Report on
HIV Sentinel Surveillance
in Cambodia
2002

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FOREWORD

The control of the HIV/AIDS epidemic is essential to sustain the development of the country because this disease has important social and economic impacts and threatens the efforts to improve quality of life of our people. Over the past decade NCHADS and international partners have been working hard to fight the epidemic. To guide our strategies we must regularly measure the magnitude of the epidemic which evaluates the success of our interventions as well as the needs of the Cambodian population.

Because HIV/AIDS is a life long disease its prevalence changes very slowly. Indeed, a decrease or stabilization of the number of new cases of HIV is translated into a reduction of the HIV prevalence only after years, when the number of people dying from AIDS surpasses the number of newly infected individuals. Therefore the epidemic should be interpreted through the trends in prevalence. Since 1994, NCHADS has conducted regular HIV sero-surveillance surveys in sentinel groups represented by core groups for the transmission of HIV in addition to the general population. The 2002 survey is the eighth round of HIV sero survey (HSS) in Cambodia.

In order to put the results in perspective and interpret their meaning, this HSS report is for the first time discussing the significance of the HIV prevalence results in the light of other sources of available information. These include behavioral surveillance surveys, sexually transmitted infections surveys, results of HIV testing from blood bank, and HIV testing in tuberculosis patients.

This report confirms the decrease of HIV prevalence in all groups characterized by risky sexual behaviors, which was suggested by the results of the HSS 2000. In addition it shows that the HIV epidemic has stabilized in the general population. In this time round, the calculation of the prevalence rate in the general population has benefited from new techniques of adjustment that yields to more accurate estimates. As a result it is estimated that 2.6% of the Cambodians aged 15 to 49 are infected with HIV which means that 157,000 adult Cambodian are currently living with HIV.

Finally, I would like to express my gratitude all colleagues who have contributed to this survey and particularly to our Cambodian men and women who have accepted to provide their blood for the good of their country.

Phnom Penh, July 5, 2004
NCHADS Director

Mean Chhi Vun, MD, MPH

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I INTRODUCTION

The importance of second generation surveillance

The ultimate goal of second generation surveillance is to provide information of relevance to policy makers for public health action. HIV surveillance systems help countries find and track HIV infection, both in terms of geographic location and key populations affected. They also help detect the behaviors and the biological factors that drive the spread of HIV. This information is needed to guide effective responses that can halt the spread of HIV. These responses need to be based on empirical evidence and driven by thorough analysis of high quality data.

The specific objectives of Second Generation Surveillance are:

1. To have a better understanding of the biological and behavioral patterns and trends driving the spread of HIV over time in order to plan more effectively for prevention and care
2. To track important trends while still being flexible enough to change with the needs and state of the epidemic
3. To help document progress in the fight against the spread of HIV

The major types of data that need to be tracked by the surveillance system include 1) HIV prevalence trends, 2) STI prevalence trends, 3) key risk behaviors that drive the spread of HIV among populations at risk, and 4) sizes of populations at risk of HIV. If second generation surveillance data are analyzed and synthesized with the appropriate tools they can provide a wealth of information on the dynamics of the epidemic, including numbers of people infected with HIV now and over time, number of AIDS cases and AIDS deaths (past, present and future), and the estimated number of incident infections over time. If good behavioral and biological trends are available, it is also possible to estimate the effects of different program components on infections averted.

The Cambodian surveillance system

The 2002 round of HIV Sentinel Surveillance (HSS) is the eighth in a series of annual surveys that have taken place in Cambodia beginning in 1994 (no data were collected for the year 2001). The surveys have been undertaken and financed by the Cambodian Ministry of Health, through the National Center for HIV/AIDS, Dermatology and STDs (NCHADS). Technical assistance and supplemental financial support for the 2002 round of HSS were provided by WHO and USAID (through Family Health International and the East West Center).

Several other surveys have been conducted since 1997 as part of the surveillance system including HIV risk behavior surveillance surveys (BSS) in high-risk sub-populations and general population males. There were also STI prevalence surveys conducted in 1996 and 2001 among key populations in selected provinces. This report presents complete information from the 8th round of HIV surveillance in Cambodia (2002) as well as relevant information from other components of the surveillance system that help with interpretation of the HSS data.

Table 1 shows the sub-populations that have been included in the HSS and BSS since 1997.

How were these surveillance populations selected?

These populations were selected because they were thought to be among the most at-risk groups for HIV infection in Cambodia. Commercial sex and subsequent husband to wife transmission is still the

Table 1: Sub-populations included in the HSS and BSS since 1997

Sub-population	HSS	BSS
Direct sex workers	Yes	Yes
Indirect sex workers	Yes	Yes
ANC attendees	Yes (except 1998)	No
Male police	Yes	Yes
Male military	No	Yes
Male moto drivers	No	Yes
General population males	No (except pilot in 5 provinces in 1999)	Household male survey
TB patients	Yes (discontinued as of 2003)	No
Hospital in-patients	Yes (discontinued after 2000)	No

largest engine of the epidemic in Cambodia. Up until the mid-1990s the largest source of new infections was from sex workers to male clients. Subsequent to that time an increase of infections were due to husband to wife and maternal to child transmission, as well as through commercial sex (Cambodia Working Group on HIV/AIDS Projections 2002). Therefore the focus of the surveillance system has been on direct and indirect female sex workers, male populations who are likely to be clients of sex workers (police, military, moto drivers) and ANC women as a proxy for general population females. A behavioral survey of general population males in 2000 confirmed that these occupation groups were among those with the highest proportion of men buying sex (Sopheab, Phalkun et al. 2000). Although injecting drug use is an important mode of transmission in surrounding countries in Asia, there is not yet any evidence that this is a major driving force in Cambodia, and there is no evidence of a population of injecting drug users large enough to track with the surveillance system. Although men who have sex with men have been identified as a highly vulnerable population through ad hoc studies in Phnom Penh (Girault, Saidel et al. 2004) more information is needed on the size of this population. As the epidemic evolves it will be important to keep reassessing whether the appropriate sub-populations and geographic locations are covered by the surveillance system.

Girault, P., Saidel T., et al. (2004). "HIV, STIs, and sexual behaviors among men who have sex with men in Phnom Penh, Cambodia." AIDS Education and Prevention In Press.
Gorbach P., H. Sopheab, et al. (2003).
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Cambodia Working Group on HIV/AIDS Projections (2002). Projections for HIV/AIDS in Cambodia: 2000-2010. Phnom Penh, NCHADs, FHI.
Sopheab H., M. Phalkun, et al. (2000). Cambodian household male behavioral surveillance survey IV, 2000. Phnom Penh, Cambodia, National Center for HIV/AIDS, Dermatology and STDs, Ministry of Health, Cambodia.

2 DESIGN and METHODOLOGY for the HSS

Purpose

To provide data to guide HIV prevention and control efforts

Objectives

- To estimate HIV prevalence in specific populations
- To monitor trends of HIV prevalence
- To provide information for program planning
- To assess the impact of prevention programs

Overview

A cross-sectional design was used to obtain HIV prevalence data from the various surveillance groups. Venous blood samples were drawn in an anonymous fashion, specifically for the purpose of HIV testing. Subjects were informed of the purpose of the survey and oral informed consent was obtained from each subject prior to drawing blood. There were no identifiers on any of the blood samples that could be traced back to the individual, although study samples could be linked to sentinel sites and geographic location. Study sites and subjects were randomly selected using probability methods wherever possible.

Sentinel groups

Five sentinel groups were included in the HSS for 2002 including:

- Direct female sex workers (DFSW) who are brothel based sex workers
- Indirect female sex workers (IDFSW) including women working as beer promotion girls and in some provinces, women working in karaoke lounges
- Male police
- Pregnant women attending antenatal clinics (ANC women)
- Tuberculosis patients (males and females)

Sentinel provinces and sentinel sites

HSS 2002 included 20 of the 24 provinces in Cambodia. These were: Bantey Meanchey, Battambang, Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Koh Kong, Kratie, Pailin, Phnom Penh, Preah Vihear, Prey Veng, Pursat, Rattanakiri, Siem Reap, Sihanoukville, Stung Treng, Svay Rieng. Although Takeo, a 21st province, had been included in HSS 2002, problems with specimen handling required that their data be excluded from analysis of the 2002 data. Respondents were selected from both provincial capitals and remaining districts (covering the whole province), although for DFSW and IDFSW most of the sites where the women were accessible were in urban areas. In sentinel provinces, DFSW, IDFSW and police were recruited from randomly selected sites while ANC women, TB patients and hospital in-patients were recruited from purposively selected sentinel sites. For ANC women the same sites were used in the 2002 round as had been used in previous rounds. For the TB patients, there has been an expansion over the last several years in the number of rural health centers, so the data may not be directly comparable over time.

Sampling strategy for HSS

See Table 2: Target sample sizes per province

Direct female sex workers

The required sample size per province was 150. In provinces where the total number of direct female sex workers did not exceed the required sample size of 150, the Provincial Surveillance Teams were asked to sample all of the direct sex workers in the province.

In provinces where the estimated number of sex workers was significantly higher than 150 (e.g.,

Table 2: Target sample sizes per province

Target sample sizes per province	
DFSW	150
IDFSW (beer and karaoke)	150 in provinces where prevalence > 5%; 300 in provinces where prevalence <=5%
Police	150 in provinces where prevalence > 5%; 300 in provinces where prevalence <=5%
ANC	300 in provincial capitals; 300 in remaining districts (to include at least 100 age 15-24)
Tuberculosis Patients	150 in provinces where prevalence > 5%; 300 in provinces where prevalence <=5%

200 or more), cluster sampling was done. All sites were listed prior to conducting the survey. It was not required that a measure of size (number of women working in the brothel) be obtained before the survey. The Provincial Surveillance Team randomly selected a sample of 30 brothels (with equal probability), and then visited each brothel. On the day the brothel was visited by the surveillance team, five women were randomly selected and invited to participate in the survey. Another randomly selected woman from the site replaced each woman who refused participation. After obtaining oral informed consent, the field teams drew blood and completed the specimen information sheet.

Indirect female sex workers

Indirect female sex workers were defined as women working as beer promotion girls or as karaoke girls (or as women working in the beer garden during that time). Although previous rounds of surveillance also included massage girls and bar girls, they were found to constitute a very small proportion of the overall sample, so they were dropped for the 2002 HSS. Beer girls (and karaoke girls in some provinces) were sampled using a two-stage cluster methodology, with sites being selected with equal probability from among a list of all beer companies that hire beer promotion girls, and all karaoke lounges. Any existing lists were validated and updated during the mapping. At the second stage, ten women were chosen from each selected cluster.

The target sample size for this group was 150 in provinces where the prevalence was greater than 5% in the previous HSS round and 300 for provinces where the prevalence was 5% or less. In those provinces where the total number of indirect sex workers was estimated to be less than 150, a "take-all" sampling approach was used. In the provinces where the number of sex workers was larger than 150 (Phnom Penh, Battambang, Siem Reap and Kampong Cham), the National Surveillance Team assisted the Provincial Surveillance Team in selecting a random sample. This was achieved by using the list of beer companies and karaoke lounges to select a random sample of 20 sites, and then selecting a random sample of 10 women from each site. Although only 150 women were required, extra clusters were chosen in the event that it was not possible to get 10 women from each cluster. Additional randomly selected eligible respondents in the cluster replaced women who refused to participate.

After randomly selecting women and obtaining oral informed consent, a blood sample was taken and the specimen information sheet was completed at each site. The specimen information sheet included the provinces surveyed, the vacutainer number, date when the sample was collected, and age, marital status, education level, duration of sex work, and nationality of each study participant. A cluster information sheet was also completed for each beer company included in the sample, detailing the name and geographic location of the company, its cluster number, the total number of women who worked for the company as beer promoters, the number of women who appeared on the day the blood collection was done, the number of women who were invited to participate in the survey, the number of women who refused and the number of specimens obtained from that beer company.

For karaoke lounges the team visited the selected sites during the day and selected a random sample of ten women, following the same procedure and completing all the same forms as at the beer companies.

Male police

For male police, the sampling frame consisted of a list of bureau/offices within districts, obtained from Provincial Surveillance Teams, under the supervision of the Provincial AIDS Manager. The bureau/offices include all non-military police including immigration, anti-drug trafficking, anti-crime, logistics and justice police. Districts that were inaccessible or accessible only with great difficulty were excluded from the sampling frame. It was the responsibility of the Provincial AIDS Manager to document which districts were excluded from the sampling frame.

For provinces where the sample size was 300 (HIV prevalence < 5%), 30 clusters were selected at random. For each selected cluster (bureau/office), the provincial team randomly selected 10 police. The same procedure as for other groups was followed. For provinces where the sample size was 150 (HIV prevalence > 5%), 15 clusters were selected at random.

ANC women

ANC women were recruited from both provincial capitals and remaining districts using the same sites that were used in HSS 2000. Only pregnant women who were present at sentinel sites for prenatal visits were eligible for the HSS sample and they were sampled consecutively (in the order that they presented themselves for services). No woman was included in the sample more than once.

For each woman recruited into the sample, clinic staff were responsible for obtaining informed consent before drawing blood, and also for recording the relevant information on age, education, nationality, name of the province surveyed, and date when the sample was collected.

The sample size was 300 for provincial capitals and 300 for remaining districts. However, the protocol specified that a sample of at least 100 women aged 15-24 be recruited in order to have a separate measure of prevalence among younger women. (Note: the reason for the over-sample in younger women was to try to approximate the incidence rate in these women who were more likely to have been recently infected than the older women). The procedure was to recruit women consecutively until a sample of 300 was reached. If, at that point, the sample contained fewer than 100 women aged 15-24, then recruitment among 15-24 years olds only continued in a consecutive manner until the target of 100 was reached. Sampling stopped after a period of three months, regardless of whether the desired sample was achieved.

TB patients

Staff of the selected TB centers underwent training by the Provincial AIDS Manager. TB patients were recruited among newly diagnosed TB patients from both provincial referral hospitals and local health centers capable of diagnosing sputum smears. Staffs from the sentinel sites were responsible for keeping track of newly diagnosed patients, making sure they were recruited into the sample in consecutive order and that no one was recruited into the sample more than once.

Training of personnel

Training for HSS 2002 was conducted at several levels.

There was a pre-surveillance training workshop for three days in Phnom Penh just before the start-up of data collection.

In each province, the Provincial AIDS Manager was responsible for establishing a Provincial Surveillance Team, and conducting training for that team. The Provincial Surveillance Team had primary responsibility for conducting the survey among DFSW, IDFSW and Police. Their training covered the topics of mapping, eligibility criteria, sampling, informed consent, specimen collection, processing and transport of specimens, and record keeping, including how to complete the specimen information sheet and the cluster information sheet.

Separate training was conducted for sentinel site staff of ANC clinics and TB clinics. This training covered eligibility criteria, the consecutive sampling technique for sentinel sites, informed consent, and the procedures for specimen collection and handling. It also covered completion of the specimen information sheet.

