et al., 2007

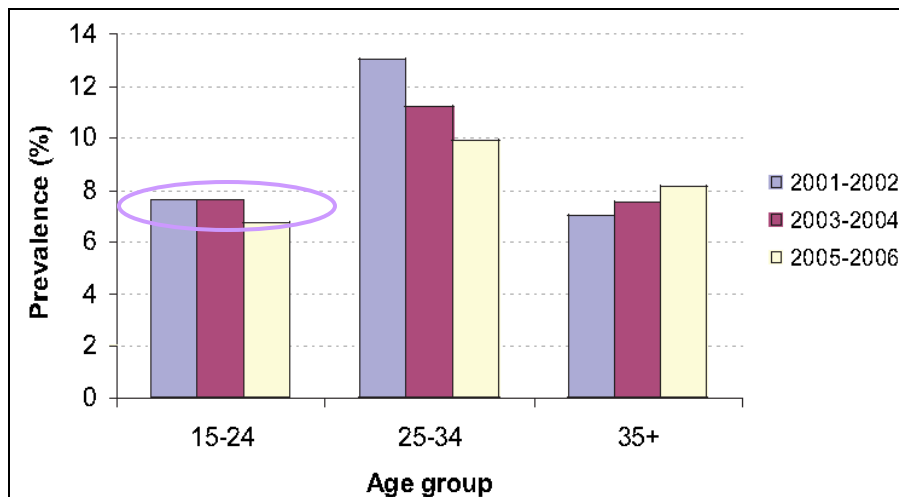
Figure 23 plots the projected number of new HIV infections, illustrating the increasing number of people contracting HIV each year from the late 1990 onwards, due to population growth and the youthful demographic structure of the population combined with stable (possibly slightly increasing) HIV incidence rates - leading to approx. 220,000 new infections in 2008, of which almost two thirds are residents of rural areas. Figure 24 shows HIV prevalence data from 15 to 24 year old ANC clients (proxy for incidence), corroborating the notion that incidence has stabilized.

Figure 7: Number of new infections nationally every year, in rural areas and in urban areas in Tanzania, 1980 to 2010



Source: Graph drawn by author, using data from HIV projections in 2005

Figure 8: HIV prevalence rate amongst different age groups of ANC clients, Tanzania, 2001 to 2006



NOTE to Figure 24:
 Care should be taken in interpreting Figure 23. First, the number of ANC sites have dramatically increased over the past 3 rounds of sentinel surveillance (from 25 in 2001 to 92 in 2006). Second, the confidence intervals for the values were not known, and the observed difference might not be statistically significant.

Source: NACP, 2007

4. Risk Factors and Drivers that have impacted on trends in the HIV epidemic in Tanzania

In this section, we summarise the data that were available about risk factors for HIV transmission (and how these have changed over time) amongst individuals, at the community level and within the broader society.

4.1 Risk factors at the individual level

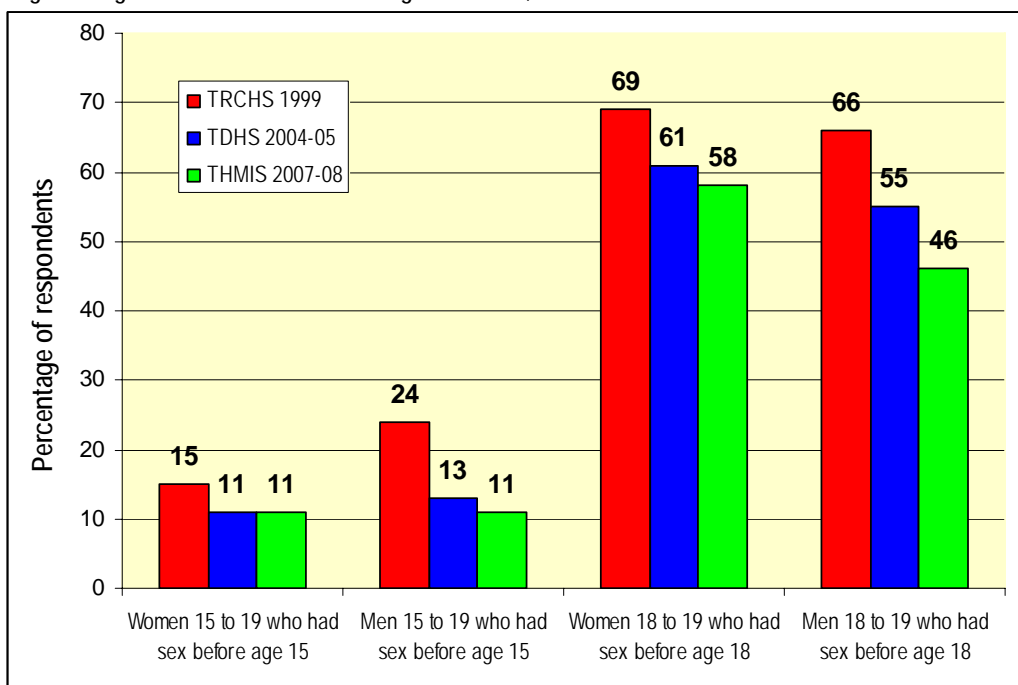
Individuals can change their behaviour and thus have control over two of the three factors that determine the reproductive rate – whether or not they are exposed to HIV and, if they are exposed, the probability of transmission during any single act of exposure – but not over the third factor (duration of infectivity). Exposure to HIV is the result of individual behaviour, whereas transmission probabilities are influenced by biological factors (such as circumcision status and the effectiveness of PMTCT efforts).

(a) Exposure to HIV

The data in this section should be viewed against the general consensus that sensitive behaviours tend to be under-reported in surveys and that reporting of sexual risk behaviour appears to be highly sensitive to survey design.⁴ Nnko, et al. (2001a, 2001b) found that 40% of married men and 3% of married women reported sexual partners other than their marital partners, but that women were mostly likely to report a partner who is well-educated, and that single men may be exaggerating their number of partners.

Age of sexual debut is increasing: The age of sexual debut has been pointed out in a number of studies (Mnyika et al., 1997) as being inversely associated with increased HIV prevalence (the lower the age of sexual debut, the higher the possibility of HIV infection), as Figure 25 shows.

Figure 9: Age of sexual debut is increasing in Tanzania, 1999 to 2008



Sources: TRCHS 1999, THS 2003-04, THMIS 2007-08

⁴ Research conducted by Nnko et al. (2004) in rural Tanzania found that the overall rate of underreporting of sexual partnerships by women was of the order of 16%. Plummer et al. (2004) reported that the validity and reliability of reported sexual experience among school students in Tanzania was low (evidence of much higher levels of sexual activity were revealed by in-depth interviews and participatory methods than in structured interviews and questionnaires).

The percent of women reporting two or more partners is back at low levels, but the percent of men reporting more than one partner increased dramatically and remains high. After an initial increase in self-reported multiple partners, data show a reduction in the percent of men and women reporting two or more partners in 2004, as can be seen in Table 4. This change is more pronounced in urban than in rural areas, more pronounced amongst women than amongst men and more prevalent amongst young people (Mmbaga et al., 2007). These increases took place despite increasing recognition of the risks of multiple partners: between 1996 and 2004, there was an almost three-fold increase in the percentage of men and women who said, in response to an unprompted question, that HIV can be avoided by limiting sex to one partner (MEASURE DHS, 2004). It should be noted that the number of reported lifetime partners remained the same between 1992 and 2004: 2.3 partners for women and 6.4 partners for men.

Table 4: % of men and women that have had two or more partners in Tanzania, 1992, 1996, 1999 and 2004

	FEMALE				MALE			
	1992	1996	1999	2004	1992	1996	1999	2004
Total	4	6	12	4	9	27	35	30
Age groups: 15-19	6	9	15	5	15	37	36	26
Age groups: 20-24	4	7	15	5	13	41	42	37
Age groups: 15-24	5	7	15	5	14	39	39	33
Age groups: 25-49	-	6	10	4	-	26	34	29
Age groups: 15-49	-	6	12	4	-	30	36	30
Residence (All ages surveyed): Urban	4	8	16	5	7	30	31	23
Residence (All ages surveyed): Rural	4	6	10	4	10	26	36	33
Education (All ages surveyed): No Education	4	5	11	4	9	19	34	30
Education (All ages surveyed): Primary	4	7	12	5	10	28	36	31
Education (All ages surveyed): Secondary and Higher	2	4	11	2	3	32	25	25

Source: MEASURE DHS, 2006

Married men are more likely than married women to report having a sexual partner who is not a spouse (21% of married men vs. 6% of married women), and this is much higher in rural areas and least frequent amongst those with most education (THIS, 2003-04; Nnko et al., 2004). These increases took place despite positive changes in attitudes about multiple partners: between 1996 and 2004, there was an almost three-fold increase in the percentage of men and women who said, in response to an unprompted question, that HIV can be avoided by limiting sex to one partner (MEASURE DHS, 2004).

At a population level, casual sex (sex with a non-married and non-cohabitating partner) amongst women have remained constant and have increased amongst men: Unprotected casual sex carries more HIV risk than sex with a regular partner (even if just one person has had such sexual intercourse) because one is 'connecting' to the casual partner's entire sexual network. Population-based data suggest that more men were having casual higher risk sex in Tanzania in 2004 than in 1996 – see Table 5. Increases are more pronounced at lower education levels (in men).

Table 5: Higher risk sex by men and women in Tanzania, 1996, 1999 and 2004

	FEMALE			MALE		
	1996	1999	2004	1996	1999	2004
Total	18	27	19	38	51	46
Age groups: 15-19	43	53	42	78	97	98
Age groups: 20-24	21	32	22	68	79	74
Age groups: 15-24	29	40	29	72	87	83
Age groups: 25-49	13	20	14	30	39	30
Age groups: 15-49	18	27	19	42	55	46

	FEMALE			MALE		
	1996	1999	2004	1996	1999	2004
Residence (All ages surveyed): Urban	26	40	29	43	53	50
Residence (All ages surveyed): Rural	16	22	15	37	50	44
Education (All ages surveyed): No Education	12	22	12	24	40	36
Education (All ages surveyed): Primary	21	28	20	40	53	46
Education (All ages surveyed): Secondary and Higher	29	44	32	46	42	51

Source: MEASURE DHS, 2006

In community-level studies, a number of authors have found that reductions in casual sex are statistically significant with decreased prevalence of HIV (Msuya et al. (2007), Kapiga et al. 2006, Kwesigabo et al. 2005), mostly in urban areas in Tanzania.

