



World Health
Organization



Results of
**HIV Sentinel
Sero-surveillance
2010
Myanmar**

**National AIDS Programme
Department of Health
Ministry of Health**

June 2011



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Acknowledgments

This 2010 HIV sentinel sero-surveillance report was the combined efforts of our M&E officers, Regional /State AIDS/STD officers, team leaders, officials from the National Tuberculosis Programme, Drug Dependency and Treatment Research Units, the Directorate of Medical Services and the International and local Non-government Organizations. Without their strong dedication and responsibilities of their work this HIV sentinel sero-surveillance could not be happened. We, therefore, owe our gratitude to all our colleagues for providing their invaluable cooperative support for this survey. We also acknowledge the World Health Organization and the Three Diseases Fund for their useful inputs and resources. Last but not the least, we are indebted to all those who participated in this survey.

**National AIDS Programme
Department of Health
Ministry of Health**

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List of abbreviations

ANC: Antenatal care

DoH: Department of Health

FSW: Female Sex Worker

HSS: HIV Sentinel Sero-Surveillance

IDU: Injecting Drug User

INGO: International Non-Government Organization

MARP: Most at risk population

M&E: Monitoring and Evaluation

MSM : Men who Have Sex with Men

NAP: National AIDS Programme

NTP: National TB Programme

NGO: Non-Government Organization

PMCT: Prevention of Mother to Child Transmission

STD: Sexually Transmitted Diseases

STI: Sexually Transmitted Infections

TB: Tuberculosis

UAT: Unlinked Anonymous Testing

WHO: World Health Organization

3DF: Three Diseases Fund

1. Background

Since 1992, the National AIDS Programme has been carrying out the yearly HIV Sentinel Sero-surveillance (HSS) among selected (8) sentinel groups. In fact, HSS is the systematic and regular collection of information on the occurrence, distribution and trends of HIV infection and factors associated with the infection for use in Public Health Action.

In concentrated epidemics, HSS is usually conducted among selected groups who may be at highest risk and are most critical to be targeted for interventions. In Myanmar, HSS is conducted among Pregnant Women attending the antenatal clinics (ANC), New Military Recruits, Blood Donors as low risk groups, and; Injecting Drug Users (IDU), Men who have Sex with Men (MSM), Female Sex Workers (FSW) and Male patients attending sexually transmitted infection (STI) clinic as high risk groups. The newly diagnosed TB patient has become one of the sentinel groups since 2005.

2. Methodology

HSS is conducted through the facility-based sampling approach, in which consecutive eligible participants are recruited until the required sample size is achieved. For pregnant women and male STI patients unlinked anonymous testing (UAT) is used for surveillance as they are undergo routine syphilis testing. For the populations at high-risk of HIV (the injecting drug users, the female sex workers, men who have sex with men, new TB patients and military recruits, blood specimen is drawn after obtaining informed verbal consent.

In all, 35 AIDS/STD teams carried out HSS followed the HSS guidelines 2010. HSS was conducted from March to May 2010 in 35 sentinel sites where AIDS/STD teams are located. The specimens from Military Recruits were collected from the new conscripts in Yangon and Pyin Oo Lwin. During the same period, TB/HIV surveillance, i.e. the screening for HIV among newly diagnosed TB patients was undertaken in 20 townships. The AIDS/STD team in each township organizes, supervises and monitors the survey process across the various participating facilities. Table 1 shows the sentinel groups, number of sentinel sites, and target sample size for each site.

Table 1 : Number of sentinel sites and sample size for each sentinel group, HSS 2010

Sr. No.	Sentinel groups	Number of sentinel site	Sample size per site
1	Pregnant women attending ANC clinics	35	400
2	Male STI patients	35	150
3	New TB patients	20	150
4	Female sex workers	6	200
5	Injecting drug users	6	200
6	Men who have sex with men	2	200
7	New military recruits	2	400
8	Blood donors	2	Not identified**

* In 2010, Kalay Township became a new sentinel site where pregnant women and Male STI patients were selected as target groups.

** Collective data compilation was done for blood donors especially from Yangon and Mandalay as much as possible

3. HIV Antibody Testing

Prior to the 2007 HSS round, HIV and syphilis testing were being done at the reference laboratories in Yangon and Mandalay. In 2007, NAP piloted a protocol in which HIV antibody testing was done at twenty pilot sentinel sites in an effort to decentralize the testing process. In those twenty sites, HIV antibody testing was performed at site level and the results were compared with those of reference laboratories in order to assess the accuracy of decentralized results. Since 2008, all sentinel sites performed HIV antibody test at the local AIDS/STD team laboratory and again tested in the corresponding state and regional level AIDS/STD team, and National Health Laboratory after that those results are compared to observe the discrepancies.

In 2010 HSS round, all sentinel sites performed HIV antibody testing. At the site laboratory, serum specimens were screened using an HIV rapid test kit (Determine) and the reactive specimens were further confirmed by a second HIV rapid test kit (Unigold) according to WHO testing strategy II. Serum specimens of all tested positive and 10% of negative were sent to the laboratories: State and Regional team laboratories, National Health Laboratory and Public Health Laboratory in Yangon and Mandalay. At the reference laboratories, the first test used was Determine followed by the second rapid test Unigold for confirmation.

The test results (reported on Form 2) from the thirty five sentinel sites were sent to NAP - Nay Pyi Taw and the results of HIV and syphilis from the reference laboratories were also sent to NAP.

4. Data analysis

Data entry and cleaning were undertaken by National AIDS Programme (NAP) by using a simple Excel worksheet. Analysis was done in NAP. Descriptive analysis was performed using SPSS software and calculated the prevalence of each sentinel groups disaggregated by age and sex and/or by sentinel site.

The test results of the local and the reference laboratories were compared and analyzed using percent agreement using McNemar chi-square test. The results of this quality assessment are also presented in this report.

5. Findings

5.1 Sample collection

Overall, 34,058 participants were included in 35 sentinel sites during the 2010 round.

- A total of 4,607 male STI patients from the (35) sentinel sites were collected during the survey
- 887 female sex workers were included in the survey from six sites
- 400 the men having sex with men from two sites
- 1029 injecting drug users were also surveyed in six townships
- 13,706 pregnant women who attended antenatal clinics in 35 townships
- 800 new military conscripts in two selected recruitment areas
- 2,863 new tuberculosis patients in twenty townships
- 9,769 blood units screened for HIV from Yangon and Mandalay townships were analyzed for HSS

Most of the sentinel sites were able to achieve the desired sample size. Table 2 provides comparison between the required and achieved sample sizes among different sentinel populations. Sample size achievement was about 75% for FSW; more than 85% for Male STI patients and IDU; more than 95% for Pregnant women and new TB patients; and was 100% for MSM and new military conscripts.

Table 2: Comparison between the required and achieved sample size among different sentinel population groups – HSS 2010

Sentinel Group	Required sample size per site	No. of sites	No (%) of sites achieving targeted sample size		Total sample size	Achieving sample size	
			No	%		No	%
Male STI patients	150	35	26	74.3%	5250	4607	87.8%
FSW	200	6	3	50.0%	1200	887	73.9%
IDU	200	6	3	50.0%	1200	1029	85.8%
MSM	200	2	2	100.0%	400	400	100.0%
Pregnant Women	400	35	32	91.4%	14000	13,706	97.9%
New Military Recruits	400	2	2	100.0%	800	800	100.0%
New TB patients	150	20	14	70.0%	3000	2863	95.4%
Blood Donors	not specified					9769	

Information on age, place of residence and marital status is collected from all groups except military recruits and blood donors. For pregnant women, the parity status (primiparous status vs. multiparous) is also recorded. Female sex workers are also distinguished as either direct or indirect sex workers, and TB patients are categorized according to the type of TB they have been diagnosed with.

5.2 HIV prevalence by sentinel population

Table 3 shows HIV prevalence among different population groups. HIV prevalence was the highest among IDUs followed by FSW and MSM. HIV prevalence per population group for each sentinel site is presented in annex 1. Among women attending ANC clinics, the median HIV prevalence was 0.8%, ranging from 0 to 3.3% across 35 sentinel sites. HIV prevalence was 0.9% in both primipara and multipara women.

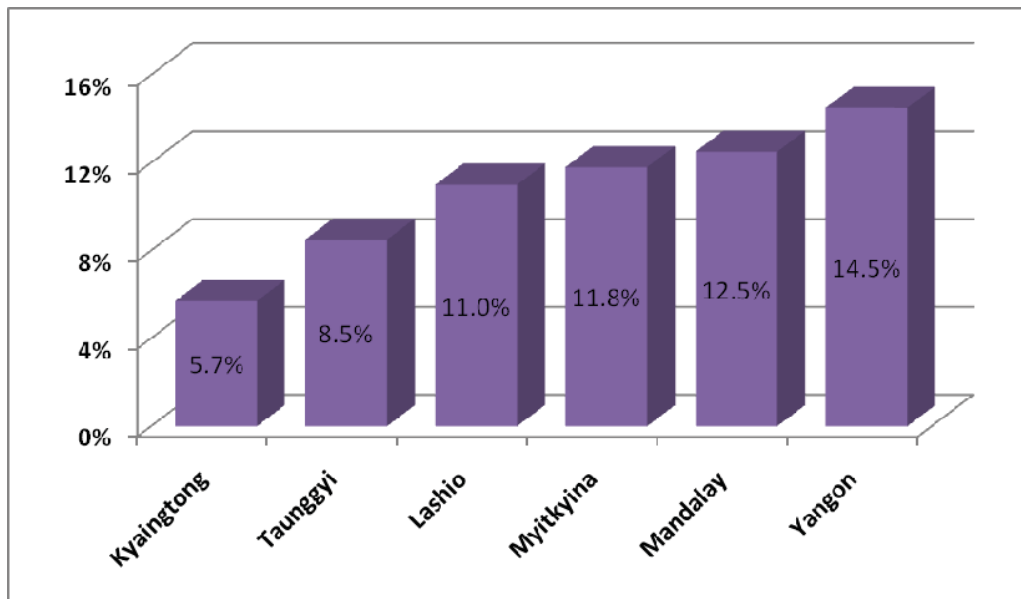
Table 3: HIV Prevalence among sentinel populations – HSS 2010

Sentinel Group	# tested for HIV	# HIV positive	sero positive (%)	Range			95% CI
				Minimum (%)	Median (%)	Maximum (%)	
Male STI patients	4607	237	5.1%	0.7%	4.0%	16.7%	4.5% - 5.8%
FSW	887	101	11.4%	5.7%	11.4%	14.5%	9.3% - 13.4%
IDU	1029	289	28.1%	7.9%	26.0%	39.4%	25.3% - 30.8%
MSM	400	44	11.0%	8.0%	11.0%	14.0%	7.9% - 14.1%
Pregnant Women	13706	122	0.9%	0.0%	0.8%	3.3%	0.7% - 1.0%
New Military Recruits	800	8	1.0%	0.8%	1.0%	1.2%	0.3%- 1.7%
New TB patients	2863	298	10.4%	0.7%	8.3%	27.9%	9.3% - 11.5%
Blood Donors	9769	34	0.35%	0.00%	0.26%	0.86%	0.2% -0.5%

Among female sex workers, HIV prevalence was the highest in Yangon (14.5%) followed by Mandalay (12.5%), Myitkyina (11.8%), Lashio (11%), and Taunggyi (8.5%). Although Kyaingtong has been one of the sentinel sites for FSW since 2007, its results were excluded in the last two years due to possible sampling bias. In this round the prevalence was (5.7%) with the sample size of (n=53).

