National AIDS Programme

Department of Health

Ministry of Health

Results of
HIV Sentinel Sero-surveillance 2009
Myanmar

May 2010

Acknowledgments

This 2009 HIV sentinel sero-surveillance report was the combined efforts of our M&E officers, State/Divisional 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. Lastly, we thank Dr Aye Myat Soe and Dr San Hone who involved in successful HSS implementation and writing this report and Dr Renu Garg for editing this report and for provision of technical assistance.

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

M&E: Monitoring and Evaluation

MSM : Men who Have Sex with Men

NAP: National AIDS Programme

NTP: National TB Project

NGO: Non-Government Organization

PMCT: Prevention of Mother to Child Transmission

STD: Sexually Transmitted Disease

STI: Sexually Transmitted Infection

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 sentinel groups on different (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 patients became one of the sentinel groups in 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, 34 AIDS/STD teams carried out HSS follow the HSS guidelines 2007. HSS was conducted from March to May 2009 in 34 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 15 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 2009

Sr. No.	Sentinel groups	Number of sentinel site	Sample size per site
1	Pregnant women attending ANC clinics	34	400
2	Male STI patients	34	150
3	New TB patients	15	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 2009, Pyinmana and Pyin Oo Lwin Townships include Pregnant Women as a sentinel group.

** 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. In 2008, the remaining (14) sentinel sites performed HIV antibody test at the local AIDS/STD team laboratory and again tested in the corresponding state and division level AIDS/STD team, after that those results are compared to observe the discrepancies.

In 2009 HSS round, all sentinel sites except Kyaing Tong, Taungoo, Myaungmya and Pyin Oo Lwin 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 Divisional 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 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, 34,153 participants were included in 34 sentinel sites during the 2009 round.

- A total of 4,535 male STI patients from the (33) sentinel sites were collected during the survey
- 838 commercial sex workers were included in the survey from five sites
- 400 the men having sex with men from two sites
- 945 injecting drug users were also surveyed in five townships
- 13,490 pregnant women who attended antenatal clinics in 34 townships
- 800 new military conscripts in two selected recruitment areas
- 2,044 new tuberculosis patients in fifteen townships
- 11,101 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 ranging from 80 to 90 percent for Male STI patients, and new TB patient, from 70 to 80 percent for FSW and IDU, and was 99% for pregnant women and 100% for MSM and new military conscripts.

Table 2: Comparison between the required and achieved sample size among different sentinel population groups – HSS 2009

Sentinel group	Required sample size per site	No of sites	No (%) of sites achieving targeted sample size	Total sample size	Achieved sample size No (%)
Male STI	150	33	25 (73.5)	5,100	4,535 (88.9%)
FSW	200	6	3 (50)	1,200	838 (69.8%)
MSM	200	2	2 (100)	400	400 (100%)
IDU	200	6	3(50)	1,200	945 (78.8%)
Pregnant women	400	34	32 (94.1)	13,600	13,490 (99.2%)
New military recruits	400	2	2 (100)	800	800 (100%)
New TB patients	150	15	8 (53.3)	2,250	2,044 (90.8%)
Blood donors	not specified	2			11,101

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 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 4% across 34 sentinel sites. HIV prevalence was 0.94% in both primipara and multipara women.

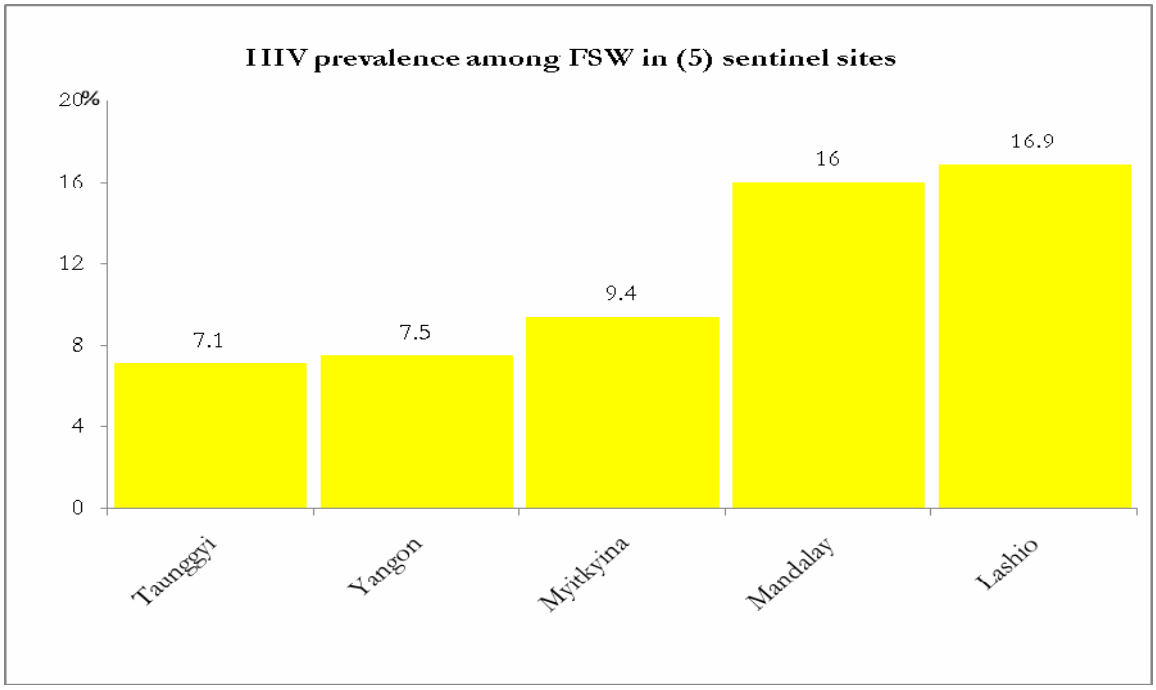
Table 3: HIV Prevalence among sentinel populations – HSS 2009

Sentinel group	# of HIV tested (n)	# of sites (n)	# of HIV positive (n)	**% Sero positive**	**Range**			95% CI
					Median (%)	Minimum (%)	Maximum (%)	
Male STI patient	4,535	33	220	**4.85**	4	0	15.7	(4.2,5.5)
FSW	838	5	94	**11.2**	8.5	0	16.9	(9.2,13.6)
IDU	945	5	327	**34.6**	32.3	0	53.8	(31.6,37.7)
MSM	400	2	89	**22.3**	22.3	12.5	32.0	(18.2,26.4)
Pregnant women	13,446	34	129	**0.96**	0.8	0	4.0	(0.8,1.1)
New military recruits	800	2	13	**1.63**	1.6	1.5	1.8	(0.8,2.5)
New TB patients	2,044	15	187	**9.15**	8.1	2	26.1	(7.6,10.0)
Blood donors	11,101	2	32	**0.3**				
Total	34,310	34						

Among female sex workers, HIV prevalence was the highest in Lashio (16.9%) followed by Mandalay (16%), Myitkyina (9.4%), Yangon (7.5%) and Taunggyi (7.1%).

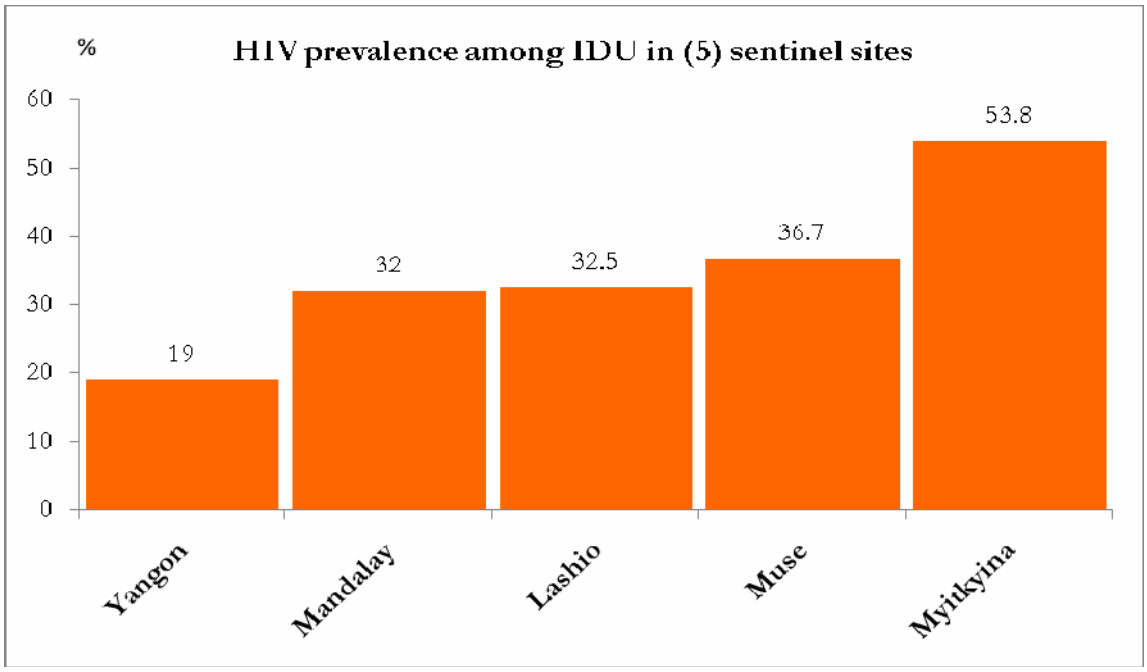
There was a little difference in HIV prevalence between direct sex workers 12.7% (67/528) and indirect sex workers 8.7% (27/310) (p=0.8).

Figure 1. HIV prevalence among female sex workers, HSS 2009



As shown in Figure 2, Myitkyina had the highest HIV prevalence (53.8%) among IDUs out of six townships included in HSS. HIV prevalence in Muse, Lashio and Mandalay townships had similar HIV levels ranging from 32%-37%, whereas Taunggyi with very small sample size (n=16) is excluded from this round.

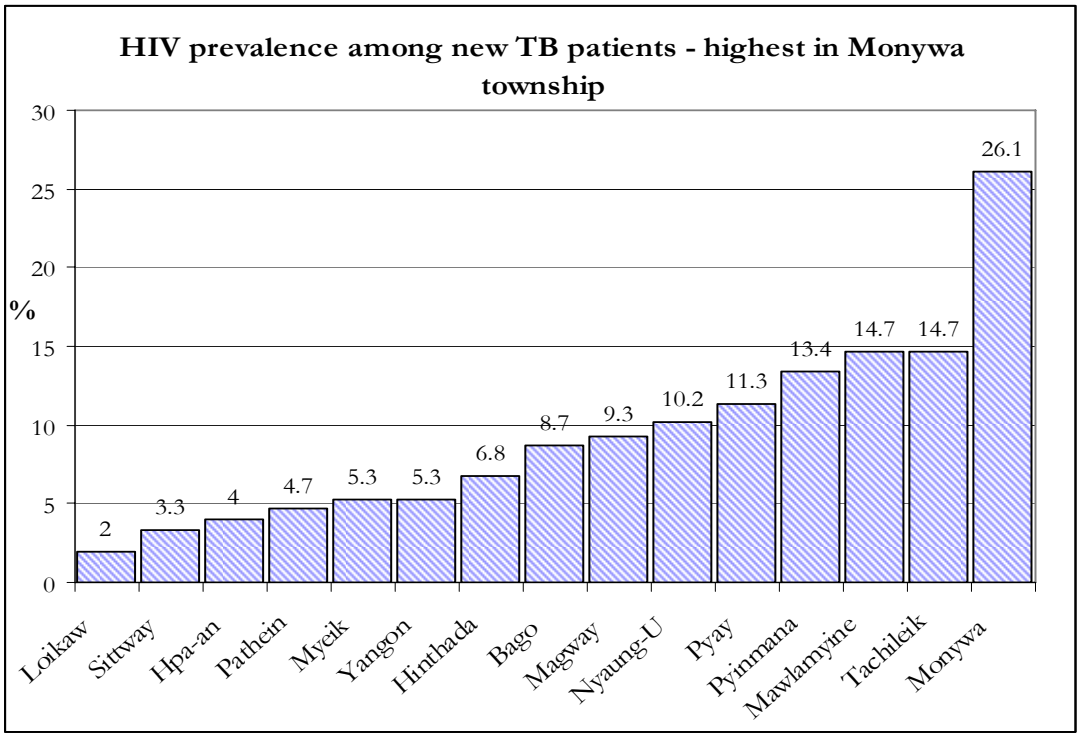
Figure 2. HIV prevalence among injecting drug users, HSS 2009



Among new tuberculosis patients, HIV prevalence ranged from 2% in Loikaw to 26.1% in Monywa. In 2009, the highest prevalence was found in Monywa, followed by Tachileik and Mawlamyine, and Pyinmana.