Condom use during sex with a non-regular and non-cohabitating partner has significantly increased amongst men and women: Rates of condom use during casual sex vary greatly by characteristic of respondents, and have also changed dramatically over time, as Table 6 shows. Although there has been an increase in the percentage of persons having sex with a casual partner (see Table 5), there have been even more pronounced increases in the percentage of men and women using condoms during casual sex:

Table 6: Condom use during casual sex by men and women in Tanzania, 1996, 1999 and 2005

	FEMALE			MALE		
	1996	1999	2004	1996	1999	2004
Total	16	22	33	32	34	51
Age groups: 15-19	17	19	40	23	26	39
Age groups: 20-24	20	24	37	37	36	51
Age groups: 15-24	18	21	39	31	31	46
Age groups: 25-49	13	24	27	33	40	56
Age groups: 15-49	16	22	33	32	35	51
Residence (All ages surveyed): Urban	27	32	48	41	52	67
Residence (All ages surveyed): Rural	10	15	22	28	27	44
Education (All ages surveyed): No Education	4	10	18	7	14	33
Education (All ages surveyed): Primary	17	24	33	32	34	49
Education (All ages surveyed): Secondary and Higher	35	44	56	47	65	78

Source: MEASURE DHS, 2006

Plummer et al. (2006) supports these findings: they noted that in Mwanza, condom use with a 'risky' partner was common, but not with a regular partner. In community-level studies, it was found that early sexual debut, being young and unmarried, high mobility and having multiple sexual partners was associated with condom use (Mnyika et al., 1997), whereas Mmbaga et al. (2008) found that there were significant increases in condom use amongst young women and older men over a 15-year period.

Paid sex / transactional sex: In Tanzania, transactional sex, not necessarily seen culturally as commercial sex, has been in existence for a long time. "Some cardinal features about sex work in Tanzania are that:

- The sex worker's first motivation is economic.
- The numbers of commercial partners are decreasing.
- Condom use has been accepted in short-term relationships.
- Condom use is rarely accepted in long term relationships" (NACP, 2001, citing Outwater et al., 2000).

These ethnographic data are also supported by quantitative data. In 1994, for example, many men and women accepted gifts or favours the last time they had sex with someone other than their regular spouse – see Table 7. Maganja et al. (2007) found that the youth described the exchange of sex for money and other material goods in all types of sexual relationships – casual and long-term relationships. Whereas young men described their

pursuit of multiple partners as being sexually motivated, women described their reasons as being economically motivated. Young women reported that their financial dependence on their male sexual partners affected their ability to negotiate safer sex practices.

Table 7: Trends in transactional sex in Tanzania, 1994 and 2007

Age group	% of individuals that accepted gifts or favours the last time they had sex with someone other than their regular spouse in Tanzania (1994)		% men age 15-49 reporting payment for sexual intercourse in the past 12 months (2007)
	Women	Men	Men
15 – 19	20	16	4.6
20 – 24	14	16	13.4
25 – 29	18	15	10.8
30 – 39	7	21	8.9
40 - 49	4	11	5.5

Source: Tanzania KAP, 1994

In 1999, up to 17% of persons in urban areas indicated that their last sexual encounter with a non-regular partner was in exchange for gifts or favours. As the nature of this question in population-based surveys has changed over time to include only commercial sex, the rates of paid sex appear to have dramatically decreased, but this is most likely due to differences in the way the question is asked, and social desirability biases. By 2003, only 1.8% of men said that they paid for sex, and this fell even further to 1.5% in 2007. The rates of paid sex are, however, not uniform – in the coastal zone, rates of paid sex are more than double that of the western and central zones. It has been widely accepted that commercial sex is linked to the tourism industry (Lugalla et al., 2007), which is concentrated along the coastal areas of Tanzania.

HIV transmission through needle sharing during injecting drug use is increasing as the practice increases: Recent studies have confirmed the existence of a small, but growing, population of injecting drug users. Most of these studies have been done in Dar es Salaam, and the prevalence of injecting drug use is therefore not yet widely understood. That said, the studies that have been done point to greater HIV risk amongst individuals with this behaviour and also in bridging populations, as needle-sharing injecting drug users also do sex work to fund their substance use (Ross et al., 2007). This raises the risk of more transmission from IDU/sex workers into the general population (provided that there are sufficient numbers of IDUs to sustain the epidemic in this sub-population).

(b) Per act probability of transmission

Male circumcision: In Tanzania, 70% of men are circumcised. Circumcision rates vary greatly across regions, and the practice is not only associated with one specific religion (98% of Muslims and 68% of Protestants indicated in 2003 that they were circumcised (Urassa et al., 1997; THIS, 2003-04; Weiss et al., 2008)). Nnko et al (2001) provided the following useful information about circumcision practices and attitudes in Tanzania: "Data from a factory workers study and a rural cohort study in northwest Tanzania were used to analyze the levels and determinants of male circumcision status and assess the reliability of self-reported data. Qualitative data from focus group discussions and in-depth interviews were obtained to ascertain norms and values in relation to male circumcision.

[We found that] male circumcision has become more popular in recent years, and 21% of 3,491 men reported themselves as circumcised. An increase in circumcision rates was observed in the rural cohort study during 1994 to 1997, though reporting inconsistencies are common. Circumcision rates were higher among men with higher levels of education and in Muslim men. Men are often circumcised in their late teens or twenties. The reasons for the increasing popularity of circumcision were investigated in group discussions and in-depth interviews. The most frequently mentioned reason was health-related; circumcision was thought to enhance penile hygiene, reduce sexually transmitted disease incidence, and improve sexually transmitted disease cure rates. **Male circumcision is becoming more popular among a traditionally non-circumcising ethnic group in Tanzania, especially in urban areas and among boys who have attended secondary schools."**

It is also important to note that the changes in circumcision status and perceptions about circumcision are occurring mostly (and firstly) amongst educated men and men who live in urban areas (Urassa et al., 1997). Weiss et al. (2008) found positive attitudes towards circumcision by young people in some areas of Tanzania, and that only 84% of those who said they were circumcised, had had their foreskin removed.

From the latest population-based HIV survey, it appears that there is an inverse relationship between the regional prevalence of circumcision and regional HIV prevalence, as Figure 25 shows (this is in agreement with internationally reported ecological data on male circumcision rates and HIV prevalence). This relationship remained statistically significant over time ($p = 0.0002$ in 2003 and $p = 0.009$ in 2007).

PMTCT: Providing antiretroviral drugs to women before and during child birth, and to the infant after child birth, can reduce the risk of transmission of HIV from mother to child. In Tanzania, PMTCT coverage has increased since 2002, when the PMTCT programme was introduced – as Figure 26 shows.

Figure 10: Male circumcision and HIV prevalence in Tanzania

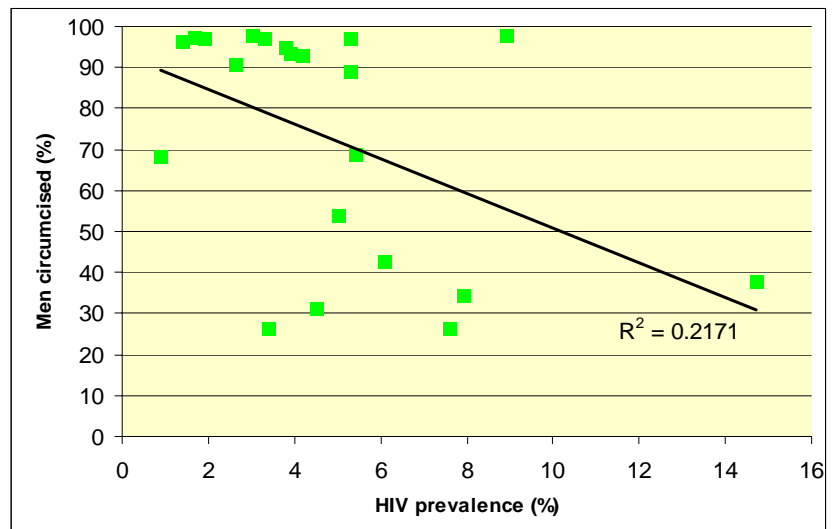
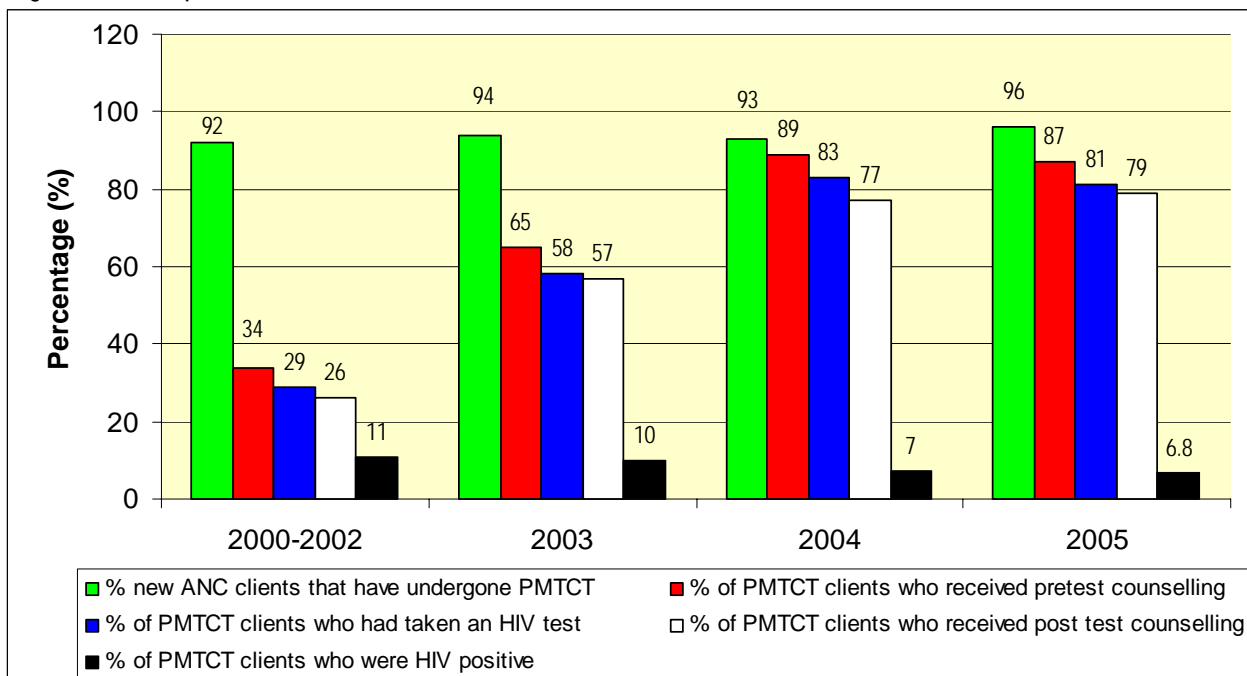


Figure 11: PMTCT performance in Tanzania over time, 2000 to 2005



Source: NACP, 2007

4.2 Household, community and society level drivers that may affect HIV transmission

Over the last 25 years, life in Tanzania has changed considerably. Not only is the political landscape a lot different, but population growth has been rapid (population density has increased from 14 persons per square kilometer, to 39 persons per square kilometer), and economic development has been strong, with economic growth around 6.3% since 2000 (World Bank, 2008). There have been significant reductions in the levels of stigma and discrimination towards HIV positive persons – in 1992, for example, 32% males and 18% females felt that AIDS patients should be quarantined or put in jail. This has dramatically decreased, with 89% of Tanzanians now having accepting attitudes towards people living with HIV (TDHS 2004-05), up from 79% in 1996. In this section, we describe data relating to community-level factors that could influence the decisions a person makes about HIV-related risk (which Haram, 2005, summarised by showing how people make decisions about sexual behaviour within the context of power and gender relationships).