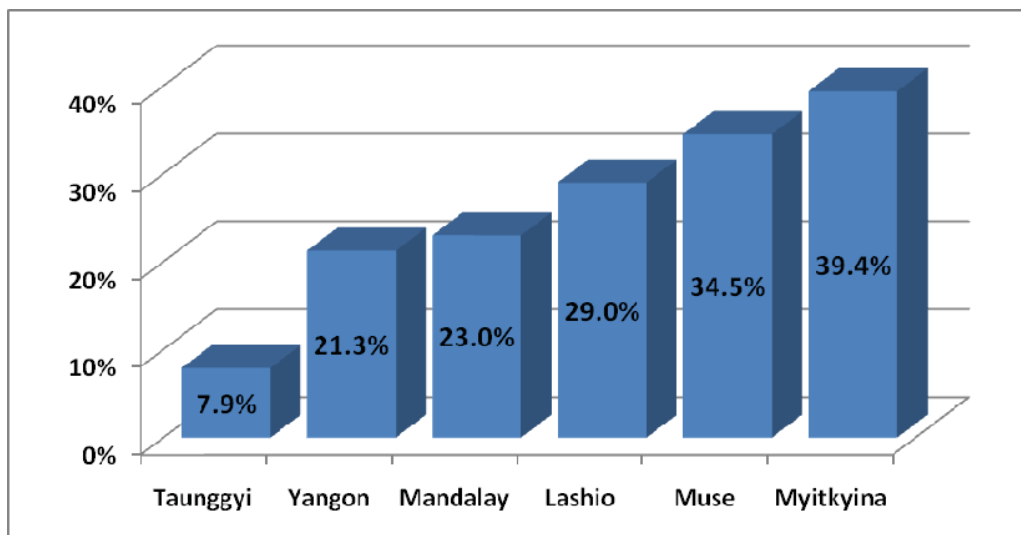
There was a little difference in HIV prevalence between direct sex workers 12.5% (80/642) and indirect sex workers 8.6% (21/245) (p=0.6).

Figure 1. HIV prevalence among female sex workers, HSS 2010



As shown in Figure 2, Myitkyina had the highest HIV prevalence (39.4%) followed by Muse (34.5%), and other sites with prevalence less than 30%. In this round Taunggyi had the lowest sample size (n=76).

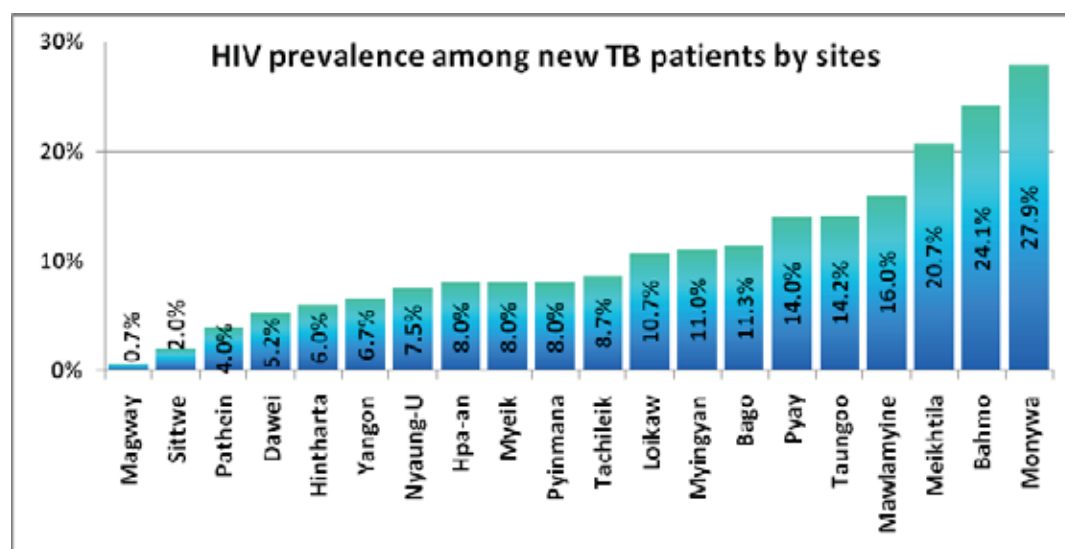
Figure 2 HIV prevalence among injecting drug users, HSS 2010



In 2010, five new sentinel sites were expanded for new TB patients. The HIV prevalence among this target group ranged from 0.7% in Magway to 27.9% in Monywa. In this round, more than 20% prevalence was found in three sentinel sites: Monywa, Bahmo and Meikhtila. As usual Monywa had the highest prevalence.

Analysed by type of TB showed that HIV prevalence was higher among smear-negative TB patients (13.5%, 199/1478) compared to smear-positive TB patients (6.6%, 79/1206) and extra-pulmonary tuberculosis patients (10.9%, 20/183) ($p=0.0001$).

Figure 3 HIV prevalence among new TB patients, HSS 2010



5.3 HIV prevalence by sex and age

The HIV prevalence among male and female TB patients was 10.6% (194/1824) and 10.0% (104/1043) respectively.

Among blood donors 2,225/9,769 (22.7%) were female. The HIV prevalence was 0.31% (7/2,225) in female and 0.36% (27/7,544) in male donors.

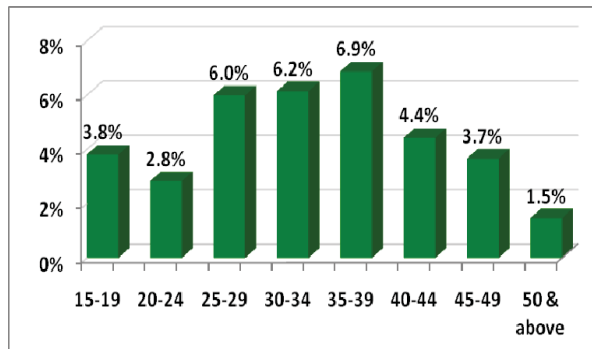
HIV prevalence by age groups is presented for each population in Figure 4. Among the most at-risk populations (i.e. male STI patients, FSW, and IDU), HIV prevalence appeared to peak after 30 years. Among MSM the higher level was seen in 40-44 years age group which may assume that they may have already infected.

Among pregnant women, HIV prevalence was higher in the 25-29 and 40-44 year age groups.

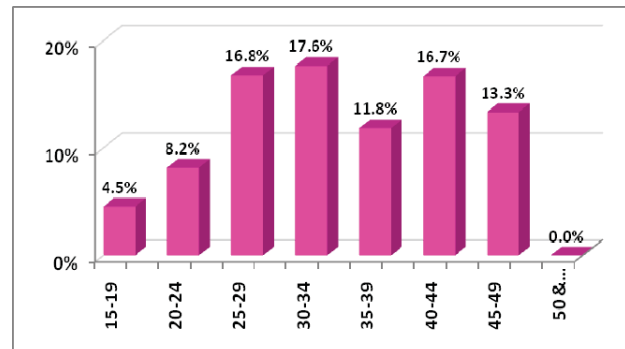
Among the younger age group 15-19 year old pregnant women ($n=946$) and military recruits ($n=289$) HIV prevalence was 0.7% and 0.0%, respectively; among the 20-24 year old pregnant women ($n=3,534$) military recruits ($n=384$) HIV prevalence was 0.8% and 1.3%, respectively (Figure 4).