Specimen Collection and Testing

The WHO recommended protocol for HIV surveillance was followed. For sentinel groups with HIV prevalence of 10% or greater (direct and indirect sex workers) the [particle agglutination assay (Serodia HIV 1/2, Fujirebio-Japan)] was used to screen all samples. Samples that were reactive on the first test were considered HIV-positive. Those that were non-reactive on the first test were considered HIV-negative. The same particle agglutination assay (Serodia HIV 1/2, Fujirebio-Japan) was performed for sentinel groups with HIV prevalence less than 10% (police, ANC women and TB patients). In these groups, however, the samples that were reactive on the first test were confirmed by enzyme-linked immunosorbent assay (Genscreen HIV 1/2, Bio-Rad/Japan). The testing was conducted in the VCT at the Preah Bat Norodom Sihanouk Hospital in Phnom Penh beginning at the end of the data collection phase. Quality control was not done in the HSS 2002.

Storage of sera and transport of specimens to the laboratory at Sihanouk hospital

Five milliliters (5 ml) of blood was drawn into a blood tube without anti-coagulated substance from each subject for HIV testing using universal precautions (disposable syringes, gloves, cotton, alcohol, bleach, etc.). After separation of cells by centrifuge, 2 ml of sera was transferred to a cryotube for storage and testing. All the specimens were accumulated, processed, and temporarily stored at the district level until the required sample size was reached - if a cold chain was available. Otherwise, specimens had to be stored in coolers and sent to the provincial laboratory within 24 hours for processing. The specimens were picked up by the supervision team and were sent to NCHADS to be rechecked and stored prior to testing. The same code number was marked on the blood tube, cryotube and the data sheet.

Data Management and Analysis

Data were entered into a computerized database using Epi-Info, and analyzed using Stata-7 software package by NCHADS staff.

Timeframe for HSS 2002

The timing of the HSS data collection has shifted slightly each year. HSS 2002 began in November of 2001 but actual data collection did not begin until January of 2002 (see Table 3)

Table 3: Timeframe

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1996												
1997												
1998												
1999												
2000												
2001												
2002												

Methodology for BSS

Between 1997 and 2001 NCHADS conducted four rounds of behavioral surveillance (BSS) among high-risk occupational groups and one round among household males in 2000. The goal of these surveys has been to monitor behaviors that put people at risk for HIV infection on a regular and systematic basis. Cambodia's BSS sentinel groups include police, military, mototaxi drivers, brothel-based direct female sex workers (DFSWs) and indirect female sex workers (IDFSWs) in five provincial capitals (Battambang, Sihanoukville, Kompong Cham, Phnom Penh and Siem Reap). The household male survey was conducted in the same five cities as the BSS, but it also covered some rural areas in those provinces as well.

Both the household survey and the BSS among high risk groups employed random sampling techniques with multi-stage cluster designs. Face-to-face questionnaires were administered by trained staff of the Provincial Health Department with coordination from the Provincial AIDS Offices. Details of the methodologies have been described elsewhere. (Sopheab, Phalkun et al. 2000), (Gorbach, Sopheab et al. 2003)

Gorbach P., Sopheab H., et al. (2003). BSS V: Sexual Behavior among Urban Sentinel Groups, Cambodia 2001. Phnom Penh, National Center for HIV/AIDS, Dermatology and STDs.

Sopheab H., Phalkun M., et al. (2000). Cambodian household male behavioral surveillance survey, IV, 2000. Phnom Penh, Cambodia, National Center for HIV/AIDS, Dermatology and STDs, Ministry of Health, Cambodia.

3 RESULTS

In this section of the report, results from the 2002 round of HIV sero-surveillance are presented along with HIV prevalence trends among sentinel groups since 1997, and selected data from behavioral surveillance and STI prevalence surveys. The latter surveys add to the interpretation of the HSS findings and help with understanding the dynamics underlying changes in the prevalence trends. In addition to the crude HIV prevalence trends from the surveillance system, estimates of the number of HIV-infected adults in Cambodia as well as the national prevalence are provided, along with a detailed description of the methodology used to make these estimates.

Sample sizes and refusal rates

A total of 19,247 specimens were collected in 2002 from 20 provinces compared to 17,991 samples in 2000. The higher number of samples in 2002 was due to over-sampling of the younger ANC women (see Table 4).

Table 4: Sample sizes for 2002

Sample sizes for 2002

Groups	Year 2002
Direct female sex workers	2110
Indirect female sex workers	1232
Policemen	4379
Tuberculosis patients	2358
Antenatal clinic attendees	9168
Total	**19247**

The proportion of refusals for each sentinel group is shown in Table 5. Refusals rates were similar to those in the previous round of HSS for direct female sex workers and indirect female sex workers, but higher in police. The refusal rate was not determined for ANC women in 2000, but only 1.9% of ANC women refused in 2002.

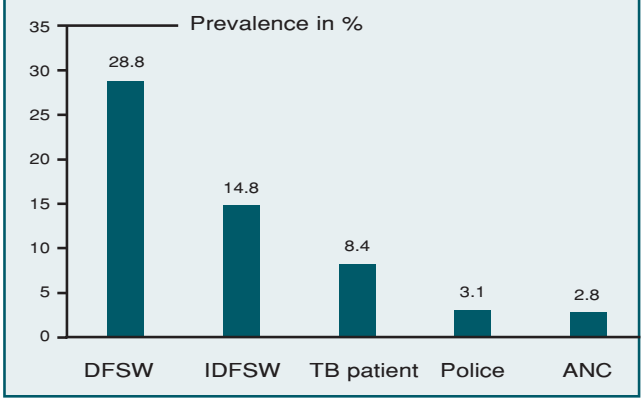
Table 5: Percentage refusal rates

No.	Provinces	DFSW	IDFSW	Police	ANC
1	Banteay Meanchey	2.3	11.8	4.5	1.2
2	Battambang	4.2	11.0	10.5	2.9
3	Kampong Cham	1.5	5.8	2.8	1.5
4	Kampong Chhnang	4.2	29.3	0.0	3.1
5	Kampong Speu	9.8	16.7	13.6	0.0
6	Kampong Thom	6.7	26.4	8.4	0.4
7	Kampot	13.1	37.7	30.9	4.0
8	Kandal	7.4	13.0	11.3	0.0
9	Koh kong	0.0	19.3	34.4	18.5
10	Kratie	5.3	6.3	6.5	2.1
11	Pailin	9.9	36.8	38.4	0.0
12	Phnom Penh	5.8	2.0	1.7	0.6
13	Prey Veng	5.0	8.6	0.0	0.0
14	Pursat	1.4	0.1	5.0	0.4
15	Rattanakiri	16.2	23.1	57.8	0.0
16	Siem Riep	4.8	4.5	2.9	2.5
17	Sihanoukville	0.0	9.0	4.5	0.0
18	Stung Treng	7.1	16.7	31.9	0.0
19	Svay Rieng	0.0	0.0	0.0	3.1
20	Preah Vihear	1.9	0.0	9.8	2.7
	Total	**4.8**	**11.6**	**14.6**	**1.9**

HIV prevalence by sentinel group

Figure 1 shows the crude prevalence in each of the five sentinel populations for 2002. As in the past, direct sex workers have the highest prevalence, followed by indirect sex workers, TB patients and police.

Figure 1: Crude prevalence of HIV among sentinel groups in Cambodia, 2002



HIV trends among direct sex workers

Although there was a marked decrease in prevalence among direct sex workers between 1998 and 1999 the decrease has been only very gradual since then, indicating a possible slow-down in decreased transmission of HIV (see Figure 2). Furthermore, when one disaggregates the data by age and duration of sex work (as shown in Figure 3), one sees that among sex workers who have been selling sex for less than one year, prevalence is quite high (19.7% in sex workers under age 20 and 30.2% in sex workers >= age 20). If infections among women who claim to have sold sex for less than one year can be considered as a proxy for incidence of new infection, then these data suggest that the incidence rate in new sex workers is quite high. Although there may be some under reporting of duration of sex work, it seems clear that HIV incidence among sex workers (especially new sex workers) remains high.

Figure 2: The trend of crude prevalence of HIV among direct sex workers

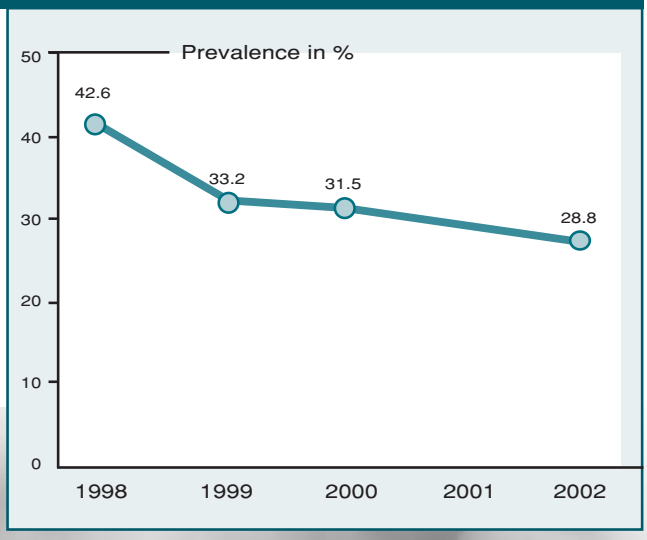
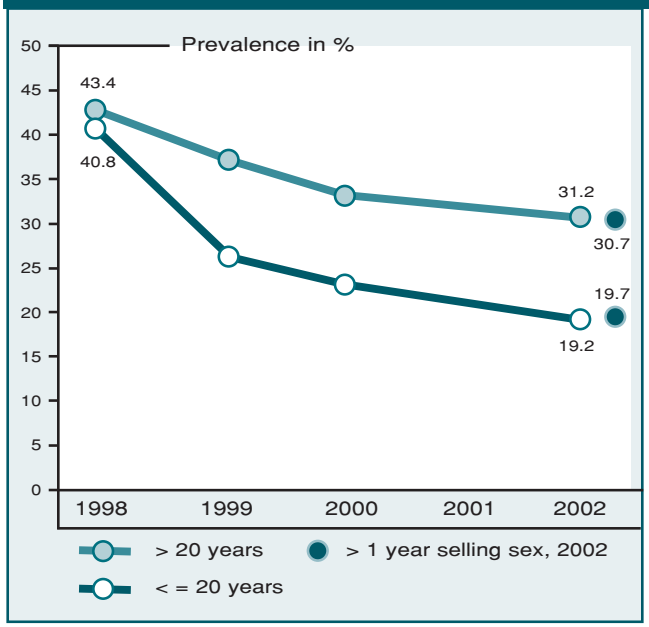


Figure 3: The trend of HIV prevalence among direct sex workers by age and duration of selling sex



HIV trends among indirect sex workers

There has been a gradual decline in HIV prevalence among indirect sex workers from 20% in 1998 to 15% in 2002. As seen in Figure 4 this decline has been much more pronounced in sex workers under the age of 20. The lower prevalence of HIV among indirect sex workers (relative to direct sex workers) is not unexpected, given that they do not all sell sex. The data from BSS V (2001) reveals that only 30% of the beer promoters had sex for money in the past year. This 2001 round of BSS also indicated that not more than 10% of men bought sex from non-brothel-based sex workers. Nonetheless, the fact that prevalence has declined among the younger members of this sub-population is a hopeful sign and reinforces the evidence (which will be discussed later in this report) that increased condom use has led to decreased transmission of HIV during commercial sex transactions.

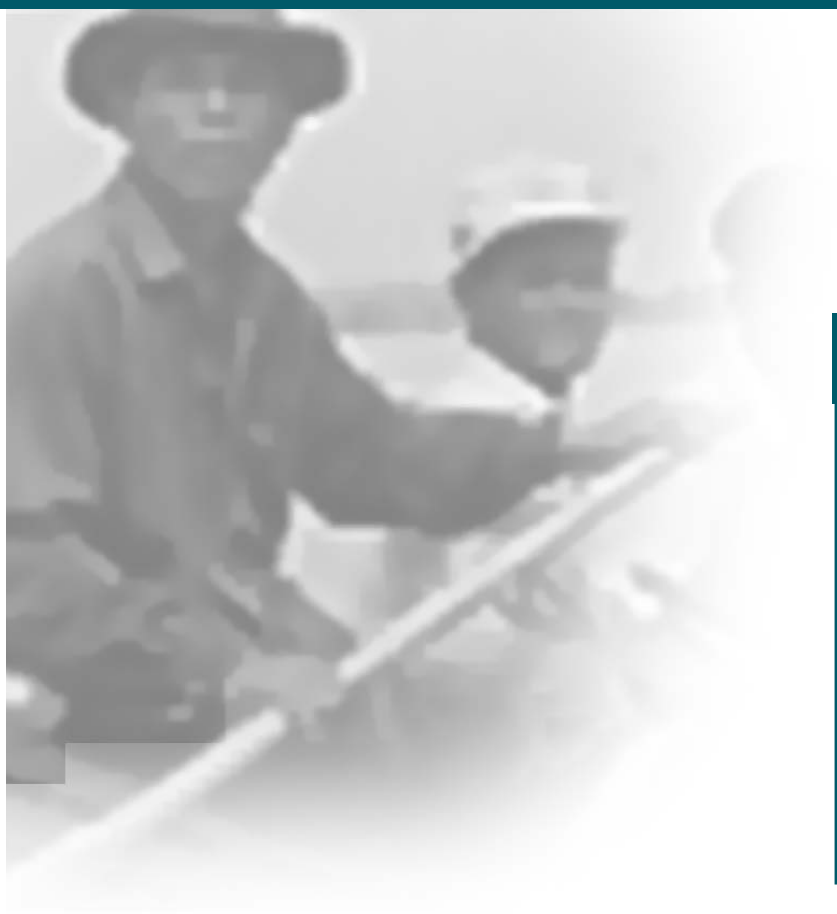
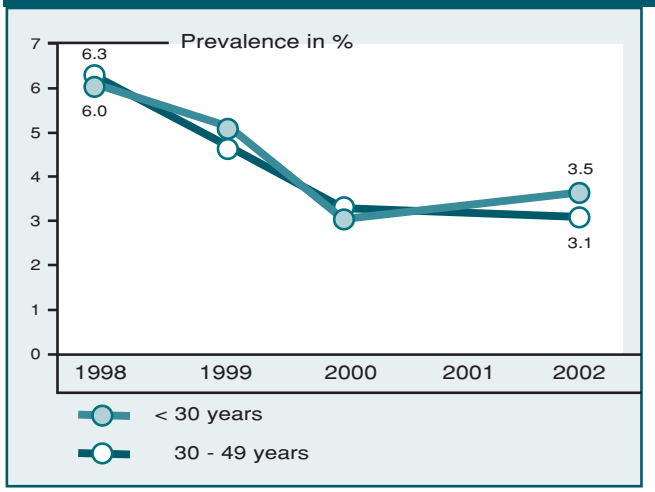


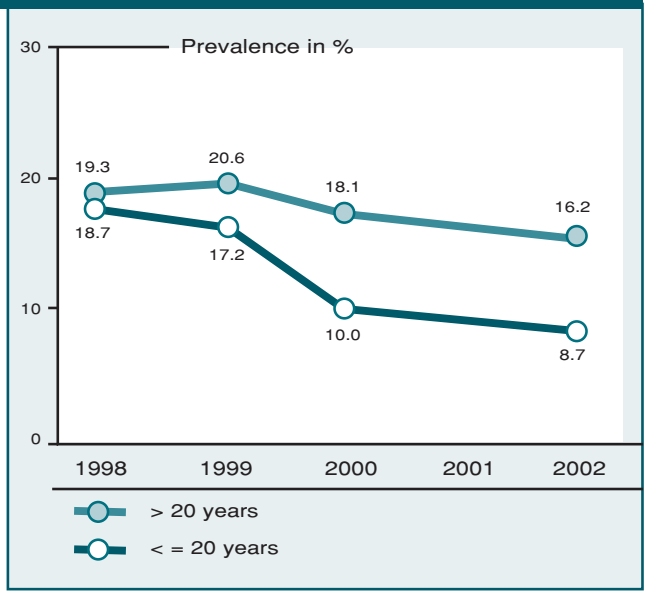
Figure 5: Trends in HIV prevalence among policemen by age group, HSS 1998 - 2002



HIV trends among police

There was an overall drop in HIV prevalence among police between 1998 and 2000, however there were no further declines as of 2002. As seen in Figure 5, this was true for both police under 30 (n=631) and those aged 30-49 (n=3488). The earlier HIV prevalence decline was likely caused by a combination of mortality and decreasing rates of new infection. However, the prevalence trends are difficult to interpret because recruitment of new police has been more or less suspended since 1993 so this is an aging cohort of men. Policemen are the only male sub-population in the Cambodian HIV surveillance system, so it is difficult to draw conclusions from these data alone. However, the drop in HIV among police reinforces the evidence that the prevalence among men in Cambodia is declining, and fits with the behavioral patterns seen in the BSS (see section on behaviors) and with the overall decline in prevalence among males derived from the ANC trends (see section on estimated infections among adult males and females).