Gender inequality increases women’s risk for HIV infection: Sa and Larsen (2008) found that economic deprivation (e.g. husbands not contributing to children’s expenses) and experiences of sexual violence were significantly associated with a woman being HIV positive. Changes in attitudes are also evident: Between 1999 and 2004, there has been an almost doubling of persons (from 55% to 94%, MEASURE DHS, 2006) who felt that a woman can refuse sex with her husband or insist on condom use if he has an STI. In a qualitative study in Dar Es Salaam, Lary et al. found that there were complex interactions between violence, forced sex, and infidelity. Men who were violent toward female partners, for example, also frequently described forced sex and sexual infidelity in these partnerships, and men in concurrent partnerships tended to become violent if their fidelity was questioned.

Community level factors such as the level of economic activity and levels of community mobility impact on HIV infection levels. Bloom et al (2002) discovered that controlling for community level effects such as the level of social and economic activity, ratio of bar workers per male population aged 18-59, the level of community mobility, and distance to the nearest town were significantly related to HIV, in addition to individual level risk factors (education, male circumcision, type of work, and number of household assets).

5. Summary: Trends in the HIV epidemic and Risk Factors in Tanzania

Tanzania has a mature, generalised epidemic, caused by specific and changing sexual behaviour. The national adult HIV prevalence peaked at 8% in 1995, and then gradually decreased to 6.5% in 2004 and 5.8% in 2007. At the onset, the epidemic was growing fastest in areas with larger or border towns, high population mobility (temporary migration due to labour factors), amongst those who were employed, more wealthy, or more educated persons (strong correlation between these factors).

However, over time, the nature of the HIV epidemic has shifted from an urban to a rural epidemic. By 2007, it was estimated that for every one person who becomes HIV positive in a rural area, only one person becomes infected in urban areas. Every year, an estimated one in every hundred people in Tanzania become HIV positive (annual HIV incidence rate = 1%; annual incidence rate in rural areas of 1.4% and annual incidence rate in urban areas of 0.7%). This trend is also reflected in the fact that the relationship between education and HIV risk has changed: earlier in the epidemic, more educated persons (who mostly live in urban areas) were more likely to be HIV positive, whereas currently persons with lower levels of education are more likely to be HIV positive.⁵

Currently, females are at significantly higher risk of being HIV infected than males (2007 national survey showed that females aged 15 to 49 were 40% more likely to be HIV+, and that females aged 15 to 24 were 33% more likely to be HIV positive than their male counterparts).

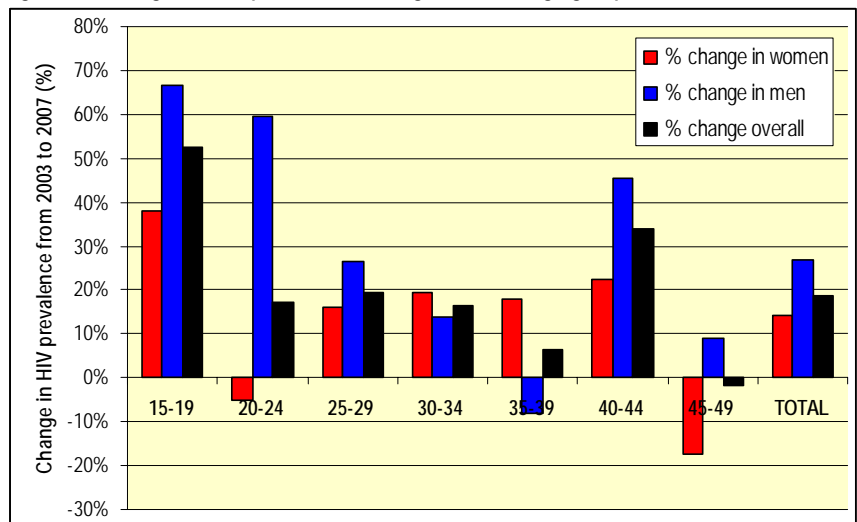
The absolute number of new infections has grown steeply over time, particularly in rural areas, due to population demographics. Currently, it is estimated that more than an estimated 1.8 million persons in Tanzania are living with HIV.

There are also significant differences in HIV prevalence levels across the various regions of Tanzania. The reasons for these differences are related to (a) prevalence of male circumcision in the region; and (b) percentage of population in urban areas in each region.

The reduction in population-based HIV prevalence (at the national level) is more pronounced at younger ages (with the exception of women aged 20-24), with small decreases (and some increases) in older age groups, as illustrated in Figure 28.

Figure 28 depicts a possible change in the prevalence trends over time. It shows that the biggest reductions in prevalence have been in the male population, not in the younger female population as many of the region-level or community-level studies have shown. These region-level or community-level studies have, however, been undertaken before these two rounds of surveys. It could therefore be that this graph (which compares 2003 and 2007 prevalence values) is pointing to a new trend of increasing prevalence changes amongst men, but may have been influenced by the refusal rates for the HIV prevalence testing in the two population-based surveys, and this could have skewed results too (see Table 3).

Figure 12: Changes in HIV prevalence amongst different age groups in Tanzania, 2003 to 2007



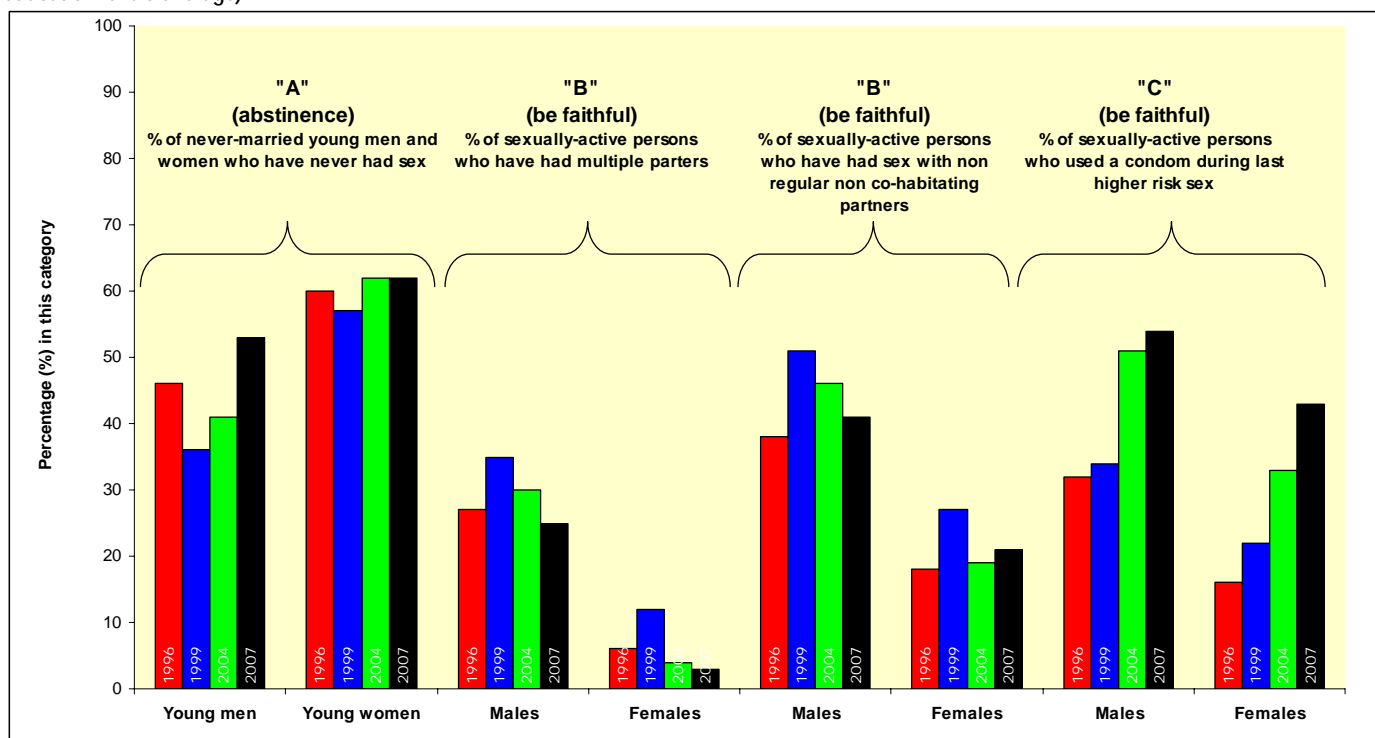
Source: Drawn by author, using data from THIS 2003-04 and THMIS 2007-08