Figure 4 HIV prevalence by age group and sentinel population – HSS 2010

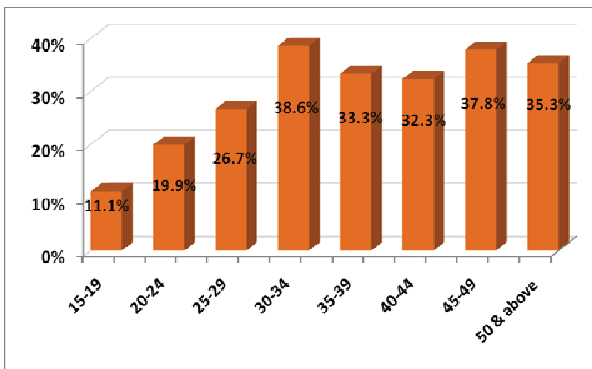
Male STI patients



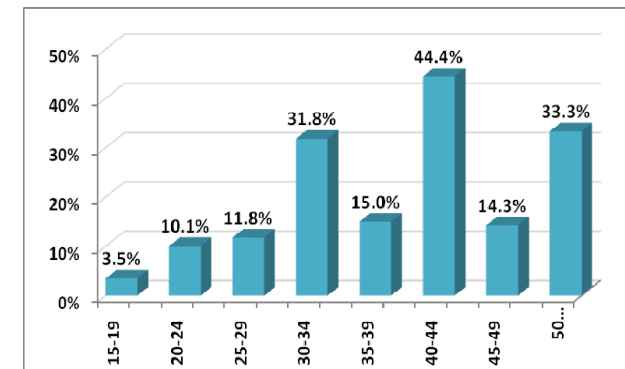
Female Sex Workers



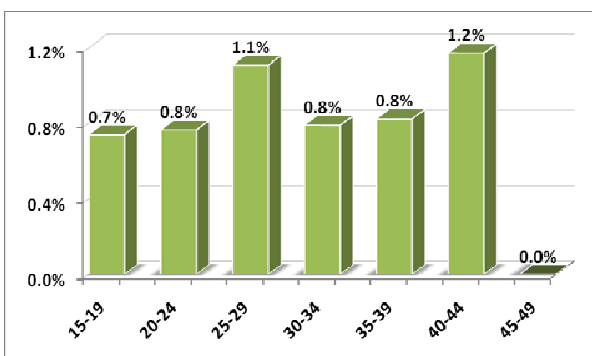
Injecting Drug Users



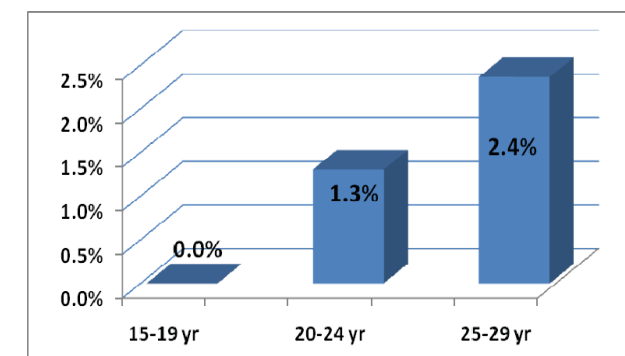
Men who have sex with Men



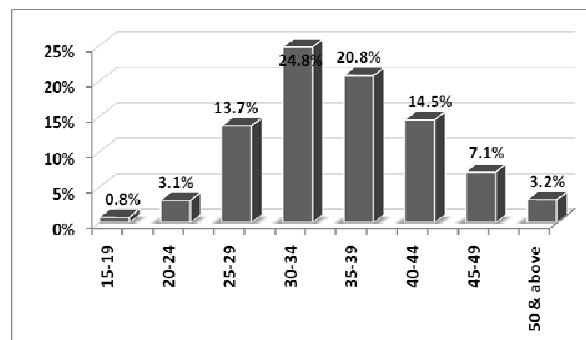
Pregnant Women



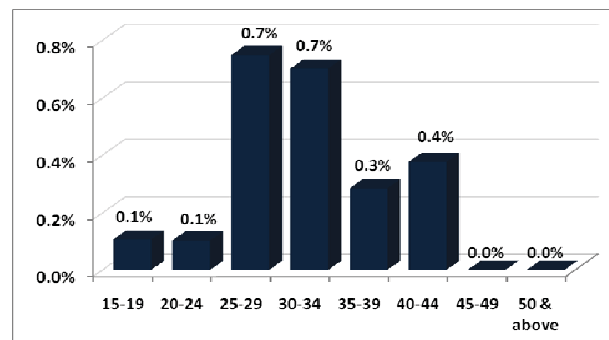
New Military Recruits



New TB patients



Blood Donors

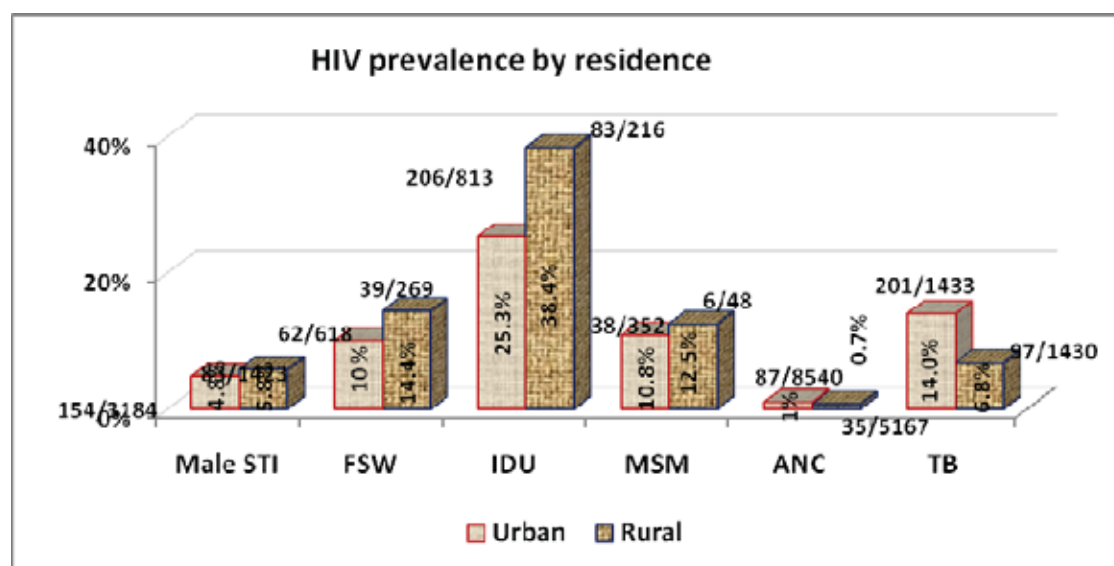


5.4 HIV prevalence by place of residence and marital status

In 2010 round, the proportion of rural population ranged from 12 to 30 percent of the collected sample in MARPs groups. With the significant smaller sample size for rural population, the prevalence was found to be higher in rural than urban in IDU, FSW, MSM and Male STI patients.

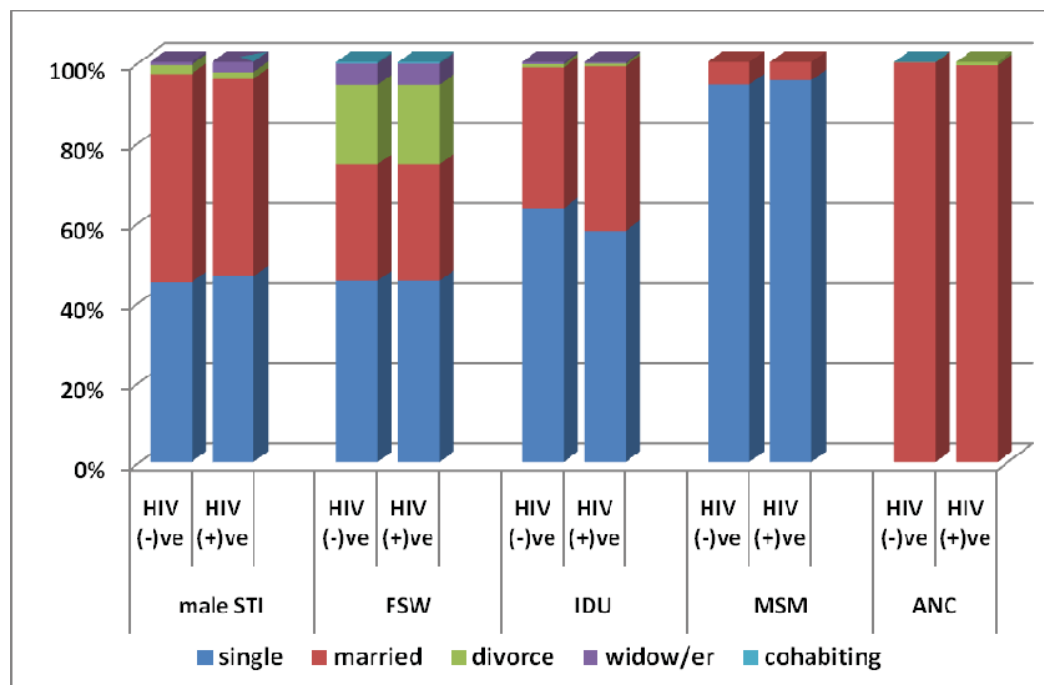
For TB patients, the sample size was equal for both urban and rural, HIV prevalence was more than two times higher in urban population (Figure 5). Similarly, HIV prevalence among pregnant women was higher in urban areas compared to those living in rural areas.

Figure 5 : HIV prevalence in different sentinel groups by place of residence (or place of permanent residence) – HSS 2010



The distribution of marital status of different sentinel groups did not differ significantly by HIV status (Figure 6). The intimate partner transmission to regular sexual partners (spouses) is very likely to take place with MARPs as married group contributed substantial portion of the HIV positive group.

**Figure 6 Distribution by marital status according to HIV status in different sentinel populations-
HSS 2010**



5.5 Results of HBs Ag and anti HCV Ab testing

In 2010 HSS round, testing for Hepatitis B and C among IDU population was conducted with the support of WHO SEARO. Due to delay in arrival of test kits and specimen storage problems, only a portion of the sample (mainly HIV positive ones) from Mandalay and Muse could be tested. In total only 758 out of 1029 IDU sample were tested. Among those tested, HBs Ag positive rate was 12.3% (9.9% - 14.6%) and anti HCV Ab positive rate was 23.9% (20.8% - 26.9%). Given the possibility of bias, one should be very cautious to use this prevalence rate for generalization. Nevertheless this is the first round that we could include testing of HBs Antigen and anti HCV Antibody for IDU.

Figure 7 reveals the distribution of Hepatitis B and Hepatitis C infection by age group; Hepatitis C infection was found to be higher in (30-39) year age group whereas it was (20-34) year age group for Hepatitis B. In depth analysis on the prevalence of Hepatitis B and C infection among HIV positive and negative IDU samples revealed that there was a significant higher prevalence of Hepatitis C infection among HIV positive IDU ($p < 0.001$) (Figure 8).

Further analysis on the nature of co-infection among IDUs revealed that (17.3%) were infected with more than one infection. Among those with double infection, (64%) were co-infected with HIV and Hepatitis C virus. Harm Reduction programme should be strengthened with emphasis on the use of sterile needle and syringe not only for prevention of HIV but also for other parentally transmitted infections especially Hepatitis C and Hepatitis B.

