Report of the 2004 Survey

HIV SENTINEL SURVEILLANCE SURVEY IN SRI LANKA

National STD/AIDS Control Programme
Department of Health Services
Colombo
Sri Lanka

Report of the 2004 survey

HIV Sentinel Sero-Surveillance Survey in Sri Lanka

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Sri Lanka

March 2005

Contents

Abbreviations used in this report

AIDS	Acquired immunodeficency syndrome
CP	Central province
DTCO	District tuberculosis control officer
ELISA	Enzyme-linked immunosorbent assasy
FSW	Female sex worker
HIV	Human immunodeficency virus
MOH	Medical officer of health
N & E P	Northern and Eastern provinces
NCP	North Central province
NSACP	National STD/AIDS control programme
NWP	North Western province
Sab P	Sabaragamuwa province
SP	Southern province
STD	Sexually transmitted diseases, Sexually transmitted disease clinic attendee
TB	Tuberculosis patient
TW	Transport worker
UP	Uva province
WP	Western province

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1. Introduction

The surveillance of Human Immunodeficiency Virus (HIV) infection is of great value in designing, implementing and monitoring of public health programmes for the prevention and control of HIV infection and the Acquired Immunodeficiency Syndrome (AIDS). There are a number of different methods available for HIV surveillance. Of these behavioural surveillance, biological or sero-surveillance, HIV and AIDS case surveillance and use of other supplementary data such as Sexually Transmitted Infections (STI) and Tuberculosis surveillance have been identified by WHO/UNAIDS.

The National STD/AIDS Control Programme (NSACP) of Sri Lanka has been annually conducting HIV Sentinel sero-surveillance since 1993. This survey was initially designed on the guidelines prepared by World Health Organization (WHO) in 1989. The purpose of HIV sentinel survey is to track HIV infection levels through 'watch post' institutions. These sentinel institutions routinely draw blood for other purposes. The usual method of HIV testing for sentinel survey is known as Unlinked Anonymous Testing. This method involves the use of blood already collected for another purpose. Having performed the stipulated test the labels of tubes are removed to delink from any identity and the HIV test is carried out. The purpose of unlinked anonymous testing is not to detect infected individuals or case finding. The objective is public health surveillance of HIV infection. The strengths and weaknesses of HIV sentinel surveys have been clearly described in 'the guidelines for Second Generation HIV Surveillance' published by UNAIDS/WHO. The HIV sero-surveillance in Sri Lanka has been regularly reviewed and necessary modifications done based on the new evidence about the local HIV epidemic. Certain Sentinel groups were discontinued while others were newly added depending on the new evidence of the local epidemic. Enrolment of some sentinel groups was done in the field level rather than from clinic settings (sex workers, transport workers).

In Sri Lanka, establishment of a behavioural surveillance system is being planned and the first round of behavioural survey is due to commence in

year 2005. This will yield more useful information to supplement the sero surveillance data as Sri Lanka is a low prevalence country for HIV infection.

All surveillance methods have their limitations. The HIV sentinel surveillance is no exception. However, the information generated by sero-survey complements to other data on the HIV epidemic and will be useful to improve the understanding of the HIV epidemic in Sri Lanka.

2. Methodology

Six populations were included in the survey. These were female sex workers, STD clinic attendees, patients with tuberculosis, military service personnel, transport workers and pre-employment category. Female sex workers were included in the survey from the beginning due to their high risk behaviour patterns. STD clinic attendees represent clients of sex workers and their partners. The patients with tuberculosis do not represent a behaviour category. However, they are a good sentinel group to monitor HIV infections in a low prevalence situation due to the synergistic relationship between HIV and TB infections. Military (service) personnel and transport workers are included in the survey since 2003 due to their reported high risk behaviours. Pre-employment category was newly included in 2004 for Northern and Eastern provinces only. The main reason for this was its inability to get adequate sample sizes for most of the sentinel groups. This group consisted of people who came for pre-employment screening with VDRL. However, in terms of behavioural risk this new sentinel group represents the general population.

Duration of the survey

The survey of 2004 was planned to be conducted over a period of 3 months from 1st July 2004. However, some sentinel sites extended the survey by two more weeks to get more blood samples.

Sentinel sites

All sentinel sites that took part in the 2003 survey were also included in the 2004 survey. In addition, Jaffna in the Northern province also participated in this year's survey. All nine provinces were included. (Annex IV). For a given sentinel site there were more than one sample collecting centres (Table 1). For the purpose of this survey, Northern province and the Eastern province were considered as one sentinel site (Northern & Eastern provinces).

Table 1. Sentinel sites and sample collecting centers for 2004 survey

Sentinel Sites	Sample-collecting centers
1. Western Province (WP)	Colombo, Colombo South & Colombo North, Negombo, Kalutara
2. Central Province (CP)	Katugastota, Matale, Dambulla, Nuwara Eliya
3. Southern Province (SP)	Mahamodara, Matara,
4. Sabaragamuwa Province (Sab.P)	Ratnapura, Kegalle
5. North Western Province (NWP)	Kurunegala, Chilaw
6. North Central Province (NCP)	Anuradhapura, Polonnaruwa
7. Uva Province (UP)	Badulla, Mahiyangana, Kataragama
8. North-Eastern Province (N&E P)	Trincomalee, Batticaloa, Vavuniya, Jaffna

Sampling method

Female sex workers were enrolled mainly from the field visits to brothels and other places where sex work take place. Blood samples were collected from all the sex workers present on the day of visit after obtaining consent. Some sex workers were enrolled from the STD clinics. A specially designed card (pink in colour) containing necessary information was given to FSW to prevent double counting.