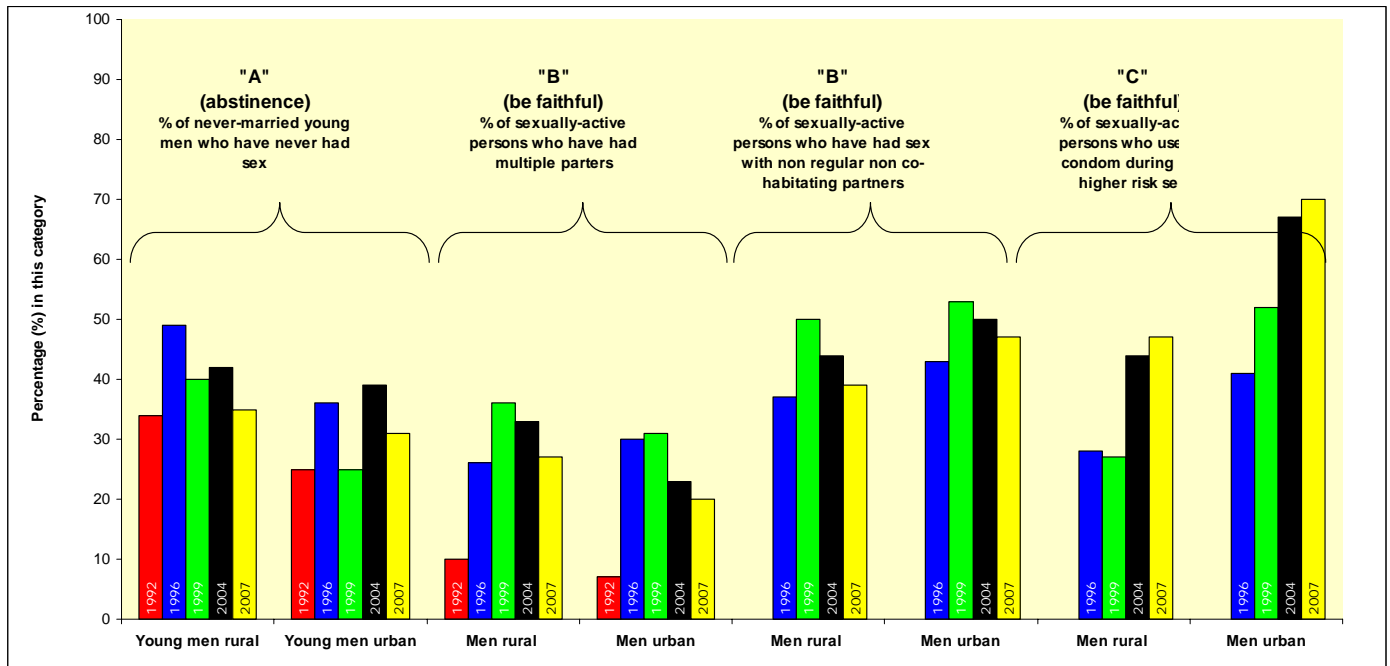
⁵ This is consistent with a similar finding by De Walque (2004) that in Uganda, initially, higher education levels were associated with higher HIV prevalence, but this changed, and later in the epidemic lower education levels were associated with higher HIV prevalence.

Sexual behaviour patterns in Tanzania have changed significantly over the last 15 years. The changes in HIV prevalence over time are consistent with the changes in sexual behaviour observed in the two surveys: positive behaviour changes (reduction in frequency of multiple sexual partners, reductions in the frequency of sex with casual partners, later sexual debut and increased condom use) have been more marked among young men and women than older adults. Figure 29 summarises what we know about sexual behaviour in Tanzania at the national level, whereas Table 8 summarises the trends in behaviour change by sex, residence, education level and age. From this data, it is clear to see that:

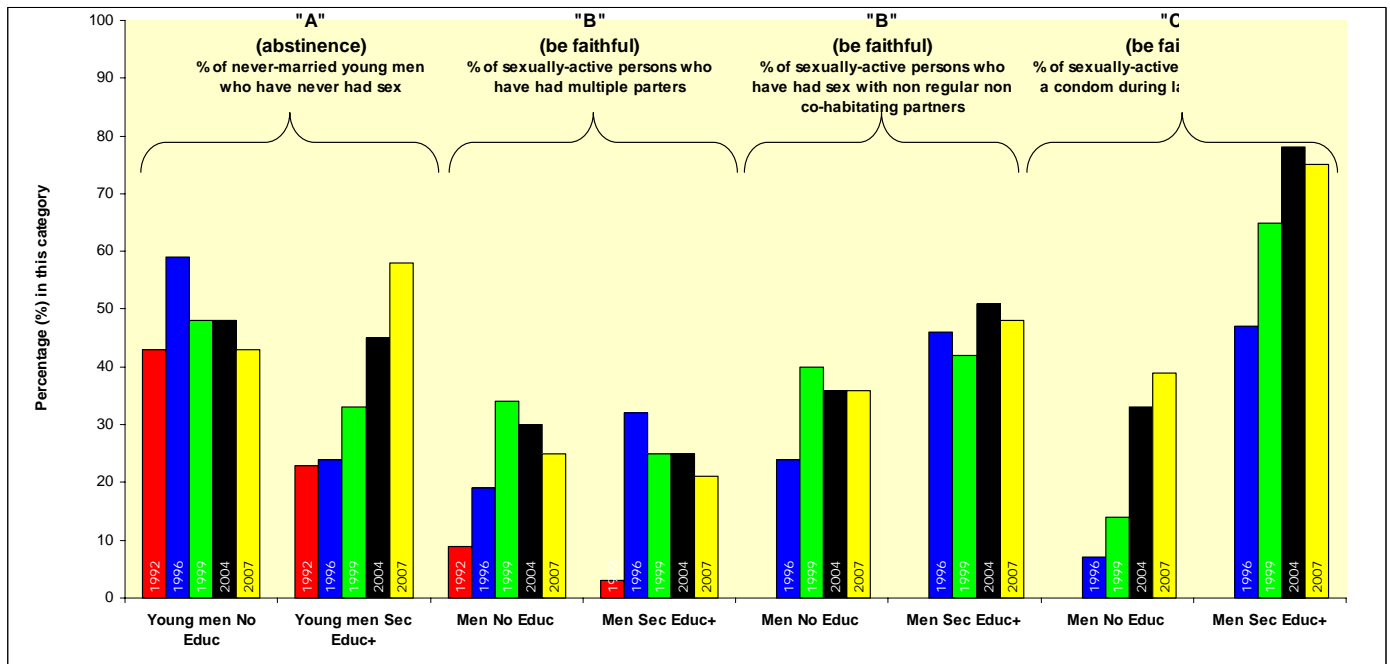
- More young men and young women are delaying sexual debut. This change is most visible amongst educated and urban-resident young men
- Opposite trends are visible in rural areas and amongst persons with no education, where more young men and young women are having sex (i.e. not abstaining)
- Across the board, men and women are having fewer sexual partners. This change is most visible amongst women of all ages, all education levels and in all residences, than amongst men
- Fewer men and women are having non regular sexual partners. This change is more visible amongst women in urban areas
- Condom use amongst men and women has increased.
- The change is more pronounced amongst women than men

Figure 13: Changes in HIV behaviour patterns over time amongst men and women in Tanzania, 1996, 1999, 2004 and 2007 (national, rural/urban, education levels and age)

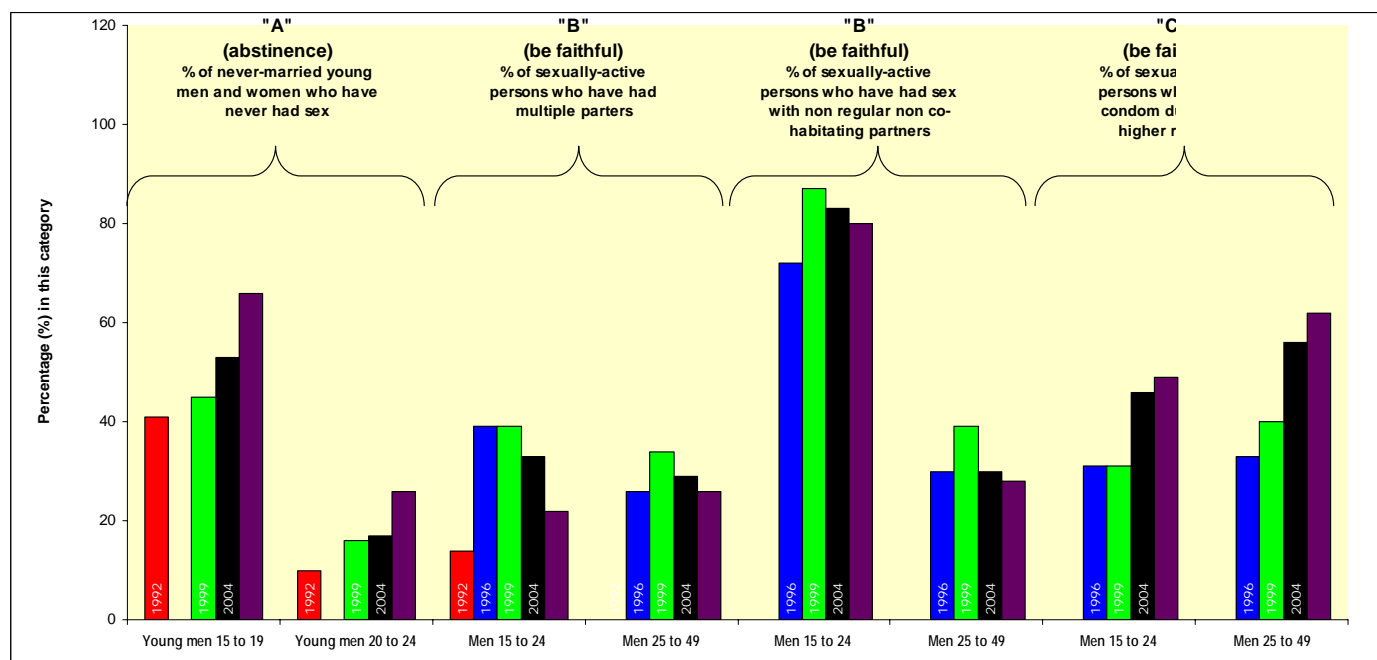




Source: Drawn by author, using TRCHS 1999; TDHS 2004-05; THMIS 2007-08



Source: Drawn by author, using TRCHS 1999; TDHS 2004-05; THMIS 2007-08



Source: Drawn by author, using TRCHS 1999; TDHS 2004-05; THMIS 2007-08

Table 8: Summary of sexual behaviour change trends in Tanzania, 1999 to 2007 (negative percentage indicates a decrease, whereas a positive percentage indicates an increase)

	% of never-married young men and women (15 to 24) who have never had sex		% sexually-active men and women (15 to 49) who have had multiple partners		% sexually-active men and women (15 to 49) who have had non regular partners		% sexually-active men and women (15 to 49) who have used condoms during sex with non regular partners	
	"A" - Abstinence		"B" - Be faithful		"B" - Be faithful		"C" - use condom	
	Young Men	Young Women	Men	Women	Men	Women	Men	Women
National	37.0%	8.3%	-37.0%	-150.0%	-26.3%	-33.3%	62.5%	131.3%
Rural	-13%	5%	-25%	-60%	-22%	-18%	74%	153%
Urban	24%	20%	-35%	-81%	-11%	-25%	35%	63%
No education	-10%	-17%	-26%	-73%	-10%	-36%	179%	200%
Sec education +	76%	72%	-16%	-82%	14%	-23%	15%	39%
Age 15 to 24	47%	8%	-44%	-73%	-8%	-20%	58%	119%
Age 25 to 49	63%	11%	-24%	-70%	-28%	-25%	55%	67%
CONCLUSION	<ul style="list-style-type: none"> More young men and young women are delaying sexual debut This change is most visible amongst educated and urban-resident young men Opposite trends are visible in rural areas and amongst persons with no education, where more young men and young women are having sex (i.e. not abstaining) 		<p>Across the board, men and women are having fewer sexual partners.</p> <p>This change is most visible amongst women of all ages, all education levels and in all residences, than amongst men</p>		<ul style="list-style-type: none"> Fewer men and women are having non regular sexual partners This change is more visible amongst women in urban areas 		<ul style="list-style-type: none"> Condom use amongst men and women has increased. The change is more pronounced amongst women than men 	

Source: Prepared by author, using data from 1999 TRCHS, 2004-05 TDHS and 2007-08 THMIS

6. How have we been responding? Recommendations for the Joint Review

In 2008, Tanzania launched its second National Multisectoral Strategic Framework. This Framework lays the foundation for the HIV response in Tanzania in the next five years. Given the evidence about HIV transmission summarised in this report, this section considers the implications of these findings and other recent research studies on the NMSF objectives relating to prevention, and also on the possible implications for care and support, and impact mitigation.