Analysed by type of TB showed that HIV prevalence was lower among smear-negative TB patients (5.9%, 55/927) compared to smear-positive TB patients (11.2%, 103/923) and extra-pulmonary tuberculosis patients (15.3%, 29/189) (p=0.0001).

Figure 3. HIV prevalence among new TB patients, HSS 2009



5.3. HIV prevalence by sex and age

The HIV prevalence among male and female TB patients was 8.05% and 9.26%, respectively.

Among blood donors 2,126/11,101 (19.2%) were female. The HIV prevalence was 0.09% in female and 0.33% in male donors.

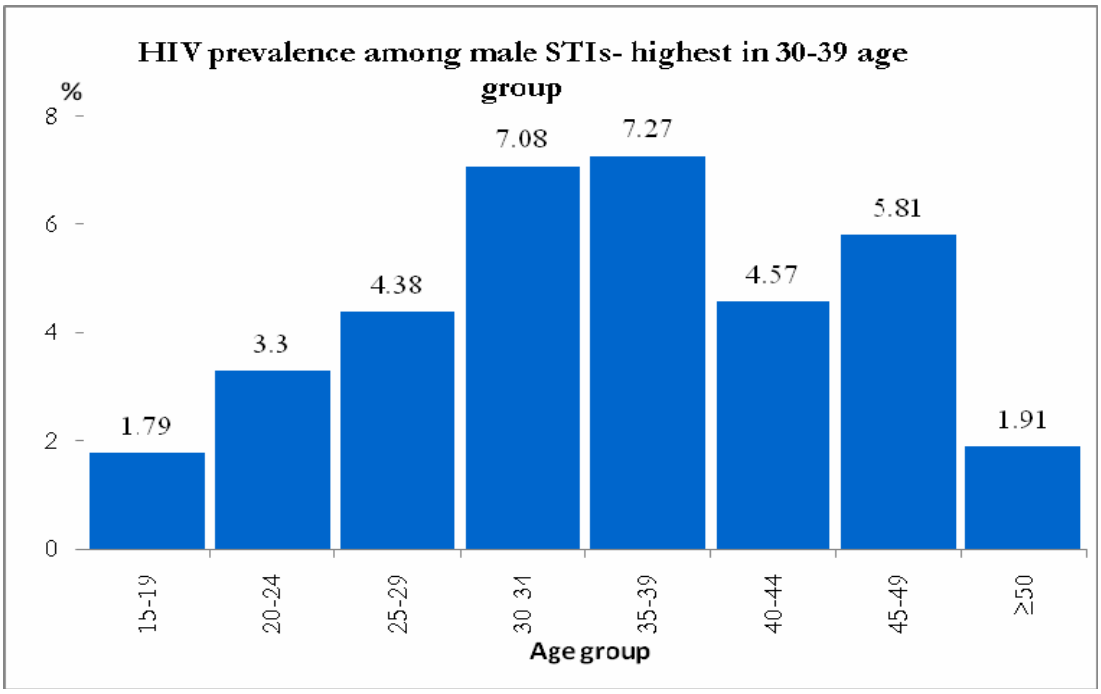
HIV prevalence by age groups is presented for each population in Figure 4. Among the most at-risk populations (i.e. male STI patients, FSW, and IDU), HIV prevalence appears to peak after 30 years. Among MSM the higher level was seen in 35-44 years age group which may assume that they may have already infected.

Among pregnant women, HIV prevalence was higher in the 20-34 years age group.

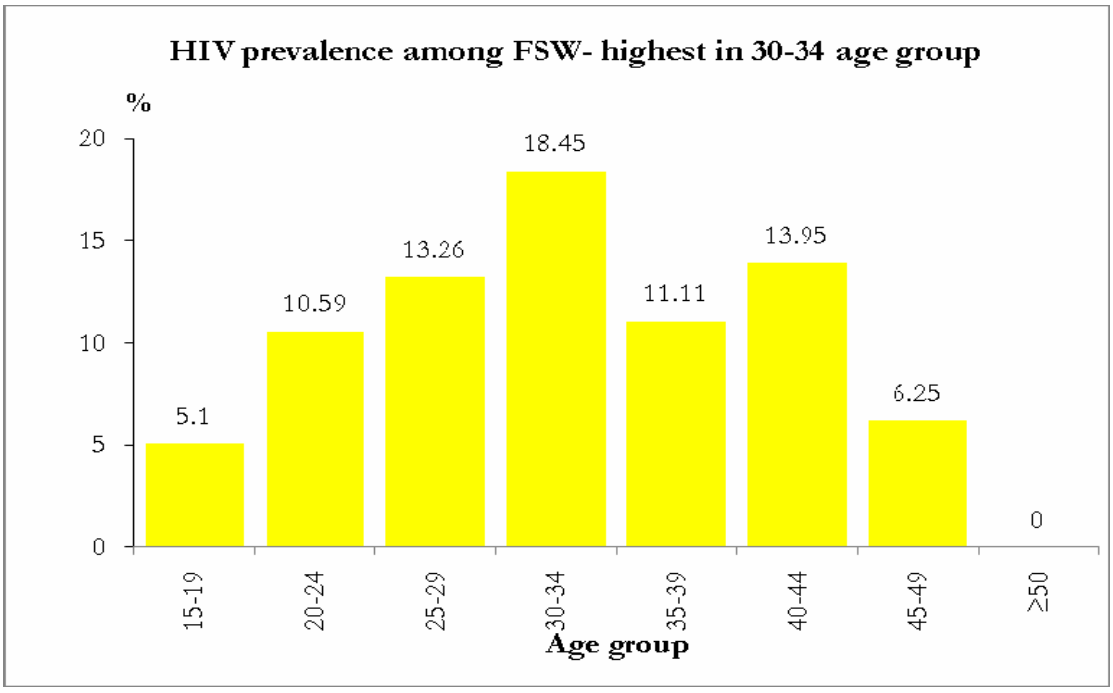
In the younger age groups 15-19 years old pregnant women (n=865) and military recruits (n=294) HIV prevalence was 0.5% and 0.7%, respectively; among the 20-24 years old pregnant women (n=3,644) military recruits (n=387) HIV prevalence was 1.0% and 2.1%, respectively (Figure 4).