Figure 4: HIV prevalence among indirect sex workers by age category

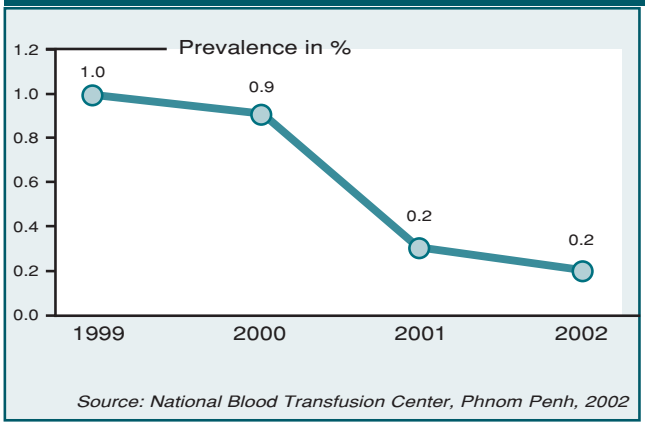


HIV prevalence among blood donors

Further evidence of a drop in new infections among males comes from the blood donor data. Although blood donors are not an HIV sentinel population and they are not representative of the general population, they still provide useful information that concurs with the patterns seen in the HSS system. The data from the National Blood Center represents a mix of self-selected individuals from three identified groups of donors: external donors (youth and Buddhist monks), replacement donors (family of the patient) and spontaneous donors (professional donors). The blood safety program has been continuously expanding since 1991 and will cover the entire country in 2003. The increasing number of provinces covered each year makes the interpretation of the trends in prevalence complicated because some provinces are more exposed to the epidemic than others.

Despite these limitations, the prevalence trend for external male donors aged 18-25 in Phnom Penh provides corroborative evidence of a decline in incidence of HIV among young males, although this may be a "best case scenario" given that this group is considered to be a "low risk" population mainly comprised of monks and youths. The prevalence has declined dramatically in this population since 1999 (see Figure 6). This information is considered to be fairly reliable since the recruitment methodology for external blood donors has not changed over the years and the sample size is large enough to provide a reasonably precise prevalence estimate (n=3152).

Figure 6: HIV prevalence in male voluntary blood donors aged below 25 from Phnom Penh, 1999-2002



Source: National Blood Transfusion Center, Phnom Penh, 2002

HIV prevalence among TB patients

One of the HSS sentinel populations is newly diagnosed TB patients. Although the relationship between HIV and TB is quite complex, it is still useful to examine the prevalence of HIV in this group to gain insights into the burden of disease. The prevalence of HIV is expected to rise in newly diagnosed TB patients as the epidemic advances. This pattern is seen in Figure 7. The dip in prevalence in 2000 is likely to be the result of an expansion of the TB program to the health center level (as opposed to only the reference centers). Since HIV positive patients are more likely to have severe TB, they are also more likely to be referred to the reference centers. This means that more HIV positive patients would have been included in the surveillance system prior to 1999. In 1999 when the system expanded to the health centers, more mild cases of newly diagnosed TB patients who were HIV-negative were probably included into the mix, resulting in a dilution of the overall prevalence and the apparent decline in prevalence between the 1999 and 2000 surveillance rounds. However, the trend continued to rise after 2000 as expected.

HIV prevalence among ANC attendees

Figure 8 shows the crude national prevalence trend among ANC women. The prevalence in this population appears to decline between 1997 and 2000, but then it rises again between 2000 and 2002. Given the long duration of HIV infection, it is not biologically plausible that the true prevalence could rise and fall in this manner. It is more likely that this trend represents a stabilization of HIV prevalence in ANC women. Indeed, if one puts confidence bounds around the data points each year (also see Figure 18 in chapter 3), it can be seen that the data points are consistent with a more or less flat prevalence curve. In the section on estimating the number of adults infected with HIV, a method is described for applying the UNAIDS Estimates and Projection Package (EPP) to the ANC data to help control for the effects of random fluctuations in the crude data. This is very helpful in improving our ability to use these data to interpret the status of the epidemic.

Figure 7: The trend of HIV prevalence among TB patients

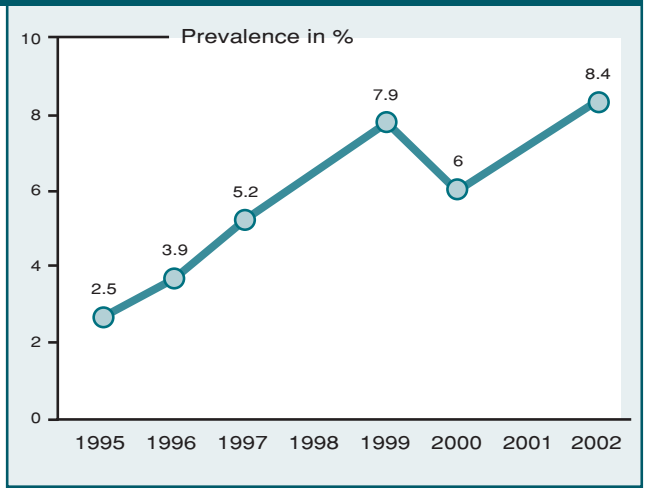
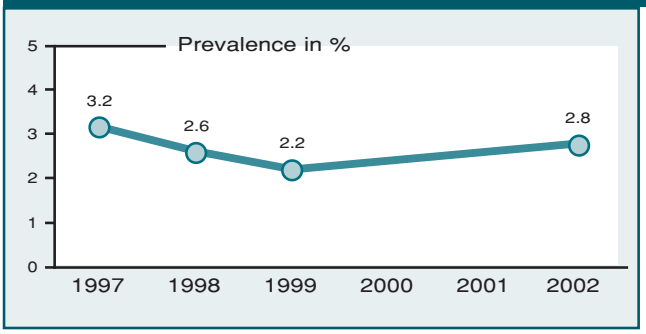


Figure 8: Crude HIV prevalence in ANC, HSS 1997-2002



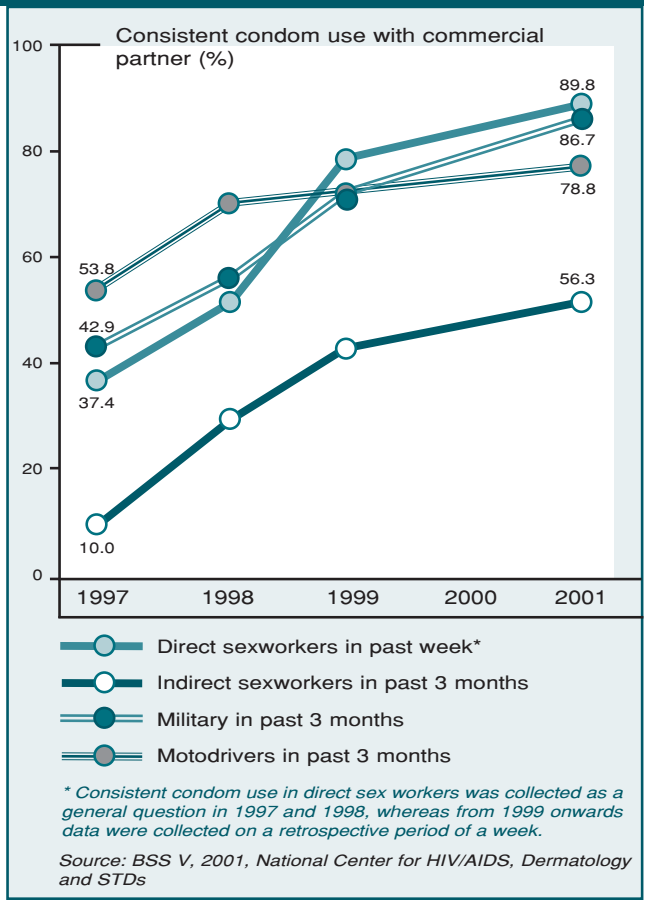
Key behavioral trends

Behavioral surveys can help us monitor the behaviors that are known to fuel or inhibit the spread of HIV, thereby helping us understand the biological trends and validate changes in incidence. In Cambodia, behaviors have been monitored among high-risk sub-populations (direct and indirect female sex workers, and police, military and moto-drivers) since 1997. In addition a household-based behavioral survey of males was conducted in 2000 in selected provinces. These behavioral surveys have helped provide an insight into the dynamics of HIV transmission.

In recent years there has been a nationwide emphasis on preventing HIV transmission through reducing commercial sex encounters among men and increasing condom use with commercial partners. Consistent condom use in commercial sex relationships has been on the rise in Cambodia since surveillance began. HIV prevalence has been decreasing since 1997 in the surveyed high-risk groups and trends in condom use have been on the rise in commercial sex during the same period. In the 2001 round of behavioral surveillance 90% of sex workers reported using condoms consistently with their clients in the last week and 80-85% of military and moto-drivers reported consistent condom use with sex workers in the past three months. Condom use is now widespread among

male clients. Indeed in the household survey of behaviors among males in 2000, 80% of urban men and 70% of rural men had consistently used condoms during their encounters with female sex workers in the three months prior to the interview (Sopheab, Phalkun et al. 2000). Unfortunately consistent condom use is insufficient among indirect sex workers and their clients. Only half of the indirect sex workers reported consistently using condoms with clients (see Figure 9).

Figure 9: Consistent condom use in populations with a commercial sex partner



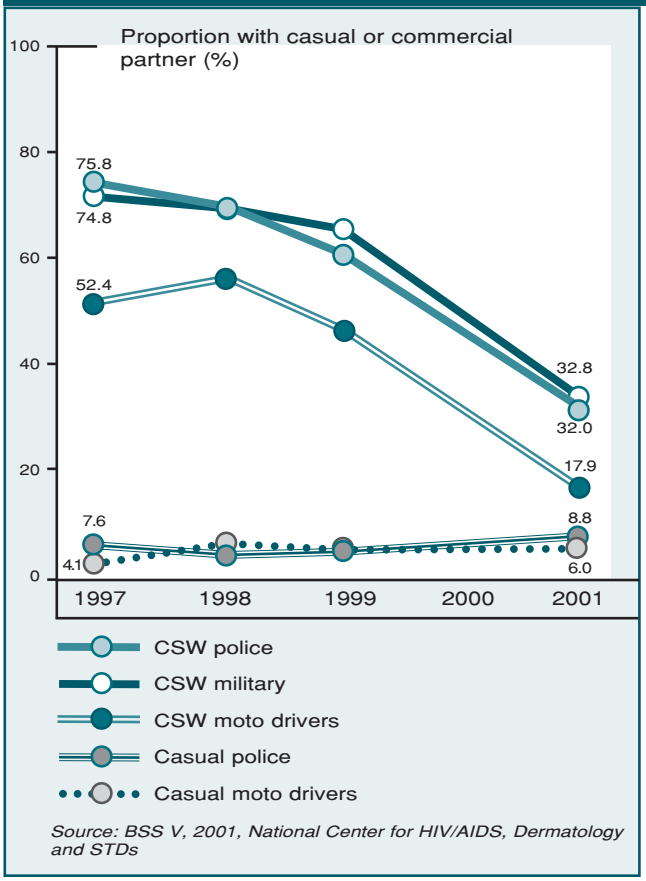
** Consistent condom use in direct sex workers was collected as a general question in 1997 and 1998, whereas from 1999 onwards data were collected on a retrospective period of a week.*

Source: BSS V, 2001, National Center for HIV/AIDS, Dermatology and STDs

While high-risk men are beginning to turn away from commercial partners, sex with sweethearts does not appear to be increasing

In 2000 and 2001 the frequency of visits to sex workers among the male groups surveyed has dropped dramatically. When comparing the results from the 1999 BSS survey with the 2001 survey among high-risk men, 40% fewer men in the uniformed services had visited sex workers in the year prior to the interview (see Figure 10).

Figure 10: Proportion of men with a commercial sex partner in the past 12 months and with non paid non marital partner in the past month, 1997-2001



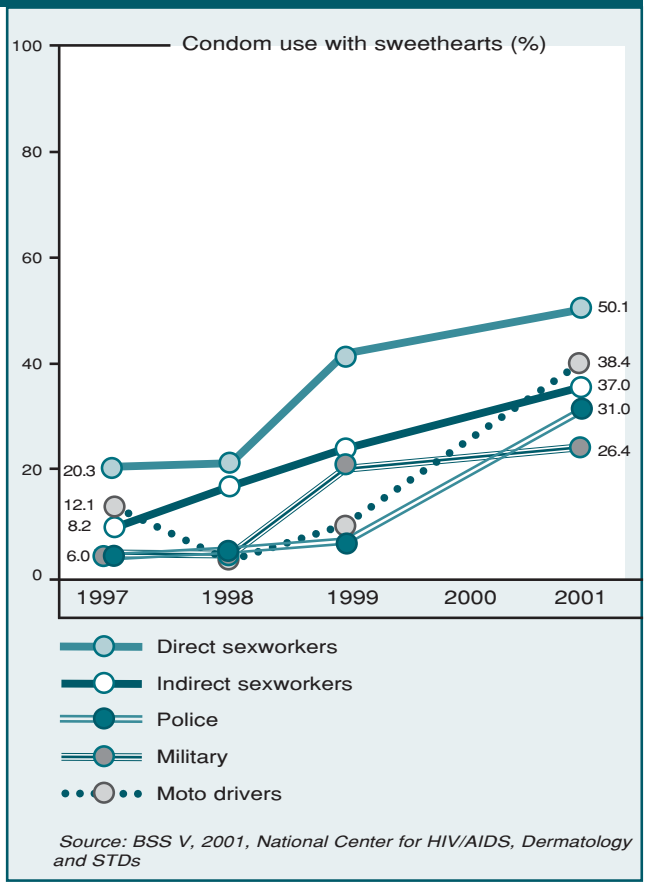
Source: BSS V, 2001, National Center for HIV/AIDS, Dermatology and STDs

There is the potential that such a decrease in the number of men seeking commercial sex (with either direct or indirect sex workers) might generate a group of men looking for casual relationships that they would perceive as presenting less risk. The term for casual partners (other than commercial partners) in Cambodia is "sweetheart". As seen in figure 10, although there has been a decline in commercial sex, there has been no corresponding rise in non paid non marital sex among the sub-populations surveyed.