RECOMMENDATIONS FOR HIV PREVENTION

Prev Strategic Objective 1: Promote abstinence, delayed sexual debut, partner reduction and consistent condom use among young people in and out of school

Progress has been made with behaviour change: behaviour amongst young adults seems to be changing with delayed sexual onset and increased condom use, despite increased levels of sex with casual partners. That said, there are also high-risk populations within Tanzania that are not yet focused on, and the NMSF's almost exclusive focus on young adults seems to be slightly misplaced within the context of Tanzania's slowing-urban, increasingly-rural epidemic. A more balanced approach may be needed – the focus on young people should continue, but should be balanced with social change communication programmes (to change society norms and standards around multiple partners) in the rural areas of Tanzania, focusing on older adults and persons who migrate on a short basis for employment purposes.

That said, there seems to be factors that could, potentially, hamper behaviour change. Macha (personal, Nov 08) have also shown that there are many distal factors that impact on sexual behaviour which, in turn, may impact on HIV transmission – e.g. in Singida, local drivers of the epidemic were identified as “poor economic base and living conditions among families, unsafe sex among communities and more specifically among girls and truck drivers, secondary school girls forced to live in rented accommodation. moral decay among parents, children and youths, traditional dances (eg chagulaga) including night-long celebrations such as the Uhuru Touch, camps for road construction workers, some parents taking their children and especially young girls as sources of income and presents, alcoholism, women inheritance/cleansing, misconceptions on Condom use among some of the societies and notably among parents, un-availability of free-distributed condoms in majority of the villages, non-availability of Youth Friendly HIV and STI services, few infected individuals spreading HIV intentionally, traditional beliefs in rural areas that HIV is not a disease that can be transmitted from one person to another but something to do with witchcraft, and beliefs that HIV is a problem only for those living in towns.

These factors are useful to understand how to pitch HIV prevention messages, and makes it clear that HIV prevention messages need to be focused and targeted to local situations. None of these factors have, however, been thoroughly researched or their impact on HIV transmission, on a population level, been determined. Regional Councils need access to such information to help them formulate the best possible responses.

In terms of the communication messaging, print media and health workers may not be the best approaches. The evidence from the DHS suggests that radio programs and peer educators would be more effective ways to deliver prevention information (Table 9).

Table 9: In response to a question “where did you hear about AIDS?”, in Tanzania 1996

	Female respondents	Male respondents
Radio	64%	87%
Friend	65%	55%
Health worker	24%	12%
Newspapers	18%	34%

Recommendation for the Joint Review: It is suggested that Tanzania does not exclusively focus on the youth or on urban areas, but to consolidate and communicate the progress made with behaviour change, and continue to focus on women – especially women in their early 20s, emphasize partner reduction and risks of unprotected sex in partnerships where the HIV status and sexual network of the partner is not known, and focus on older adults (male and female) in urban and rural areas.

Prev Strategic Objective 2: Reduce risk of HIV infection among the most vulnerable populations

Before the advent of the new NMSF, main avenues of HIV transmission in Tanzania were considered to be either heterosexual transmission in the general population, or transmission from mother to child. Although the new NMSF recognises the importance of focusing on the most at risk populations, implementation guidelines are not available and the size of the populations most at risk is not known. Research data also shows that there are key populations at risk who need to be focused on with additional HIV interventions.

Recommendation for the Joint Review: (a) What is suggested, first of all, is a size estimation study to determine the approximate numbers of IDUs, sex workers and MSM in Tanzania, their HIV prevalence and sexual behaviour. After this, appropriate decisions can be made about the kinds of prevention interventions that are most likely to be effective in reaching these persons and their networks and enabling them to protect themselves and their partners from HIV infection. (b) Specific programmes for other populations with disproportionately high HIV burdens such as fishing populations, females affected by sexual and domestic violence, female sex workers (also those not formally known as sex workers), mine workers, the military, and the families in which these populations are located, are suggested – also that such efforts be coordinated with the GLIA's implementation processes.

Prev Strategic Objective 3: Expand workplace interventions, with special attention to mobile and migrant workers

Mobility and short-term migration has been shown to be associated with increased HIV risk in the Tanzania data. Whilst workplace programmes exist, programmes for mobile workers have not been implemented at scale (including programmes for short term migrant workers).

Recommendation for the Joint Review: It is suggested that (a) Integrated prevention programmes urgently be implemented in all major trading centres (including centres that are not in areas classified as trading areas); (b) specific programmes be designed that would be appropriate to men and women of higher education levels in urban areas who travel for short periods of time (for example, to a workshop or business meeting in another town in Tanzania); (c) that all HIV implementers include HIV prevention messaging and condom distribution as part of HIV-related workshops so as to set an example (e.g. whenever HIV workshops take place to discuss the NMSF or district-level HIV planning); (d) focus integrated workplace programmes in locations where migrant workers are found (large factories, transport organizations, plantations) and ensure that these programmes focus on social change communication, and not only HIV testing; and (e) that the 2007 THMIS and future surveys that collect sexual behavioural and HIV biomarker data also include questions on time spent away from home and analyse these data as an HIV risk factor.

Prev Strategic Objective 4: Prevent, treat and control other sexually transmitted infections (STI)

Whereas there is plausible biological evidence that STIs increase HIV transmission, some new findings in terms of STI control as an effective HIV prevention strategy has emerged. Contrary to what observational studies suggested in earlier years and the randomized control trial in Mwanza, Tanzania in the 1990s, evidence from all other randomised controlled trials for STI control in the past ten years seem to suggest the efficacy of STI control as an effective HIV prevention strategy (Sangani et al., 2004; Gray and Waver, 2008). Researchers have suggested that this is in part because “observational studies about the associations between sexually transmitted infections and HIV acquisition are susceptible to confounding, because both infections are transmitted by the same sexual risk behaviours” (Gray and Waver, 2008), but also because of the implementation challenges associated with the syndromic management approach to STI control. Sangani et al (2004) found that there were varying levels of compliance with syndromic management guidelines, and no significant changes in treatment-seeking behaviour or service uptake (Sangani et al., 2004). A recently completed study amongst sex workers in Zimbabwe (Cowan et al., 2008) showed that amongst HIV-1 positive and HSV-2 positive female sex workers, suppressive acyclovir therapy had no effect on the rate of HIV

genital shedding despite reduction in genital HSV-2 viral shedding – adding to the body of knowledge that HSV-2 treatment is not effective as an HIV prevention strategy.

It therefore seems that despite their common behavioral pathways, STIs and HIV are not necessarily highly correlated at the population level. We have numerous examples of countries with high STI rates that have not experienced commensurate HIV epidemics. Also, therefore, the hypothesis that reducing STI infection reduces HIV transmission has been extensively tested and at least 8-9 trials have found no effect. There is thus insufficient evidence to support either bacterial or viral STI treatment to help prevent HIV.

However, offering STI treatment to vulnerable populations, including sex workers and men-having-sex-with-men, who may have a high STI burden, may help to build rapport, trust and solidarity and as such may be a component of a comprehensive intervention. Also, STIs are an important health problem in their own right – greater than HIV in many countries – and as such STI control for the general population should be a priority, but in keeping with the recommendations of the Commission on AIDS in Asia, financed by non-HIV health resources.

Recommendation for Joint Review: These findings do not mean that STI control is not important as a public health intervention. STI treatment and control should continue as a public health intervention. What is, however, suggested is that Tanzania reviews its strategy around STI control and HIV prevention, based on the latest research evidence.

Prev Strategic Objective 5: Promote and expand HIV testing and counseling services

Between 1996 and 2004, the percentage of persons who know their HIV status increased from 4% F and 11% M (TDHS 1996) to 15%F and 11% M. There are significant variations: people in urban areas in the highest wealth quintile and of highest education levels had double the overall HIV testing rates at 30% or higher. It is also in these populations (wealthier, more educated persons in urban areas) that the HIV epidemic initially spread.

A recent meta-analysis of research about the effectiveness of VCT as an HIV prevention measure has shown that “VCT recipients were significantly less likely to engage in unprotected sex when compared to behaviours before receiving VCT, or as compared to participants who had not received VCT. VCT had no significant effect on the number of sex partners. While these findings provide only moderate evidence in support of VCT as an effective prevention strategy, neither do they negate the need to expand access to HIV testing and counseling services” (Denison et al., 2007:363). Other studies have shown positive behavioural outcomes for HIV positive persons (Eisele et al., 2008), but negative outcomes for HIV negative persons (who either increase or maintain their high risk behaviour after testing negative) (Corbett et al., 2007; Potts et al., 2008).

Other studies (Eisele et al., 2008) have also shown that HIV positive persons do not always engage in safer sex practices – either with their regular partners or with casual partners. Given the large pool of already-positive persons in Tanzania, it is important to focus on these persons to ensure that they themselves adopt safer sex practices consistently, and to ensure that there is careful good counseling for people who test positive.

From this review of recent research it is clear that HIV counseling and testing is not a panacea for HIV prevention – just as it is over-simplistic to assume that HIV education will necessarily lead to behaviour change, it is over-simplistic to assume that once a person knows their HIV status, they will automatically change their behaviour to reduce their risk of becoming infected or infecting others.

Recommendation for Joint Review: HIV counseling and testing is important as an entry point for HIV prevention, care and support, and impact mitigation. As such, it is recommended that Tanzania focuses on quality of service, and on ensuring that HIV prevention follows HIV counseling and testing, irrespective of whether a person tests positive or negative.

Prev Strategic Objective 6: Prevent mother to child transmission of HIV

From an epidemiological point of view, PMTCT is highly effective in reducing HIV infection from mother to child, and has been scaled up in recent years. What is important, is to avoid HIV transmission during pregnancy (of HIV negative women). This high risk has been pointed out in a number of studies (Gray et al (2005) Uganda; and Shisana et al (2005) in South Africa both showed the increased incidence in (recently) pregnant women).