Figure 4. HIV prevalence by age group and sentinel population – HSS 2009

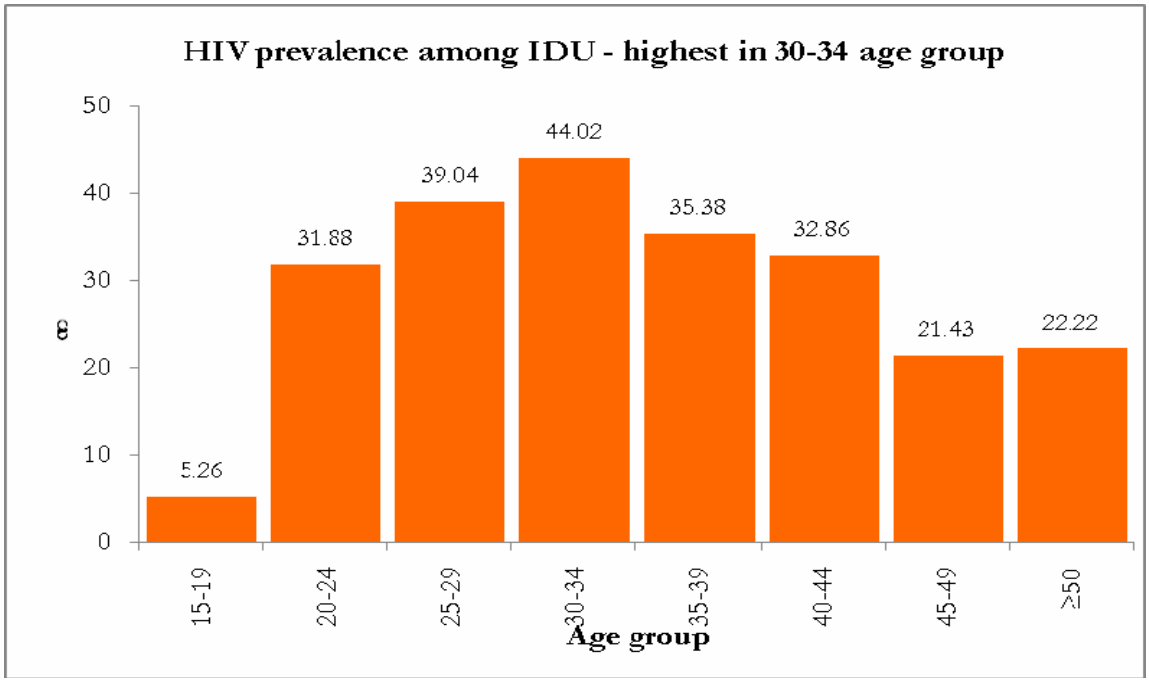
Male STI patient



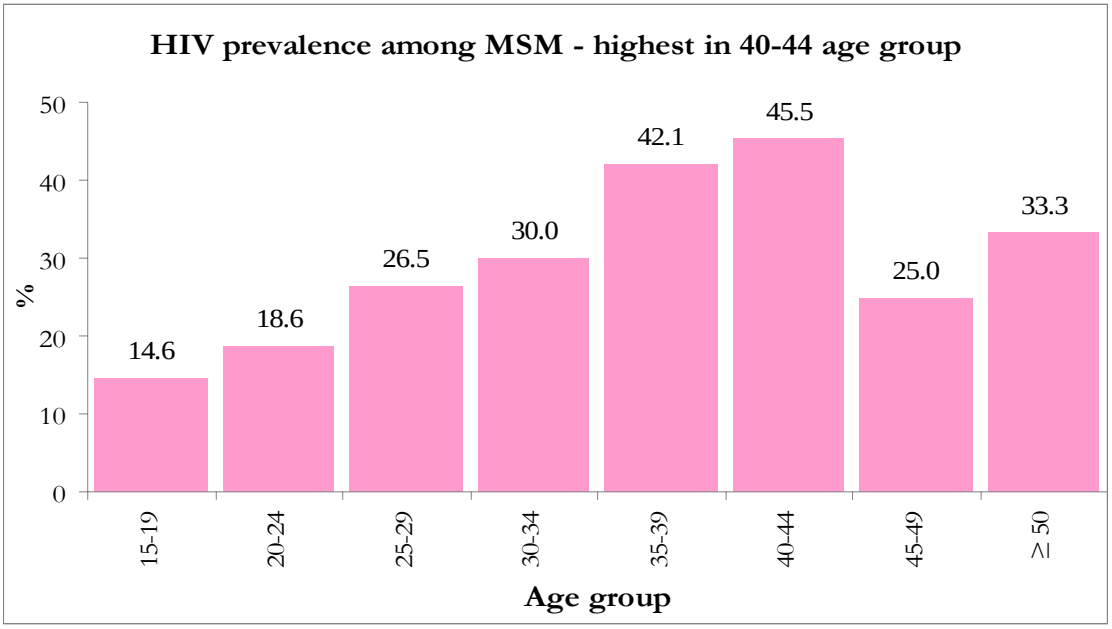
Female Sex Workers



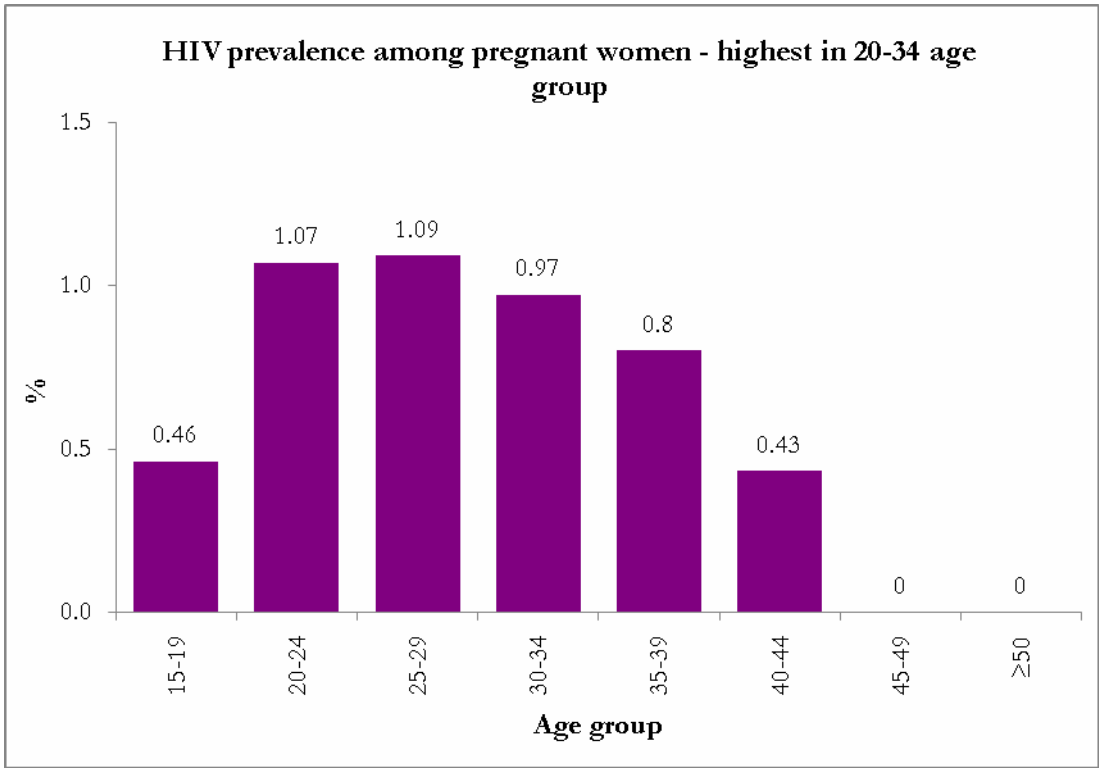
Injecting Drug Users



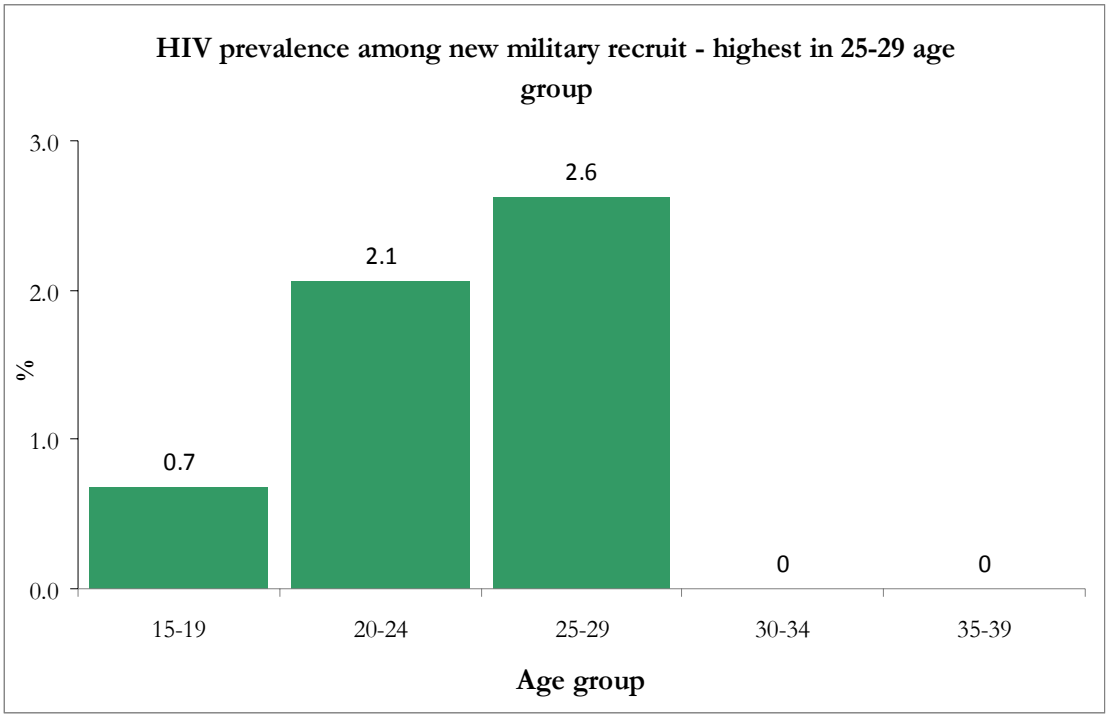
Men who have sex with Men



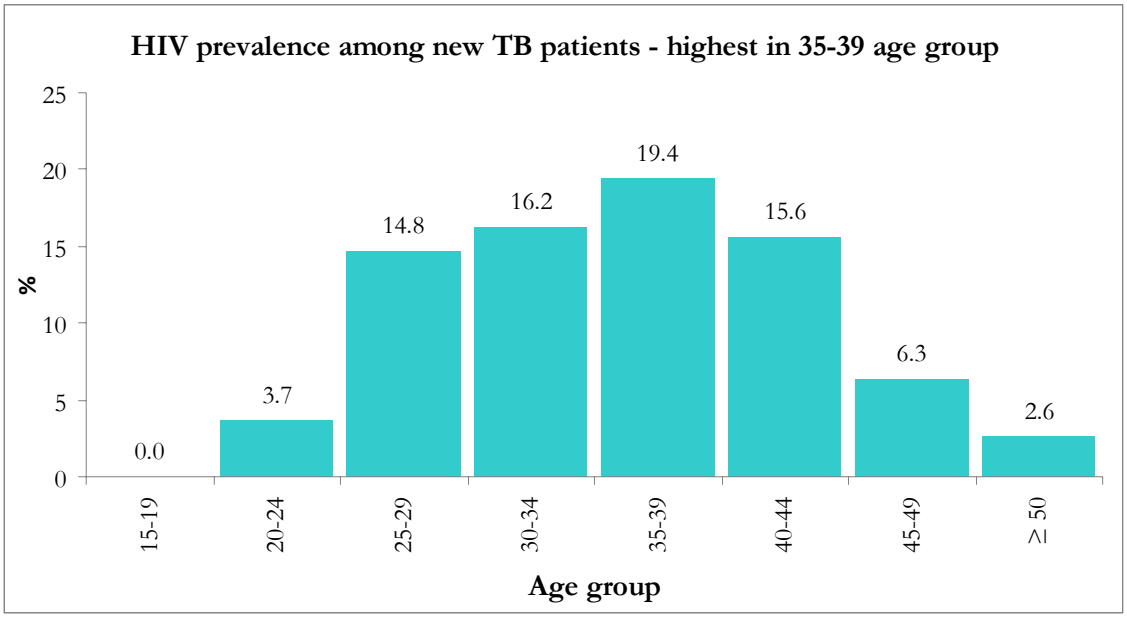
Pregnant Women



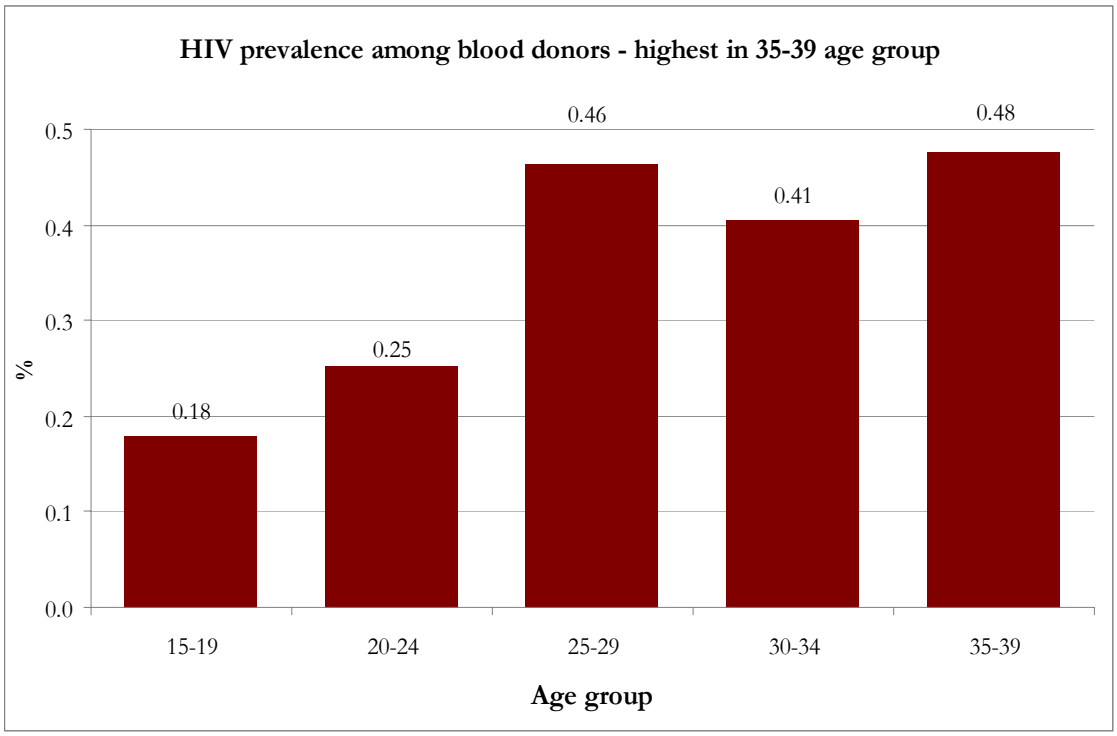
New Military Recruits



New TB patients



Blood Donors

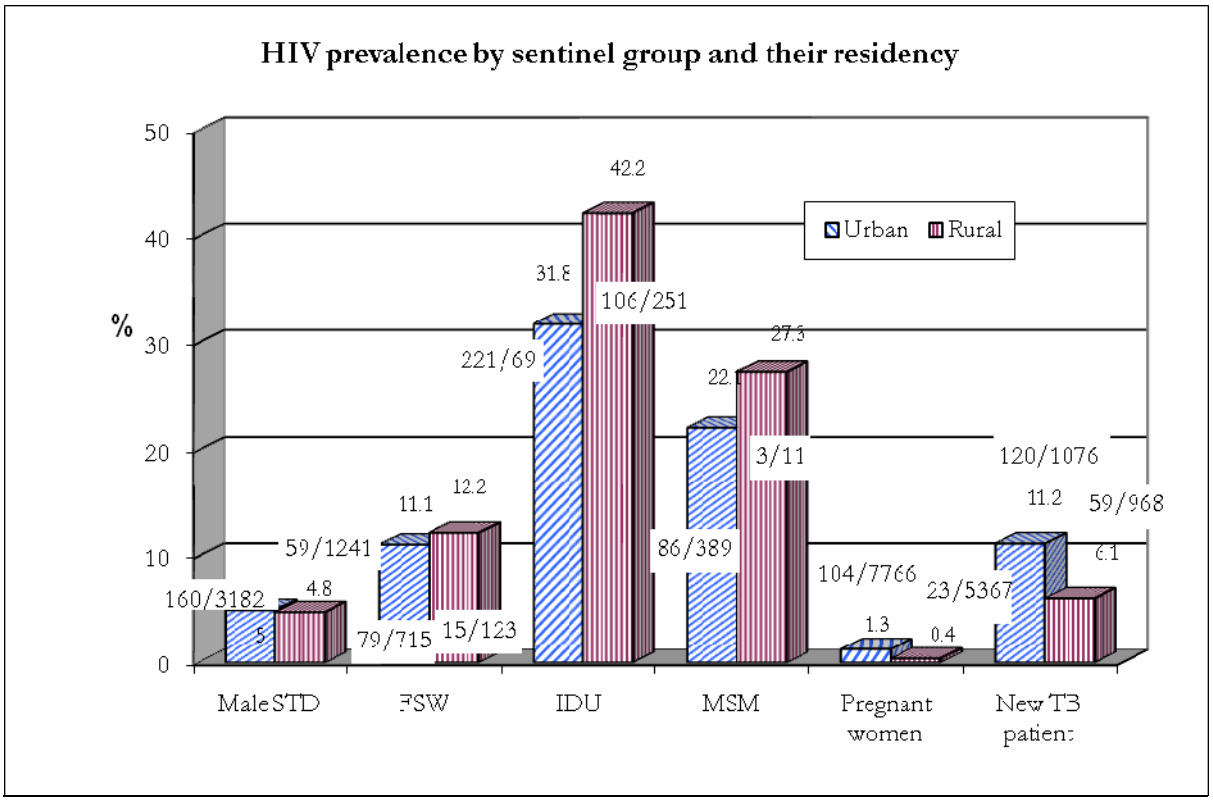


5.4. HIV prevalence by place of residence and marital status

For TB patients, HIV prevalence was nearly twice as high among persons living in urban areas compared to those living in rural areas (Figure 5). Similarly, HIV prevalence among pregnant women was thrice as high (1.3%) (104/7766) in urban areas compared to those living in rural areas (0.4%) (23/5367) ($p<0.001$).