STD clinic attendees and pre-employment category were consecutively enrolled from STD clinics till the stipulated sample size was obtained. Similarly patients with TB were enrolled consecutively from Chest clinics and wards.

Collection of the samples from military service personnel was carried out by the Sri Lanka Army Medical Services from selected camps situated in all provinces.

Transport workers were enrolled from Dambulla economic centre based on convenient sampling method. All transport workers present on the day of visit were enrolled.

Sample size

Sample sizes were mainly based on WHO recommendations for HIV sero- surveillance surveys. The sample collection was discontinued once the stipulated sample sizes were completed. These predetermined sample sizes are given in table 2.

Table 2. Stipulated sample sizes for each sentinel group and site

Sentinel Group	WP	CP	SP	Sab.P	NWP	NCP	UP	NEP
1. FSW	400	250	250	250	250	250	250	250
2. STD	500	250	250	250	250	250	250	250
3. TB	250	250	250	250	250	250	250	250
4. Service personnel	400	400	400	400	400	400	400	400
5.Transport workers*	-	600	-	-	-	-	-	-
6. Pre-employment#	-	-	-	-	-	-	-	1000

* Enrolled only at Dambulla in Central province,

Enrolled only at sample collecting centers in North East province

The following working definitions were used for survey.

1. Female Sex Workers (FSW) - Women who have practised commercial sex work during past one year. They were enrolled mainly by field visits. However, when this option was limited, sex workers who were seeking care at STD clinics were also enrolled for the survey. Both indirect and direct female sex workers were included in the survey irrespective of their age.

2. STD clinic attendees (STD)- Persons who attend a STD clinic seeking care at selected sentinel sites during the survey period. Both males and females were included. All age groups over 18 months were included in the survey if they had attended for a STD related complaint. Those who came for routine pre-employment or antenatal screening, were excluded from the STD clinic attendee category. Patients with previously diagnosed HIV infection were included only if they had attended for a STD related complaint. Both newly registered patients and those who came for follow up visits were included.

3. TB patients (TB) - Both new and old TB patients who were registered in the TB register maintained by the District Tuberculosis Control Officer (DTCO) during the survey period were enrolled. Both pulmonary and extra-pulmonary

TB cases were included. Children under 15 years were excluded. Over 49 age category was allowed if sample size could not be achieved during the survey period

4. Service personnel (Service) - Currently serving army personnel in combat in selected army camps in each sentinel site were enrolled. Female officers and those who were engaged in full time office work were excluded. Age was limited to 18 to 49 years. To prevent double counting a beige colour card with relevant information was given to those enrolled.

5. Transport workers (TW) - Lorry drivers and lorry cleaners who came to the Dambulla Economic Centre for business purposes on sample collection days were enrolled as transport workers. Age was limited to 15-49 years.

6. Pre-employment (PE)– Both males and females who attend STD clinics in N & E provinces for pre-employment medical screening during the survey period. The age was limited to 18 to 49 years.

Method of HIV testing

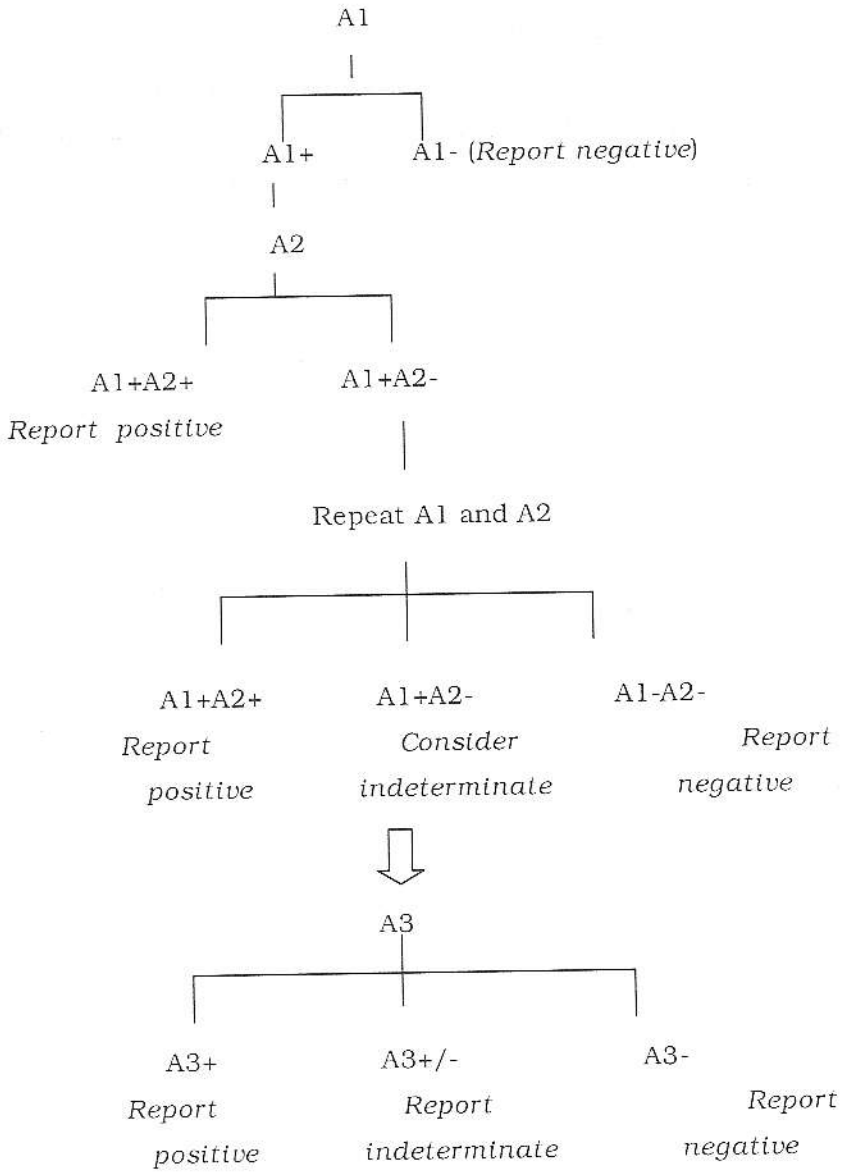
All HIV tests were done on an unlinked anonymous basis. Routinely collected blood was used only in STD clinic attendees and pre-employment category. In all other sentinel groups blood samples were collected for the VDRL test on obtaining consent. Once the VDRL tests were carried out, left over blood were used for HIV testing after removing individual identifying labels.