Condom use among sex workers with sweethearts is increasing but still remains low among higher risk men with a sweetheart

While the message to use condoms with commercial sex partners seems to have resulted in high levels of condom use during commercial sex, condom use with casual partners still remains low. Only half of the brothel based sex workers reported consistently using condoms with their sweethearts, and only one third of the beer promotion girls (who represent a large proportion of the indirect sex workers) reported the same. Sex workers have the highest prevalence of HIV in the country, and 50% of them reported having a sweetheart in the past year, so there are still a substantial number of unprotected high-risk sex encounters (see Figure 11).

Figure 11: Consistent condom use in past 3 months with sweethearts



Source: BSS V, 2001, National Center for HIV/AIDS, Dermatology and STDs

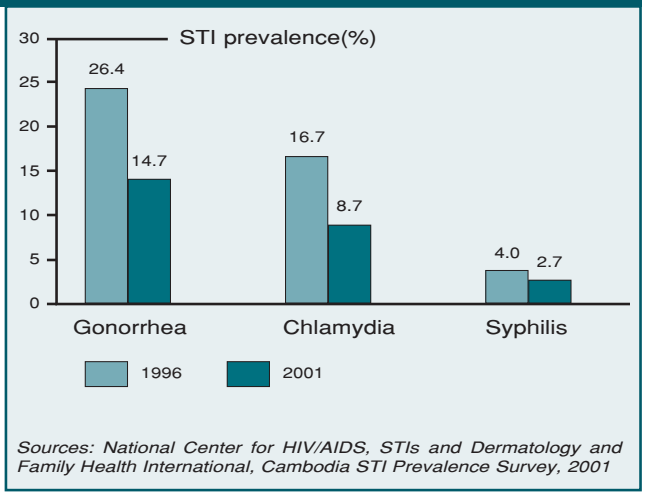
The spread of sexually transmitted infections is being controlled even among high-risk populations.

Studies have shown that STIs are a co-factor for the transmission of HIV, therefore the control of STIs is an important component of a national HIV prevention strategy. In addition, because the duration of bacterial STIs is shorter than the duration of HIV infection, the prevalence of some STIs over time is more sensitive to changes in behaviors than the prevalence of HIV over time.

The available data on STIs in Cambodia indicate that declines in transmission are being seen. While it is difficult to extract STI trend data from existing surveys, an STI prevalence survey (Leng, Wantha et al. 2002) in seven provinces indicated that in 2001 chlamydia remained below 4% in both policemen and women attending reproductive health clinics. Gonorrhea and syphilis were undetected in the same populations. Among the groups sampled in the surveys, the direct sex workers had the highest prevalence of STIs. Nonetheless, given their high level of exposure (10% reported not consistently using condoms with clients, and 50% did not use them with sweethearts), the 2001 survey measured a low 3% prevalence of syphilis and moderate rates of 12% for gonorrhea and 14% for Chlamydia.

Restricting the analysis to Phnom Penh only allows for a comparison of the prevalence levels measured in 1996 and 2001 (Leng, Wantha et al. 2002), which shows a substantial decline in the prevalence of common STIs among women selling sex in Phnom Penh brothels. Although two prevalence points are not sufficient to establish trends, this decrease is likely to result from the joint effect of the reduction of numbers of commercial partners, the increase of condom use in commercial sex, and the increased access to STI treatment facilities (see Figure 12)

Figure 12: Prevalence of STIs among direct sex workers in Phnom Penh, 1996 and 2001



Sources: National Center for HIV/AIDS, STIs and Dermatology and Family Health International, Cambodia STI Prevalence Survey, 2001

Estimating the number of adults living with HIV in Cambodia

In addition to showing the trends in HIV among the various high-risk groups and the population at-large in Cambodia, surveillance data can be used to estimate the number of adults in the population living with HIV. It can also help to understand how that number changes over time and the underlying dynamics behind those changes. Although the surveillance system is not designed to directly measure the actual number of people living with HIV in the country, surveillance data can be used to make a reasonable approximation. In a country like Cambodia where the prevalence among the population is more than 1%, the data from the ANC women are especially useful for that purpose.

How were national estimates made in the past?

The data from ANC women have been used to estimate the total number of people infected with HIV in Cambodia for several years. In the past, this was done with a spreadsheet using the following steps:

- Multiply the prevalence of HIV among ANC women in each province by the population of women aged 15-49 in the province
- Total up the numbers across all the provinces to get a national estimate of HIV among women aged 15-49 and
- Apply a ratio of infected males to females aged 15-49 to the female estimate and apply to the population of males age 15-49 to come up with a national estimate for males aged 15-49.

This method assumed that the bulk of infections were among 15-49 year olds, and that the relative contribution of higher-risk populations (such as sex workers) was minor relative to the total number of people living with HIV. Although this method gave fairly good estimates, it had several limitations, including the following:

Limitations of previous methodology:

- It produced inflated national estimates because it applied the rates among pregnant women to all women, even though we know that pregnant women are more likely to be infected than other women (especially single women). This is because they are more likely to be sexually active and therefore more likely to be exposed to HIV.
- At the provincial level, it produced unstable trend lines with many large random fluctuations due to the small sample sizes in the individual provinces.
- At the national level it produced more stable trend lines, however even these were subject to random fluctuations which were not reflective of the actual situation, leading to a risk of drawing false conclusions about the state of the epidemic.
- When attempts were made to weight the national estimate according to the sizes of the provinces, the largest provinces tended drive the

estimates upward or downward, thereby greatly exaggerating the effect of the random fluctuations in the provincial level data in the bigger provinces.

- Finally, although a new estimate of current infections was being produced each year, it was difficult to interpret the trend in those estimates because of the lack of information about the dynamics underlying it. As epidemics mature, people start to die of HIV. This will eventually cause a decrease in the overall number of people infected. However, as long as there are more new people becoming infected each year than there are people dying, the number of current infections will not decrease. And even when it does decrease, it is difficult to know whether this is because people are dying, or because there are fewer people becoming infected. In order to truly understand what is happening, it is important to determine how trends in the number of current infections are related to trends in both the number of new infections and in the number of deaths.

Improvements in the methodology for making estimates in 2002

In 2002 the national surveillance team changed its method of making the estimate of people living with HIV to take advantage of the availability of new and improved tools. The team began using the UNAIDS/WHO Estimation and Projection Package (EPP) to help produce more stable provincial estimates from year to year. These estimates were based on the sentinel surveillance data at the provincial level. However, a new method of applying those data to the population-at-large was used.

How was the estimate of the number of people living with HIV in 2002 produced?

The method for calculating the number of people infected with HIV was a multi-step process which is described in the next several pages of this report. The steps are summarized in Table 6.

Table 6:
Summary of steps for calculating the number of people currently living with HIV

1. EPP is used in each province to obtain a smoothed prevalence curve for females age 15-49 in that province using the ANC data
2. The prevalence for 2002 is extracted from the smoothed prevalence curve and multiplied by the population of females aged 15-49 in that province to find the estimated number of infected females in that province
3. This is done for each province and then the estimated numbers from each province are summed to obtain the national estimated number of infected females
4. That number is adjusted to account for the difference between ANC women and general population women
5. The adjusted number is divided by the total population of females aged 15-49 to obtain the national estimated prevalence in females
6. The male/female sex ratio is applied to the national estimated prevalence among females to obtain the estimated prevalence among males
7. The estimated prevalence among males is multiplied by the population of males aged 15-49 to obtain the estimated number of infected males
8. The estimated number of infected males is added to the estimated number of infected females to obtain the estimated total number of infected people aged 15-49
9. The estimated total number of infected people aged 15-49 is divided by the total population aged 15-49 to obtain the national prevalence

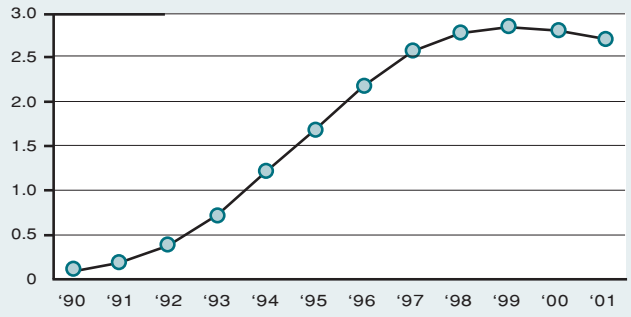
Step I: Calculating the number of women currently living with HIV

In Cambodia, antenatal clinic (ANC) data is collected in most provinces, providing one of the few windows on HIV infection in the general population. The basic procedure for using the ANC data is as follows:

- In each province the data are smoothed to produce stable provincial HIV prevalence trends. Smoothing is done by fitting a curve to the observed provincial ANC data points over time using the EPP package. This procedure allows the provincial situation to be determined by several years of surveillance data rather than just one year and reduces the effect of annual fluctuations in the raw data on the provincial estimates.
- For each year, a crude number of adult females living with HIV is calculated for each province by multiplying the smoothed prevalence in ANC women for that year by the number of adult women aged 15-49 in that province. The provincial values are summed to form a national figure. The national figure is divided by the total population of women aged 15-49 to provide a prevalence figure for women.
- An adjustment is made to account for the fact that ANC women do not represent all women. In particular prevalence among ANC women is likely to overestimate the prevalence in the population of women-at-large, since not all women are sexually active. (This procedure is described in more detail in Appendix-I).

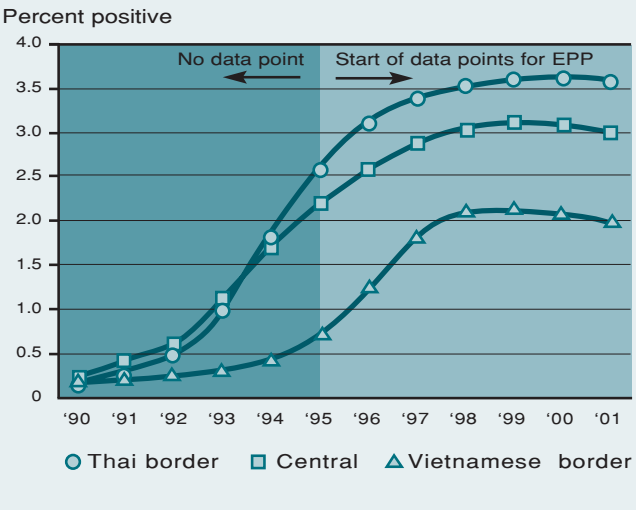
The national ANC prevalence levels obtained from this process are shown in Figure 13. It illustrates that overall prevalence among pregnant women in the country is more or less stable, having peaked in about 1999, and it is declining only very slowly.

Figure 13: Smoothed antenatal clinic HIV prevalence rates on a national basis, 1990-2001 based on calculations from the UNAIDS EPP model



In addition, an examination of regional variations in the ANC rate, made by aggregating the individual provincial estimates in each region and shown in Figure 14, demonstrates that the epidemic began somewhat earlier and rose to higher levels in the parts of the country neighboring Thailand and in the center of the country than in the provinces bordering Vietnam. This is consistent with the observed regional epidemiological trends in Cambodia. (See appendix 3: Surveillance Regions Map)

Figure 14: HIV prevalence growth in different regions of the country based on smoothed ANC data summed over provinces in the region - based on calculations from the UNAIDS EPP model

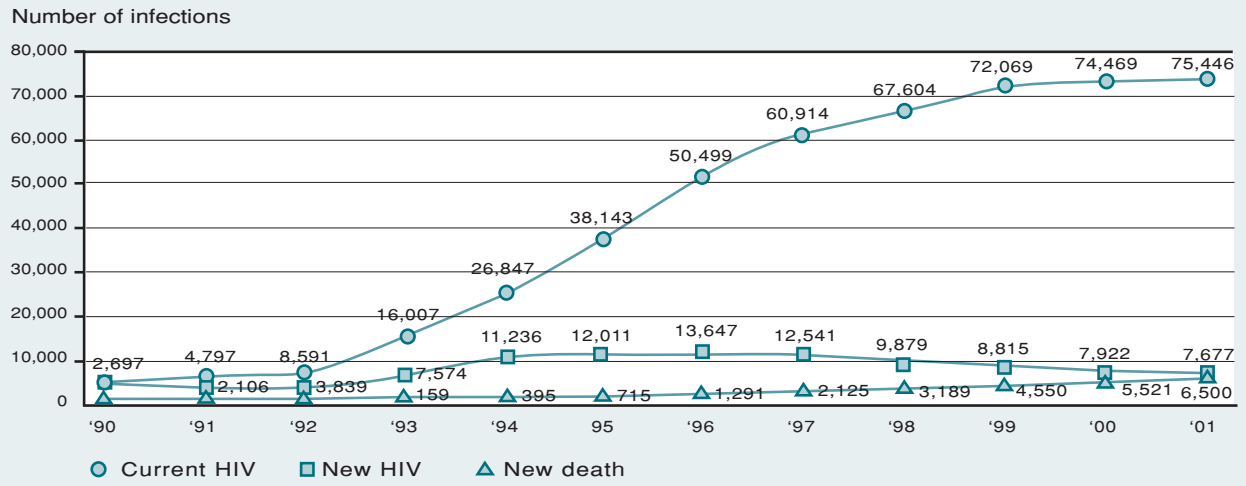


The procedure outlined above produces the trends in the number of adult women living with HIV as shown in Figure 15. The number has grown steadily from less than 3,000 in 1990 to over 75,000 in 2001. While the antenatal clinic prevalence in Figure 15 is declining slightly at present, the absolute number of women living with HIV is still increasing at the present time because the population itself is growing.

Once the number of women living with HIV over time is known, the survival time from HIV infection to death can be applied to these data to estimate both the number of deaths and the number of new infections. The fast UNAIDS progression from HIV to death (as used in the 1999 round of global estimates) has a median survival time of roughly 9 years and was applied to calculate the number of new infections and deaths among adult women in Cambodia. This is in agreement with internationally accepted practice - the UNAIDS Reference Group on Estimates, Modeling and Projections has reviewed developing country survival cohorts and recommends the use of a 9 year survival in developing country situations (The UNAIDS Reference group on Estimates 2002). The resulting annual new infections and deaths are shown in the lower two lines in Figure 15.

The number of new infections annually in adult women grew rapidly in the early 1990s peaking at approximately 13,600 women a year in 1996. New infections among women then began to decline slowly dropping to approximately 7,500 in 2001. In the meantime, mortality has been climbing as the women infected earlier in the epidemic are now developing illness and dying. The number of women dying annually of HIV-related causes has steadily grown from less than 500 in 1994 to 6,500 in 2001. Comparing the two curves, one can see that the relatively stable prevalence among women at present is the result of roughly equal numbers of new infections and deaths.