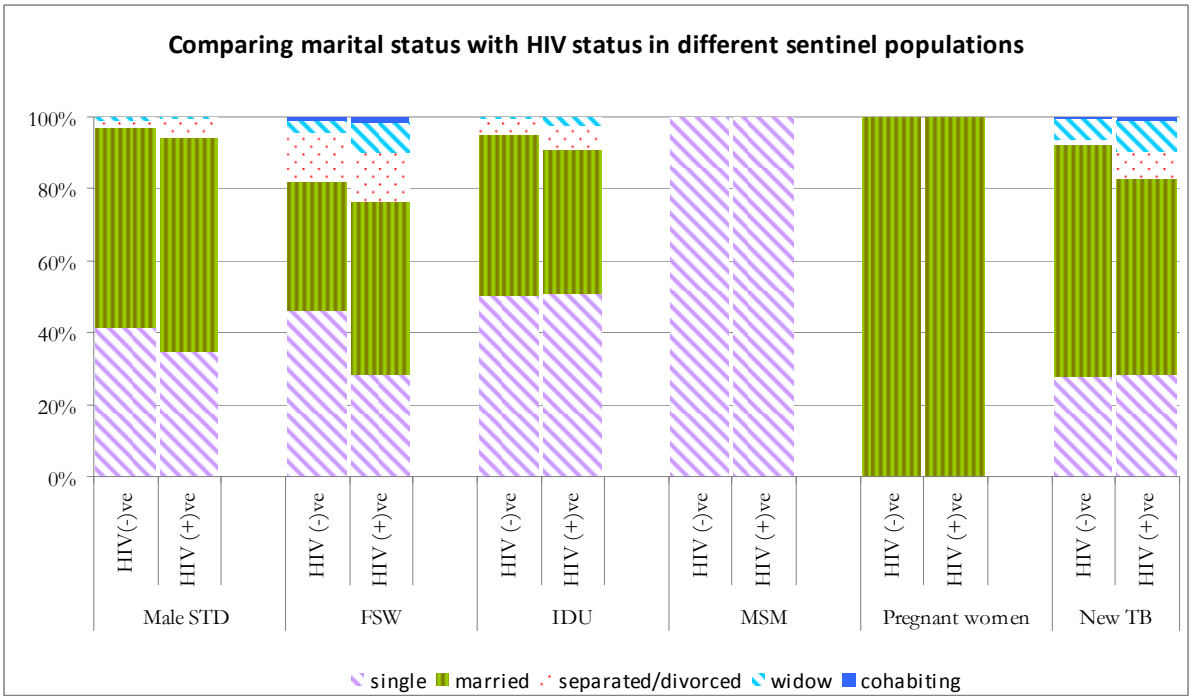
In contrast, HIV prevalence was higher in rural IDUs (42.2%) compared to urban IDUs (31.8%). This was also true for FSWs and MSMs (Figure 5). However, there was little difference in HIV prevalence among male STI patients by residence.

Figure 5. HIV prevalence in different sentinel groups by place of residence (or place of permanent residence) – HSS 2009. Sample size for rural MSM is very low.



The marital status of different population groups did not differ significantly by HIV status with the exception of FSWs (Figure 6). The intimate partner transmission is noticeably most likely to their sexual partners as the HIV positive status was higher in married people of male STI patients, FSW and pregnant women.

Figure 6. Distribution by marital status according to HIV status in different sentinel populations – HSS 2009



5.5. Results of syphilis screening

The prevalence of VDRL positive was the highest (6.3%) among MSM group, followed by FSW (2.2%), new military recruits (2.13%) and male STI patients (2%) (Table 4).

Table 4: Prevalence of syphilis (VDRL+) among sentinel population, HSS 2009

Sentinel Group	Sample (n)	# VDRL (+)	VDRL (+)ve (%)
Male STI Patient	4,535	89	2
FSW	838	19	2.3
IDU	945	14	1.5
MSM	400	25	6.3
Pregnant Women	13,446	98	0.73
New Military Recruits	800	17	2.13

Syphilis testing was started on sentinel groups in 2007. Among FSWs and IDUs, there were wide variations in the syphilis prevalence by sites (Figure 7 & 8).

Figure 7. VDRL positive rate among FSW by sites- HSS 2007-2009

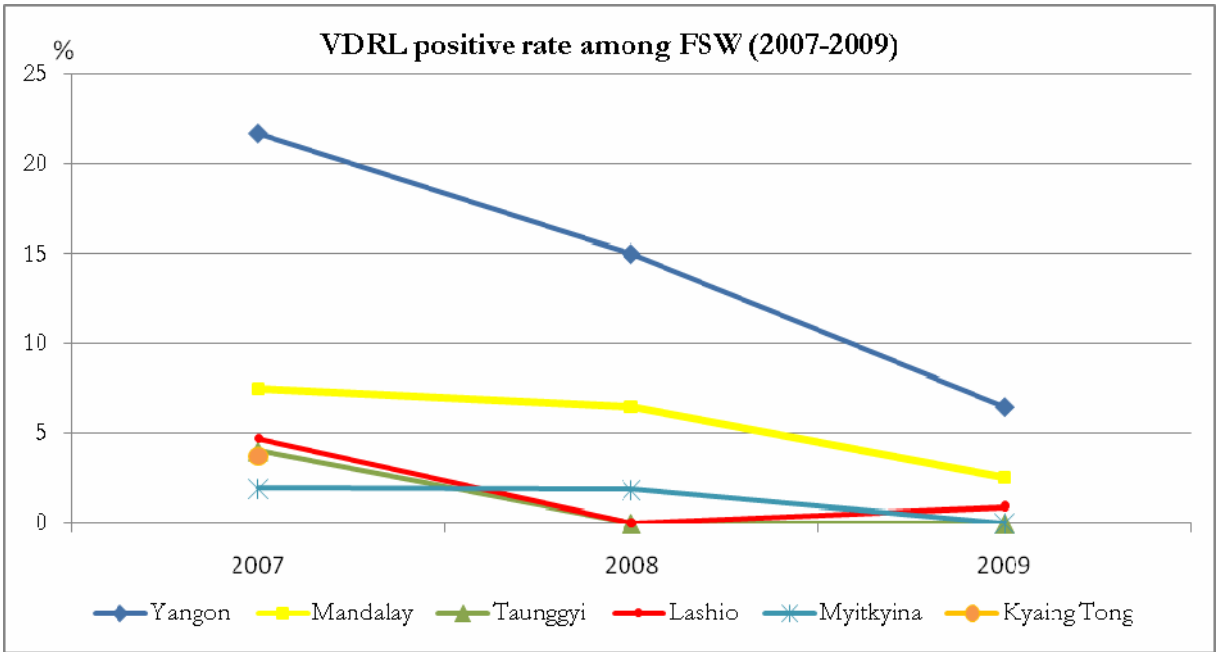


Figure 8. VDRL positive rate among injecting drug users by sites- HSS 2007- 2009

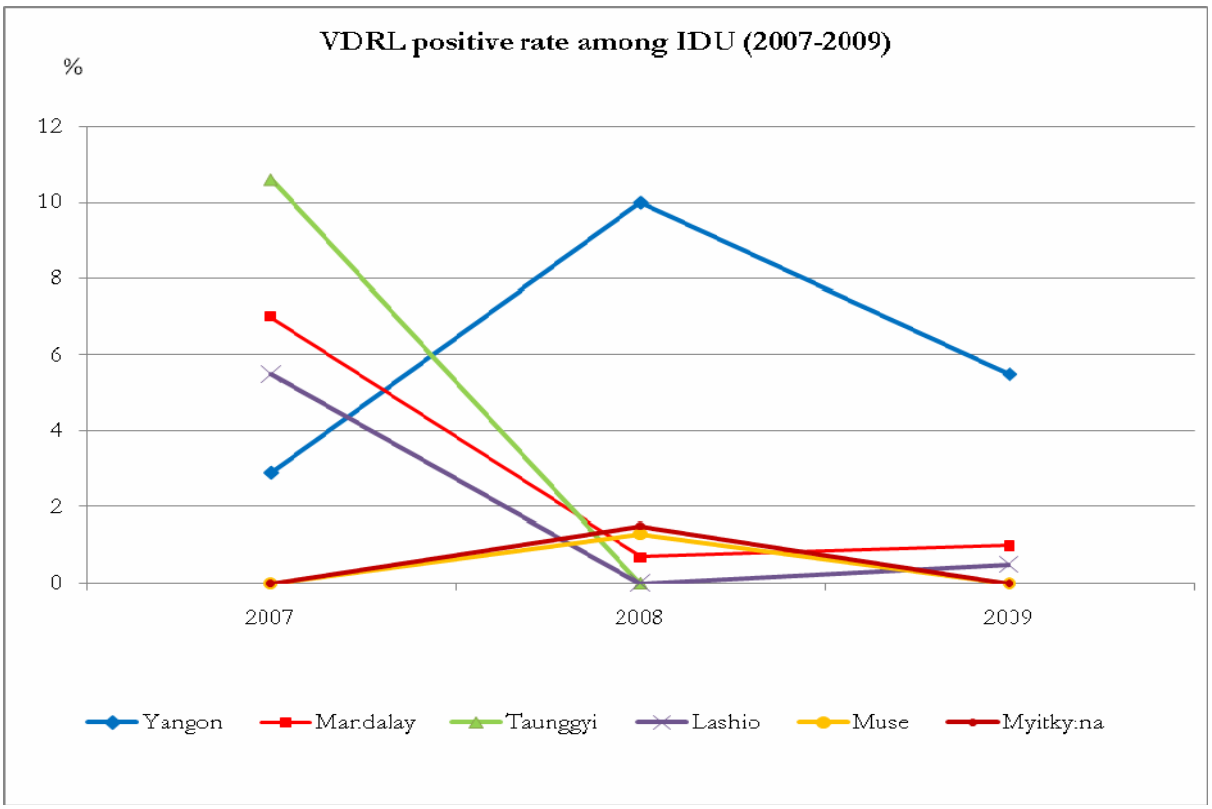
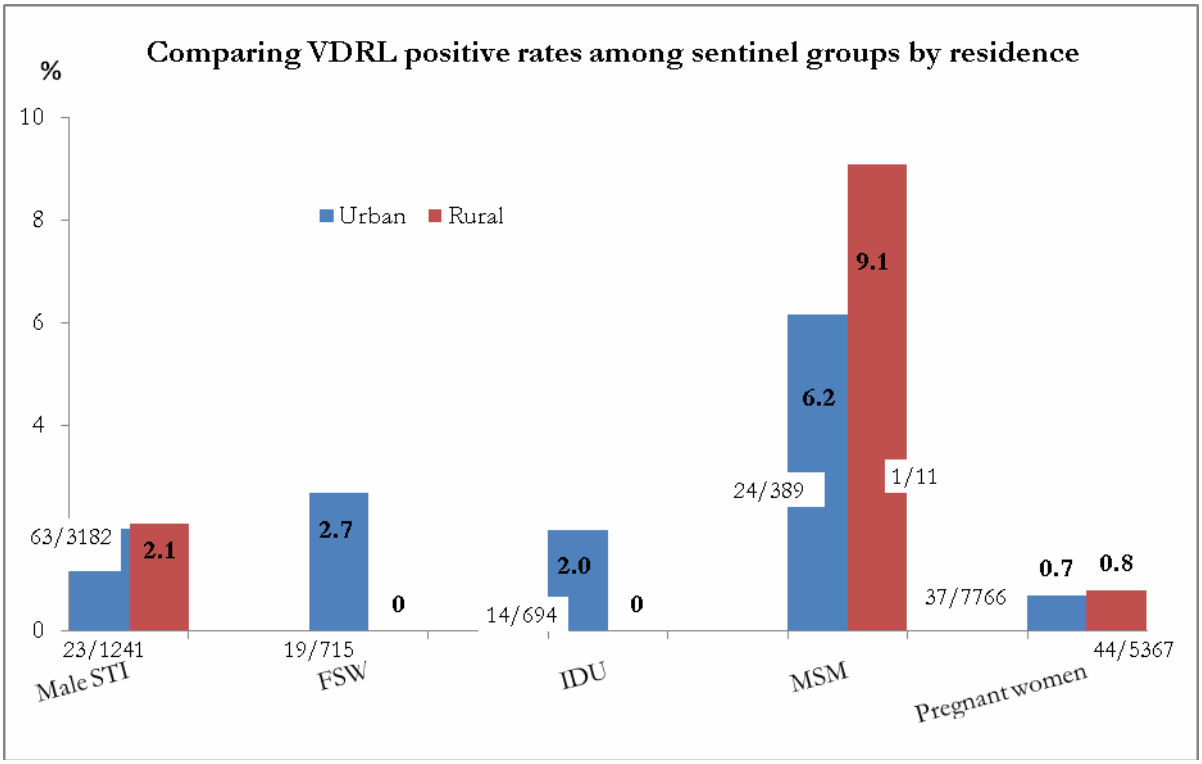


Figure 9 showed the comparison of VDRL positive rate between urban and rural populations. Syphilis prevalence was seemed to be higher in urban areas in FSW and IDU whereas in MSM and male STI population syphilis rate was higher in rural setting. However, the syphilis rate of MSM in rural areas is misled to interpret as only one MSM was found to be VDRL

positive out of eleven MSMs. Nevertheless, the spread of sexually transmitted diseases has expanding to rural populations is quite concerning.