Laboratory testing strategy for HIV antibodies

HIV antibody status was determined based on the results of two screening assays i.e. ELISA and Particle agglutination assay. All samples tested positive with one test were tested with the other type of screening test. If both tests were positive the sample was considered as positive. If the 2nd test was negative, then both screening tests were repeated (1st and 2nd test) and if both were positive it was considered as positive. If one test was positive and the other test was negative it was considered as indeterminate.

Since the prevalence of HIV is low in Sri Lanka, it was decided that indeterminate samples from screening tests should be tested again with a confirmatory test. This was a significant amendment to the existing protocol.

Algorithm used for the 2004 survey is given below.



Assay A1, A2 represents 2 different screening assays (ELISA and Particle agglutination tests). A3 represent a confirmatory test (Line Blot assay)

Staff training, Monitoring and supervision

The survey protocol was modified to suit changes in the 2004 survey. A training workshop was held in Colombo prior to the commencement of survey to familiarize health-care personnel and other relevant persons on this protocol. Monitoring and supervision were carried out to ensure uniformity at all sentinel sites.

Supervisory visits were carried out to sample collecting centers during the survey period. Officers from Colombo as well as experienced officers from the provincial STD clinics conducted these visits. A standardized structured checklist was used to collect relevant information. Many supervisory visits to sentinel sites in North and East provinces were not possible due to logistical problems. Jaffna, the main sample collection center in the northern province participated in the 2004 survey.

3. Results

A total of 10,310 samples were tested and 7 HIV antibody positive samples were detected in 2004 HIV sentinel sero-survey. Of these, 4 were from STD patients and 3 were from female sex workers. There were no HIV positives among any other sentinel groups.

In addition to the 7 HIV antibody positive samples, 'indeterminate' results were seen in 3 blood samples from TB patients. Of these, 2 samples were tested with confirmatory test and found to be 'true' indeterminate samples while the 3rd sample was not sent to the Central Laboratory Colombo for confirmatory test.

Table 3. HIV test results by sentinel sites and sentinel groups

Sentinel Sites	Sentinel groups											
	STD		FSW		TB		Service		TW		PE	
	No. tests	No. +ve	No. tests	No. +ve	No. tests	No. +ve	No. tests	No. +ve	No. tests	No. +ve	No. tests	No. +ve
WP	621	1 (0.2%)	439	1 (0.2%)	256	0	399	0	-	-	-	-
CP	302	0	97	1 (1%)	304	0	394	0	557	0	-	-
S.P	250	0	209	0	152	0	398	0	-	-	-	-
Sab.P	250	0	212	0	212	0	398	0	-	-	-	-
NWP	328	0	219	1 (0.5%)	216	0	400	0	-	-	-	-
NCP	357	1 (0.3%)	216	0	275	0	400	0	-	-	-	-
UP	250	0	86	0	77	0	397	0	-	-	-	-
N & E P	244	2 (0.9%)	19	0	164	0	400	0	-	-	812	0

Table 3 describes the number of HIV antibody tests, number of HIV positive samples and sero-positivity rates amongst different sentinel groups at various sites. All sites were able to enrol adequate sample sizes for STD clinic attendees. Most of sites had enrolled more than the stipulated sample size for the given site. Of the 7 HIV positive samples, 4 were in STD clinic attendees whose sero-prevalence rates ranged from 0.2% to 0.9%.

Only Western province was able to enrol adequate number of FSW for the survey. Northern & Eastern provinces could enrol only 7.6% of the required sample size. CP and UP enrolled fewer than 100 FSWs. There were three HIV positive samples amongst the FSW category. The sero-prevalence rate ranged from 0.2% to 1 % in FSWs.

Among TB patients, satisfactory numbers were enrolled only in 3 sentinel sites. There were no HIV antibody positive samples amongst TB patients.

Adequate numbers have been enrolled for Service personnel. Enrollment of transport workers and pre-employment groups were satisfactory. However, none of these groups tested positive for HIV antibodies.