Figure 15: Number of adult women currently living with HIV in Cambodia (current HIV), new HIV infections in adult women each year (new HIV), and deaths in adult women associated with HIV/AIDS (new death)



Step 2: Calculating the number of men currently living with HIV

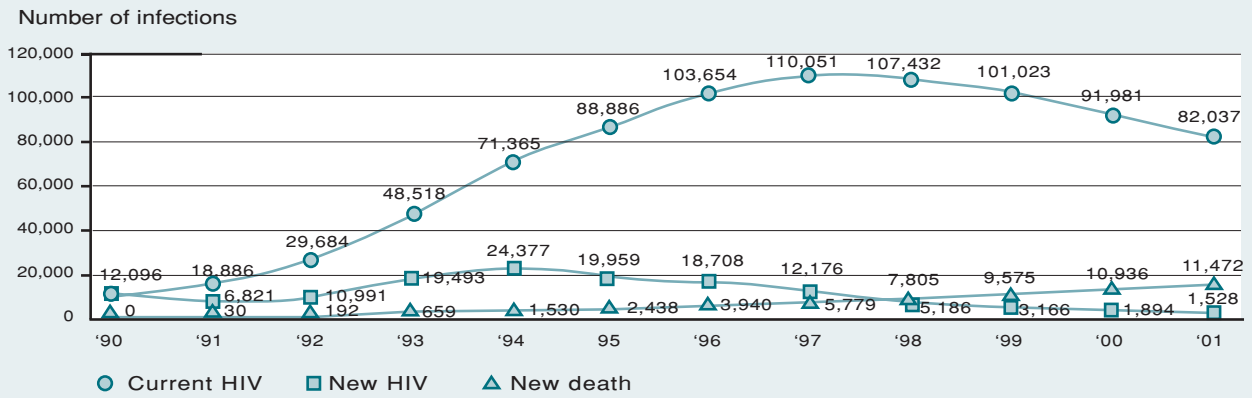
Unfortunately, no surveillance data directly examine prevalence levels in general population males, so an indirect approach must be used to estimate it. One possible approach is to use information about the ratio of infected males to females to estimate the number of infected males. If this ratio can be ascertained, HIV prevalence in men can be approximated by multiplying the national HIV prevalence in women by this ratio. However, this ratio is not constant over time, especially in an epidemic such as Cambodia's. The early phases of the epidemic in the country were largely driven by infections occurring in sex work, and from experiences in other countries such epidemics follow a clear pattern. In the early stages many more male clients of sex workers are infected than sex workers themselves, yielding a fairly high male to female ratio of HIV in the population. However, over time many of these clients transmit HIV to their wives, bringing the male to female ratio closer and closer to 1.0. This ratio declines both because more women become infected and because the men, who were infected much earlier than most of the women, begin to die much sooner than the women, reducing the number of men living with HIV more quickly.

Fortunately, data on HIV in TB patients, shown in Table 7, has been collected by gender and this provides some evidence about the changes in the male to female ratio over time in Cambodia. A declining exponential function was fit to these data using the solver in Microsoft Excel. This fit was used to provide values for the male to female ratio for each year. These ratios were then multiplied by national female prevalence in the corresponding year to obtain the national male prevalence over time. Multiplying this male prevalence by the number of 15-49 year old males gives the number of men living with HIV over time. This is shown in Figure 16. This figure shows that the prevalence among men is already declining (having peaked in about 1997), and that the decline is the result of both a steady increase in the number of HIV-related deaths and a substantial decrease in the number of new infections.

Table 7: Male to female ratio of infections among tuberculosis patients from Cambodian HIV surveillance system used to estimate male to female ratio of HIV prevalence

Year	Male to female ratio of HIV
1995	2.6
1997	2.2
1999	1.6
2000	1.5
2002	1.1

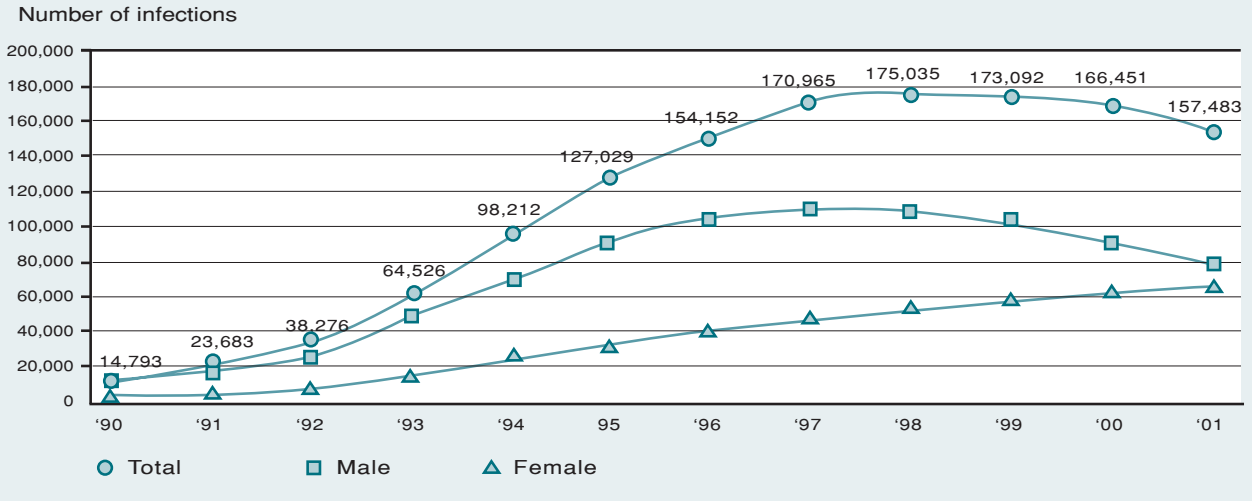
Figure 16: Number of adult men currently living with HIV in Cambodia (current HIV), new HIV infections in adult men each year (new HIV), and deaths in adult men associated with HIV/AIDS (new death)



Step 3: Calculating the number of adults currently living with HIV

The total number of current infections in a given year is then calculated by summing current male and female infections for that year. The result is shown in Figure 17. This figure shows that the overall number of current adult HIV infections in the country is approximately 157,000, and that that number is slowing declining after having peaked at approximately 175,000 in the late 1990s. The estimated 157,000 adult living with HIV represents a HIV prevalence rate of 2.6% among Cambodian aged 15 to 49 in 2001.

Figure 17: Total number of adults currently living with HIV in Cambodia, calculated by summing adult males and females living with HIV



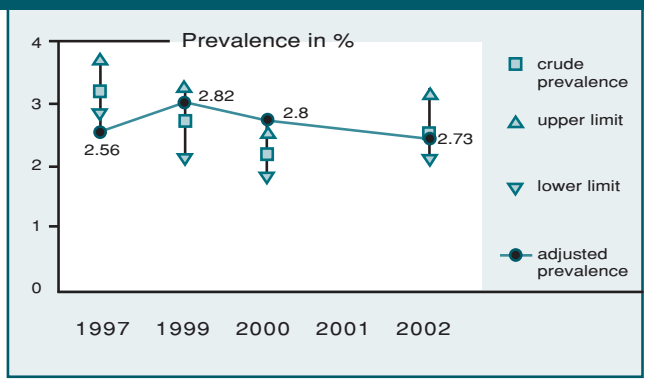
Step 4: Validating the estimates and interpreting the trends seen

Some may have concerns that models have been used in making these estimates and calculating the trends over time. Thus, it is important to validate that the current and new infection curves presented here are consistent with the observed trends in epidemiology and behavior as documented in the HIV and behavioral surveillance systems and with our understanding of the Cambodian epidemic and its driving forces.

The first validation to be made is a comparison of the national HIV prevalence trends in ANC women obtained from combining the summed provincial curve fits with the actual national level surveillance data. This must be done with appropriate attention to the margins of error associated with the raw data.

Figure 18 shows the results of just such a comparison. The raw surveillance values and their likely error range (from lower limit to upper limit for each point) are shown along with the values coming from the national ANC prevalence calculated earlier from the provincial fits. The values generated by the summed provincial fits fall within the margin of error for the raw data points, increasing our confidence that they are realistic.

Figure 18: Crude and adjusted ANC prevalence by year (1997-2002)



In addition, the trend line generated from the summed EPP fits produces a smooth curve that is consistent with what we know of the epidemiological evolution of HIV epidemics - prevalence does not and cannot change rapidly as it is the product of both recent infections and infections in the distant past. Thus the rapid decreases and subsequent increases seen in the raw data are not epidemiologically plausible on a population basis; they are much more likely reflective of statistical fluctuations in the data, as the error bars show.

The calculation for males is based upon looking at the changes in the male to female ratio over time. This ratio shows the type of steady and consistent decline we expect in an epidemic largely driven by sex work, which the Cambodian epidemic is. This declining ratio, coupled with more or less stable female prevalence, implies that the male prevalence must be falling over the last several years after a peak in the mid-1990s. This peak in 1997 and subsequent decline is clear in Figure 16.

There is no direct source of HIV prevalence data among men against which the curves can be compared. However, most male infections in Cambodia result from visits to sex workers. This means that behavioral surveillance data on the percentage of men visiting sex workers and the levels of condom use between sex workers and clients can be used indirectly to determine if the decline in new infections in males is consistent with what has been happening. As can be seen in Figure 16, in 1996, the first year where we have behavioral data, there were approximately 18,700 new infections in males. This number had declined to 1,500 by the year 2001. This is a 12-fold reduction in the number of men becoming infected each year.

Most male infections in Cambodia occur through unprotected contacts with direct sex workers. Thus, the number of new infections should be directly proportional to the number of unprotected sexual contacts occurring with direct sex workers with HIV. The number of unprotected sexual contacts with HIV+ sex workers is in turn proportional to the percentage of contacts in which a condom is not used and to the number of men visiting sex workers. Behavioral data from the surveillance system tells us that condom use between direct sex workers and their clients at last contact went from 72.7% (in the STD survey in 1996) to 95.7% (in the STD survey in 2001). That is, the percentage of contacts in which a condom was not used went from 27.3% to 4.3%, a 6-fold reduction. Thus, increases in condom use alone should reduce HIV incidence by a factor of 6.

The other major factor operating to reduce incidence in Cambodia has been a reduction of the number of men visiting sex workers. If one examines behavioral surveillance data for police and military, the fraction of men visiting sex workers fell from 75% in 1997 to roughly 32% in 2001. Thus the number of men involved in risky contacts fell by roughly a factor of 2 over the time frame in question, which will reduce incidence by another factor of two. The combination of these two factors (increased condom use and decreased number of men visiting sex workers), as determined from behavioral surveillance data, would be expected to produce roughly a 12-fold decrease in new HIV infections. This is in excellent agreement with what the estimates here show.

Understanding trends in new infections and prevalence in Cambodia

This simple analysis, in combination with the trends in new infections in men and women as calculated here and available epidemiological and behavioral surveillance data, allows us to interpret what we are seeing in Figure 15 and Figure 16 (page 18 and 20).

The Cambodian epidemic began in the late 1980s when clients introduced HIV to sex workers in the country, which then led to a large number of both sex workers and clients becoming infected. Through the early 1990s, the number of men becoming infected every year grew rapidly, reaching 24,000 men a year in 1994, as prevalence among sex workers grew to almost 40% by 1994. Fortunately, as several studies around Phnom Penh show, condom use was already rising at this time and the increases in condom use quickly turned around the growth in new infections. By the time behavioral surveillance was started in 1996, 73% of direct sex workers were already reporting using condoms during their last sexual contact. As condom use continued to increase, new infections among males continued to fall. In the late 1990s, widespread awareness of the HIV epidemic also resulted in a rapid reduction in the number of men visiting sex workers. As outlined above only half as many men in the behavioral surveillance populations in 2001 reported visiting sex workers in the last year when compared to 1997. The combined effect of increased condom use and fewer clients rapidly drove down incidence in men, as seen in Figure 16 (page 20).

For women, however, the situation was quite different. Most women in Cambodia were infected by their husbands, who were current or past clients of sex workers. But transmission from husband to wife takes time, so even once a man is infected it may be a few years before he transmits HIV to his wife. Thus in 1991 and 1992, the ratio of male to female infections was high, almost 4 to 1, as a large number of clients became infected. But these men did not infect their wives immediately, the process took time; and as more

of these men infected their wives over time, the male-female ratio declined steadily, reaching 2 in 1996 and 1.1 by 2002.

But because most female infections are from husband to wife, and condom use is not common between husbands and wives in Cambodia, the number of annual new infections in women (shown in Figure 15, page 18) has not declined anywhere near as rapidly as new infections in men (Figure 16, page 20). Many of the men infected through sex work have not yet transmitted to their wives, but the couples are not using condoms and transmission continues. As a result as of 2001, new infections among women are estimated at 7,500 per year, 5 times as high as the new infections among men. Thus, the patterns seen for men and women in the data here are perfectly consistent with our understanding of the evolution of epidemics in countries where sex work has played a major role in driving transmission and with the behavioral data available in the country. They also point to the importance of sustaining programs to keep HIV transmission in sex work low while simultaneously expanding programs to protect married women in discordant couples from HIV infection.

However, despite the promising news on reductions in new infections among men and women in Cambodia presented in this section, it is essential not to become complacent. The male new and current HIV infection numbers presented here are based upon ANC prevalence rates. They are more likely to give an accurate picture of new infection trends among males in the more distant past than recently. This is because those earlier infections have been accumulating over time and are therefore having a large impact on current prevalence. In addition, infections in ANC women usually occur several years after their male partners first became infected. Therefore this approach will not detect any recent rise in HIV infections among men since these infections will not yet have been transmitted to their wives and thus will not be visible at all in ANC data. It is critical that close attention be paid in surveillance systems and analysis of new data collected to any indications of increases in prevalence among any male population in Cambodia or for changes in behavior that may indicate increased risk of exposure to HIV. With close to 3% of the adult male population living with HIV in 2002, the potential for resurgence of the epidemic should preventive behaviors start to fall is very real and potentially devastating for the country.

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Gorbach P., Sopheab H., et al. (2003). BSS V: Sexual Behavior among Urban Sentinel Groups, Cambodia 2001. Phnom Penh, National Center for HIV/AIDS, Dermatology and STDs.

Leng, H. B., Wantha S. S., et al. (2002). Low Prevalence of Sexually Transmitted Infections in Cambodia Supports Recent Behavioral and HIV seroprevalence Trends: 2001 Cambodia STI Prevalence Survey. Phnom Penh, NCHADS, FHI.

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Sopheab H., Phalkun M., et al. (2000). Cambodian household male behavioral surveillance survey, IV, 2000. Phnom Penh, Cambodia, National Center for HIV/AIDS, Dermatology and STDs, Ministry of Health, Cambodia.

The UNAIDS Reference group on Estimates, Modeling and Projections. (2002). "Improved methods and assumptions for estimation of the HIV/AIDS epidemic and its impact: recommendations of the UNAIDS Reference Group on Estimates, Modeling and Projections." AIDS 16: W1-W14.