Figure 9. VDRL positive rate among sentinel groups, by place of residence, HSS 2009



With the exception of IDU and MSM, prevalence of syphilis is higher in people living with HIV than who do not have HIV in most sentinel groups.

Figure 10. Prevalence of syphilis (VDRL+) by HIV status and sentinel population group, HSS 2009

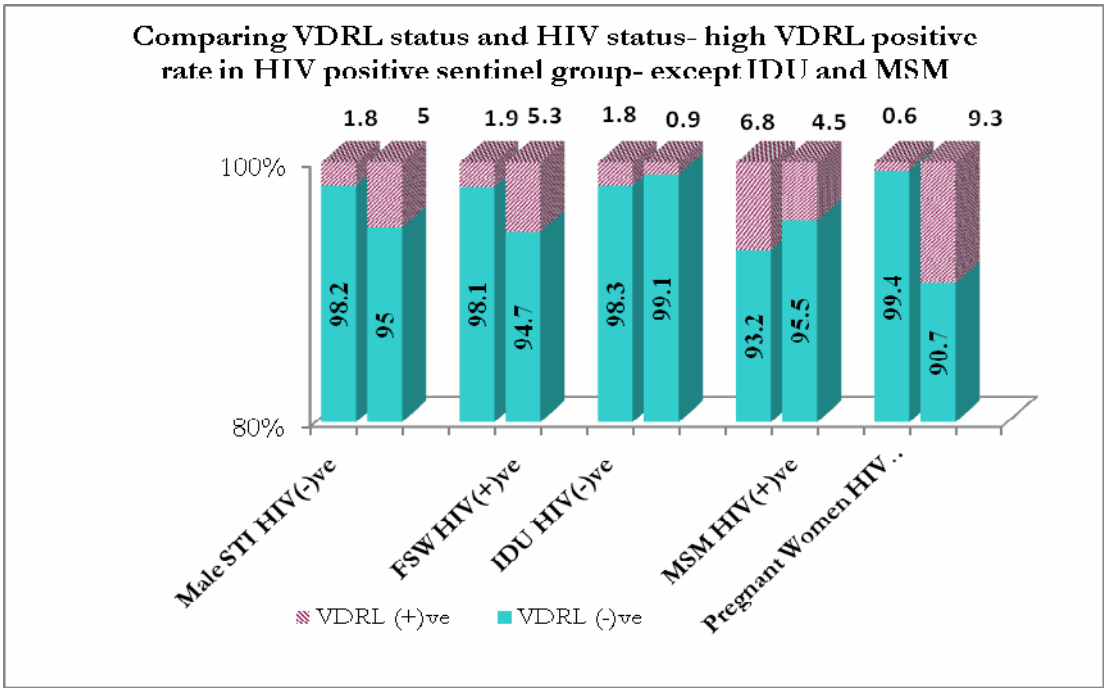
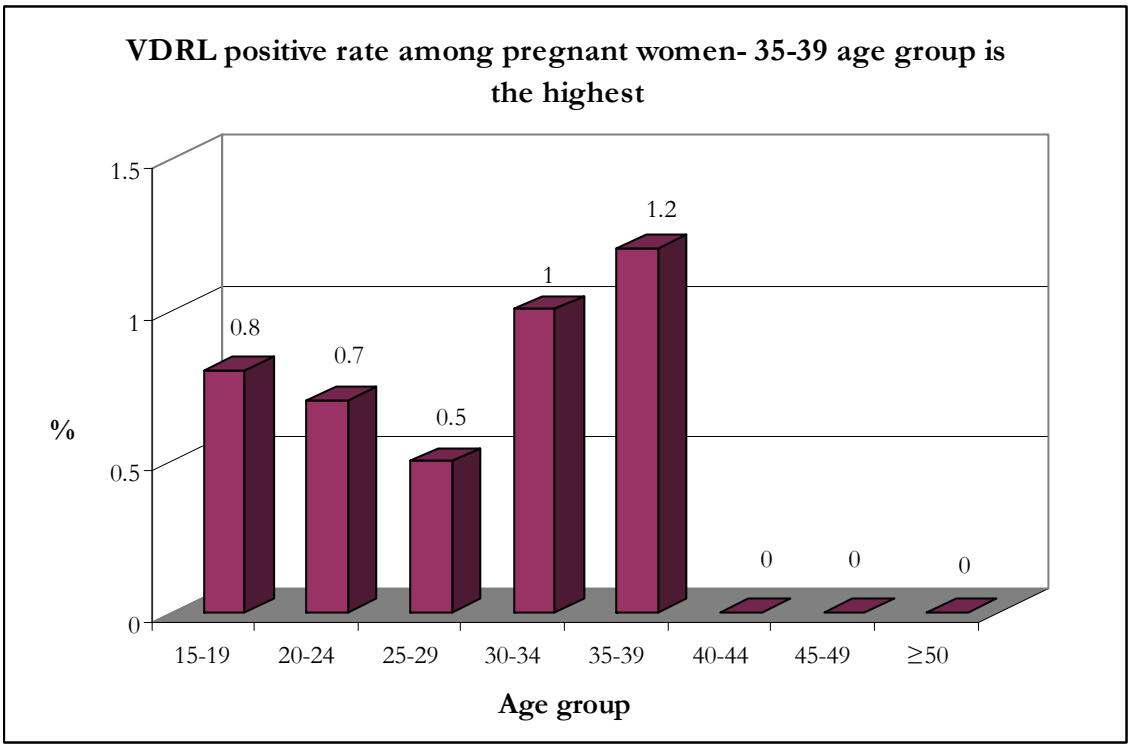


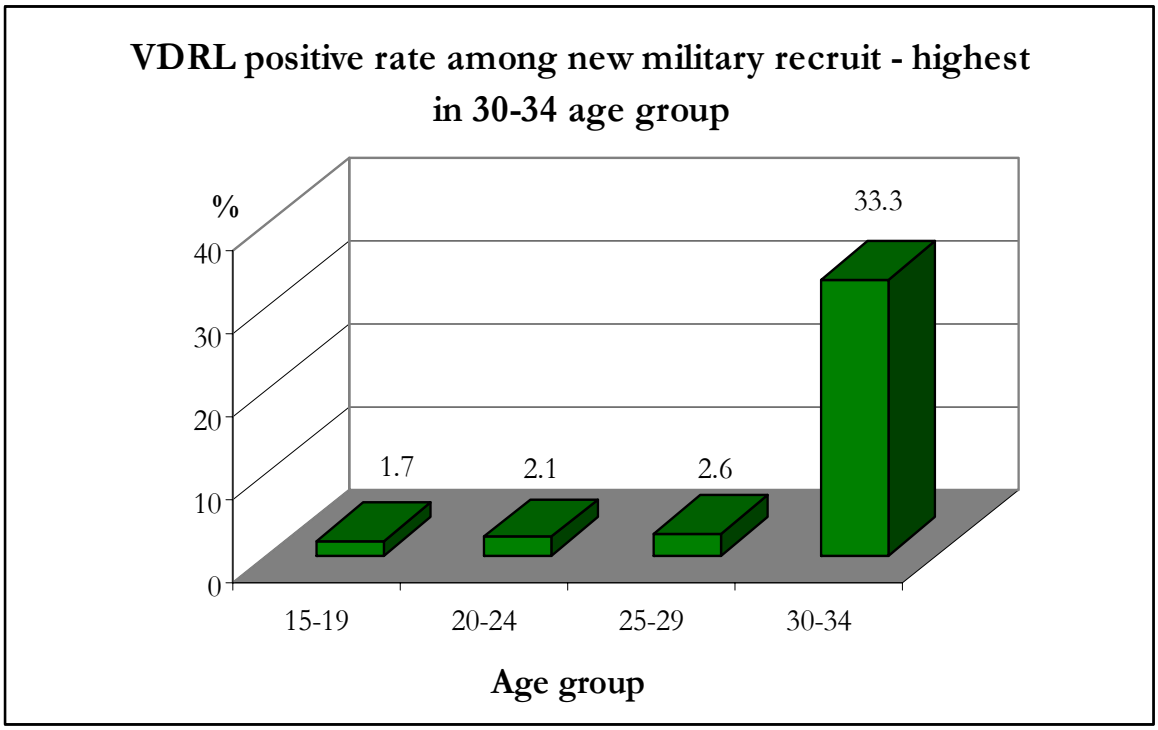
Figure 11 presents the prevalence of syphilis by age group in pregnant women and new military recruits. The age group 30-39 years had highest prevalence of syphilis.

Figure 11. Prevalence of syphilis (VDRL+) by groups in pregnant women and new military recruits, HSS 2009

Pregnant Women



New Military Recruits



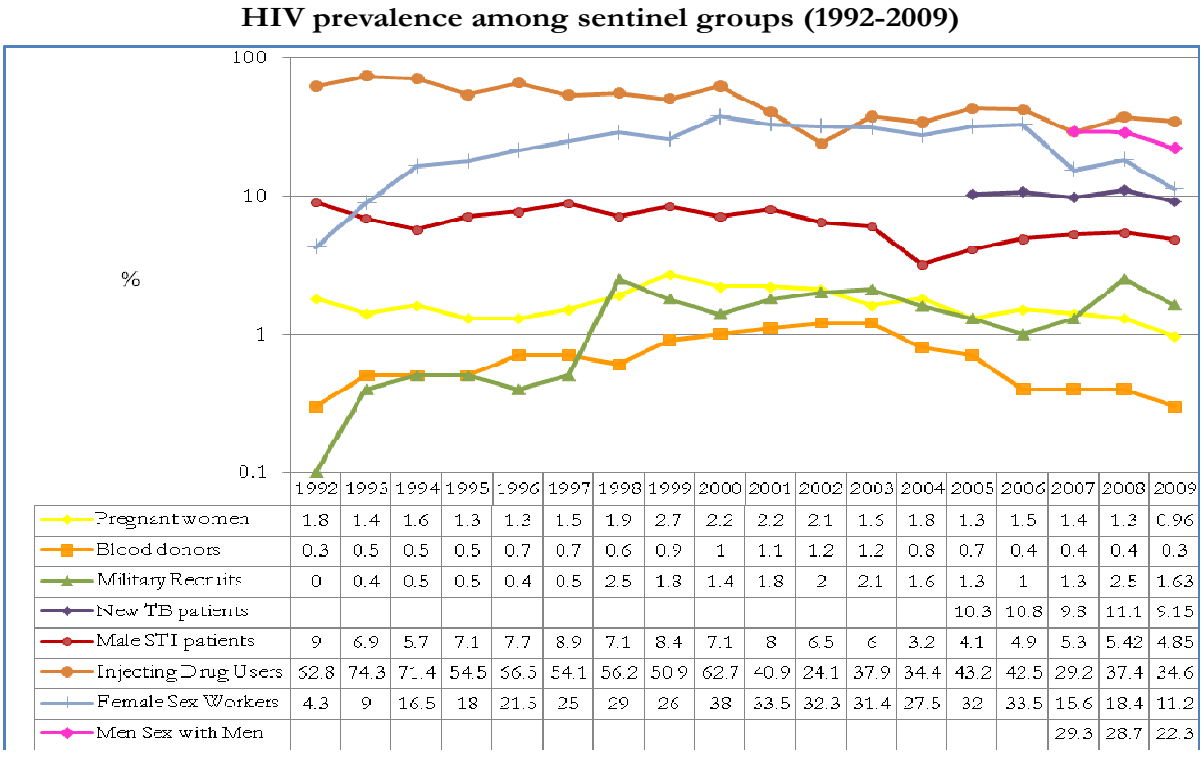
6. HIV trends over time

6.1. HIV prevalence among sentinel groups 1992-2009

Among low risk populations, HIV prevalence levels in 2009 continued to plateau after reaching a peak in the late 1990s. A slight rise was observed especially among new military conscripts in 2008. The expansion of sentinel sites for new TB patients may explain the slight fall in HIV prevalence from 11.1% in 2008 to 9.15% in 2009.

Since 2000, HIV prevalence among most at risk populations has been slowly declining. It was noted that relatively sharp decline in HIV prevalence among FSWs from 2006 to 2009 may be explained by the expansion of sentinel sites (resulting in an increased sample size). Moreover, better understanding and standardizing sampling methodology across sentinel sites and better cooperation with stakeholders could be one of the reasons for that decline. The same reasons may also be applied for the slight sharp decline for IDU from 2006 to 2007 (Figure 12).