Figure 7 HBs Ag and anti HCV-Ab positive rate by age group

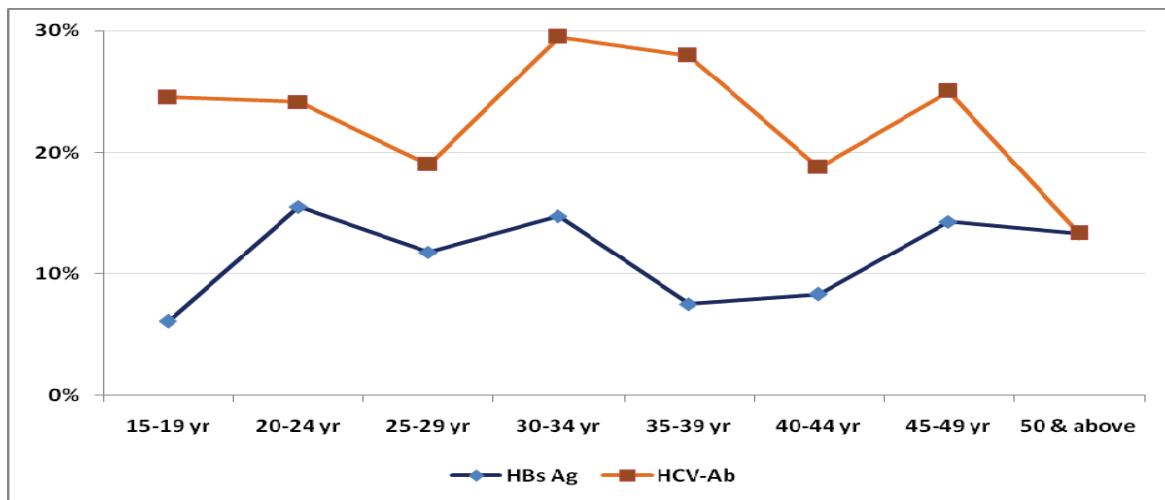


Figure 8 Distribution of HBs Ag and anti HCV Ab positive by HIV status

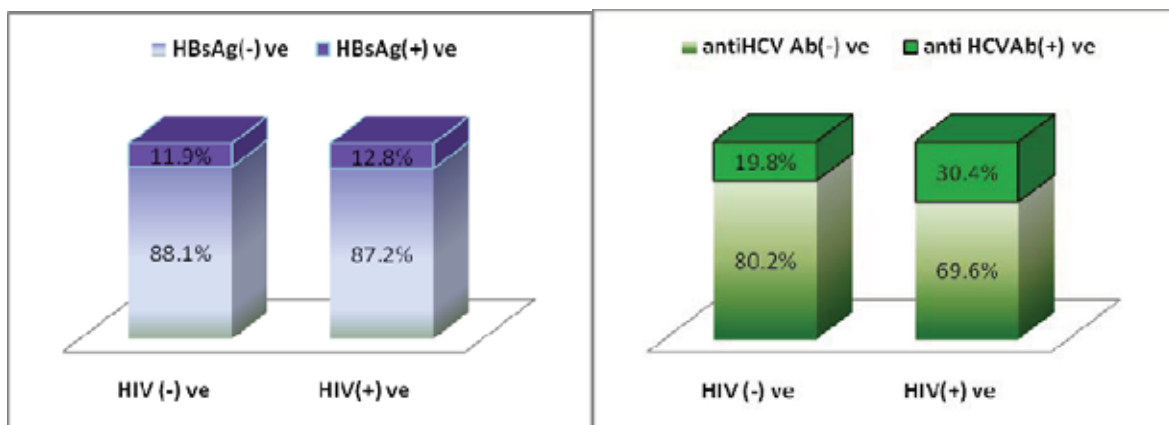
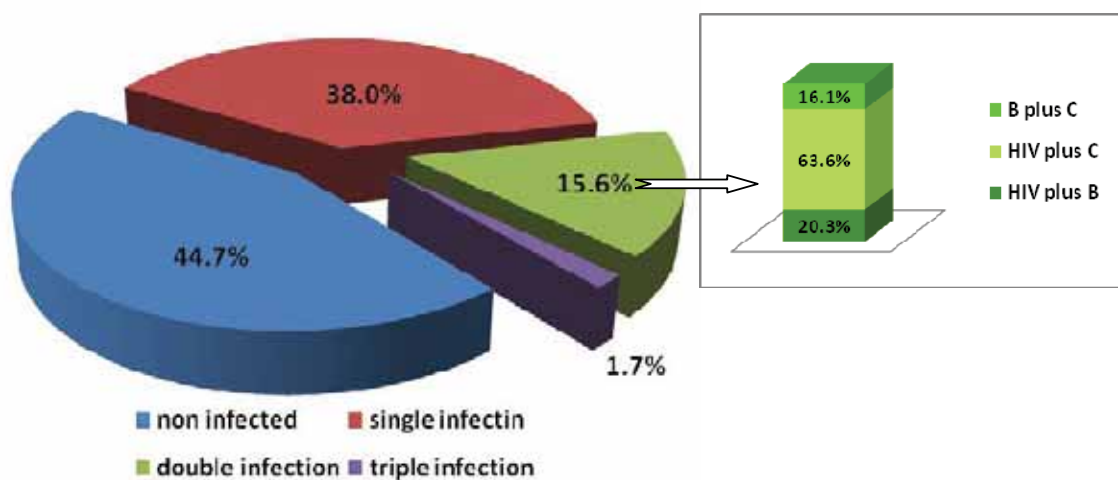


Figure 9 Nature of infection and co-infection among IDUs (HSS-2010)



5.6 Results of syphilis screening

The prevalence of VDRL positive was the highest (2.1%) among male STI patient, followed by MSM (1%) and FSW (0.7%). (Table 4)

Table 4: Prevalence of syphilis (VDRL+) among sentinel population, HSS 2010

Sentinel Group	Sample (n)	# VDRL (+)	VDRL (+)ve (%)
Male STI Patient	4,607	96	2.1
FSW	887	6	0.7
IDU	1029	4	0.4
MSM	400	4	1
Pregnant Women	13,706	69	0.5

Syphilis testing was started on sentinel groups in 2007. Among FSWs and IDUs, there were wide variations in the syphilis prevalence by sites (Figure 10 & 11).

Figure 10 VDRL positive rate among FSW by sites- HSS 2007-2010

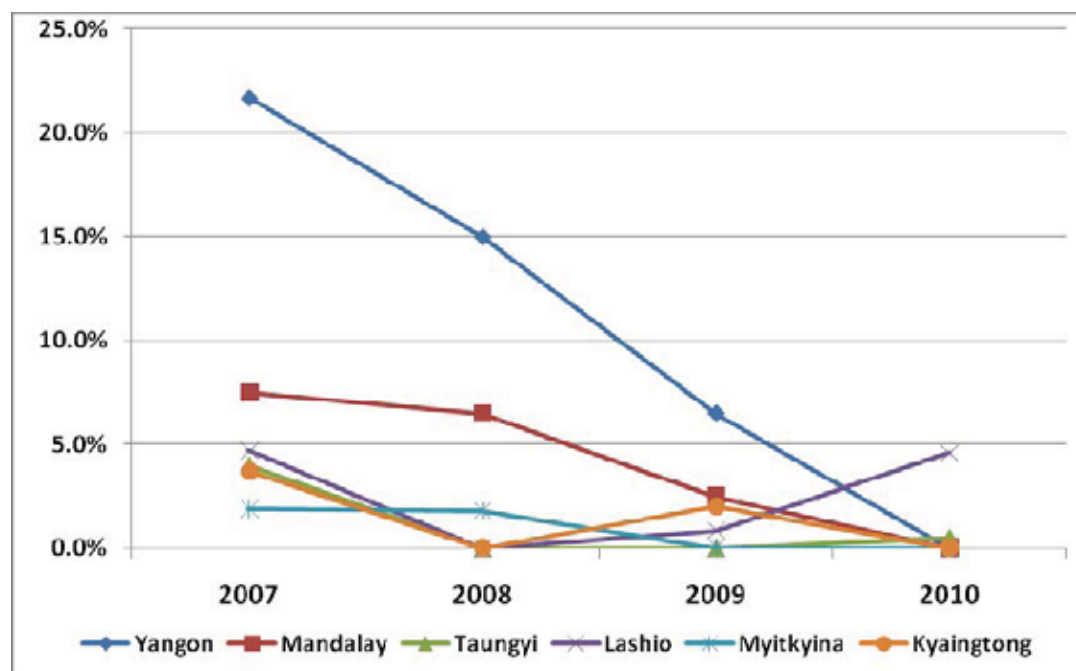


Figure 11 VDRL positive rate among injecting drug users by sites- HSS 2007- 2010

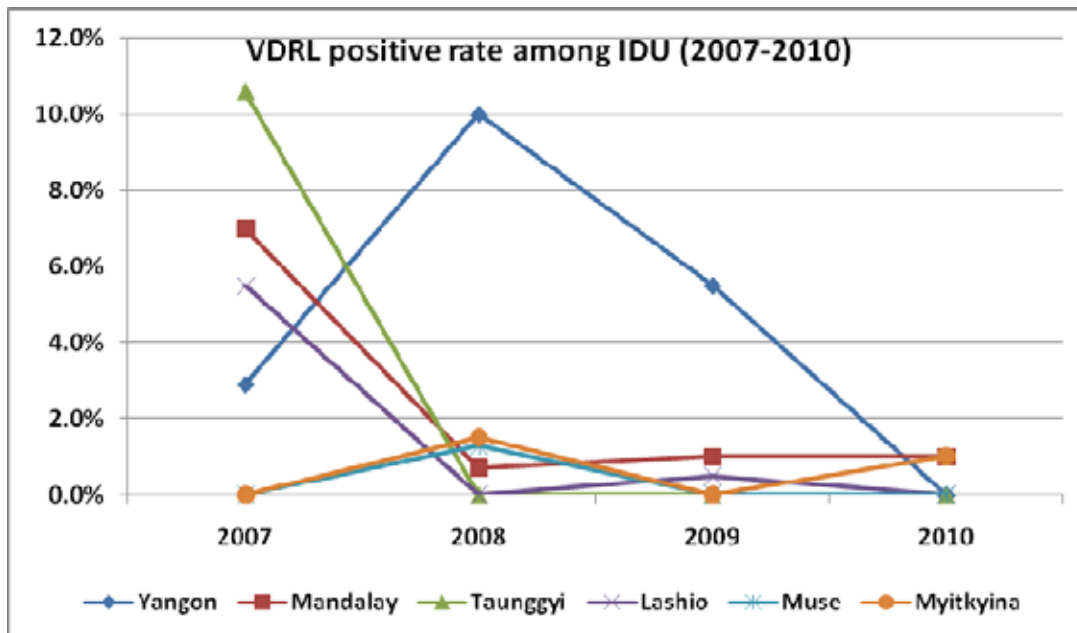
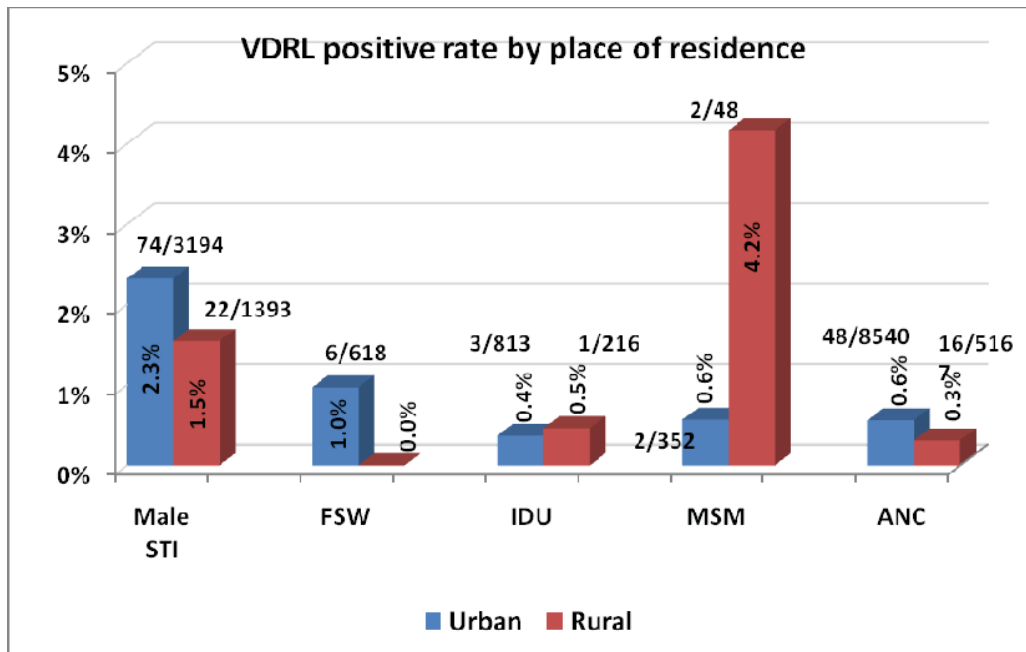


Figure 12 showed the comparison of VDRL positive rate between urban and rural populations. Syphilis prevalence was found to be higher in urban areas in Male STI patients, FSW and pregnant women; not much difference between urban and rural IDU. Although the rate was found to be pretty much higher in rural MSM, it might be a misled interprets with the significantly lower sample size for rural group. Nevertheless, the spread of sexually transmitted diseases has expanding to rural populations is quite concerning.