4 Discussion and Conclusions

The good news - cause for cautious optimism

In recent years there has been cause for cautious optimism in Cambodia because of the indications from the surveillance system that the HIV epidemic is slowing down. The prevalence of HIV has leveled off or declined since 1997 in all surveillance populations (except TB patients), and great strides have been made in reducing risk behaviors that drive the spread of HIV. The decline in prevalence among adult males in Cambodia derived from the HSS data (and supported by the blood donor data) is partially due to HIV related deaths. However, the estimated number of new infections per year among males has also declined dramatically (from an estimated high of 24,000 in 1994 to approximately 1,500 in 2001). This provides strong evidence that prevention measures resulting in reduced levels of commercial sex (the main engine of HIV spread in Cambodia) and increased condom use during commercial sex transactions have had an impact on the epidemic. The reduction in new infections among males (primarily clients of sex workers) is beginning to translate into similar reductions among the female partners of these men, as evidenced by the flattening HIV prevalence curve among ANC women. Estimated new infections in women are running about 7,500 per year now (down from a high of 13,500 in 1996). Although these levels of infection are still far too high, the good news is that they are declining slowly.

The bad news - continued high incidence of infection among female sex workers

The bad news is that despite declines in prevalence among sex workers, the incidence of new infections among sex workers is still very high. The prevalence of HIV among sex workers who report selling sex for less than one year is 29%, suggesting that the majority of these infections are likely to be recent. The pattern of continued high incidence in sex workers may seem surprising considering the decline in new infections among their clients. However, high rates of condom use can be expected to be more protective for clients of sex workers than for the women themselves. This is because despite condoms being used in the majority of commercial sex acts, individual sex workers, on average, have far more unprotected sex acts than their male partners, making them highly vulnerable to HIV infection. The current levels of new infections among sex workers are unacceptably high indicating that current prevention efforts among sex workers and their clients, while having made some headway are not yet sufficient.

Other bad news - continued high levels of husband to wife and parent to child transmission

The high incidence of HIV among sex workers means that the potential for a new wave of infections among clients of sex workers is a very real danger, especially if current levels of condom use are not sustained. Although the estimated number of infected males and females is almost equal now, husband to wife transmission is still a major area of concern, with approximately 7,500 new infections per year among females. If the number of males becoming infected through commercial sex starts to rise again, the situation will become even worse. Given that an estimated 75,000 women are thought to be currently living with HIV, maternal-to-child transmission can be expected to rise. Therefore prevention of husband to wife and maternal to child transmission will be critical.

Limitations

Lack of male sentinel populations

A weakness of the surveillance system in Cambodia is the lack of direct measures of HIV prevalence among males other than police. Given

the difficulties posed in interpreting the police data (described above), the only way to estimate HIV infection among males in the population at large is to make indirect estimates based on ANC data (which is already indirect information on prevalence in the population at large). Although the estimates that were made in 2002 make epidemiologic sense given what is known about changes in behavioral patterns (lower levels of commercial sex and high condom use), in the event that levels of men buying sex start to rise again or condom use falls off, any resulting increases in HIV infection among clients will not be reflected for several years in the surveillance data until ANC levels start to rise again. This is several years too late! The only data currently available to track changes in male risk are from the behavioral surveillance system. A better and more immediate source of HIV prevalence data among males would help to rectify this situation.

Refusal rates

The HSS system in Cambodia relies on participation of sentinel group members. The system does not use an unlinked anonymous testing system (where the blood specimens are collected for other purposes and then tested for HIV). Each person who provides a blood sample for HSS does so with the knowledge that their blood will be tested for HIV, and with the knowledge that the results of the test will not be available to them. They are also informed that all identifiers will be removed so that the results of the test can never be linked to them. The degree of participation bias caused by this system is not known. What is known is that refusal rates range from a high of 14% in police to a low of 1.9% among ANC women. This is of concern, especially for police, because this is a population with low turnover which has been part of the HSS system for many years. If men who know they are HIV positive are less likely to participate than those who are not, then the overall prevalence among this group could be underestimated. In addition, the fact that police are more or less a "closed cohort" since recruitment of new police has been minimal over the last several years makes interpretation of the trend data problematic. It is difficult to say how much of the declining prevalence is due to mortality or drop-out of HIV positive men from the police force as opposed to decreasing numbers of new infections.

Representativeness of ANC women

Sentinel surveillance systems are designed to track trends of HIV at sentinel sites, but the sentinel populations are never fully representative of the population-at-large. Although ANC women are considered to be the best proxy available for prevalence among women in general, it is not known to what degree the ANC population over- or under-represents the prevalence of HIV in women in Cambodia. For this reason, careful consideration must be given to how ANC data is applied to the population at large for the purpose of estimating the number of HIV infected people in Cambodia.

Lack of information on the ratio of infected males to females

Given the lack of data on males in the HSS, the system is heavily reliant on assumptions about the ratio of infected males to females for making national estimates. Currently, the sources of information used to set the value for this ratio come primarily from reported AIDS cases, blood donors, TB cases, hospital in-patients and the International Organization of Migration (IOM). In the past it has been difficult to obtain gender specific data from these sources, making the accuracy of the information used to make the national estimates less than optimal.

Quality control

Although the HIV surveillance system is fairly robust because of the large samples sizes at the national level, there are still many potential sources of error. Among the key ones are sampling error, participation bias, field supervision, handling of specimens and quality control in the lab. It is not possible for the NCHADS surveillance staff at the national level to supervise data collection in all the provinces at all times. Therefore some of the problems occurring at the provincial level might go undocumented. In addition, for the 2002 round, there was no quality control by a reference lab, as there had been in 2000, so any problems happening at the central lab would not have been detected. The capacity at NCHADS should continue to be expanded if the quality of the surveillance system is to be sustained. Given the high prevalence in the country, a resurgence of high levels of HIV incidence could occur quickly, thus maintaining a strong surveillance system is a high priority.

Programmatic implications

- Approximately one quarter of women selling sex are becoming infected with HIV within the first year of selling sex. Intensive efforts are needed to reduce the risk of HIV infection among sex workers, including better condom promotion efforts for clients and sex workers and expanded STD treatment services, and providing young women alternatives to entering sex work.
- A large number of general population women (estimated to be 7,500 per year) are becoming infected with HIV, primarily by their husbands. Intensive efforts to prevent husband to wife transmission are also needed. Such programs need to reach male clients of sex workers and their regular female partners and sweethearts. These might include, e.g., voluntary premarital screening by couples and expanded access and encouragement for VCT in primary health or contraceptive settings for both men and women at-risk.
- Special attention should be given to younger women (aged below 25) because their prevalence is quite high (according to the ANC data it is 3.1%), indicating recent infection in younger women.
- Approximately 75,000 women of child-bearing age are currently living with HIV. Those who become pregnant are at risk of transmitting HIV to their children. Therefore programs for prevention of maternal to child transmission are urgently needed.
- Current intervention programs should be evaluated for their effectiveness. These include the 100% condom use, condom social marketing, peer education and outreach, STI case management and VCT programs
- The health care system needs to prepare for an increasing number HIV-infected people requiring care. According to current projections, there will be between 7,000 and 11,000 new cases of HIV a year over the next five years.
- TB prophylaxis among HIV patients to prevent or delay onset of AIDS should be scaled up.

Surveillance recommendations

The recommendations for improving the surveillance system in Cambodia fall roughly into four categories, those related to 1) collecting better quality data that is relevant to the Cambodian epidemic, 2) strengthening the ability to analyze the data, 3) improving the estimation process, 4) making better use of the data, and 5) expanding the capacity of the central surveillance staff.

Data collection

- The HIV surveillance advisory committee (SAC) should be set-up and participate in

making decisions, acting on recommendations, and coordinating the surveillance partners.

- The SAC should consider ways to get better data on males. Some ways to do that might include 1) collecting data at the household level on males every 3-5 years, e.g. as part of a DHS survey, and 2) make better use of blood donor data by disaggregating it by blood donor category, age and province over time and keeping track of any changes in recruitment procedures.
- The SAC should encourage ad hoc investigation of other sub-populations which may play a role in HIV spread in Cambodia (e.g. populations with high levels of infection or who are at high risk of infection based on their behaviors, and who are large enough to play a role in the epidemic). For example, men who have sex with men and intravenous drug users.
- A behavioral and biological national household survey should be conducted every 3-5 years. This might be best done in the context of a large-scale health survey so that bloods could be gathered and tested in an unlinked, anonymous way for HIV. The data from such a survey are urgently needed since such a survey for the whole country has never been conducted. This has been a recommendation for several years running.
- Although the DHS indicates that most single women are not sexually active, this situation should be monitored for change and validated with qualitative studies.
- More supervision is needed during data collection.
- More timely collection and processing of surveillance data are needed. This issue cannot be addressed properly unless more human resources are made available to do the work.
- Quality control procedures for field work and the laboratory component of the system need to be strengthened.

Data analysis

- More timely and better support for analysis of surveillance data is needed.
- Adequate time and resources (both human and financial) need to be mobilized for proper analysis of surveillance data.
- The projections done in 2000 need to be updated with the new data.
- Better documentation of the programmatic response is needed in terms of level and intensity of effort. These are necessary for interpreting current surveillance trends and helping determine whether current efforts are adequate.

Improving estimates

- Better documentation of the ratio of infected males to females from several data sources is needed to improve the estimation process.
- Implementation of calibration studies to characterize differences between ANC attendees and women in the population at large in terms of HIV prevalence are needed.

Data use

- Improved ways of translating surveillance findings into action are urgently needed.
- As a start, different products of the surveillance system tailored to the needs of the many different stakeholders including the MOH, NCHADS, NAA, multilateral and bilateral donors, NGOs and the target populations being surveyed should be made available. Again, this requires adequate financial and human resources and human capacity development.

Expand staff capacity

- Central surveillance staff capacity needs to be strengthened and the replacements for those who leave need to be trained to ensure continuity of the system.
- Attempts should be made to identify other institutions in Cambodia that can assist in analysis of surveillance data, ad hoc study design, implementation and analysis, and future modeling and projection efforts. This will provide a more stable and sustainable basis for use of data, and provide redundancy to the central surveillance staff.

APPENDIX 1: Calculation of number of HIV infections in Cambodia

Number of women living with HIV in 2001

The primary data available for estimating the number of women living with HIV in Cambodia is the prevalence data from antenatal clinics (ANCs), which is collected in all provinces annually. However, while ANC HIV prevalence is probably a reasonable proxy for HIV prevalence in married adult females, it is not perfect for the female population at large. For several reasons, ANC prevalence may overestimate or underestimate adult female prevalence. These reasons include:

Almost all ANC women are married and sexually active, however a large portion of the female population in Cambodia is single and not sexually active. This means that the age and residence structure of ANC women is different from that in the female population at large, and will generally have higher prevalence than the population as a whole.

There are a number of women who are now or formerly were sex workers, many of these women are currently single and/or are heavy users of contraception. As such they are unlikely to be captured in the ANC sample.

A number of women have been widowed by the death of their husbands, again they are unlikely to appear in ANC samples as they are not currently sexually active.

Single women who are sexually active will not be captured unless they become pregnant.

Thus, while ANC women may provide a reasonable approximation for HIV prevalence among married women the numbers must be adjusted to reflect age and residence differences between ANC women and the wider population of women and to include these other categories of HIV+ single women as well.

Summary of the procedure

In order to calculate the total number of women living with HIV in 2001 in Cambodia, the following procedure was followed, which takes these factors into account:

The number of HIV infections among married women was calculated using the ANC data.

HIV infections among single women were calculated by summing:

- the estimated number of current female sex workers living with HIV
- the estimated number of former sex workers now living with HIV who are still single
- the estimated number of women widowed by the HIV-related death of their husbands
- the number of single women living with HIV (excluding sex workers)

The numbers for single and married women were then summed to get the total number of adult females currently living with HIV in Cambodia.

When these numbers were summed, 52,900 married women and 22,500 single women with HIV are estimated for a total of 75,400 adult females were living with HIV in Cambodia.

Specifics of the calculation

Infections among married women

To calculate the number of married women currently living with HIV:

ANC prevalence data was analyzed by province to obtain current HIV prevalence in each of four age-groups (15-19, 20-24, 25-29, and 30-49) for urban and rural women separately.

From 1998 Census data, the percentage of women married in each age group was determined by urban and rural residence.

The ANC prevalence was then multiplied by the number of women in each age and residence category and the percentage of women married in that age and residence category to obtain the total number of married women in that category living with HIV.

The HIV+ women in each age and residence category were then summed to get the total number of married women living with HIV.

This gave a total of 52,900 married women living with HIV in the year 2001.

Current female sex workers living with HIV

Estimates by the Cambodian Working Group on HIV/AIDS Projection are that there are roughly 5000 direct sex workers and 7500 indirect sex workers in the country. They have HIV prevalences of 29% and 14.8% respectively in 2002, leading to an estimate of 2,500 current sex workers living with HIV.

Single former sex workers living with HIV

However, on average women remain in sex work only 2 years in Cambodia, thus over the history of the epidemic a large number of women have become infected as sex workers and then moved on to other work. To estimate this, historical trends in the number of sex workers as proposed by the Cambodian Working Group on HIV/AIDS Projection were used in combination with past data on HIV among sex workers from the sentinel surveillance system. These historical data assume that the number of direct sex workers was 14,400 in 1992 and has declined to roughly 5000 in 2001 (the approximate number enumerated by NCHADS in their censuses of sex workers in the country). The number of indirect workers was assumed to grow from 5700 in 1992 to almost 8,000 by 2001. Taking these numbers, applying the HIV surveillance values for direct and indirect sex workers in the intervening years, and adjusting for HIV mortality (using an average 9 year survival curve from UNAIDS) gives an estimate of 18,000 former direct sex workers and 7,500 former indirect sex workers currently living with HIV. However, many of these women have gotten married and will be included in the ANC surveillance sample. So the number of still single former sex workers was calculated by assuming sex workers married at the same rate as the rest of the population, in which case 27% of them in the 20-29 year old age range will still be single. Applying this percentage to the total gives an estimate of 5,000 HIV+ former direct sex workers and 2,000 HIV+ former indirect sex workers who are still single.

Widows of husbands dying of AIDS

Given the male time trends in HIV infection (see final section of this appendix for how this was calculated), it is possible to calculate the percentage of these men who will still be alive by applying the standard survival curve. This leads us to expect 77% of all men infected during the course of the epidemic to still be living. If 52,900 married women are currently living with HIV as calculated from the ANC surveillance above, it can be expected that another 16,000 women have lost their husbands to HIV. However, not all of these women were infected by their husbands, based on the numbers calculated earlier, approximately 20% are former sex workers who became infected before their husbands. Thus, this number is reduced by 20% to give approximately 13,000 widows to AIDS.

Single women with HIV

The DHS survey found only 0.1% of single women reported being sexually active in Cambodia. Given an estimated 15-49 population of 3.2 million, this only gives roughly 3,000 sexually active single women. Given this low number, even if prevalence were comparable to that of pregnant women it would produce less than 100 infections. Thus, it was not included in the calculation here.

Total number of women living with HIV in 2001

When all of these numbers are summed, one gets an estimate of 75,400 women living with HIV in Cambodia in 2001.