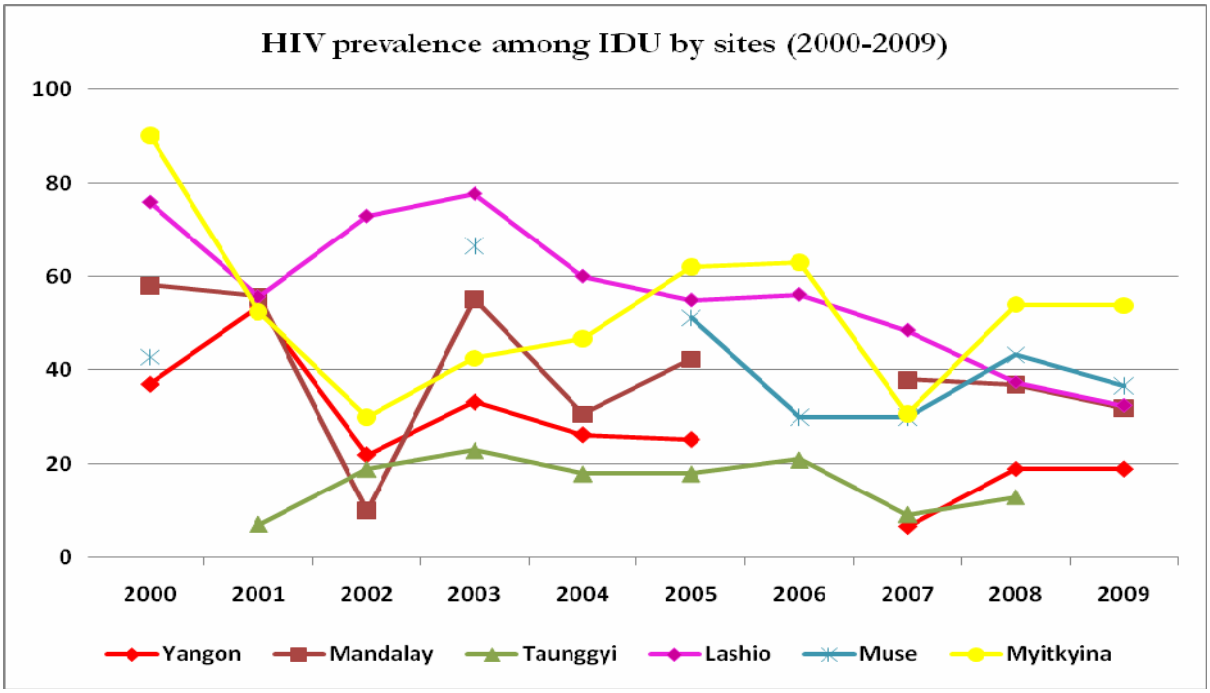
Figure 12. HIV prevalence among sentinel groups 1992-2009



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Pregnant women	1.8	1.4	1.6	1.3	1.3	1.5	1.9	2.7	2.2	2.2	2.1	1.5	1.8	1.3	1.5	1.4	1.3	0.96
Blood donors	0.3	0.5	0.5	0.5	0.7	0.7	0.6	0.9	1	1.1	1.2	1.2	0.8	0.7	0.4	0.4	0.4	0.3
Military Recruits	0	0.4	0.5	0.5	0.4	0.5	2.5	1.8	1.4	1.8	2	2.1	1.6	1.3	1	1.3	2.5	1.63
New TB patients														10.3	10.8	9.8	11.1	9.15
Male STI patients	9	6.9	5.7	7.1	7.7	8.9	7.1	8.4	7.1	8	6.5	6	3.2	4.1	4.9	5.3	5.42	4.85
Injecting Drug Users	62.8	74.3	71.4	54.5	56.3	54.1	56.2	50.9	62.7	40.9	24.1	37.9	34.4	43.2	42.5	29.2	37.4	34.6
Female Sex Workers	4.3	9	16.5	18	21.5	25	29	26	38	33.5	32.3	31.4	27.5	32	33.5	15.6	18.4	11.2
Men Sex with Men																29.3	28.7	22.3

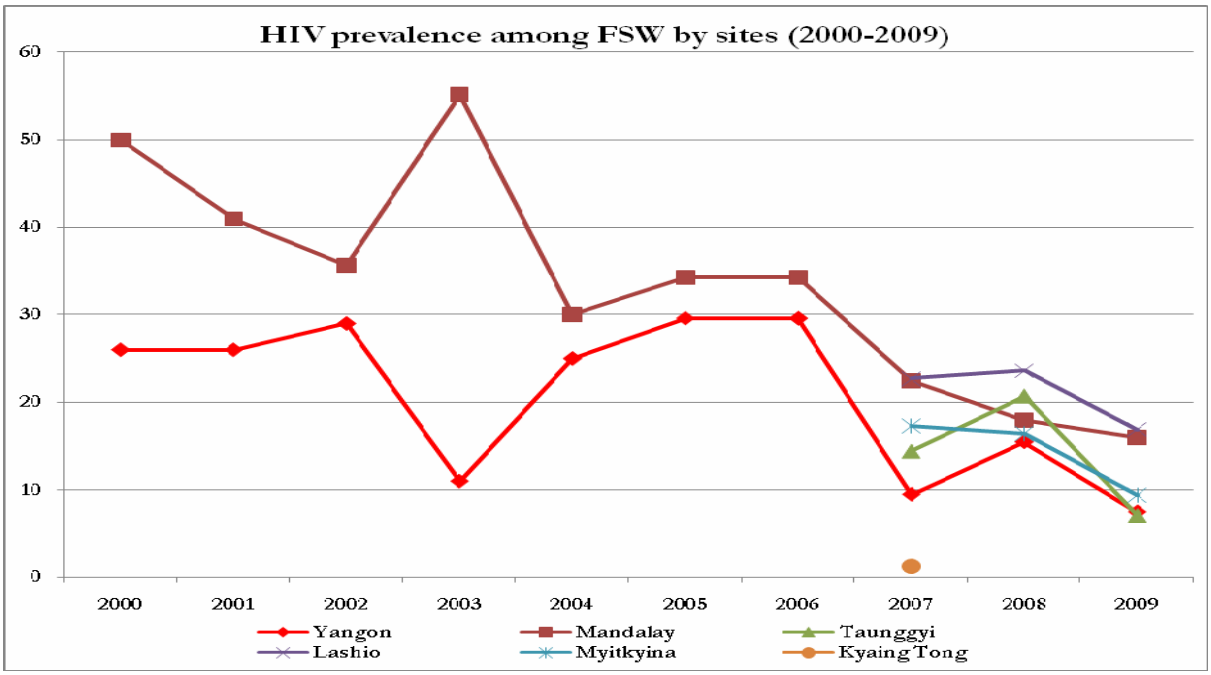
Despite the observed downward trend of overall HIV prevalence among IDU since 2000, a careful look in the trend in each sentinel site revealed that the prevalence reached the peak at 2003 in most sites (except Myitkyina) and declined slowly after that. In Myitkyina, there was an upward trend during 2002 to 2006 and remained stagnant at relatively high level. The slow decline together with the stagnation is of concern and underscores that appropriate interventions for IDUs must be intensified (Figure 13).

Figure 13. Prevalence of HIV among injecting drug users by sites- HSS 2000-2009



In 2009, HIV positivity rate among female sex workers appeared to fall in all sentinel sites. In Yangon and Mandalay, being the sentinel sites for decades, a significant continuous decline in prevalence was seen since 2007. This may be explained by a couple of reasons, getting better coordination with partners in sample collection leads to more representativeness of the collected sample, turning over of the FSW and catching the newly recruited group or the actual declines in HIV prevalence with the intensive TCP programme in place for a long time. The last reason is supported by declining HIV prevalence among younger group (15-24) in these two sites. Figure 14 depicts trends of HIV prevalence among female sex workers by sites.

Figure 14. Prevalence of HIV among female sex workers by sites- HSS 2000-2009



The overall HIV prevalence among tuberculosis patients showed slight fluctuation from 2005 to 2009. Having included as a sentinel group since 2005, trend analysis could be done in ten sites. The prevalence varied with the sites of collection: upward trend was observed in Monywa; downward trend was seen in Yangon, Bago, Pathein and Myeik (Figure 15 (a) and (b); the others showed some fluctuation overtime.

Figure 15 (a). HIV prevalence among tuberculosis patients by site -2005-2009

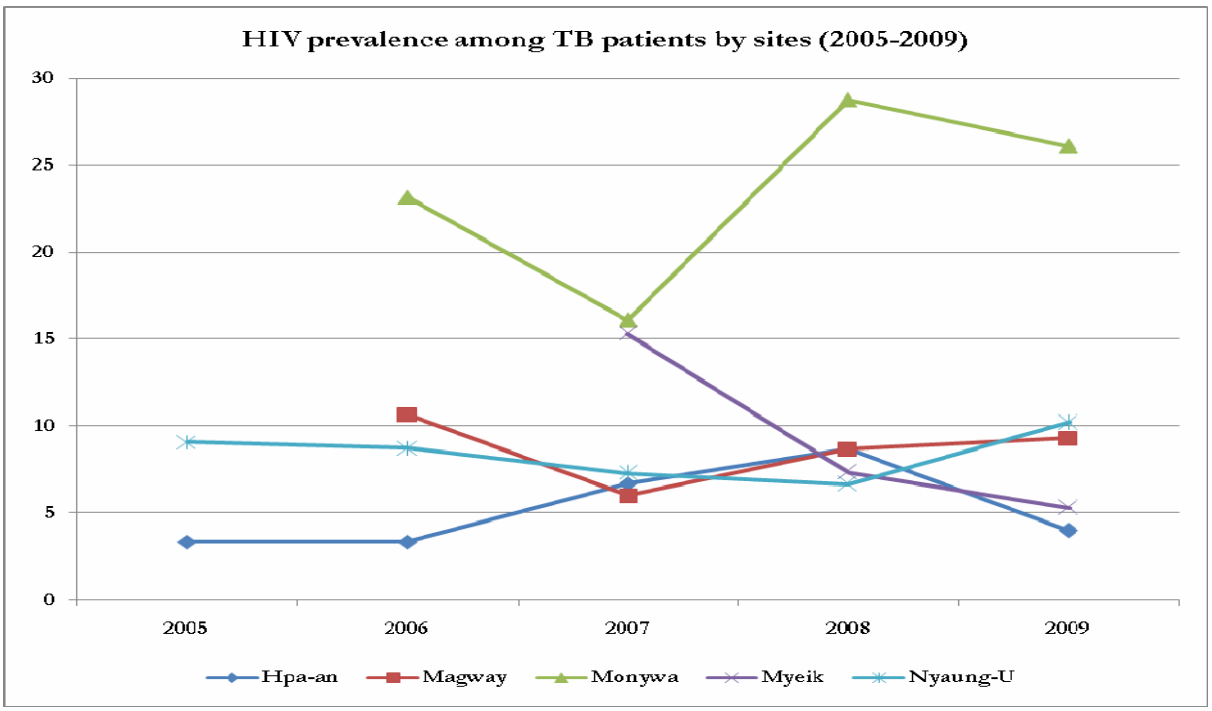
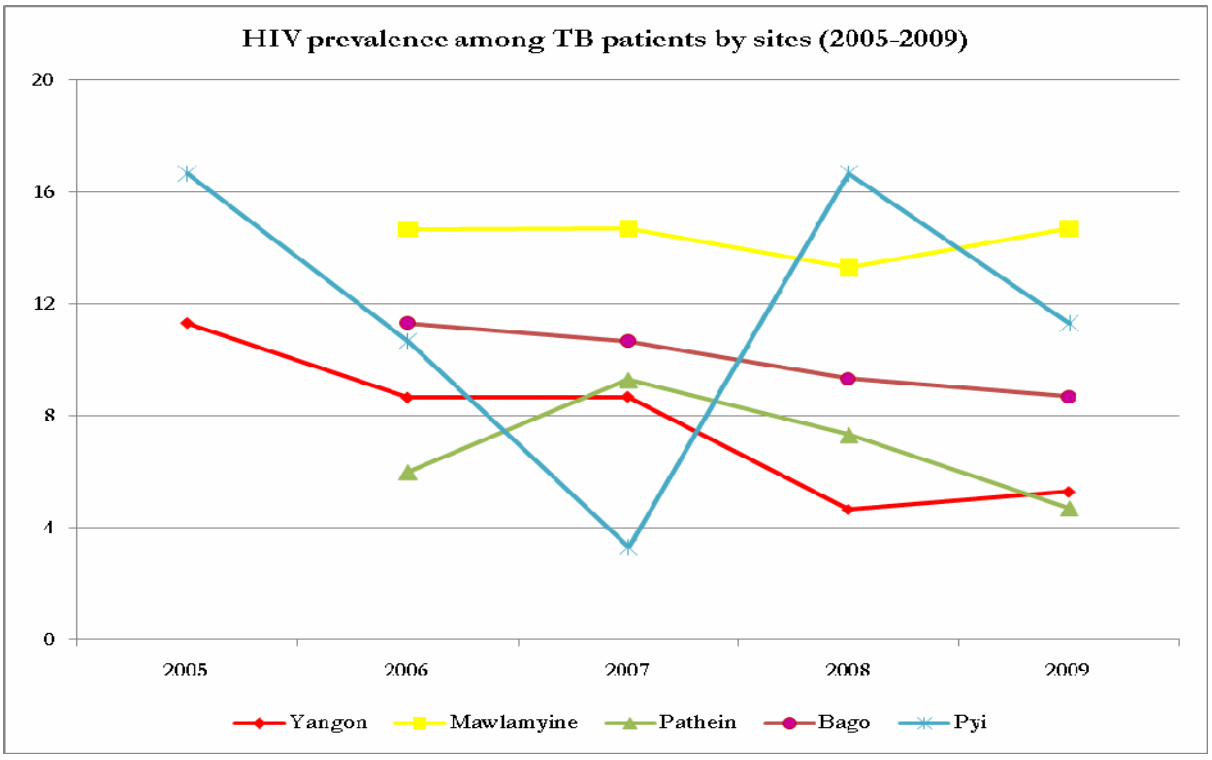
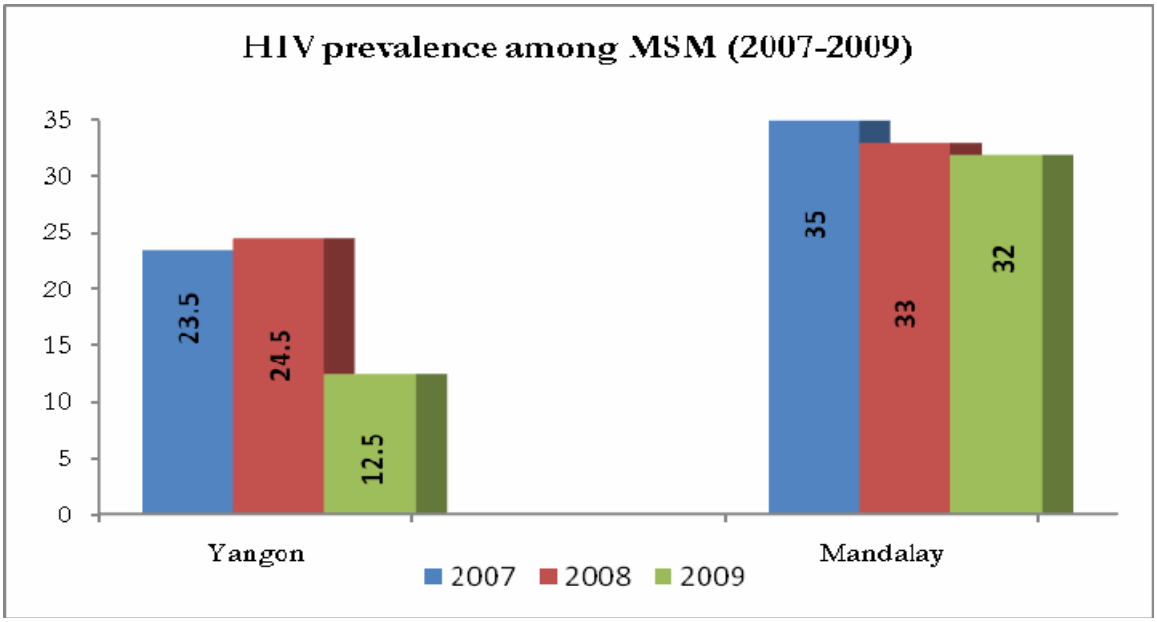