Recommendation for Joint Review: No recommendations from an epidemiological perspective.

Prev Strategic Objective 7: Promote and distribute condoms

There is a clear demand in Tanzania for condoms, with reported levels of condom use increasing dramatically. Condoms also work as an HIV prevention strategy, if used consistently and correctly. What is, however, alarming, is the general notion in Tanzania that you 'use a condom with a casual partner, but not with your regular partner'.

Recommendation for Joint Review: It is suggested that messaging around condom distribution and use should focus on the importance of consistent condom use – 'using a condom some times, if you have multiple partners or concurrent partners – is not going to be effective'. Concomitantly, risk perception in any sexual relationships between partners who have not tested for HIV or who have multiple partners should be increased, in order to improve condom demand by those at risk.

Prev Strategic Objective 8: Prevent HIV transmission through blood transfusions, exposure to contaminated body fluids and contaminated instruments

This intervention is successful, and HIV prevention efforts are working -- blood products are tested before use. However, because a replacement donor system is mostly used there is a risk of HIV transmission through blood products if blood is donated during the early period after infection (the "window period" when HIV antibody testing may not detect HIV). Epidemiologically, universal precautions work to reduce accidental exposure to HIV, as long as these programmes are implemented comprehensively.

Recommendation for Joint Review: It is recommended that efforts be considered to expand the volunteer blood donor system, with appropriate screening measures.

Prev Strategic Objective 9: Introduce new prevention interventions

Male circumcision is listed in the NMSF as a new prevention intervention. There is agreement in Tanzania that male circumcision has been proven to work as an HIV prevention tool, and research in Tanzania shows that (a) most of the male population is already circumcised; (b) male circumcision is accepted in most parts culturally and for personal hygiene purposes and practiced by persons of all religions in Tanzania, and (c) that more persons in urban than rural areas are circumcised. Tanzania is also currently undertaking research in Mara and Manyara about male circumcision, to address the fact that "in almost all regions of Tanzania, there is a dearth of information regarding cultural attitudes and practices towards male circumcision, the safety of the procedure and techniques used in both clinical and traditional settings and the capability of the existing health service infrastructure to deliver safe male circumcision services. Such information is needed to establish strategies for effective programming and scaling up of safe male circumcision practices in Tanzania" (NIMR, 2006). The objective of this study is to "investigate the context, extent and pattern of male circumcision practices in selected areas of Tanzania and to provide recommendations to the government of Tanzania on the effective roll-out of male circumcision services in the country."

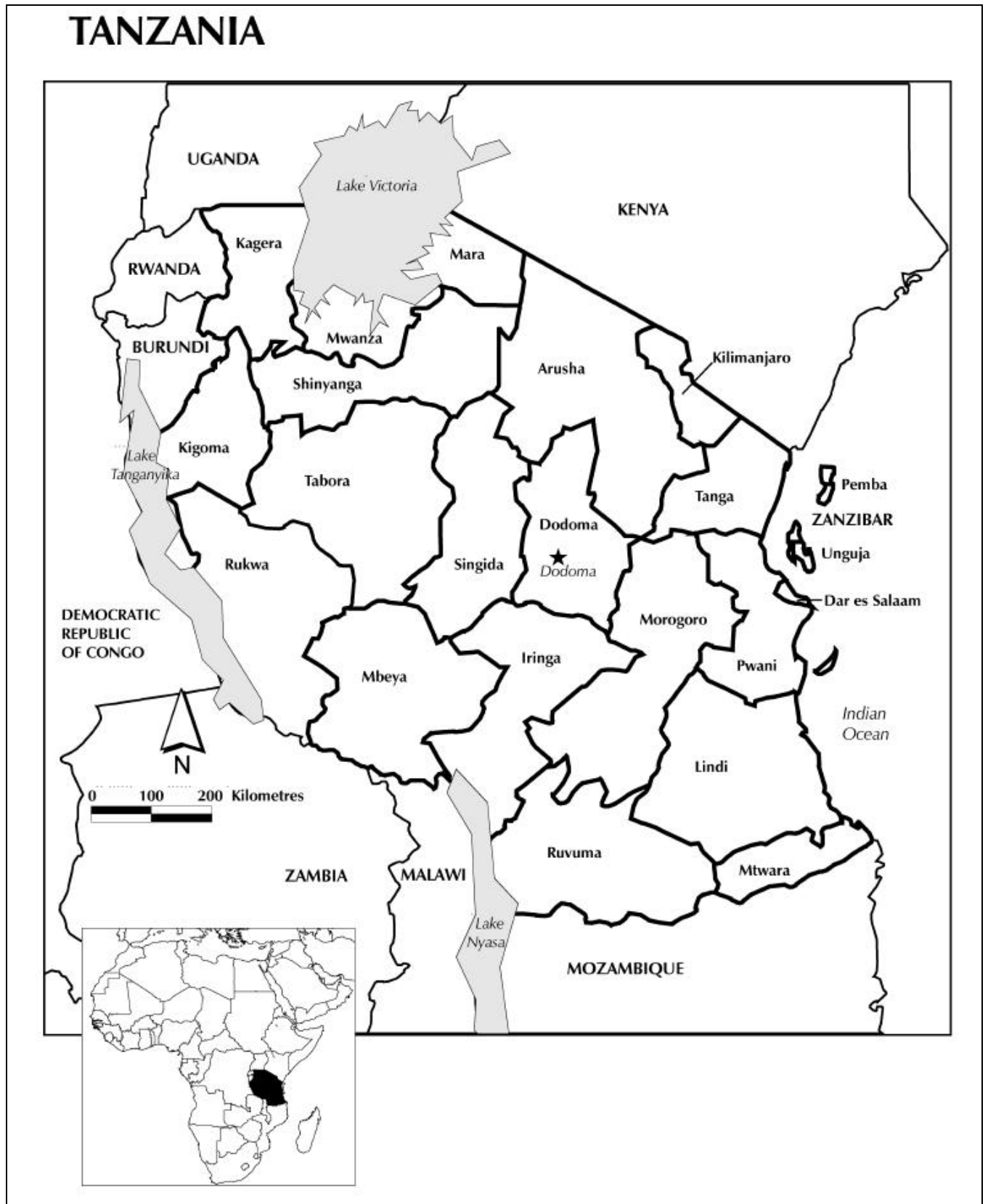
Recommendation for the Joint Review: As the Mara-Manyara study is concluded and recommendations for the roll-out of male circumcision practices are considered, it is recommended that (a) male circumcision services be made available in rural areas; (b) that the general acceptability of male circumcision (not only for HIV prevention purposes but also for the purpose of personal hygiene) form a cornerstone of the communications campaign; and that (c) attention is given to the understanding and addressing possible misunderstandings, given the finding in one study that a high percentage of men who reported that they were circumcised, had not had their foreskin removed.

RECOMMENDATIONS FOR HIV TREATMENT, CARE AND SUPPORT, AND IMPACT MITIGATION

In the early years of the epidemic, HIV clearly started in urban areas and then slowly moved out into rural areas. Whereas positive behaviour change has taken place in urban areas, trends in rural areas have not been as positive, and even been negative in terms of some behaviours. The impact of this changing trend is that there are now more HIV positive persons in rural than in urban areas, and this number is set to increase in future.

Recommendation for the Joint Review: Given the increase in the numbers of persons living with HIV, those affected by HIV and orphans made vulnerable by the death of their parents, it is critical that service delivery extend to and focus on road side villages and the rural areas – this will also indirectly contribute to HIV prevention, as HIV positive persons have lower viral load and there is therefore a lower risk of transmission.

Annex A: Regions in Tanzania



Source: TDHS, 2004-05

7. Bibliography

- Ao, TTH., Sam, NE., Masenga, EJ., Seage, GR., Kapiga, SH. 2006. Human Immunodeficiency Virus Type 1 Among Bar and Hotel Workers in Northern Tanzania: The Role of Alcohol, Sexual Behavior, and Herpes Simplex Virus Type 2, in *Sexually Transmitted Diseases*, March 2006, Vol. 33, No. 3, p.163–169. DOI: 10.1097/01.olq.0000187204.57006.b3
- Bakari M.; Lyamuya E.; Mugusi F.; Aris E.; Chale S.; Magao P.; Jossiah R. ; Janabi M.; Swai A.; Pallangyo N. ; Sandström E.; Mhalu F.; Biberfeld G.; Pallangyo K. 2000. The prevalence and incidence of HIV-1 infection and syphilis in a cohort of police officers in Dar es Salaam, Tanzania : a potential population for HIV vaccine trials. Accessed online on 19 October 2008 at <http://cat.inist.fr/?aModele=afficheN&cpsid=1333386> . AIDS, 2000, vol. 14, no3, pp. 313-320 (21 ref.)
- Bloom, SS, Urassa, M, Isingo, R, Ng'weshemi, J and Boerma, JT (2002) *Community effects on the risk of HIV infection in rural Tanzania* Sex Transm Infect vol 78 (4) pgs:261-6
- Bloom, SS, Urassa, M, Isingo, R, Ng'weshemi, J and Boerma, JT. 2002. Community effects on the risk of HIV infection in rural Tanzania Sex Transm Infect. Vol 78 (4) pgs:261-6
- Boerma, JT, Urassa, M, Senkoro, K, Klokke, A and Ng'weshemi, JZ (1999) *Spread of HIV infection in a rural area of Tanzania* AIDS vol 13 (10) pgs:1233-40
- Boerma, JT, Urassa, M, Nnko, S, Ng'weshemi, J, Isingo, R, Zaba, B and Mwaluko, G (2002) *Sociodemographic context of the AIDS epidemic in a rural area in Tanzania with a focus on people's mobility and marriage* Sex Transm Infect vol 78 Suppl 1 (pgs:97-105
- Boerma, JT, Gregson, S, Nyamukapa, C and Urassa, M (2003) *Understanding the uneven spread of HIV within Africa: comparative study of biologic, behavioral, and contextual factors in rural populations in Tanzania and Zimbabwe* Sex Transm Dis vol 30 (10) pgs:779-87
- Clift, S., Anemona, A., Watson-Jones, D., Kanga, A., Ndeki, L., Changalucha, J., Gavyole A., and Ross, DA. 2003. Variations of HIV and STI prevalences within communities neighbouring new goldmines in Tanzania: importance for intervention design, in *Sex. Transm. Inf.* 2003;79:307-312. doi:10.1136/sti.79.4.307
- Coast, E. 2006. Local understandings of, and responses to, HIV: Rural–urban migrants in Tanzania, in *Social Science & Medicine* 63 (2006) 1000–1010
- Corbett, EL, Makamure, B, Cheung, YB et al. (2007). HIV incidence during a cluster randomised trial of two strategies providing voluntary counselling and testing at the workplace, Zimbabwe. *AIDS* 2007. 21: p483 – 498
- Cowan, FM., Pascoe, S., Barlow, K., Langhaug, L., Jaffar, S., Hargrove, J., Robinson, N., Bassett, MT., Wilson, D., Brown, DWG., Hayes, RJ. 2008. A randomised placebo controlled trial to explore the effect of suppressive therapy with acyclovir on genital shedding of HIV-1 and herpes simplex virus type 2 among Zimbabwean sex workers, in *Sex. Transm. Inf.* 0: sti.2008.031153v1. Accepted 3 July 2008
- Denison. J.A., O'Reilly, K.O., Schmid, G.P., Kennedy, C.E., Sweat, M.D. (2007). HIV Voluntary Counseling and Testing and Behavioral Risk Reduction in Developing Countries: A Meta-analysis, 1990–2005. *AIDS Behav* (2008) 12:363–373. DOI 10.1007/s10461-007-9349-x
- Desmond, N., Allen, CF., Clift, S., Butolwa J., Mzugu, J., Plummer, ML., Watson-Jones, D., Ross, DA. 2005. A typology of groups at risk of HIV/STI in a gold mining town in north-western Tanzania, in *Social Science & Medicine, Volume 60, Issue 8, April 2005, Pages 1739-1749*
- Egwaga SM, Cobelens FG, Muwinge H, Verhage C, Kalisvaart N, Borgdorff MW. 2006. The impact of the HIV epidemic on tuberculosis transmission in Tanzania, in *AIDS*. 2006 Apr 4;20(6):915-21.
- Eisele. T.P., Mathews, C., Chopra, M., Brown, L., Daries, V., Kendall, C. 2008. High Levels of Risk Behavior Among People Living with HIV Initiating and Waiting to Start Antiretroviral Therapy in Cape Town South Africa, in *AIDS Behav* (2008) 12:570–577. DOI 10.1007/s10461-007-9279-7
- Fraser, N., Gorgens, M. 2008. Rapid analysis of HIV epidemiological and HIV response data about vulnerable populations in the Great Lakes Region of Africa. Great Lakes Initiative on AIDS: Rwanda.