Figure 1. Age distribution of STD clinic attendees by sentinel sites

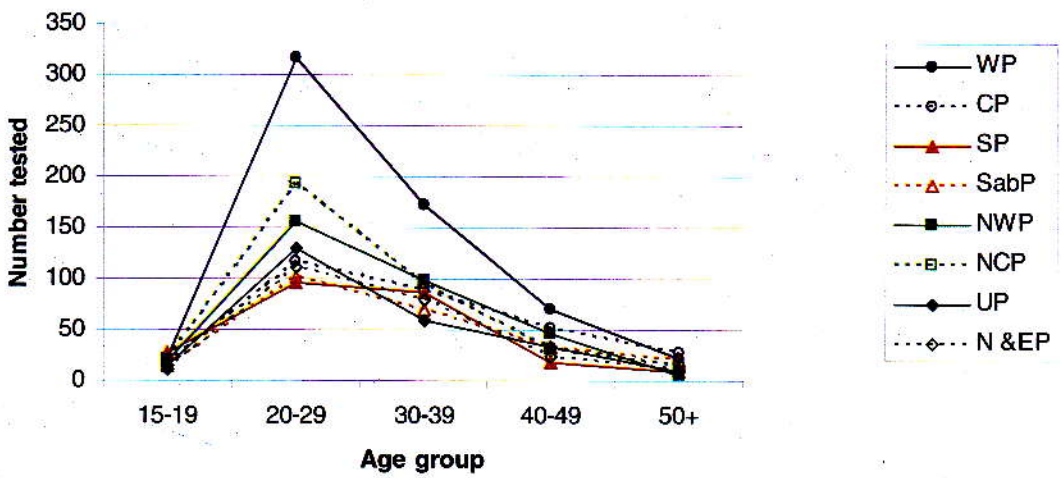
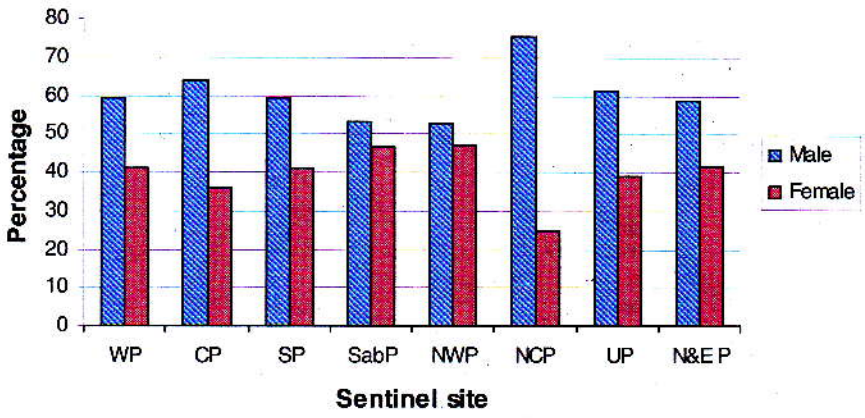


Figure 1 shows the distribution of STD clinic attendees enrolled in various sentinel sites by age group and sentinel sites. Majority of the sample was in 20-29 and 30-39 age groups in all sentinel sites.

A total of 2602 STD clinic attendees were tested and 4 (3 males and 1 females) were found to be positive for HIV antibodies. Of these, 2 persons were in 50+ year age group.

Figure 2. STD Clinic attendees by sentinel sites and sex



In all sentinel sites, a higher percentage of male STD clinic attendees were enrolled for the survey. This was marked in north central province (male 75 % vs. female 25%) (Figure 2).

Figure 3. Female sex workers by age group and sentinel sites

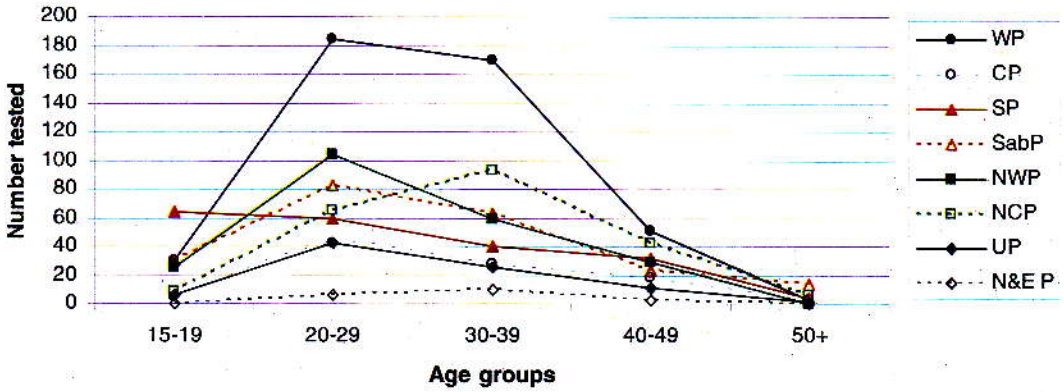
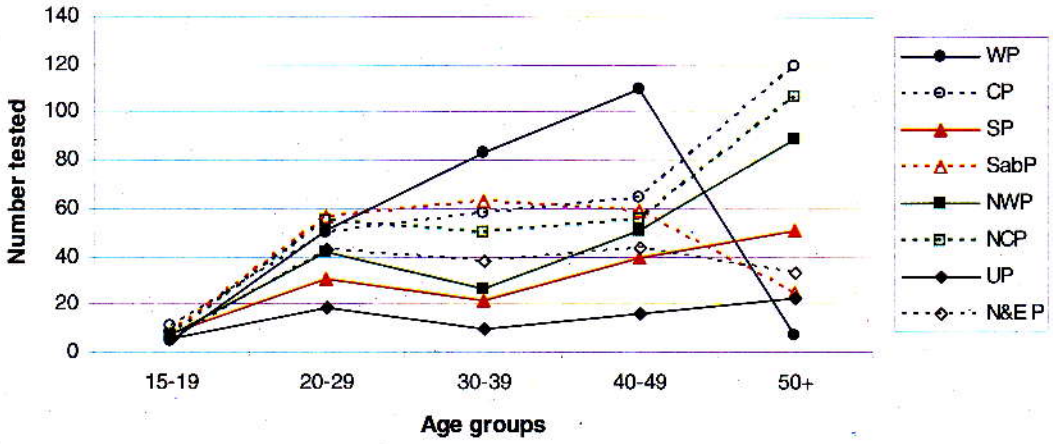


Figure 3 shows the distribution of female sex workers enrolled in the survey by age group and sentinel sites. Similar to STD clinic attendees, majority of the sample was in 20-29 and 30-39 age groups in all most all sentinel sites. However, in southern province, higher number of FSW were in under 20 year age group.