Figure 12 VDRL positive rate among sentinel groups, by place of residence, HSS 2010



Prevalence of syphilis was found to be significantly higher in people living with HIV than who did not have HIV in male STI, MSM and pregnant women. Not much association was found in IDU and FSW groups.

Figure 13 Prevalence of syphilis (VDRL+) by HIV status and sentinel population group, HSS 2010

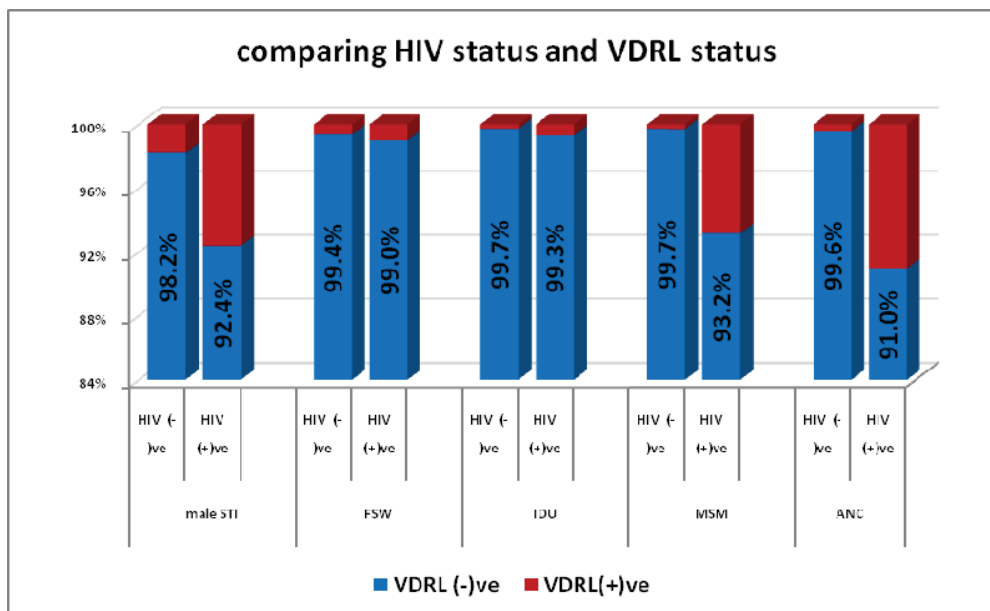
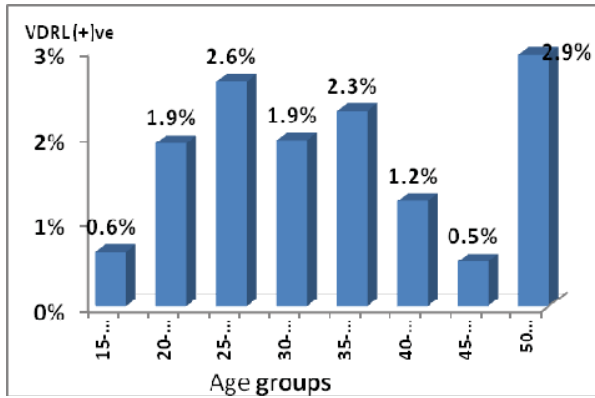


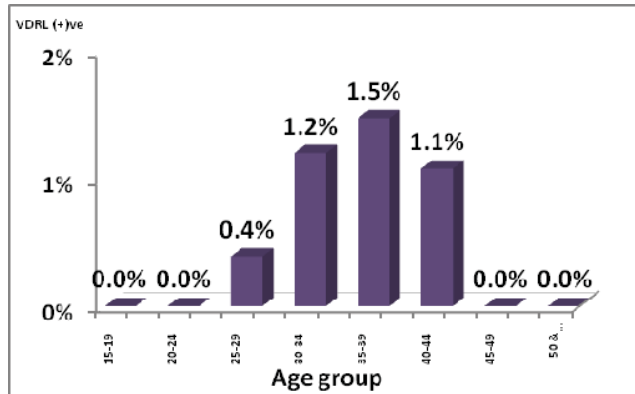
Figure 14 revealed the variation of syphilis rate by age group in sentinel populations.

Figure 14 Prevalence of syphilis (VDRL+) by groups, HSS 2010

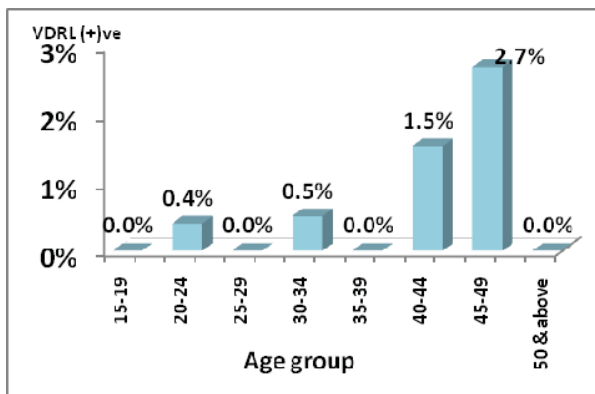
Male STI patients



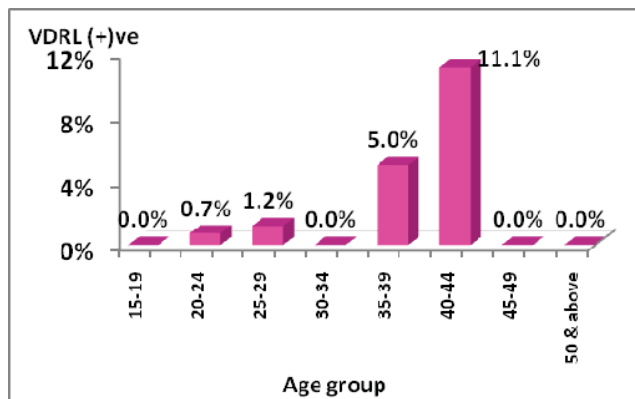
Female Sex Worker



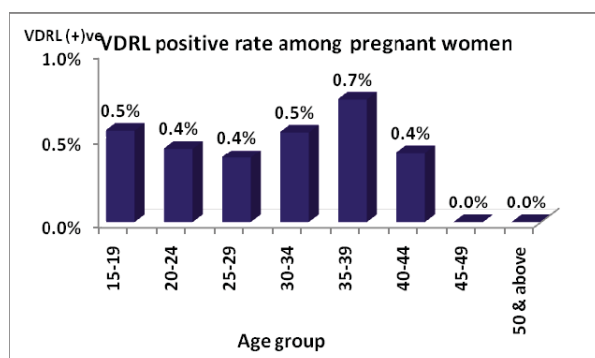
IDU



MSM



Pregnant Women

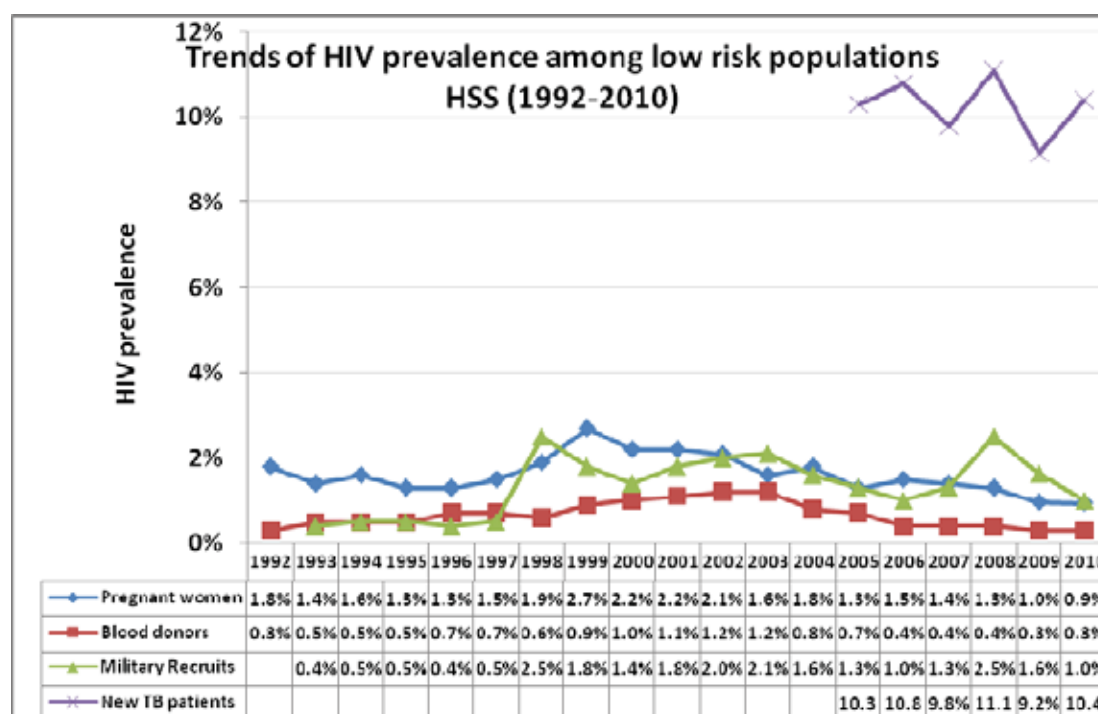


6. HIV trends over time

6.1 HIV prevalence among sentinel groups 1992-2010

Among low risk populations, HIV prevalence levels in 2010 continued to plateau after reaching a peak in the late 1990s. A slight rise was observed especially among new military conscripts in 2008. The prevalence for new TB patients was fluctuating round about 1% above and below the 10% level. (Figure 15)

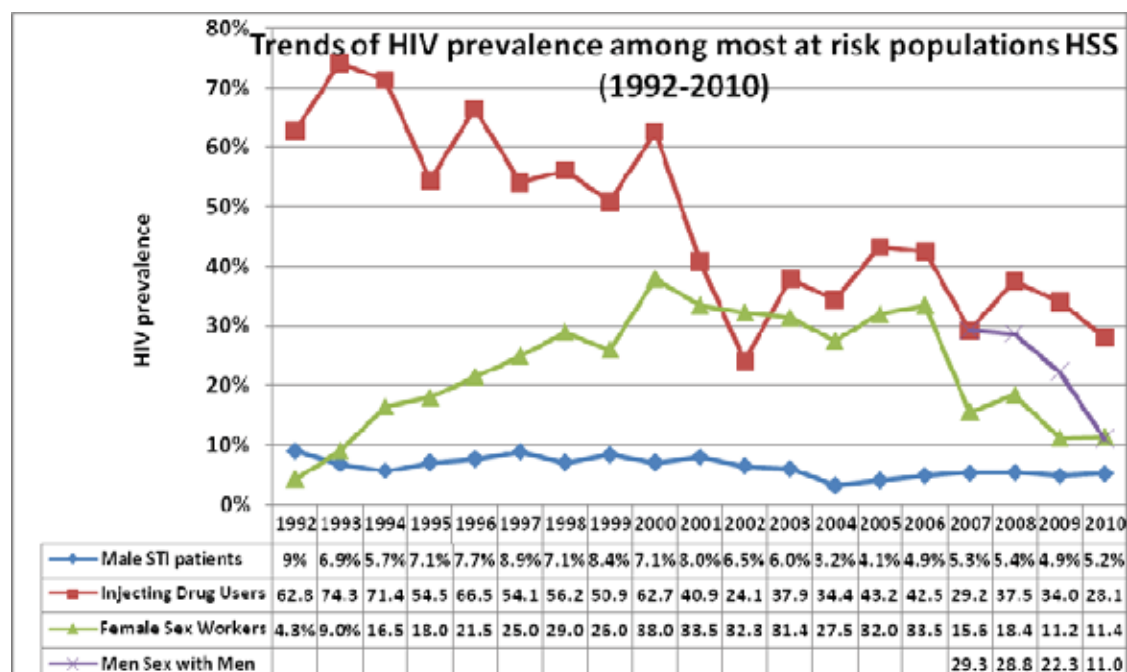
Figure 15 Trends of HIV prevalence among low risk sentinel groups 1992-2010