- Genberg BL, Kulich M, Kawichai S, Modiba P, Chingono A, Kilonzo GP, Richter L, Pettifor A, Sweat M, Celentano DD; for the NIMH Project Accept Study Team (HPTN 043). 2008. HIV Risk Behaviors in Sub-Saharan Africa and Northern Thailand: Baseline Behavioral Data From Project Accept, in *J Acquir Immune Defic Syndr*. 2008 Oct 3.
- Gray, R.H, Li, X., Kigozi, D., Serwadda, H., Brahmbhatt, F., Wabwire-Mangen, F., Nalugoda, M., Kiddugavu, N, Sewankambo, T. Quinn. 2005. Increased risk of incident HIV during pregnancy in Rakai, Uganda: a prospective study. *The Lancet*, Volume 366, Issue 9492, Pages 1182 - 1188
- Gray, R.H., Wawer, M. (2008). Reassessing the hypothesis on STI control for HIV prevention, in *The Lancet*, Vol 371 June 21, 2008
- Great Lakes Initiative on AIDS and UNHCR. 2005. Behavioural Surveillance Surveys Among Refugees and Surrounding Host Populations: Lukole and Lugufu, Tanzania. Oct/Nov 2005
- Haram L. 2005. AIDS and risk: the handling of uncertainty in northern Tanzania, in *Cult Health Sex*. 2005 Jan;7(1):1-11.
- Hoffmann, O., Zaba, B., Wolff, B., Sanga, E., Maboko, L., Mmbando, D., Von Sonnenburg, F., Hoelscher, M. 2004. Methodological lessons from a cohort study of high risk women in Tanzania, in *Sex Transm Infect* 2004;80:ii69-ii73
- Holzemer WL, Uys LR, Chirwa ML, Greeff M, Makoe LN, Kohi TW, Dlamini PS, Stewart AL, Mullan J, Phetlhu RD, Wantland D, Durrheim K. 2007. Validation of the HIV/AIDS Stigma Instrument - PLWA (HASI-P), in *AIDS Care*. 2007 Sep;19(8):1002-12.
- Hunter, SC, Isingo, R, Boerma, JT, Urassa, M, Mwaluko, GM and Zaba, B (2003) *The association between HIV and fertility in a cohort study in rural Tanzania* *J Biosoc Sci* vol 35 (2) pgs:189-99
- Jordan-Harder B, Maboko L, Mmbando D, Riedner G, Nagele E, Harder J, Kuchen V, Kilian A, Korte F, Sonnenburg F: Thirteen years HIV-1 sentinel surveillance and indicators for behavioural change suggest impact of programme activities in south-west Tanzania. *AIDS* 2004, 18:287-294.
- Kapiga SH, Sam NE, Mlay J, Aboud S, Ballard RC, Shao JF, Larsen U. 2006. The epidemiology of HIV-1 infection in northern Tanzania: results from a community-based study, in *AIDS Care*. 2006 May;18(4):379-87.
- Kesheni PS; Boerma, JT., Klokke, AH, Ng'weshemi, JZL, Muro, AS, Gabone, R, Borgdorff, MW. 2000. HIV Incidence and HIV-Associated Mortality in a Cohort of Factory Workers and Their Spouses in Tanzania, 1991 Through 1996, in *JAIDS Journal of Acquired Immune Deficiency Syndromes*:Volume 23(2)1 February 2000pp 194-202
- Kishamawe, C, Vissers, DC, Urassa, M, Isingo, R, Mwaluko, G, Borsboom, GJ, Voeten, HA, Zaba, B, Habbema, JD and de Vlas, SJ (2006) *Mobility and HIV in Tanzanian couples: both mobile persons and their partners show increased risk* *AIDS* vol 20 (4) pgs:601-8
- Kwesigabo G, Killewo J, Urassa W, Lugalla J, Emmelin M, Mutembei A, Mhalu F, Biberfeld G, Wall S, Sandstrom A. 2005. HIV-1 infection prevalence and incidence trends in areas of contrasting levels of infection in the Kagera region, Tanzania, 1987-2000, in *J Acquir Immune Defic Syndr*. 2005 Dec 15;40(5):585-91
- Lary, H., Maman, S., Katebala, M., McCauley, A., Mbwambo, J. 2004. Exploring the Association Between HIV and Violence: Young People's Experiences with Infidelity, Violence And Forced Sex in Dar es Salaam, Tanzania, in *International Family Planning Perspectives*, 2004, 30(4):200-206
- Lugalla JP., Kaare, S., Kihombo, A., Mwakitwange, R. 2007. Ministry Of Trade Tourism And Investment: A Consultancy Report: Situation And Impact Analysis Of HIV/Aids On The Tourism Sector In Zanzibar. 17 May 2007
- Maganja, R. K., Maman, S., Groves, A. and Mbwambo, J. K. (2007) 'Skinning the goat and pulling the load: transactional sex among youth in Dar es Salaam, Tanzania', *AIDS Care*, 19:8, 974 - 981
- Matasha, E, Mtembelea, T., Mayaud, P., Saidi, W., Mujaya, B., TEndo-Wambua, L. 1998. Sexual and reproductive health among primary and secondary school pupils in Mwanza, Tanzania: need for intervention, in *AIDS Care*, Volume 10, Issue 5 October 1998, pages 571 - 582
- MEASURE DHS. 2006. HIV/AIDS Indicators Country Report Tanzania 1992 - 2004. This report is generated from the HIV/AIDS Survey Indicators Database (<http://www.measuredhs.com/hivdata/start.cfm>). Last Updated: September 2006

- Mishra V, Assche SB, Greener R, Vaessen M, Hong R, Ghys PD, Boerma JT, Van Assche A, Khan S, Rutstein S. 2007. HIV infection does not disproportionately affect the poorer in sub-Saharan Africa, in *AIDS*. 2007 Nov;21 Suppl 7:S17-28.
- Mmbaga EJ, Hussain A, Leyna GH, Holm-Hansen C, Mnyika KS, Sam NE, Klouman E, Klepp KI. 2007. Trends in HIV-1 prevalence and risk behaviours over 15 years in a rural population in Kilimanjaro region of Tanzania, in *AIDS Res Ther*. 2007 Oct 16;4:23.
- Mmbaga, MD., Germana HL, Kagoma S., Mnyika, MD, Hussain, A., Knut-Inge Klepp, A. Education Attainment and the Risk of HIV-1 Infections in Rural Kilimanjaro Region of Tanzania, 1991–2005: A Reversed Association, in *Sexually Transmitted Diseases*, December 2007, Vol. 34, No. 12, p.947–953. DOI: 10.1097/OLQ.0b013e31813e0c15
- Mmbaga, EJ., Hussain, A., Leyna, GH., Mnyika, KS., Sam, NE., Klepp, K. Prevalence and risk factors for HIV-1 infection in rural Kilimanjaro region of Tanzania: Implications for prevention and treatment, in *BMC Public Health* 2007, 7:58 doi:10.1186/1471-2458-7-58
- Mnyika KS, Klepp KI, Kvåle G, Ole-Kingöri N. 1997. Determinants of high-risk sexual behaviour and condom use among adults in the Arusha region, Tanzania, in *Int J STD AIDS*. 1997 Mar;8(3):176-83.
- Montana LS, Mishra V, Hong R. 2008. Comparison of HIV prevalence estimates from antenatal care surveillance and population-based surveys in sub-Saharan Africa.
- Mshana G, Plummer ML, Wamoyi J, Shigongo ZS, Ross DA, Wight D. 2006. 'She was bewitched and caught an illness similar to AIDS': AIDS and sexually transmitted infection causation beliefs in rural northern Tanzania, in *Cult Health Sex*. 2006 Jan-Feb;8(1):45-58.
- Msuya, SE., Mbizvo, EM., Stray-Pedersen, B., Uriyo, J., Sam, NE., Rusakaniko, S., Hussain A. 2007. Decline in HIV prevalence among women of childbearing age in Moshi urban, Tanzania, in *International Journal of STD & AIDS* 2007; 680 18: 680–687
- Mwakagile, D., Mmari E., Makwaya, C., Mbwana, J., Biberfeld, G., Mhalu, F., Sandström, E. 2001. Sexual behaviour among youths at high risk for HIV-1 infection in Dar es Salaam, Tanzania, *Sexually Transmitted Infections* 77:255-259 (2001)
- Mwaluko, G, Urassa, M, Isingo, R, Zaba, B and Boerma, JT (2003) Trends in HIV and sexual behaviour in a longitudinal study in a rural population in Tanzania, 1994-2000 *AIDS* vol 17 (18) pgs:2645-51
- National Bureau of Statistics Dar es Salaam, ORC Macro Calverton. Tanzania Demographic and Health Survey report 2004. Tanzania Standard DHS 2005.
- Ngalula, J, Urassa, M, Mwaluko, G, Isingo, R and Ties Boerma, J (2002) Health service use and household expenditure during terminal illness due to AIDS in rural Tanzania *Trop Med Int Health* vol 7 (10) pgs:873-7
- Ng'weshemi, J, Urassa, M, Isingo, R, Mwaluko, G, Ngalula, J, Boerma, T, Marston, M and Zaba, B (2003) HIV impact on mother and child mortality in rural Tanzania *J Acquir Immune Defic Syndr* vol 33 (3) pgs:393-404
- Nnko, S, Boerma, JT, Urassa, M, Mwaluko, G and Zaba, B (2004) Secretive females or swaggering males? An assessment of the quality of sexual partnership reporting in rural Tanzania *Soc Sci Med* vol 59 (2) pgs:299-310
- Nnko, S, Washija, R, Urassa, M and Boerma, JT (2001a) Dynamics of male circumcision practices in northwest Tanzania *Sex Transm Dis* vol 28 (4) pgs:214-8
- Ntata, PRT, Muula, AS, Siziya, S. 2008. Socio-demographic characteristics and sexual health related attitudes and practices of men having sex with men in central and southern Malawi, in *Tanzania Journal of Health Research*, Vol. 10, No. 3, July, 2008, pp. 124-130
- Nuko, S, Chiduo, B, Mwaluko, G and Urassa, M (2001b) Pre-marital sexual behaviour among out-of-school adolescents: motives, patterns and meaning attributed to sexual partnership in rural Tanzania *Afr J Reprod Health* vol 5 (3) pgs:162-74
- Outwater A., Nkya L., Lwihula G. et al. 2000. Patterns of partnership and condom use in two communities of female sex workers in Tanzania. *J of the Association of Nurses in AIDS Care*, 2000; 11: 46-54.
- Plummer, ML., Wight, D., Wamoyi, J., Mshana, G., Hayes, RJ., Ross, DA. 2006. Farming with Your Hoe in a Sack: Condom Attitudes, Access, and Use in Rural Tanzania, in *Studies In Family Planning* 2006; 37[1]: 29–40.
- Potts M et al. (2008). Reassessing HIV prevention. *Science*, 320, 9 May 2008.