Of the total 1497 FSW tested in 2003 survey, three samples became positive for HIV antibodies and the sero-prevalence rate ranged from 0.2% to 1%.

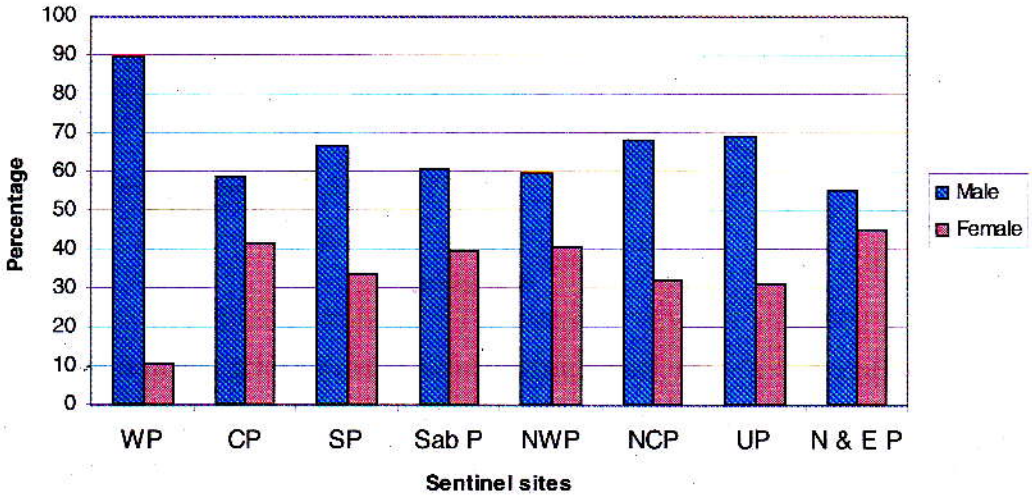
Figure 4. TB patients by age group and sentinel sites



Only three sentinel sites were able to enrol adequate numbers of TB patients. In all sites more patients in the older age group were enrolled.

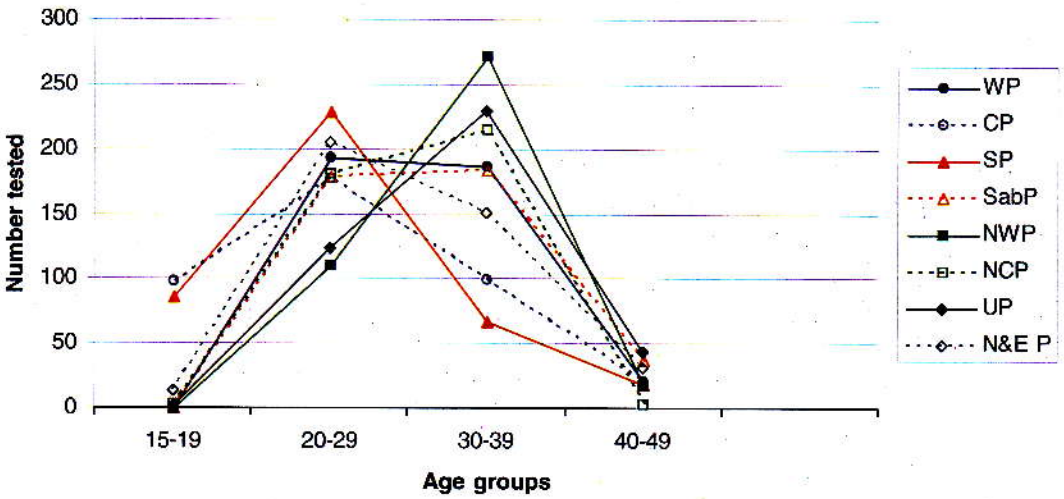
A total of 1656 TB patients were tested during the survey. There were no HIV positive samples amongst TB patients. However, there were three indeterminate samples in this group.

Figure 5. TB patients by sentinel sites and sex



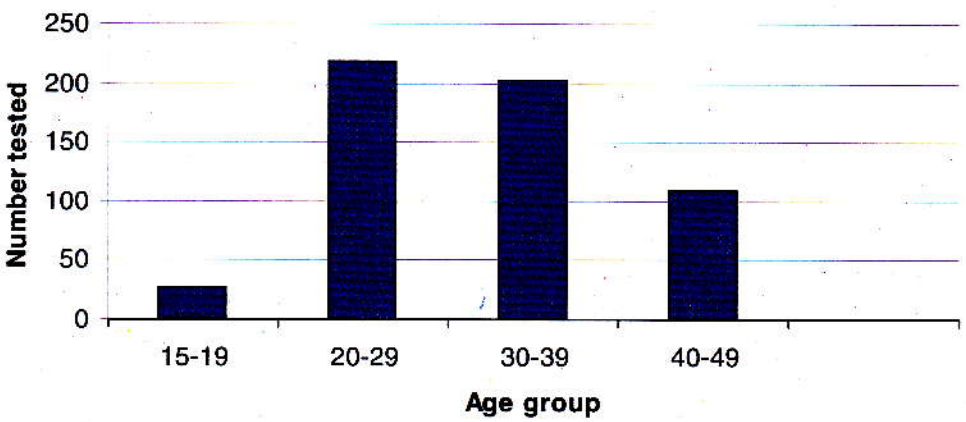
In all sentinel sites, a higher proportion of males was noted among TB patients (figure 5). Similar to the results of last year, this sex difference was most marked in the western province (89% males Vs 11% females).