Figure 15(b). HIV prevalence among tuberculosis patients by site -2005-2009



Men who have sex with men have been included as one of the sentinel groups since 2007. At that time, HIV prevalence in this group was high in both Yangon and Mandalay sentinel sites. HIV prevalence among MSM is still very high at about the same level in Mandalay but a sharp decline was observed in Yangon this year. Getting a wider sample collection network in Yangon 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. Nevertheless, intensifying the targeted prevention interventions for this group must be continued (Figure 16).

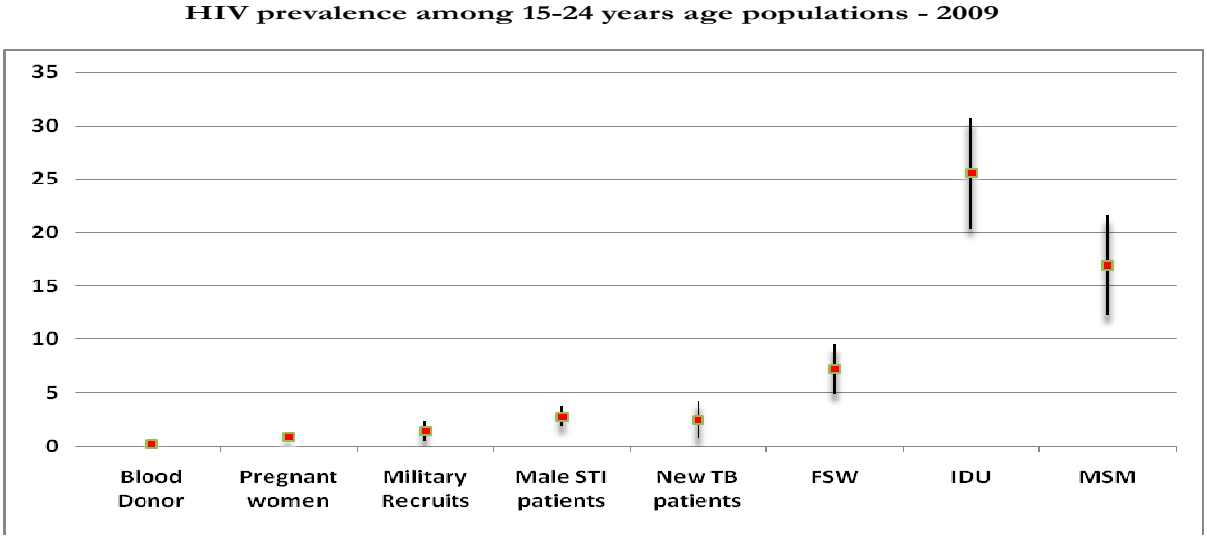
Figure 16. HIV prevalence among men who have sex with men – HSS 2007-2009



6.2. HIV prevalence among young population

HIV prevalence among youth, a proxy for incidence of HIV, was significantly high in most sentinel population groups. Thus, the prevention programmes must be strengthened with intervention programmes focusing all sentinel groups (Figure 17).

Figure 17. HIV prevalence among 15-24 years of age populations, by sentinel groups, HSS 2009



It was encouraging to note that HIV prevalence among young high risk population is declining. However, among young military recruits, there appeared to be fluctuating in the recent four years. It is still important to continue tracking HIV prevalence among these populations in the coming rounds of HSS (Figure 18 & 19).

Figure 18. Prevalence of HIV among young injecting drug users and female sex workers, HSS 2000-2009

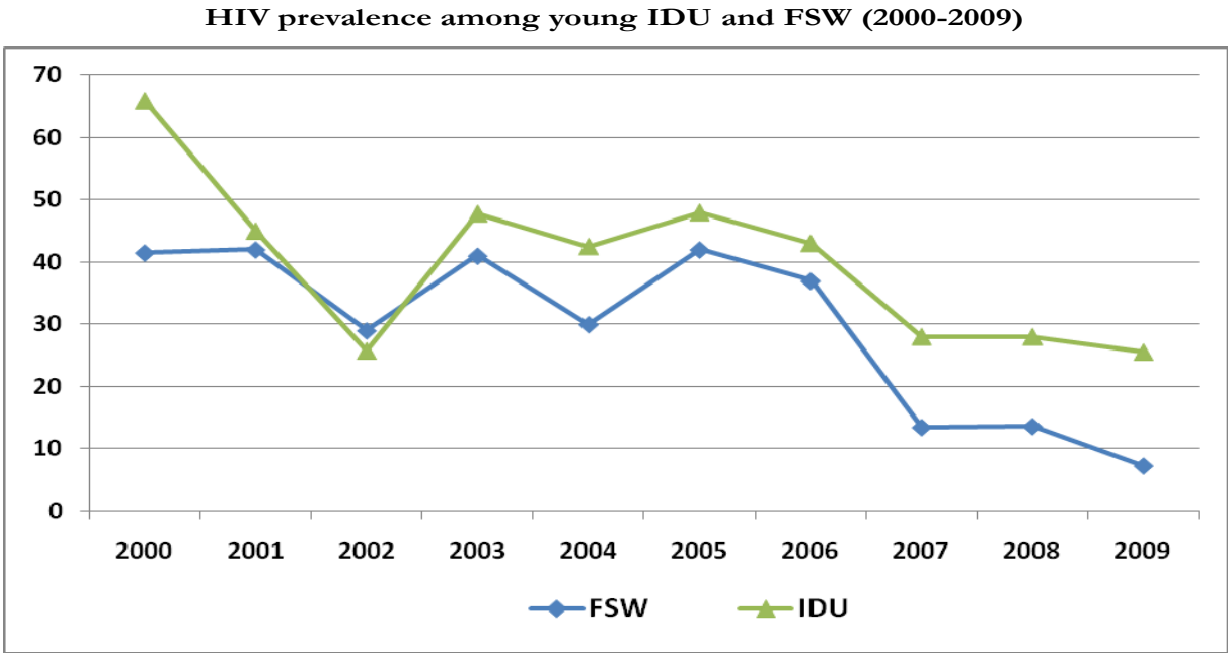
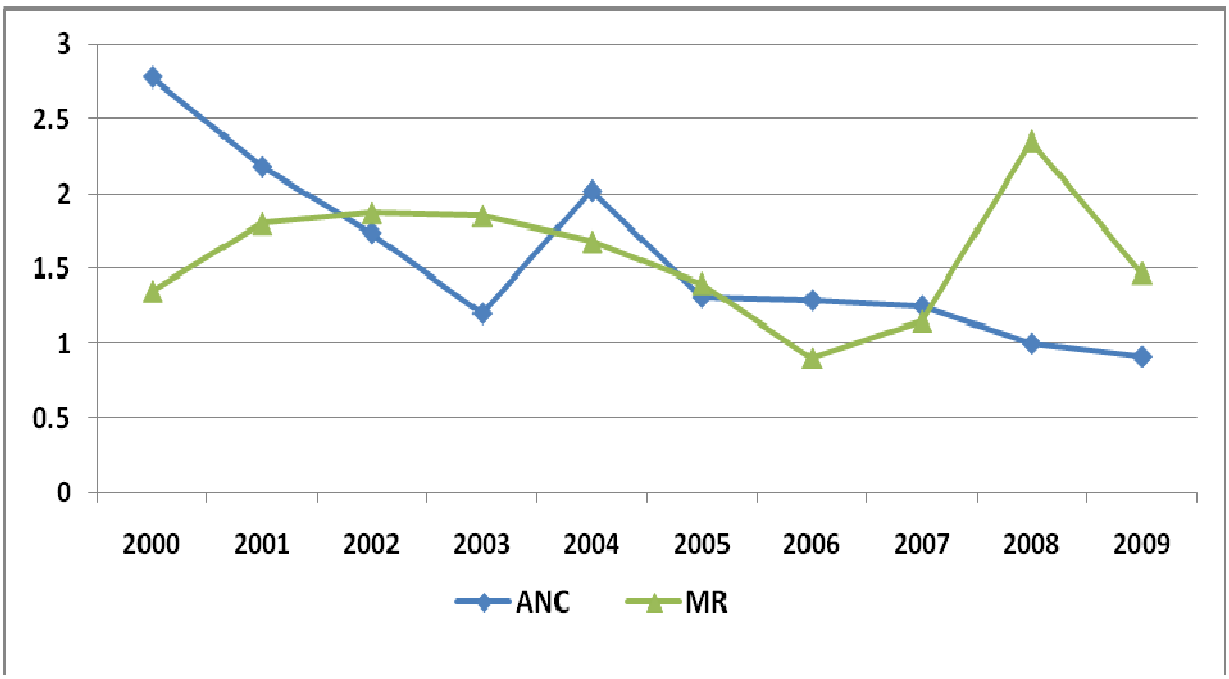


Figure 19. Prevalence of HIV among young pregnant women and military recruits, HSS 2000-2009



7. Decentralization of HIV testing

The decentralized HIV testing approach continued used in 2009. In this round, HIV antibody testing was performed at the local level in 30 sites and all the 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 (0.17%) and false negative was (1.47%); 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)		**Total**
		Negative	*Positive*	
Local Lab	*Negative*	4,120	15	**4,135**
		(99.83%)	**(1.47%)**	
	Positive	7	1003	**1,010**
		(0.17%)	**(98.53%)**	
	TOTAL	4127 (100%)	1018 (100%)	**5,145**

There was high concordance between the laboratory results of local and reference laboratories at all sites with the exception of one site which showed more than 50% discordant results – Pyinmana (Table 7).