- Ramachandran V, Shah MK, Turner GL. 2007. Does the private sector care about AIDS? Evidence from firm surveys in East Africa. *AIDS*. 2007 Jul;21 Suppl 3:S61-72.
- Range N, Ipuge YA, O'Brien RJ, Egwaga SM, Mfinanga SG, Chonde TM, Mukadi YD, Borgdorff MW. 2001. Trend in HIV prevalence among tuberculosis patients in Tanzania, 1991-1998, in *Int J Tuberc Lung Dis*. 2001 May;5(5):405-12.
- Riedner G, Rusizoka M, Hoffmann O, et al. 2003. Baseline survey of sexually transmitted infections in a cohort of female bar workers in Mbeya Region, Tanzania. *Sex Transm Infect* 2003;79:382-7.
- Riedner, G., Todd, J., Rusizoka, M., Mmbando, M., Maboko, L., Lyamuya, E., Hoffmann, O., MacLean, I., Grosskurth, H., Hayes, R. 2007. Possible reasons for an increase in the proportion of genital ulcers due to herpes simplex virus from a cohort of female bar workers in Tanzania, in *Sex Transm Infect* 2007;83:91-96. doi: 10.1136/sti.2006.021287
- Ross DA, Changalucha J, Obasi AI, Todd J, Plummer ML, Cleophas-Mazige B, Anemona A, Everett D, Weiss HA, Mabey DC, Grosskurth H, Hayes RJ. 2007. Biological and behavioural impact of an adolescent sexual health intervention in Tanzania: a community-randomized trial, in *AIDS*. 2007 Sep 12;21(14):1943-55.
- Ross MW, McCurdy SA, Kilonzo GP, Williams ML, Leshabari MT. 2008. Drug use careers and blood-borne pathogen risk behavior in male and female Tanzanian heroin injectors, in *Am J Trop Med Hyg*. 2008 Sep;79(3):338-43.
- Sa Z, Larsen U. 2008. Gender inequality increases women's risk of hiv infection in Moshi, Tanzania, in *J Biosoc Sci*. 2008 Jul;40(4):505-25. Epub 2007 Dec 19
- Sangani P, Rutherford G, Wilkinson D. (2004) Population-based interventions for reducing sexually transmitted infections, including HIV infection. *Cochrane Database of Systematic Reviews* 2004, Issue 3. Art. No.: CD001220. DOI: 10.1002/14651858.CD001220.pub2.
- Shisana O et al. (2005). *South African HIV prevalence, HIV incidence, behaviour and communication survey*. Cape Town: HSRC Press
- Somi GR; Matee MI; Swai RO; Lyamuya EF; Killewo J. 2006. Estimating and projecting HIV prevalence and AIDS deaths in Tanzania using antenatal surveillance data, in *BMC Public Health*. 2006 May 3;6:120.
- Tanaka Y, Kunii O, Hatano T, Wakai S. 2008. Knowledge, attitude, and practice (KAP) of HIV prevention and HIV infection risks among Congolese refugees in Tanzania, in *Health Place*. 2008 Sep;14(3):434-52. Epub 2007 Sep 21.
- Tanzania Ministry of Health and Social Welfare. National AIDS Control Programme. 2005. *Surveillance of HIV and Syphilis Infections Among Antenatal Clinic Attendees 2003/04*.
- Tanzania National Bureau of Statistics (NBS). 2002. *The 2002 Population and Housing Census Database*. Tanzania 2002 Census, accessed online on 19 October 2008 at <http://www.tanzania.go.tz/census/censusdb/ageSexRegionAgeGroups.asp>
- Tao SM., Sam, NE., Manongi, R., Seage, G., Kapiga, S. 2003. Social and behavioural determinants of consistent condom use among hotel and bar workers in Northern Tanzania, in *International Journal of STD & AIDS* 2003; 14: 688-696
- TDHS 2004-05
- THMIS 2007-08
- TRCHS 1999
- Ukwuani, FA., Tsui, AO., Suchindran, CM. 2003. Condom Use for Preventing HIV Infection/AIDS in Sub-Saharan Africa: A Comparative Multilevel Analysis of Uganda and Tanzania, in *J Acquir Immune Defic Syndr* 2003;34:203-213
- Urassa, M, Boerma, JT, Isingo, R, Ngulula, J, Ng'weshemi, J, Mwaluko, G and Zaba, B (2001) The impact of HIV/AIDS on mortality and household mobility in rural Tanzania *AIDS* vol 15 (15) pgs:2017-23
- Urassa, W. Kaaya, S., Mwakagile, D., O'Brien, M., Antelman, G., Hunter, D., Fawzi, W., Msamanga, G. (2006) 'Evidence of a substantial decline in prevalence of HIV-1 infection among pregnant women: Data from 1995 to 2003 in Dar es Salaam, Tanzania', *Scandinavian Journal of Public Health*, 34:3, 272 - 278. DOI: 10.1080/14034940500434871

- Urassa, M, Todd, J, Boerma, JT, Hayes, R and Isingo, R (1997) Male circumcision and susceptibility to HIV infection among men in Tanzania *AIDS* vol 11 (1) pgs:73-9
- Villamor E, Mugusi F, Urassa W, Bosch RJ, Saathoff E, Matsumoto K, Meydani SN, Fawzi WW. 2008. A trial of the effect of micronutrient supplementation on treatment outcome, T cell counts, morbidity, and mortality in adults with pulmonary tuberculosis, in *J Infect Dis*. 2008 Jun 1;197(11):1499-505
- Vissers DC, Voeten HA, Urassa M, Isingo R, Ndege M, Kumogola Y, Mwaluko G, Zaba B, de Vlas SJ, Habbema JD. 2008. Separation of spouses due to travel and living apart raises HIV risk in Tanzanian couples, in *Sex Transm Dis*. 2008 Aug;35(8):714-20.
- Wambura M, Urassa M, Isingo R, Ndege M, Marston M, Slaymaker E, Mngara J, Changalucha J, Boerma TJ, Zaba B. 2007. HIV prevalence and incidence in rural Tanzania: results from 10 years of follow-up in an open-cohort study, in *J Acquir Immune Defic Syndr*. 2007 Dec 15;46(5):616-23.
- Watson-Jones, D., Weiss, HA., Rusizoka, M., BAisley, K., Mugeye, K., Changalucha, J., Everett, D., Balira, R., Knight, L., Ross, D., Hayes, RJ. 2007. Risk Factors for Herpes Simplex Virus Type 2 and HIV Among Women at High Risk in Northwestern Tanzania Preparing for an HSV-2 Intervention Trial, in *J Acquir Immune Defic Syndr* _ Volume 46, Number 5, December 15, 2007
- Weiss HA, Plummer ML, Changalucha J, Mshana G, Shigongo ZS, Todd J, Wight D, Hayes RJ, Ross DA. 2008. Circumcision among adolescent boys in rural northwestern Tanzania. *Trop Med Int Health*. 2008 Aug;13(8):1054-61. Epub 2008 Jun 28
- Whetten K, Whetten RA, Ostermann J, Itemba D. 2008. Trauma, anxiety and reported health among HIV-positive persons in Tanzania and the US Deep South, in *AIDS Care*. 2008 Jun 18:1-9.
- Williams, ML., McCurdy, SA., Atkinson, JS., Kilonzo, GP., Leshabari, MT., Ross, MW. 2007. Differences in HIV Risk Behaviors by Gender in a Sample of Tanzanian Injection Drug Users, in *AIDS Behav* (2007) 11:137-144. DOI 10.1007/s10461-006-9102-x
- Yahya-Malima KI, Matee MI, Evjen-Olsen B, Fylkesnes K. High potential of escalating HIV transmission in a low prevalence setting in rural Tanzania. *BMC Public Health* 2007; 9:7:103.
- Zaba, B, Slaymaker, E, Urassa, M and Boerma, JT (2005) The role of behavioral data in HIV surveillance *AIDS* vol 19 Suppl 2 (pgs:S39-52
- Zaba, B, Whitworth, J, Marston, M, Nakiyingi, J, Ruberantwari, A, Urassa, M, Issingo, R, Mwaluko, G, Floyd, S, Nyondo, A and Crampin, A (2005) HIV and mortality of mothers and children: evidence from
- Zaba, BW, Carpenter, LM, Boerma, JT, Gregson, S, Nakiyingi, J and Urassa, M (2000) Adjusting ante-natal clinic data for improved estimates of HIV prevalence among women in sub-Saharan Africa *AIDS* vol 14 (17) pgs:2741-50