Figure 6. Service personel by age group and sentinel sites



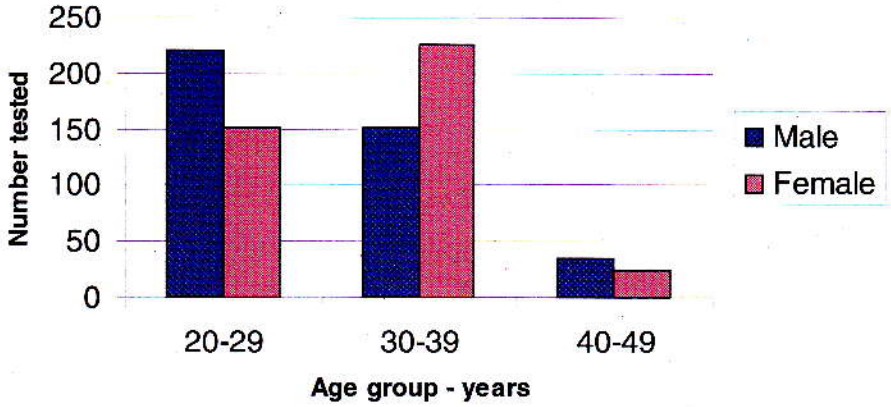
Only male army service personnel in combat duties were enrolled in the survey. Numbers of samples collected in all sites were satisfactory. More persons enrolled were in the 30-39 and 20-29 year age groups (figure 6). Of the 3186 samples tested, there were no HIV antibody positive samples.

Figure 7. Transport workers by age groups



Transport workers were enrolled only from one sentinel site. Total number tested was 557. All were males and the majority was in 20-29 and 30-39 year age groups respectively (figure 7). All samples were negative for HIV antibodies.

Figure 8. Pre-employment category by age and sex



The enrolment of the pre-employment category was started newly for 2004 survey. Samples were collected only from bleeding sites situated in northern & eastern provinces. Inability to enrol adequate sample sizes for other sentinel groups in the North-East sentinel site was the main reason to initiate this new sentinel group. Pre-employment category consists of males and females who come for VDRL screening as part of their pre-employment medical screening before they are confirmed in a government employment. Therefore this group may represent the general population. A total of 812 samples were collected. Fifty one percent of the sample consisted of males. More males were found in 30-39 age group. There were no HIV antibody positive samples in this category.

Table 4. VDRL positivity rates among sentinel groups

Sentinel sites	Sentinel groups				
	FSW	STD	TW	Service	PE
Western p	13/439 (2.9%)	60/621 (9.7%)	-	0/399	-
Central p	2/97 (2.1%)	29/302 (9.6%)	2/557 (0.4%)	0/394	-
Southern p	10/209 (4.8%)	14/250 (5.6%)	-	0/398	-
Sab. p	1/212 (0.5%)	5/250 (2.0%)	-	0/398	-
North Western p	7/219 (3.1%)	32/328 (9.8%)	-	0/400	-
North Central p	2/216 (0.9%)	7/357 (1.9%)	-	0/400	-
Uva p	7/86 (8.1%)	30/250 (12.0%)	-	0/397	-
North & East p	1/19 (5.3%)	9/244 (3.7%)	-	0/400	3/812 (0.4%)

Table 4 indicates the VDRL positivity rates among selected sentinel groups. The VDRL rate among FSW ranged from 0.5% in Sabaragamuwa province to 8.1% in Uva province. Among STD clinic attendees, the VDRL rate varied from 1.9% in north central province to 12 % in Uva province. Higher VDRL rates among STD clinic attendees could be explained by the fact that large numbers of VDRL positive patients are referred to STD clinics for management. None of the samples collected from service personnel tested positive for VDRL.

SUMMARY

Table 5. Summary of HIV positive cases found in HIV sentinel survey 2004.

No	Sentinel site	Bleeding site	Sentinel group	Age	Sex	Sero-prevalence rate
1	Western P.	Colombo South	FSW	29	Female	0.2%
2	Western P.	Colombo	STD	27	Female	0.2%
3	North Central P	Anuradhapura	STD	62	Male	0.3%
4	North Western P	Chilaw	FSW	27	Female	0.5%
5	Central P	Kandy	FSW	24	Female	1.0%
6	North & East P	Vauniya	STD	45	Male	0.9%
7	North & East P	Jaffna	STD	50	Male	

Of the seven HIV antibody positive samples , 4 were from STD clinic attendees. Sero-prevalence ranged from 0.9% in North and East provinces to 0.2% in the Western province. The balance 3 HIV positive samples belonged to female sex workers in Western province, North western province and Central province. The sero-prevalence ranged from 0.2% Western province to 1% in Central province.

4. Discussion

The number of blood samples tested in 2004 HIV sentinel sero-survey was 10,310. Of these 7 samples gave positive HIV antibody test results. One new sentinel group was newly added to this year's survey. This new group consisted of people whose VDRL test was done as a requirement for pre-employment screening. This group was added only to sample collecting centres situated in the northern and eastern provinces. The main reason for adding this new group to N & E provinces was its inability to enrol adequate sample sizes for most of the sentinel groups. However, in terms of behaviour risk group this new category may represent general population and may not be indicated for sero-surveillance for a low HIV prevalent country.

There were no changes in the sentinel sites from the previous survey. However it should be noted that Jaffna STD clinic participated in this year's survey as one of the sample collecting centers in N & E province. Jaffna did not participate in previous surveys due to logistic problems. In terms of HIV spread, this area is generally considered to be high risk due to its proximity to South Indian states where HIV prevalence is high. Volatile political environment and presence of military in the area may further worsen the situation. One STD clinic attendee from the Jaffna site tested positive for HIV antibodies while all other groups were negative.