Since 2000, HIV prevalence among most at risk populations has been slowly declining. There was a relatively sharp decline of prevalence from 2006 to 2007 among FSW and IDU groups. This decline may be explained by the expansion of sentinel sites; better understanding and standardizing sampling methodology across sentinel sites; and better cooperation with stakeholders. With the in-depth analysis, the trends for IDU revealed somewhat cyclical pattern of fall in HIV prevalence every two to three years; and this round also showed a fall in prevalence. This pattern of fall might be due to dilution effect with the influx of new injectors, turning over of IDU to DU; passing away of the infected cases, or actual decline in transmission following the intensive and coordinated harm reduction programme. Factors associated with the pattern of cyclical fall should be explored by looking into and triangulating with other available information. Although the HIV prevalence among FSW is declining and reported condom use is on the increase, the persistent level of HIV prevalence among male STI patients urges vigilant action to be taken for sexual transmission prevention activities to have more focus on the clients and regular partners of FSWs. Since 2007, MSM has become one of the sentinel groups in HSS, the trends of HIV prevalence revealed a sharp decline in 2010 round. Sentinel sites reported the use of standard sampling methodology for MSM, however it was reported to have a higher denier rate in this round. Moreover with the limited data points and sentinel sites, it was hard

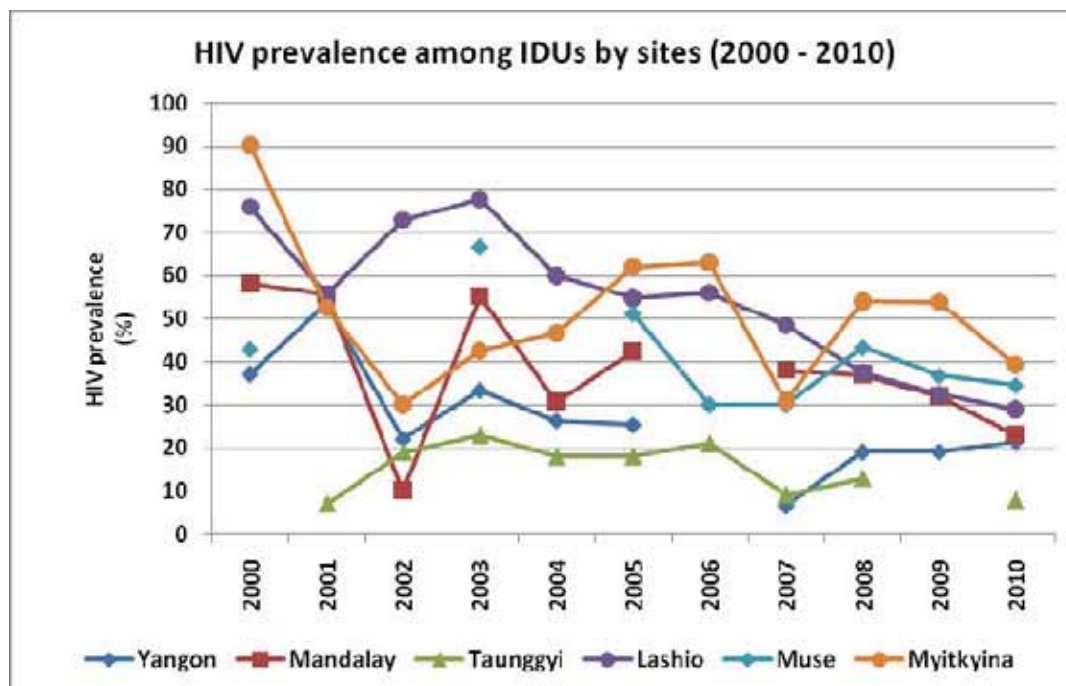
to say that the HIV prevalence was on the declining. Nevertheless we should keep an eye on this target group for timely detection of any changes in disease transmission pattern. (Figure 16)

Figure 16 Trends of HIV prevalence among high risk sentinel groups 1992-2010



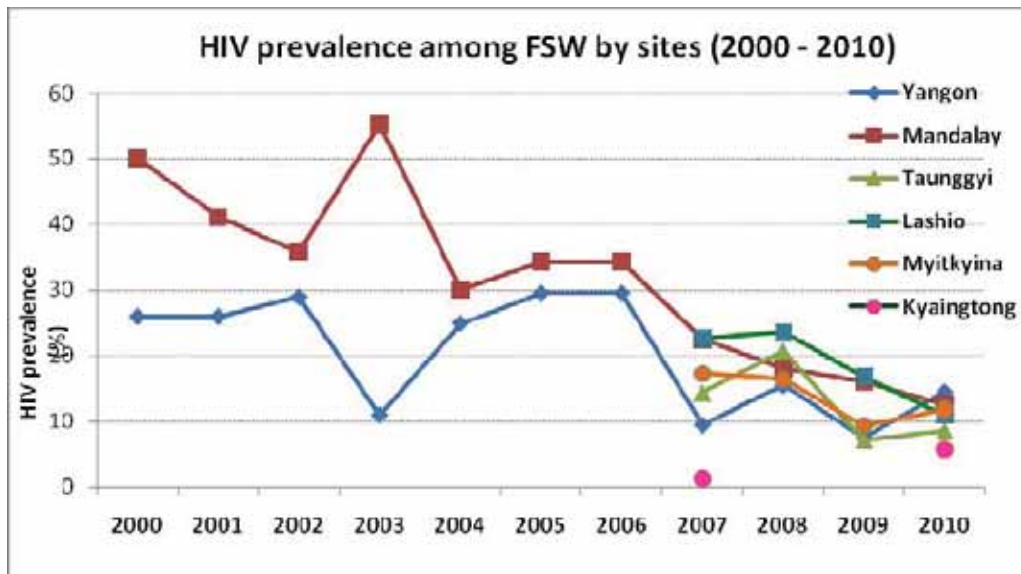
In 2010, the prevalence among IDU showed a decline in all sites except Yangon. The decline was more obvious in Myitkyina site. A careful look in the trend in each sentinel site revealed that Lashio site has a continuous steady decline since its peak in 2003; this may be one of the fruitful results from the coordinated effort of all implementing partners working closely together for the harm reduction programme in Lashio. A close look into the Myitkyina trend showed the three times of relatively sharp decline in 2002, 2007 and 2010. This decline contributed to the cyclical pattern of decline observed at the overall level. If this pattern of decline and rise is associated with some preventable issue(s), the partners working in that area should work close enough to find out that issue(s) and should provide appropriate intervention preventing another rising wave that might as usual follows the mark decline. (Figure 17)

Figure 17 Prevalence of HIV among IDUs by sites- HSS 2000-2010



A close look at FSW trend for each sentinel site revealed that there was a continuous declining trend of prevalence in Mandalay since the peak at 2007. Lashio also showed a declining trend since 2007, the first year of being included as new sentinel site for FSW. For Yangon, although there was a slight upward fluctuation of the positive rate, there was a declining trend in general. The apparent decline trends observed in decades old sentinel sites, Yangon and Mandalay, since 2007 may be explained by a couple of reasons: getting more representative sample through better coordination with partners in sample collection; turning over of the FSW and thus catching the newly recruited group; or the actual declines in HIV prevalence with the intensive TCP programme in place for a long time. The first reason was supported by having the positive rate within the acceptable range of those of newly expanded sentinel sites. The last reason was supported by declining HIV prevalence among younger group (15-24) in these two sites. Figure 18 depicts trends of HIV prevalence among female sex workers by sites.

Figure 18 Prevalence of HIV among Female Sex Workers by sites- HSS 2000-2010



The overall HIV prevalence among tuberculosis patients showed slight fluctuation from 2005 to 2010. Having included as a sentinel group since 2005 and expanded to five sites in 2006, 2009 and 2010; trend analysis could be done for ten sites only. In 2010, most of the sites had a slight increase in HIV positive rate. The trends varied with the sentinel sites: Monywa had a consistent high level of prevalence since 2008; a markedly obvious fluctuation was observed in Pyay; a sharp decline from 2009 to 2010 was seen in Magway whereas a sharp increase was in Loikaw. The use of standard sampling methodology should be assessed for the sites with marked fluctuation. (Figure 19 (a) and (b))