Table 7: Comparison of local and reference HIV testing by sentinel sites – HSS 2009

No	Site	Target group	Total sample screened	Local lab positive	Reference lab positive	False (+)ve	False (-)ve
1	Yangon	6	247	117	117	0	0
2	Mandalay	5	277	181	181	0	0
3	Meiktila	2	80	23	23	0	0
4	Taunggyi	3	70	25	25	0	0
5	Lashio	4	167	96	97	0	1
6	Tachileik	3	595	22	21	1	0
7	Muse	3	132	71	72	0	1
8	Dawei	2	550	10	10	0	0
9	Kawthoung	2	62	9	10	0	1
10	Myitkyina	4	222	138	138	1	1
11	Bhamo	2	65	9	8	1	0
12	Mawlamyine	3	104	34	34	0	0
13	Pathein	2	77	18	18	0	0
14	Bago	3	100	30	30	0	0
15	Pyay	3	160	16	16	0	0
16	Magway	3	93	24	24	0	0
17	Hpa-an	3	79	9	9	0	0
18	Sittway	3	87	7	7	0	0
19	Monywa	3	112	45	44	2	1
20	Loikaw	3	90	12	12	0	0
21	Haka	2	54	7	7	0	0
22	Hinthada	3	89	19	19	0	0
23	Maubin	2	59	4	4	0	0
24	Myeik	3	83	14	14	0	0
25	Myingyan	2	464	4	4	0	0
26	Pakokku	2	65	9	9	0	0
27	Shwebo	2	66	8	8	0	0
29	Myawaddy	2	71	13	13	0	0
30	Nyaung-U	2	537	15	15	0	0
32	Myaung Mya	2	59	4	4	0	0
34	Pyinmana	3	206	17	25	2	10
	Total		**5145**	**1010**	**1018**	**7**	**15**

8. Limitations

- As HSS is a sero-survey, there is limited information on the behaviour data. Triangulate sero-surveillance data with the behavioral survey will help see the whole picture.
- Again, as it is a facility based survey, the prevalence may be an over or under estimate depending on who gets captured in the sample.
- This year again some townships did not complete the sample size. These are because they smaller townships with smaller population, the number of STI patients who come to the clinics were fewer than the identified sample size of STI patients or high risk population.
- As sample size was seen smaller from those who came from rural setting, which led to misinterpretation of results. To avoid this, the sampling of rural settings should consider separately in the next round.

9. Recommendations

9.1. Recommendations for programme implementation

All implementers at field level must follow the HSS 2007 protocol.

HIV antibody testing should be decentralized in 34 sentinel sites, however, the internal and external quality assurance must be assured.

As 50% of the discordant HIV test results was attributed by Pyinmana STD team, special attention should be given that site.

In additional to the internal quality assessment, 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.

The prevention intervention activities must be intensified not only for most at risk population, HIV-TB coinfected population but also for general population including rural population.

Strengthen human resources and institutional capacity in surveillance for data analyses and interpretation.

9.2. Recommendations for surveillance

Increase 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. Particularly the samples of male STI patients from Nyaung-U, Haka, Myingyan, Muse, Pyay, Lashio, Myaung Mya and Pyin Oo Lwin townships was insufficient in number. Also, some townships such as Tachileik and Nyaung-U recruited incomplete sample size of TB patients and should coordinate with Myanmar Medical Association and some INGOs.

Before the start of HSS, all State and Divisional AIDS/STD and TB officers and team leaders with the central level surveillance officers must gather together to discuss and share the field experience and any difficulties.

HSS data should be triangulated with other data resources: behavioral surveillance surveys, programme monitoring data, rapid assessments and other surveys data to understand the magnitude and epidemiological nature of the HIV.

National AIDS Programme must strengthen the supervisory mechanism for the sentinel surveillance sites. State and Divisional 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 Divisional AIDS/STD officers and team leaders must supervise overall process of specimen collection and specimen transportation.
Routine documentation of specimen in the form 1 must be completed, however, site of specimen collection must be added in the extra column.
In Taunggyi township where the sample of injecting drug users was insufficient, the National AIDS Programme must consider discontinuing as IDU sentinel site.

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, in-depth research to improve definitions of each high-risk population
- Social networking among indirect sex workers
- 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

Annexes

Annex 1: Total number of blood samples collected (n) and HIV prevalence (%) by sentinel population and sites - HSS 2009

Sr	Site		Sentinel Population								
			Male STD	FSW	IDU	MSM	ANC	MR	TB	Blood donor	Total
1	**Yangon**	n	150	200	200	200	400	400	150	5566	7266
		%	10	7.5	19	12.5	4	1.5	5.3	0.3	
2	**Mandalay**	n	150	200	200	200	400	400		5535	7235
		%	7.3	16	32	32	2.5	1.75		0.2	
3	**Meiktila**	n	150				400				550
		%	9.3				2.3				
4	**Taunggyi**	n	150	140	Excluded		400				690
		%	6.7	7.1			1.3				
5	**Lashio**	n	98	118	200		400				816
		%	9.2	16.9	32.5		0.8				
6	**Tachileik**	n	140				400		75		615
		%	3.6				1.3		14.7		
7	**Muse**	n	70		150		400				620
		%	15.7		36.7		1.5				
8	**Dawei**	n	150				400				550
		%	4.0				1.0				
9	**Kawthoung**	n	150				400				550
		%	3				1				
10	**Myitkyina**	n	150	180	195		400				925
		%	6.7	9.4	53.8		1.5				
11	**Bahmo**	n	150				400				550
		%	3				1				
12	**Mawlamyine**	n	150				400		150		700
		%	4.7				1.3		14.7		
13	**Pathein**	n	150				400		150		700
		%	7.3				1.8		4.7		
14	**Bago**	n	150				400		150		700
		%	8.7				1		8.7		
15	**Pyay**	n	94				400		106		600
		%	1.1				0.8		11.3		
16	**Magway**	n	150				400		150		700
		%	4.7				0.8		9.3		
17	**Hpa-an**	n	150				400		150		700
		%	1.3				0.3		4		

18	**Sittway**	n	150		400	92	642
		%	2.7		0	3.3	
19	**Monywa**	n	150		400	138	688
		%	4.7		0.5	26.1	
20	**Loikaw**	n	150		400	150	700
		%	4		0.8	2	
21	**Haka**	n	65		400		465
		%	3.1		1.3		
22	**Hinthada**	n	150		400	147	697
		%	4		0.8	6.8	
23	**Maubin**	n	150		400		550
		%	1.3		0.5		
24	**Myeik**	n	150		400	150	700
		%	3.3		0.3	5.3	
25	**Myingyan**	n	64		400		464
		%	1.6		0.75		
26	**Pakkoku**	n	160		400		560
		%	4.4		0.5		
27	**Shwebo**	n	150		400		550
		%	3.3		0.75		
28	**Kyaing Tong**	n	150	Excluded	400		550
		%	0		0.3		
29	**Myawaddy**	n	150		400		550
		%	7.3		0.5		
30	**Nyaung-U**	n	Excluded		400	137	537
		%			0.25	10.2	
31	**Taungoo**	n	150		400		550
		%	9.3		0.5		
32	**Myaungmya**	n	110		315		425
		%	3.6		0		
33	**Pyin Oo Lwin**	n	112		331		443
		%	0.9		0.6		
34	**Pyinmana**	n	150		400	149	699
		%	1.3		0.8	13.4	

* Due to sample size was less than 20, male STI patients from Nyaung-U and IDU from Taunggyi was excluded
** FSW from Kyaing Tong was disqualified in this round due to sampling errors

Annex 2: HIV prevalence by age group HSS-2009

Age group	Male STI patients			FSW			IDU			MSM	
	Sample	HIV (+)ve	%	Sample	HIV (+)ve	%	Sample	HIV (+)ve	%	Sample	HIV (+)ve
15-19	336	6	**1.8**	157	8	**5.1**	57	3	**5.3**	103	15
20-24	878	29	**3.3**	255	27	**10.6**	207	66	**32**	145	27
25-29	1,119	49	**4.4**	181	24	**13.3**	251	98	**39**	68	18
30-34	805	57	**7.1**	103	19	**18.5**	184	81	**44**	40	12
35-39	605	44	**7**	72	9	**11.1**	130	46	**35.4**	19	8
40-44	394	18	**4.6**	43	6	**14**	70	23	**32.9**	11	5
45-49	241	14	**5.8**	16	1	**6.3**	28	6	**21.4**	8	2
≥50	157	3	**1.9**	2	0	**0**	18	4	**21.1**	6	2
Total	**4,535**	**220**	**4.85**	838	94	**11.2**	94	327	**34**	400	89

Age group	Pregnant Women			Military Recruits			New TB Patients			Blood Do	
	Sample	HIV (+)ve	%	Sample	HIV (+)ve	%	Sample	HIV (+)ve	%	Sample	HIV (+)ve
15-19	868	4	**0.5**	294	2	**0.7**	101	0	**0**	1115	2
20-24	3,658	37	**1.1**	387	8	**2.1**	217	8	**3.7**	3180	8
25-29	4,036	43	**1.1**	114	3	**2.6**	244	36	**14.8**	2157	10
30-34	2,796	27	**1**	3	0	**0**	228	37	**16.2**	1479	6
35-39	1,628	13	**0.8**	1	0	**0**	237	46	**19.4**	1260	6
40-44	460	2	**0.4**	0			199	31	**15.6**	949	0
45-49	43	0	**0**	1	0	**0**	190	12	**6.3**	591	0
≥50	1	0	**0**	0			622	16	**2.6**	370	0
Total	13,490	126	**0.96**	800	13	**1.63**	2,044	187	**9.15**	11,101	32

Annex 3: Prevalence of syphillis (VDRL +) by sentinel population and by sites, HSS 2009

	Site		Sentinel Population					
			Male STD	FSW	IDU	MSM	ANC	MR
1	**Yangon**	n	150	200	200	200	400	400
		%	5.3	6.5	5.5	7	3	2.25
2	**Mandalay**	n	150	200	200	200	400	400
		%	2	2.5	1	5.5	0	2
3	**Meiktila**	n	150				400	
		%	1.3				0.3	
4	**Taunggyi**	n	150	140			400	
		%	0	0			0	
5	**Lashio**	n	98	118	200		400	
		%	3.1	0.9	0.5		0	
6	**Tachileik**	n	140				400	
		%	0				0.8	
7	**Muse**	n	70		150		400	
		%	1.4		0		0	
8	**Dawei**	n	150				400	
		%	0				6.5	
9	**Kawthoung**	n	150				400	
		%	0				0	
10	**Myitkyina**	n	150	180	195		400	
		%	0	0	0		0	
11	**Bahmo**	n	150				400	
		%	3				0	
12	**Mawlamyine**	n	150				400	
		%	4				1.5	
13	**Pathein**	n	150				400	
		%	2				0.8	
14	**Bago**	n	150				400	
		%	1.3				1.3	
15	**Pyay**	n	94				400	
		%	2.1				0	
16	**Magway**	n	150				400	
		%	0				0	
17	**Hpa-an**	n	150				400	
		%	0				0	

18	**Sittway**	n	150	400
		%	2	0
19	**Monywa**	n	150	400
		%	3.3	0
20	**Loikaw**	n	150	400
		%	1.3	1.3
21	**Haka**	n	65	400
		%	3.1	1.3
22	**Hinthada**	n	150	400
		%	4	1.3
23	**Maubin**	n	150	400
		%	3.3	0.5
24	**Myeik**	n	150	400
		%	0	0
25	**Myingyan**	n	64	400
		%	0	0
26	**Pakkoku**	n	160	400
		%	0	0
27	**Shwebo**	n	150	400
		%	3.5	0.7
28	**Kyaing Tong**	n	150	400
		%	2	1
29	**Myawaddy**	n	150	400
		%	1.3	0.3
30	**Nyaung-U**	n		400
		%		0
31	**Taungoo**	n	150	400
		%	0	0
32	**Myaungmya**	n	110	315
		%	0	0.3
33	**Pyin Oo Lwin**	n	112	331
		%	0.0	0
34	**Pyinmana**	n	150	400
		%	6.7	4