Testing protocol for the 2004 was modified to include confirmatory HIV testing for indeterminate samples from the screening tests. There were three such indeterminate samples in 2004 survey. All these were from TB patients. Of these, two samples were tested with the Line Blot test and found to be 'true' indeterminate samples while the 3rd sample was not made available for the Central laboratory for confirmatory testing.

The enrolment of STD clinic attendees was satisfactory in all sentinel sites. Both male and female patients who attended public STD clinics during the survey period were taken as STD clinic attendees. Male STD clinic attendees are thought to be representing clients of sex workers. Of the 4 STD clinic attendees tested positive for HIV, 3 were males. The sero-prevalence rate

ranged from 0.2% in Western province to 0.9% in the North and East provinces.

Female sex workers are an important risk group for HIV epidemic. It is well known that liaisons between males and sex workers are the main driving force of HIV epidemic in Asian countries. Both direct and indirect female sex workers were enrolled mainly from the community for HIV sero-survey. Three female sex workers from Western, Central and North western provinces gave positive results for HIV antibodies. The sero-prevalence ranged from 0.2% in Western province to 1% in Central province. However, the enrolment of adequate sample sizes for female sex workers was a recurrent problem for many sentinel sites. Only the Western province was able to enrol adequate sample for 2004 survey.

Patients with tuberculosis were traditionally included in sero-surveys due to its synergistic nature with HIV infection. Apart from 3 indeterminate samples, all other samples from TB patients were tested negative for HIV antibodies. Only three sentinel sites were able to get adequate sample sizes for TB patients.

The enrolment of Service personnel, Transport workers and pre-employment category was satisfactory. There were no HIV positive samples in these groups.

HIV sentinel survey conducted in 2004 did not show a marked change in HIV sero-prevalence among the sentinel groups surveyed. These results are compatible with a low level HIV prevalence in the country. A properly conducted behavioral surveillance system would be more sensitive to issues related to HIV epidemic in this situation. The first round of behavioral survey is due to commence in 2005. The results of this survey will be useful to clarify many issues related to sero-prevalence surveys in the local situation.

Acknowledgement

The National STD/AIDS Control Programme wishes to thank the World Health Organization and World Bank for funding the survey.

The staff of the STD clinics and Chest clinics who participated in the sentinel surveillance are acknowledged for their co-operation for carrying out the survey.

The NSACP appreciates the support given by Medical Service Unit of the Sri Lanka Army.

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Annex 1

Results of HIV Sentinel survey 1993-2004 for Female sex workers

Number tested and number positive (rate)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Colombo (WP)	1/200 (0.5%)	0/200	0/200	0/100	0/110	0/407	0/654	0/286	0/243	0/424	1/405 (0.2%)	1/439 (0.2%)
Kandy (CP)	0/100 0/100	0/100	0/80	0/41	0/82	0/86	0/105	0/70	0/55	1/147 (0.7%)	0/88	1/97 (1%)
Galle (SP)	0/23 0/8	0/26	0/79	0/95	0/100	0/191	0/291	0/279	0/211	0/242	0/245	0/209
Rathnapura (Sab.P)	0/7 0/46	0/27	0/101	0/57	0/47	0/174	0/245	0/341	1/213 (0.5%)	0/118	0/188	0/212
Anuradhapura (NCP)	-	0/100	0/100	0/100	0/100	0/250	0/290	0/342	0/250	0/192	0/170	0/216
Kurunegala (NWP)	-	0/30	1/187 (0.5%)	1/100 (1%)	0/67	0/41	0/40	0/593	1/187 (0.5%)	1/320 (0.3%)	0/277	1/219 (0.5%)
Badulla (UP)	-	-	-	0/17	0/43	-	-	0/251	0/250	0/105	0/84	0/86
N&E P	-	-	-	-	-	-	-	-	-	-	0/13	0/19

- Not included in the survey

Annex II

Results of HIV Sentinel survey 1993-2004 for STD Clinic Attendees

Number tested and number positive (rate)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Colombo (WP)	0/205 0/200	0/376	0/400	0/200	1/400 (0.25%)	1/1385 (0.07%)	0/1849	2/1448 (0.1%)	1/1702 (0.05%)	3/1577 (0.2%)	2/602 (0.3%)	1/621 (0.2%)
Kandy (CP)	0/100 0/100	0/200	0/200	0/100	0/200	0/250	0/556	2/749 (0.3%)	0/700	0/775	0/445	0/302
Galle (SP)	0/198 0/133	0/98	0/200	0/100	0/200	0/449	0/494	0/595	0/801	0/668	2/410 (0.5%)	0/250
Rathnapura (Sab.P)	0/50 0/79	0/43	0/103	0/100	0/185	0/250	0/286	2/375 (0.5%)	0/412	0/372	0/275	0/250
Anuradhapura (NCP)	-	0/96	0/174	0/100	0/100	0/275	0/313	0/349	1/268 (0.4%)	0/488	0/407	1/357 (0.3%)
Kurunegala (NWP)	-	0/79	1/234 (0.4%)	1/113 (0.9%)	0/100	0/250	2/251 (0.8%)	0/668	1/680 (0.2%)	1/951 (0.1%)	3/296 (1%)	0/328
Badulla (UP)	-	-	-	0/34	0/62	-	-	0/276	1/374 (0.3%)	1/326 (0.3%)	1/250 (0.4%)	0/250
N&E P	-	-	-	-	-	-	-	-	-	0/79	0/134	0/244