Figure 19 (a) HIV prevalence among tuberculosis patients by site - 2005-2010

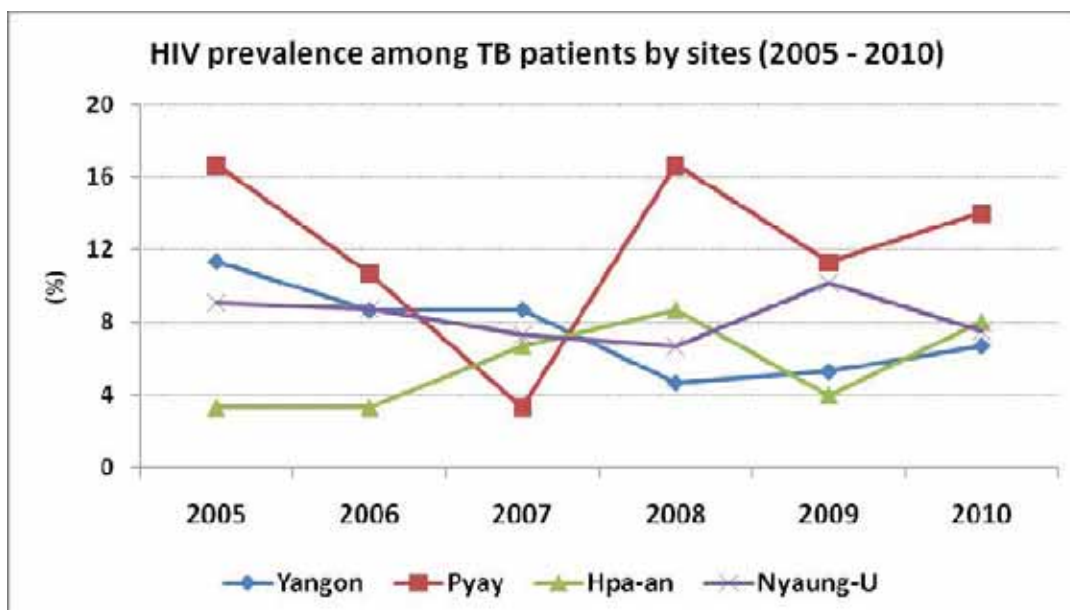
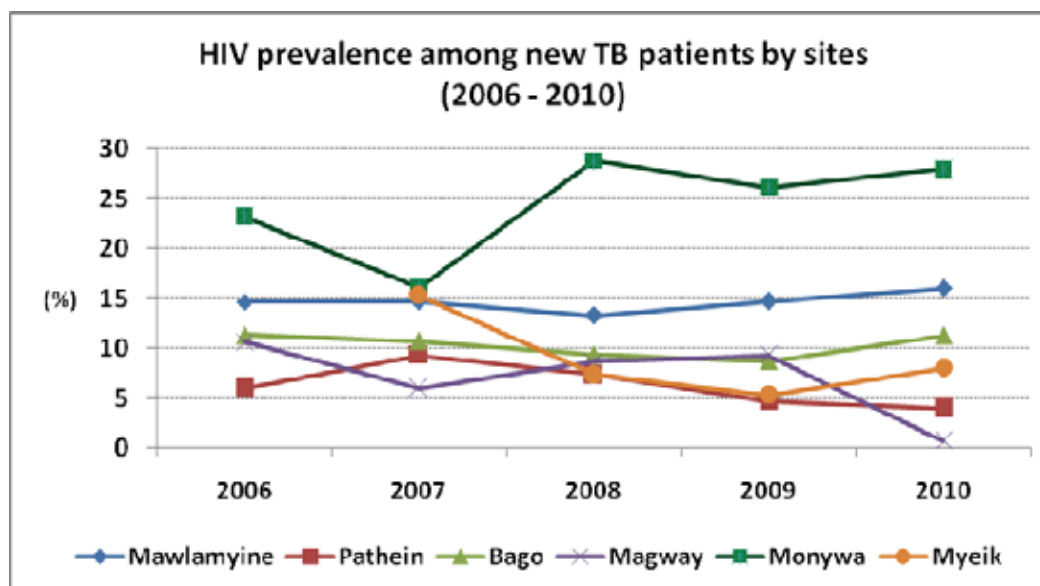
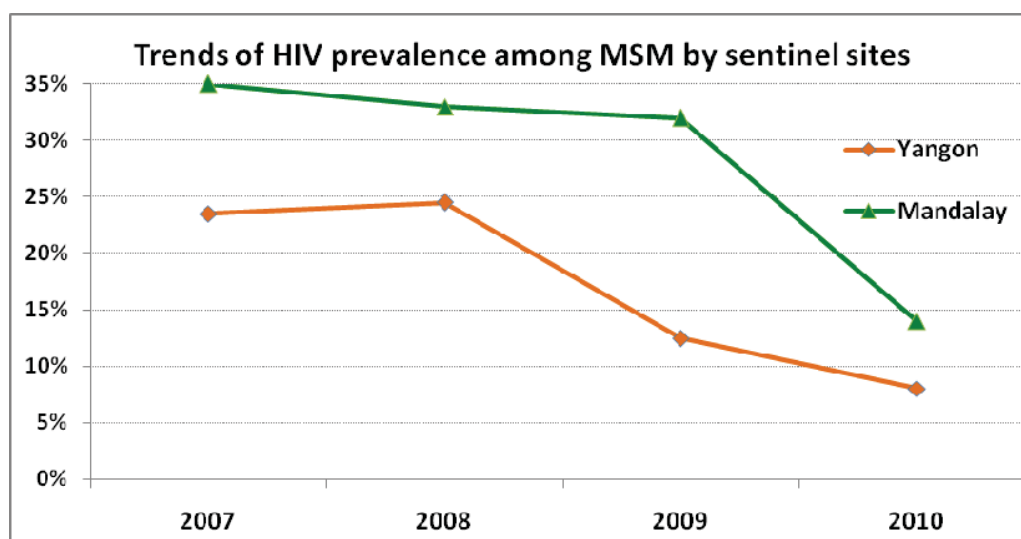


Figure 19(b) HIV prevalence among tuberculosis patients by site - 2006-2010



Since 2007, Men who have sex with men have been included as one of the sentinel groups. At the beginning, HIV prevalence in this group was high in both Yangon and Mandalay sentinel sites. In Yangon, a sharp decline was observed for a consecutive of two years; and only this year in Mandalay. Getting a wider sample collection network and thus more representative sample may explain the decline, however a careful watch on the coming years' result is necessary to confirm the fall in prevalence is due to the more representativeness of the collected sample and reflects the actual level of prevalence among this target group. Nevertheless, intensifying the targeted prevention interventions for this group must be continued (Figure 20).

Figure 20 HIV prevalence among men who have sex with men – HSS 2007-2010



6.2 HIV prevalence among young population

Being taken as a proxy for HIV incidence, the HIV prevalence among young sentinel populations showed a continuous decline in recent years. However, the prevalence among most at risk youth still remained at high level. Thus, the prevention programmes must be strengthened with interventions focusing on prevention of new infection among youth with risky behavior. (Figure 21, 22 & 23)

Figure 21 HIV prevalence among 15-24 years of age populations, by sentinel groups,

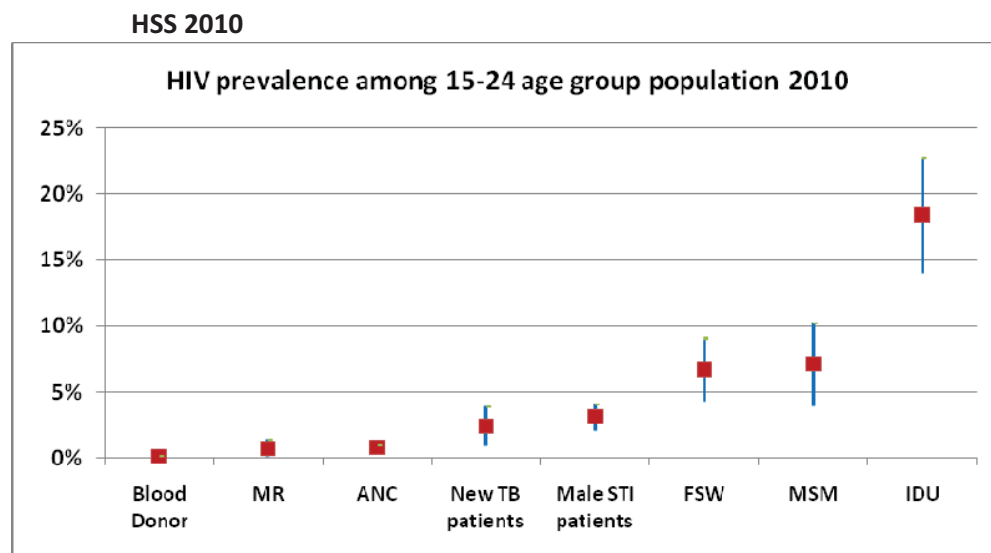


Figure 22 Prevalence of HIV among young injecting drug users and female sex workers,

HSS 2000-2010

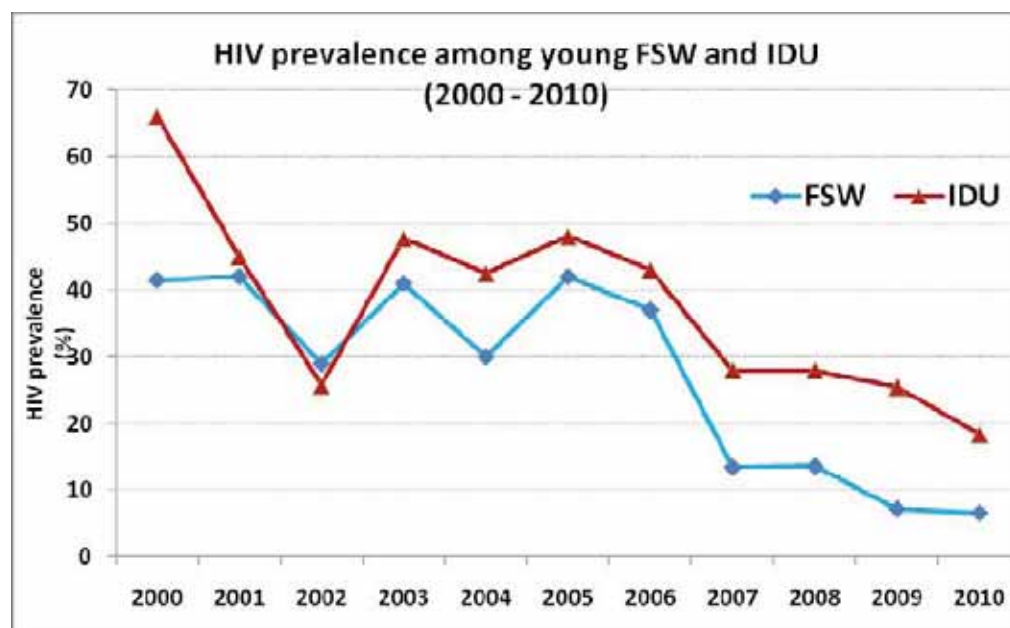
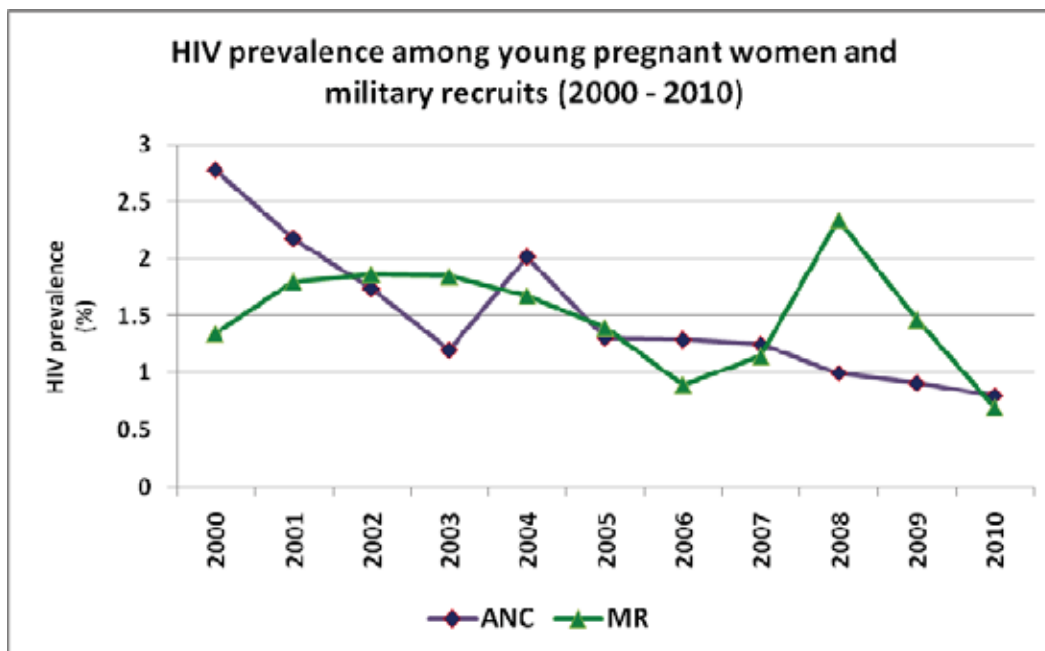


Figure 23 Prevalence of HIV among young pregnant women and military recruits, HSS 2000-2010



7. Decentralization of HIV testing

The decentralized HIV testing approach continued used in 2010. In this round, HIV antibody testing was performed at the local level in 35 sites and all tested positive and 10% of negative blood samples were sent to reference laboratories where the tests were repeated.