Number of women living with HIV 1990 to 2000

To obtain the trends in number of women living with HIV, the national prevalence trends in ANC women were first calculated as follows:

- The UNAIDS/WHO Estimation and Projection Package was used to fit the individual ANC prevalence data for each province as determined by the HIV surveillance system. This gives provincial trends in the epidemic from 1990 through 2001.
- Taking the number of 15-49 year old women in the province and dividing by the total number of women 15-49 in the country gave a weight for each province.
- The annual provincial ANC values were then multiplied by the corresponding weights and summed to obtain the overall national ANC prevalence for each year. The results of this procedure have been shown in Figure 15.

Once national ANC prevalence trends were obtained, they needed to be adjusted to reflect the fact that ANC prevalence overestimates general population prevalence among women. The HIV trends in ANC prevalence were then converted to HIV prevalence trends in all adult women by the following procedure:

- Calculate HIV prevalence in all adult females in 2002 by dividing the number of women living with HIV in 2002 (as calculated in the preceding section) by the number of women 15-49.
- ·Form the ratio of this prevalence with the ANC prevalence for 2001. This gave a ratio of 1.17 to 1, i.e., it was calculated that ANC prevalence over-estimated general population female prevalence by 17%. This is within the margins of error of the findings of (Saphonn, Hor, et al, 2002), where it was found that ANC prevalence overestimated the overall prevalence in the female population by roughly 30%.
- Divide this ratio into the ANC surveillance data to give an estimate of adult female prevalence. This assumes that the ratio of ANC to adult female prevalence is constant over time.

Once adult female prevalence was determined, the number of adult females living with HIV in a given year was determined by multiplying the adult female prevalence by the number of females aged 15-49 as determined from Cambodian population projections for this time frame.

Number of men living with HIV 1990 to 2001

As described in the text, given an estimate of the number of women living with HIV in the population for each year between 1990 and 2001, the number of men can be calculated as follows:

- Determine the male to female ratio (M/F ratio) of HIV infections over time. This was done by fitting a simple exponential curve to the male to female ratio obtained in HIV prevalence surveys among tuberculosis patients. This was done using the solver in Microsoft Excel. This gives the trend in M/F ratios over time, which declines

steadily from 5.4 in 1990 to 1.2 in 2001.

- Multiply the overall prevalence in adult females by the M/F ratio to obtain the prevalence in adult males. This is a straightforward multiplication, if the adult female prevalence is 1% and the M/F ratio is 2.0, then the adult male prevalence is 2.0%.
- Multiply the adult male prevalence by the number of 15-49 year old males to obtain the number of men living with HIV. This makes the inherent assumption that the vast majority of prevalent adult infections are in the 15-49 year old range.

National HIV prevalence - number of people living with HIV in Cambodia

Once the number of adult females and males living with HIV are calculated above, they are summed to obtain the overall adult prevalence in the country.

Saphonn V., Leng H. B., et al. (2002). "How well do antenatal clinic (ANC) attendees represent the general population? A comparison of HIV prevalence from ANC sentinel surveillance sites with a population-based survey of women aged 15-49 in Cambodia." Int J Epidemiol 31(2): 449-55.

Table 1. Changes of the sentinels sites and groups of HIV Surveillance System in Cambodia, 1992-2002

Year	1993	1994	1995	1996	1997	1998	1999	2000	2002
Province	No survey	PNP	PNP	PNP	PNP	PNP	PNP	PNP	PNP
		BMC	BMC	BMC	BMC	BMC	BMC	BMC	BMC
		BTB	BTB	BTB	BTB	BTB	BTB	BTB	BTB
		SHV	SHV	SHV	SHV	SHV	SHV	SHV	SHV
		SRP	SRP	SRP	SRP	SRP	SRP	SRP	SRP
			KDL	KDL	KDL	KDL	KDL	KDL	KDL
			KHK	KHK	KHK	KHK	KHK	KHK	KHK
			PST	PST	PST	PST	PST	PST	PST
			RTK	RTK	RTK	RTK	RTK	RTK	RTK
				KCM	KCM	KCM	KCM	KCM	KCM
				KCN	KCN	KCN	KCN	KCN	KCN
				KPT	KPT	KPT	KPT	KPT	KPT
				KRT	KRT	KRT	KRT	KRT	KRT
				KSP	KSP	KSP	KSP	KSP	KSP
				PV G	PV G	PV G	PV G	PV G	PV G
				STG	STG	STG	STG	STG	STG
				SVG	SVG	SVG	SVG	SVG	SVG
				TKO	TKO	TKO	TKO	TKO	KTH
					KEP	KTH	KTH	KTH	PAL
					KTH		PAL	PAL	PVH
					MDK			PVH	
					PVH				
Number of Province		5	9	18	22	19	20	21	20
Group Surveyed		. DFSW	. DFSW	. DFSW	. DFSW	. DFSW	. DFSW	. DFSW	. DFSW
		. TB	. TB	. TB	. TB		.TB	. TB	. TB
		. POL	. POL	. POL	. POL	. POL	. POL	. POL	. POL
		. MIL	. MIL	. MIL	. MIL				
		. ANC	. ANC	. ANC	. ANC	. MWRA	. ANC	. ANC	. ANC
			. IDFSW			. IDFSW	. BEG	. IDFSW	. IDFSW
							. FRL		
					.HIPN	. HIPN	. HIPN	. HINP	
							. HH		

BMC: Bantey Meanchey
BTB: Battambang
KCM: Kampong Cham
KCN: Kampong Chhnang
KSP: Kampong Speu
KTH: Kampong Thom
KPT: Kampot
KDL: Kandal
KHK: Koh Kong
KRT: Kratie
PAL: Pailin
PNP: Phnom Penh
PVG: Prey Veng
PST: Pursat
RTK: Rattanakiri
SRP: Siem Reap
SHV: Sihanoukville
STG: Stung Treng
SVG: Svay Rieng
TKO: Takeo
PVH: Preah Vihear

. DFSW: Direct Female Sex Workers
. TB: Tuberculosis patients
. POL: Police
. MIL: Military personnel
. ANC: Antenatal Clinic Attendees
. MWRA: Married Women of Reproductive Age
. IDFSW: Indirect Female Sex Workers
. BEG: Beer Girls
. FRL: Freelance sex workers
. HIPN: Hospital In-Patients
. HH: Household (male and female)

Table 2. HIV Seroprevalence rates among target populations in Cambodia, 2002

No.	Province/Ville	DFSW's			IDFSW's			Police			TB Patients			ANC								
														PC*			RD**			PC + RD		
		Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.
1	Banteay Meanchey	171	64	37.4%	45	9	20.0%	170	7	4.1%	167	26	15.6%	250	11	4.4%				250	11	4.4%
2	Battambang	159	16	10.1%	130	16	12.3%	298	7	2.3%	143	30	21.0%	300	18	6.0%	300	14	4.7%	600	32	5.3%
3	Kampong Cham	133	31	23.3%	98	14	14.3%	307	9	2.9%	98	12	12.2%	400	10	2.5%	315	8	2.5%	715	18	2.5%
4	Kampong Chhnang	68	25	36.8%	29	7	24.1%	285	14	4.9%	197	8	4.1%	250	8	3.2%	250	4	1.6%	500	12	2.4%
5	Kampong Speu	119	39	32.8%	19	0	0.0%	285	6	2.1%	71	3	4.2%	249	7	2.8%	249	9	3.6%	498	16	3.2%
6	Kampong Thom	84	17	20.2%	53	5	9.4%	285	6	2.1%	140	2	1.4%	234	6	2.6%	239	5	2.1%	473	11	2.3%
7	Kampot	53	18	34.0%	38	3	7.9%	297	8	2.7%	149	4	2.7%	250	4	1.6%	250	4	1.6%	500	8	1.6%
8	Kandal	100	23	23.0%	40	5	12.5%	142	1	0.7%	157	9	5.7%	250	4	1.6%	245	0	0.0%	495	4	0.8%
9	Koh Kong	112	57	50.9%	71	9	12.7%	107	9	8.4%	14	2	14.3%	154	4	2.6%	57	3	5.3%	211	7	3.3%
10	Kratie	90	22	24.4%	45	6	13.3%	300	6	2.0%	64	6	9.4%	219	4	1.8%	200	7	3.5%	419	11	2.6%
11	Pailin	109	33	30.3%	24	1	4.2%	93	9	9.7%				162	9	5.6%	179	11	6.1%	341	20	5.9%
12	Phnom Penh	162	30	18.5%	145	20	13.8%	169	10	5.9%	150	24	16.0%	696	24	3.4%				696	24	3.4%
13	Prey Veng	151	26	17.2%	32	4	12.5%	157	3	1.9%	319	13	4.1%	250	2	0.8%	250	7	2.8%	500	9	1.8%
14	Pursat	71	45	63.4%	66	9	13.6%	302	3	1.0%	118	12	10.2%	200	3	1.5%	300	5	1.7%	500	8	1.6%
15	Rattanak kiri	31	4	12.9%	20	1	5.0%	140	4	2.9%	19	0	0.0%	240	4	1.7%	159	13	8.2%	399	17	4.3%
16	Siem Reap	160	59	36.9%	150	33	22.0%	169	11	6.5%	150	7	4.7%	250	17	6.8%	250	4	1.6%	500	21	4.2%
17	Sihanouk Ville	148	39	26.4%	152	25	16.4%	150	7	4.7%	90	22	24.4%	148	7	4.7%	74	1	1.4%	222	8	3.6%
18	Stung Treng	65	19	29.2%	10	3	30.0%	192	6	3.1%	44	5	11.4%	126	5	4.0%	190	2	1.1%	316	7	2.2%
19	Svay Reing	73	26	35.6%	47	12	25.5%	300	3	1.0%	229	12	5.2%	299	6	2.0%	300	4	1.3%	599	10	1.7%
20	Preah Vihear	50	15	30.0%	17	0	0.0%	227	7	3.1%	37	1	2.7%	197	2	1.0%	235	3	1.3%	432	5	1.2%
	Total	**210**	**608**	**28.8%**	**1231**	**182**	**14.8%**	**4375**	**136**	**3.1%**	**2356**	**198**	**8.4%**	**5124**	**155**	**3.0%**	**4042**	**104**	**2.6%**	**9166**	**259**	**2.8%**

* PC: Provincial Capital ** RD: Remaining Districts

Table 3. HIV Seroprevalence rates among DFSW by age groups in Cambodia, 2002

Age Groups													
No.	Province/Ville	Total			< 20			20 - 29			>= 30		
		Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.
1	Banteay Meanchey	171	64	37.4%	24	7	29.2%	135	52	38.5%	12	5	41.7%
2	Battambang	159	16	10.1%	31	1	3.2%	115	12	10.4%	13	3	23.1%
3	Kampong Cham	133	31	23.3%	26	7	26.9%	101	22	21.8%	6	2	33.3%
4	Kampong Chhnang	68	25	36.8%	8	1	12.5%	46	17	37.0%	14	7	50.0%
5	Kampong Speu	119	39	32.8%	13	1	7.7%	81	26	32.1%	25	12	48.0%
6	Kampong Thom	84	17	20.2%	8	0	0.0%	70	15	21.4%	6	2	33.3%
7	Kampot	53	18	34.0%	7	2	28.6%	39	12	30.8%	7	4	57.1%
8	Kandal	100	23	23.0%	26	3	11.5%	68	20	29.4%	6	0	0.0%
9	Koh Kong	112	57	50.9%	35	12	34.3%	74	44	59.5%	3	1	33.3%
10	Kratie	90	22	24.4%	12	0	0.0%	68	17	25.0%	10	5	50.0%
11	Pailin	109	33	30.3%	20	4	20.0%	85	28	32.9%	4	1	25.0%
12	Phnom Penh	162	30	18.5%	40	5	12.5%	116	22	19.0%	6	3	50.0%
13	Prey Veng	151	26	17.2%	48	10	20.8%	93	14	15.1%	10	2	20.0%
14	Pursat	71	45	63.4%	14	7	50.0%	49	36	73.5%	8	2	25.0%
15	Rattanak kiri	31	4	12.9%	9	0	0.0%	21	3	14.3%	1	1	100.0%
16	Siem Reap	160	59	36.9%	34	8	23.5%	118	45	38.1%	8	6	75.0%
17	Sihanouk Ville	148	39	26.4%	18	1	5.6%	128	38	29.7%	2	0	0.0%
18	Stung Treng	65	19	29.2%	13	1	7.7%	48	17	35.4%	4	1	25.0%
19	Svay Reing	73	26	35.6%	20	9	45.0%	50	17	34.0%	3	0	0.0%
20	Preah Vihear	50	15	30.0%	6	0	0.0%	39	12	30.8%	5	3	60.0%
	Total	**2109**	**608**	**28.8%**	**412**	**79**	**19.2%**	**1544**	**469**	**30.4%**	**153**	**60**	**39.2%**

Table 4. HIV Seroprevalence rates among IDFSW by age groups in Cambodia, 2002

Age Groups													
No.	Province/Ville	Total			< 20			20 - 29			>= 30		
		Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.
1	Banteay Meanchey	45	9	20.0%	10	0	0.0%	33	8	24.2%	2	1	50.0%
2	Battambang	130	16	12.3%	31	4	12.9%	86	11	12.8%	13	1	7.7%
3	Kampong Cham	98	14	14.3%	15	1	6.7%	79	13	16.5%	4	0	0.0%
4	Kampong Chhnang	29	7	24.1%	5	1	20.0%	23	6	26.1%	1	0	0.0%
5	Kampong Speu	20	0	0.0%	6	0	0.0%	14	1	7.1%			
6	Kampong Thom	53	5	9.4%	11	0	0.0%	37	5	13.5%	5	0	0.0%
7	Kampot	38	3	7.9%				32	3	9.4%	6	0	0.0%
8	Kandal	40	5	12.5%	13	0	0.0%	24	5	20.8%	3	0	0.0%
9	Koh Kong	71	9	12.7%	22	4	18.2%	44	3	6.8%	5	2	40.0%
10	Kratie	45	6	13.3%	6	0	0.0%	38	5	13.2%	1	1	100.0%
11	Pailin	24	1	4.2%	12	0	0.0%	11	1	9.1%	1	0	0.0%
12	Phnom Penh	145	20	13.8%	12	2	16.7%	113	17	15.0%	20	1	5.0%
13	Prey Veng	32	4	12.5%	10	2	20.0%	21	2	9.5%	1	1	100.0%
14	Pursat	66	9	13.6%	13	1	7.7%	48	8	16.7%	5	0	0.0%
15	Rattanak kiri	20	1	5.0%	3	0	0.0%	17	1	5.9%			
16	Siem Reap	150	33	22.0%	30	6	20.0%	114	26	22.8%	6	1	16.7%
17	Sihanouk Ville	152	25	16.4%	30	0	0.0%	107	23	21.5%	15	2	13.3%
18	Stung Treng	10	3	30.0%				10	3	30.0%			
19	Svay Reing	47	12	25.5%	6	1	16.7%	40	11	27.5%	1	0	0.0%
20	Preah Vihear	17	0	0.0%	7	0	0.0%	5	0	0.0%	5	0	0.0%
	Total	**1232**	**182**	**14.8%**	**242**	**22**	**9.1%**	**896**	**152**	**17.0%**	**94**	**10**	**10.6%**