- Not included in the survey

Annex III

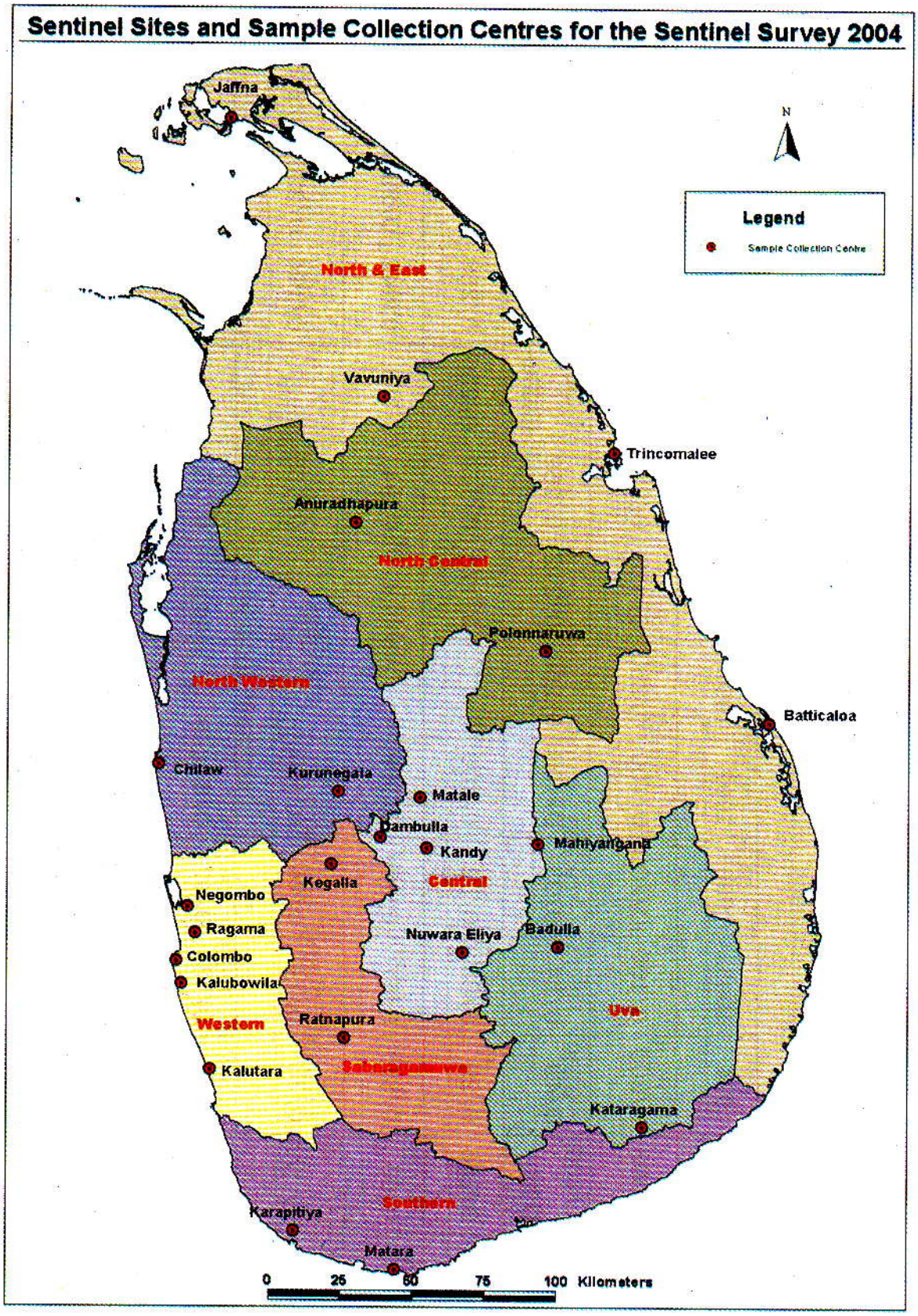
Results of HIV Sentinel survey 1993-2004 for TB patients

Number tested and number positive (rate)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Colombo (WP)	1/303	0/200	0/155	0/200	0/100	0/250	0/413	0/223	0/276	0/287	1/282 (0.3%)	0/256
Kandy (CP)	1/100 (1%)	0/49	0/54	0/93	0/100	0/250	0/242	0/269	1/363 (0.3%)	0/324	0/282	0/304
Galle (SP)	0/166	0/29	0/63	0/52	0/100	-	0/177	0/174	0/250	0/289	0/143	0/152
Rathnapura (Sab.P)	0/65	0/31	0/57	0/88	0/100	-	-	0/94	-	0/242	0/254	0/212
Anuradhapura (NCP)	-	0/76	0/74	0/26	0/100	-	-	0/165	-	0/194	0/220	0/275
Kurunegala (NWP)	-	0/35	0/134	0/47	0/61	-	-	0/75	-	0/199	0/167	0/216
Badulla (UP)	-	-	-	0/39	0/67	-	-	0/111	-	0/187	0/152	0/77
N&E P	-	-	-	-	-	-	-		-	0/2	0/66	0/164

- Not included in the survey

Annex IV


Sentinel Sites and Sample Collection Centres for the Sentinel Survey 2004
N
Legend
Sample Collection Centre
Jaffna
North & East
Vavuniya
Trincomalee
Anuradhapura
North Central
Polonnaruwa
North Western
Batticaloa
Chilaw
Kurunegala
Matale
Dambulla
Kandy
Mahiyangana
Kegalla
Central
Negombo
Ragama
Colombo
Kalubowila
Nuwara Eliya
Badulla
Western
Ratnapura
Uva
Sabaragamuwa
Kalutara
Kataragama
Karapitiya
Southern
Matara
0
25
50
75
100 Kilometers