The results of the reference laboratories were regarded as the gold standard. In total, the number of false positive was minimal (0.4%) and false negative was (3%); this could have minimal underestimation of the true prevalence but this quantity of false negative and positive is acceptable for the purpose of surveillance (Table 5).

Table 5 Comparing HIV test results of local and reference laboratories

		Reference Lab (NHL/ PHL& State/Regional team)		Total
		<i>Negative</i>	<i>Positive</i>	
Local Lab	<i>Negative</i>	1,621	15	1,636
		(99.6%)	(3%)	
	<i>Positive</i>	7	481	488
		(0.4%)	(97%)	
	TOTAL	1,627 (100%)	497 (100%)	2,124

Out of 16 sites involved in sending sample to reference lab for quality checking, 9 sites showed discordant results and seven sites had relatively higher discordant results. (Table 6)

Table 6: Comparison of local and reference HIV testing by sentinel sites – HSS 2010

No.	Site	Local lab		Reference lab		False	False
		(-) ve	(+) ve	(-) ve	(+) ve	(-) ve	(+) ve
1	Meikthila	71	62	71	62	0	0
2	Muse	645	105	643	107	2	0
3	Kawthoung	53	12	53	12	0	0
4	Bahmo	75	45	72	48	3	0
5	Hpa-an	71	29	73	27	0	2
6	Loikaw	86	45	90	41	0	4
7	Hinthata	87	26	84	29	3	0
8	Maubin	54	4	54	4	0	0
9	Myingyan	57	34	56	35	1	0
10	Shwebo	59	8	59	8	1	1
11	Myawaddy	56	12	53	15	3	0
12	Nyaung-U	70	24	70	24	0	0
13	Taungoo	73	44	73	44	0	0
14	Myaungmya	53	8	53	8	0	0
15	Pyinmana	87	23	85	25	2	0
16	Haka	39	7	38	8	0	0
Total		1636	488	1627	497	15	7

8. Limitations

- Being a sero-survey, the biological information from HSS should be triangulated with other available information such as Behaviour information; service provision information from all implementing partners so as to have an over view of the whole picture of the epidemic.
- As a facility based survey, it bears some issues on the representativeness of sample.
- Few sentinel sites could not complete the targeted sample size.

9. Recommendations

9.1 Recommendations for programme implementation

- To understand the magnitude and epidemiological nature of the HIV in the country, HSS data should be triangulated with other available data sources: behavioral surveillance surveys, programme monitoring data, rapid assessments and other surveys data.
- The prevention intervention activities must be intensified not only for most at risk populations, but also for general population including rural population.
- Human resources and institutional capacity in surveillance should be strengthened.

9.2 Recommendations for surveillance

- In order to get information regarding the trends of HIV incidence among most at risk populations, information on years of initiating the risk behavior among each MARP group should be collected in coming rounds of HSS.
- With the decreasing trends of prevalence in most target groups, the adequacy of sample size for each group should be checked with expertise from the strategic information and M&E working group.
- Before starting any round of HSS, all State & Regional AIDS/STD and TB officers and team leaders must gather together with the central level surveillance officers to discuss and share the field experience, difficulties in conducting the survey and find the ways to overcome difficulties.
- All implementers at field level must strictly follow the HSS protocol (2010).
- In order to avoid possible sampling bias and achieve required sample size for sentinel groups, coordination and networking at township level with INGOs, national NGOs, Drug Treatment Centers and Myanmar Medical Associations especially with general practitioners before the commencement of HSS should be improved.
- National AIDS Programme must strengthen the supervisory mechanism for the sentinel surveillance sites. State and Regional AIDS/STD officers must conduct preliminary assessment for the needs and attempt to arrange the mechanisms of specimen collection at the respective areas where they cover before the HSS commences.
- State and Regional AIDS/STD officers and team leaders must supervise overall process of specimen collection and specimen transportation.
- For Taunggyi with the insufficient sample size for injecting drug users and Kyaingtong with the insufficient sample size for Female Sex Workers, the possibility of achieving adequate sample size in the next rounds should be critically considered.

- HIV antibody testing should be decentralized in 35 sentinel sites, however, the internal and external quality assurance must be assured and all AIDS/STD teams must participate in the external quality control procedures.
- The new sites for military recruits should be considered to participate in the next rounds.
- The expansion of sentinel sites for TB must be carried out in the next rounds.

9.3 Recommendations for research

- Not all data can be collected from surveillance systems. Special data needs should be fulfilled by undertaking appropriate research, such as:
 - Qualitative study among MSM about social networks, risk behaviors and concurrency of partners
 - Determinants of risk behaviors among high-risk population
 - Changing patterns of drug use in selected sites where it is difficult to recruit adequate sample size for IDU sentinel surveillance

Annex 1 Total number of blood samples collected (n) and HIV prevalence (%) by sentinel population and sites - HSS 2010

Sr No	sentinel site		sentinel group								
			Male STD patient	FSW	IDU	MSM	ANC	MR	New TB patient	Blood Donor	Total
1	Yangon	n	150	199	160	200	400	400	150	3369	5028
		%	7.3	14.5	21.3	8.0	1.0	1.2	6.7	0.5	
2	Mandalay	n	150	200	200	200	400	400		6400	7950
		%	15.3	12.5	23	14	1.5	0.8		0.3	
3	Meiktila	n	150				400		150		700
		%	8				0.75		20.7		
4	Taunggyi	n	150	200	76		400				826
		%	6.7	8.5	7.9		0.5				
5	Lashio	n	82	109	200		400				791
		%	4.9	11.0	29		1				
6	Tachileik	n	150				400		150		700
		%	4				0.75		8.7		
7	Muse	n	150		200		400				750
		%	16.7		34.5		3.3				
8	Dawei	n	150				400		134		684
		%	2.7				0		5.2		
9	Kawthoung	n	150				400				550
		%	4				1.5				
10	Myitkyina	n	106	126	193		400				825
		%	8.5	11.8	39.4		1.0				
11	Bahmo	n	150				400		83		633
		%	3.3				1.3		24.1		
12	Mawlamyine	n	150				400		150		700
		%	2				1.5		16.0		
13	Patheingyi	n	93				399		150		642
		%	6.5				1.8		4.0		
14	Bago	n	150				400		150		700
		%	8				0.5		11.3		
15	Pyaw	n	135				400		150		685
		%	0.7				0.0		14.0		
16	Magway	n	150				400		150		700
		%	9.3				1.3		0.7		
17	Hpa-an	n	150				400		150		700
		%	2				0.5		8.0		

18	Sittwe	n	150				400		149		699
		%	2				0.25		2.0		
19	Monywa	n	150				400		147		697
		%	2.7				0.5		27.9		
20	Loikaw	n	150				400		148		698
		%	4.7				0.5		10.7		
21	Haka	n	61				327				388
		%	4.9				1.8				
22	Hinthada	n	150				400		150		700
		%	4				1.5		6.0		
23	Maubin	n	150				400				550
		%	1.3				0.5				
24	Myeik	n	150				400		150		700
		%	10				0.25		8.0		
25	Myingan	n	91				400		136		627
		%	1.1				1.0		11.0		
26	Pakkoku	n	150				400				550
		%	4.7				0				
27	Shwebo	n	150				400				550
		%	3.3				0.8				
28	Kyaing Tong	n	70	53			231				354
		%	4.3	5.7			0.0				
29	Myawaddy	n	150				400				550
		%	6				1.8				
30	Nyaung-U	n	(exclud ed)				400		147		547
		%	0				0.5		7.5		
31	Taungoo	n	150				400		119		669
		%	4				1.25		14.2		
32	Myaungmya	n	150				400				550
		%	2.7				1.0				
33	Pyin Oo Lwin	n	150				349				499
		%	3.3				1.4				
34	Pyinmana	n	150				400		150		700
		%	0.7				0.0		8.0		
35	Kalay	n	69				400				469
		%	2.9				0.0				
	Total		4607	887	1029	400	13706	800	2863	9769	34061

Annex 2 HIV prevalence by age group HSS-2010

Age group	Male STI patients			FSW			IDU			MSM		
	sample	HIV (+)ve	%	sample	HIV (+)ve	%	sample	HIV (+)ve	%	sample	HIV (+)ve	%
15-19 yr	316	12	3.8	176	8	4.5	54	6	11.1	115	4	3.5
20-24 yr	841	24	2.9	257	21	8.2	251	50	19.9	139	14	10.1
25-29 yr	1217	73	6.0	167	28	16.8	300	80	26.7	85	10	11.8
30-34 yr	962	59	6.1	136	24	17.6	197	76	38.6	22	7	31.8
35-39 yr	614	43	7.0	93	11	11.8	108	36	33.3	20	3	15.0
40-44 yr	401	18	4.5	42	7	16.7	65	21	32.3	9	4	44.4
45-49 yr	189	7	3.7	15	2	13.3	37	14	37.8	7	1	14.3
≥ 50 yr	67	1	1.5	1	0	0.0	17	6	35.3	3	1	33.3
Total	4607	237	5.1	887	101	11.4	1029	289	28.1	400	44	11.0

Age group	Pregnant women			New Military Recruits			New TB patients			Blood Donors		
	sample	HIV (+)ve	%	sample	HIV (+)ve	%	sample	HIV (+)ve	%	sample	HIV (+)ve	%
15-19 yr	946	7	0.7	289	0	0	129	1	0.8	927	1	0.1
20-24 yr	3534	27	0.8	384	5	1.3	287	9	3.1	2878	3	0.1
25-29 yr	4058	45	1.1	127	3	2.4	358	49	13.7	2002	15	0.7
30-34 yr	2911	23	0.8				351	87	24.8	1281	9	0.7
35-39 yr	1698	14	0.8				303	63	20.8	1053	3	0.3
40-44 yr	512	6	1.2				296	43	14.5	797	3	0.4
45-49 yr	47	0	0.0				238	17	7.1	511	0	0.0
≥ 50 yr							901	29	3.2	320	0	0.0
Total	13706	122	0.9	800	8	1.0	2863	298	10.4	9769	34	0.35