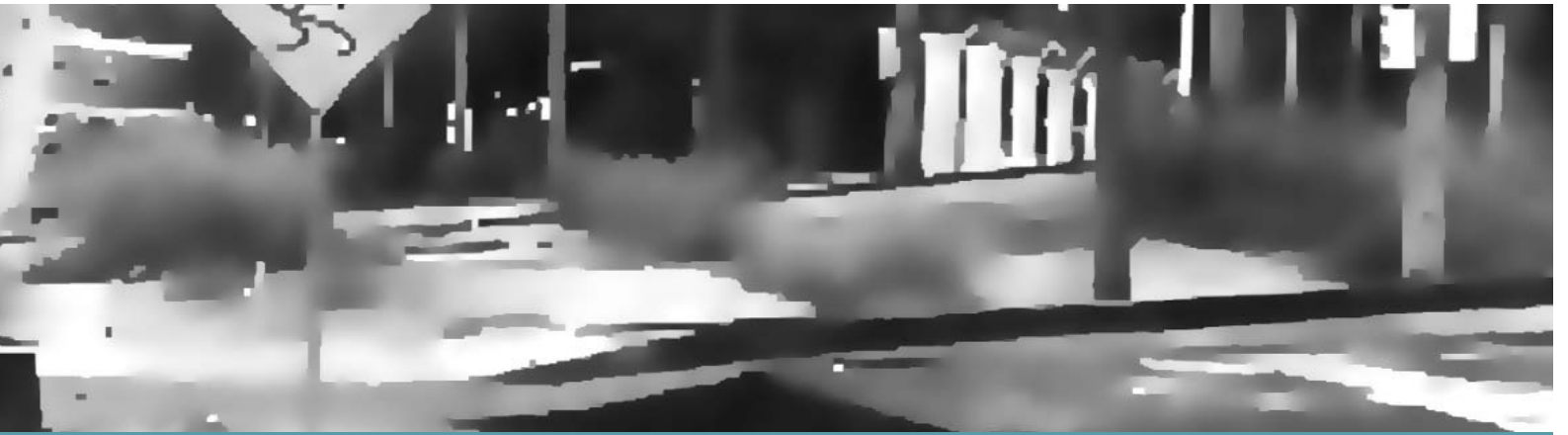


Table 5. HIV Seroprevalence rates among Police by age groups in Cambodia, 2002

No.	Province/Ville	Age Groups								
		Total			< 30			>=30		
		Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.
1	Banteay Meanchey	170	7	4.1%	35	2	5.7%	135	5	3.7%
2	Battambang	298	7	2.3%	32	1	3.1%	266	6	2.3%
3	Kampong Cham	307	9	2.9%	34	1	2.9%	273	8	2.9%
4	Kampong Chhnang	285	14	4.9%	20	2	10.0%	265	12	4.5%
5	Kampong Speu	285	6	2.1%	43	2	4.7%	242	4	1.7%
6	Kampong Thom	285	6	2.1%	34	2	5.9%	251	4	1.6%
7	Kampot	297	8	2.7%	35	0	0.0%	262	8	3.1%
8	Kandal	142	1	0.7%	9	0	0.0%	133	1	0.8%
9	Koh Kong	107	9	8.4%	22	1	4.5%	85	8	9.4%
10	Kratie	300	6	2.0%	67	1	1.5%	233	5	2.1%
11	Pailin	93	9	9.7%	38	2	5.3%	55	7	12.7%
12	Phnom Penh	169	10	5.9%	36	2	5.6%	133	8	6.0%
13	Prey Veng	157	3	1.9%	40	0	0.0%	117	3	2.6%
14	Pursat	302	3	1.0%	29	1	3.4%	273	2	0.7%
15	Rattanakiri	140	4	2.9%	31	0	0.0%	107	4	3.7%
16	Siem Reap	169	11	6.5%	36	2	5.6%	133	9	6.8%
17	Sihanouk Ville	150	7	4.7%	6	0	0.0%	144	7	4.9%
18	Stung Treng	192	6	3.1%	22	2	9.1%	170	4	2.4%
19	Svay Reing	300	3	1.0%	25	0	0.0%	275	3	1.1%
20	Preah Vihear	227	7	3.1%	37	1	2.7%	190	6	3.2%
	Total	**4375**	**136**	**3.1%**	**631**	**22**	**3.5%**	**3742**	**114**	**3.0%**

Table 6. HIV Seroprevalence rates among ANC by age groups and site in Cambodia, 2002

No.	Province/Ville	PC + RD									PC									RD								
		Tota;			15 - 29			30 - 49			Total			15 - 29			30 - 49			Total			15 - 29			30 - 49		
		Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.	Test	Posi	Prev.
1	Banteay Meanchey	250	11	4.4%	187	8	4.3%	63	3	4.8%	250	11	4.4%	187	8	4.3%	63	3	4.8%									
2	Battambang	600	32	5.3%	417	21	5.0%	183	11	6.0%	300	18	6.0%	197	12	6.1%	103	6	5.8%	300	14	4.7%	220	9	4.1%	80	5	6.3%
3	Kampong Cham	715	18	2.5%	532	13	2.4%	183	5	2.7%	400	10	2.5%	308	7	2.3%	92	3	3.3%	315	8	2.5%	224	6	2.7%	91	2	2.2%
4	Kampong Chhnang	500	12	2.4%	322	9	2.8%	178	3	1.7%	250	8	3.2%	161	7	4.3%	89	1	1.1%	250	4	1.6%	161	2	1.2%	89	2	2.2%
5	Kampong Speu	498	16	3.2%	355	9	2.5%	143	7	4.9%	249	7	2.8%	178	5	2.8%	71	2	2.8%	249	9	3.6%	177	4	2.3%	72	5	6.9%
6	Kampong Thom	473	11	2.3%	350	8	2.3%	123	3	2.4%	234	6	2.6%	183	4	2.2%	51	2	3.9%	239	5	2.1%	167	4	2.4%	72	1	1.4%
7	Kampot	500	8	1.6%	354	6	1.7%	146	2	1.4%	250	4	1.6%	173	4	2.3%	77	0	0.0%	250	4	1.6%	181	2	1.1%	69	2	2.9%
8	Kandal	495	4	0.8%	423	4	0.9%	72	0	0.0%	250	4	1.6%	215	4	1.9%	35	0	0.0%	245	0	0.0%	208	0	0.0%	37	0	0.0%
9	Koh Kong	211	7	3.3%	148	6	4.1%	61	1	1.6%	154	4	2.6%	112	4	3.6%	40	0	0.0%	57	3	5.3%	36	2	5.6%	21	1	4.8%
10	Kratie	419	11	2.6%	274	7	2.6%	145	4	2.8%	219	4	1.8%	143	1	0.7%	76	3	3.9%	200	7	3.5%	131	6	4.6%	69	1	1.4%
11	Pailin	341	20	5.9%	142	11	7.7%	199	9	4.5%	162	9	5.6%	94	7	7.4%	68	2	2.9%	179	11	6.1%	48	4	8.3%	131	7	5.3%
12	Phnom Penh	696	24	3.4%	475	16	3.4%	221	8	3.6%	696	24	3.4%	475	16	3.4%	221	8	3.6%									
13	Prey Veng	500	9	1.8%	379	5	1.3%	121	4	3.3%	250	2	0.8%	192	1	0.5%	58	1	1.7%	250	7	2.8%	187	4	2.1%	63	3	4.8%
14	Pursat	500	8	1.6%	335	7	2.1%	165	1	0.6%	200	3	1.5%	151	3	2.0%	49	0	0.0%	300	5	1.7%	184	4	2.2%	116	1	0.9%
15	Rattanak kiri	399	17	4.3%	312	14	4.5%	87	3	3.4%	240	4	1.7%	201	3	1.5%	39	1	2.6%	159	13	8.2%	111	11	9.9%	48	2	4.2%
16	Siem Reap	500	21	4.2%	343	13	3.8%	157	8	5.1%	250	17	6.8%	184	11	6.0%	66	6	9.1%	250	4	1.6%	159	2	1.3%	91	2	2.2%
17	Sihanouk Ville	222	8	3.6%	147	6	4.1%	75	2	2.7%	148	7	4.7%	102	6	5.9%	46	1	2.2%	74	1	1.4%	45	0	0.0%	29	1	3.4%
18	Stung Treng	316	7	2.2%	211	6	2.8%	105	1	1.0%	126	5	4.0%	85	5	5.9%	41	0	0.0%	190	2	1.1%	126	1	0.8%	64	1	1.6%
19	Svay Reing	599	10	1.7%	405	6	1.5%	194	4	2.1%	299	6	2.0%	207	4	1.9%	92	2	2.2%	300	4	1.3%	198	2	1.0%	102	2	2.0%
20	Preah Vihear	432	5	1.2%	232	2	0.9%	200	3	1.5%	197	2	1.0%	107	1	0.9%	90	1	1.1%	235	3	1.3%	125	1	0.8%	110	2	1.8%
	Total	9166	259	2.8%	6343	177	2.8%	2821	82	2.9%	5124	155	3.0%	3655	113	3.1%	1467	42	2.9%	4042	104	2.6%	2688	64	2.4%	1354	40	3.0%

Table 7. HIV Seroprevalence rates among sentinel groups in Cambodia, 1992 - 2002

Target groups	Year																	
	1992		1994		1995		1996		1997		1998		1999		2000		2002	
	No. tested	%	No. tested	%	No. tested	%	No. tested	%	No. tested	%	No. tested	%	No. tested	%	No. tested	%	No. tested	%
DCSW's	207	9	213	39	1007	38	1859	40.9	1132	39.3	2284	42.6	2259	33.2	2180	31.1	2109	28.8
IDCSW's					549	25					1358	19.1	1488	18.6	1799	16.1	1232	14.9
Police personnel	240	0			954	8	1775	5.5	1325	6	2650	6.2	4141	4.7	4711	3.1	4375	3.1
Military personnel	200	0			1013	5.9	1429	5.9	1249	7.1								
Tuberculosis patients					602	2.5	1826	3.9	1035	5			2166	7.9	2739	6.0	2356	8.4
STD patients	805	4	1072	9														
Hospital in patients									1155	6	1173	12.2	1061	11	1016	10		
ANC attendees	195	0			870	2.6	3429	1.7	5003	3.2			5397	2.6	6562	2.3	9166	2.8
MWRA											8879	2.4%						
Households male													3069	1.8%				
Households female													3066	1.2%				

Table 8: Banteay Meanchey Surveillance Data

Province: Banteay Meanchey	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	171	64	**37.4 %**		2.3%		45.8%	54.5%	58.1%	54.0%	50.7%	37.3%	**37.4 %**
Age <20	24	7	**29.2 %**					156	198	202	148	150	
Age 20-29	135	52	**38.5 %**										
Age>=30	12	5	**41.7 %**										
Indirect sex worker	45	9	**20.0 %**		11.8%		31.3%			22.3%	10.0%	13.3%	**20.0 %**
Age <20	10	0	**0.0 %**							94	126	150	
Age 20-29	33	8	**24.2 %**										
Age>=30	2	1	**50.0 %**										
Police	170	7	**4.1 %**	1.1 - 7.1	4.5%		4.4%	11.8%		10.0%	6.0%	7.3%	**4.1 %**
Age <30	35	2	**5.7 %**					68		160	150	150	
Age >=30	135	5	**3.7 %**										
ANC PC = 1 sites	250	11	**4.4 %**										**4.4 %**
ANC RD = sites													
ANC (PC+RD)	250	11	**4.4 %**	6.9 - 18.5	1.2%		1.5%	1.7%	3.8%	0.24%**	2.8%	4.7%	**4.4 %**
Age 15-29	187	8	**4.3 %**					178	263	420	106	150	
Age 30-49	63	3	**4.8 %**										
TB patient male + female	167	26	**15.6 %**				0.0%	3.0%	7.4%		12.1%	13.3%	**15.6 %**
								168	27		149	150	
Blood donor *	738	16	**2.2 %**									1.8%	**2.2 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 9: Battambang Surveillance Data

Province: Battambang	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	159	16	**10.1 %**		4.2%		48.0%	58.3%	47.1%	53.3%	35.4%	29.9%	**10.1%**
Age <20	31	1	**3.2 %**					156	102	150	161	147	
Age 20-29	115	12	**10.4 %**										
Age>=30	13	3	**23.1 %**										
Indirect sex worker	130	16	**12.3 %**		11.0%		29.2%			20.4%	20.8%	24.7%	**12.3%**
Age <20	31	4	**12.9 %**							103	101	150	
Age 20-29	86	11	**12.8 %**										
Age>=30	13	1	**7.7 %**										
Police	298	7	**2.3 %**	0.6 - 4.0	10.5%		9.7%	11.6%	8.7%	5.3%	4.4%	4.4%	**2.3%**
Age <30	32	1	**3.1 %**					86	126	152	160	298	
Age >=30	266	6	**2.3 %**										
TB Patients Male + Female	143	30	**21.0 %**				3.5%	5.1%	16.0%		11.7%	19.5%	**21.0%**
								117	50		120	149	
Hospital Patients									11.5%	18.4%	14.5%	12.1%	
									61	402	372	380	
ANC PC = 2 sites	300	18	**6.0 %**										**6.0%**
ANC RD = 4 sites	300	14	**4.7 %**										**4.7%**
ANC (PC+RD)	600	32	**5.3 %**	3.5 - 7.1	2.9%		2.0%	4.4%	4.0%	3.25%**	1.6%	1.7%	**5.3%**
Age 15-29	417	21	**5.0 %**					180	253	800	374	401	
Age 30-49	183	11	**6.0 %**										
Blood donor *	2976	116	**3.9 %**									4.8%	**3.9%**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 10: Kampong Cham Surveillance Data

Province: Kampong Cham	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	133	31	**23.3 %**		1.5%			27.3%		28.0%	28.0%	29.3%	**23.3 %**
Age <20	26	7	**26.9 %**					154		150	157	150	
Age 20-29	101	22	**21.8 %**										
Age>=30	6	2	**33.3 %**										
Indirect sex worker	98	14	**14.3 %**		5.8%					8.0%	29.0%	15.1%	**14.3 %**
Age <20	15	1	**6.7 %**							100	200	152	
Age 20-29	79	13	**16.5 %**										
Age>=30	4	0	**0.0 %**										
Police	307	9	**2.9 %**	1.0 - 4.8	2.8%			3.1%	1.8%	3.3%	3.0%	2.0%	**2.9 %**
Age <30	34	1	**2.9 %**					161	112	150	301	299	
Age >=30	273	8	**2.9 %**										
TB Patients Male + Female	98	12	**12.2 %**					3.4%	2.0%		7.3%	4.6%	**12.2 %**
								118	51		179	151	
Hospital Patients:									5.8%		7.6%	8.1%	
									52		289	236	
ANC PC = 1 sites	400	10	**2.5 %**										**2.5 %**
ANC RD = 2 sites	315	8	**2.5 %**										**2.5 %**
ANC (PC+RD)	715	18	**2.5 %**	1.0 - 4.0	1.5%			0.9%	1.5%	3.25%**	3.5%	1.0%	**2.5 %**
Age 15-29	532	13	**2.4 %**					232	268	600	566	487	
Age 30-49	183	5	**2.7 %**										
Blood donor *	1230	28	**2.3 %**									1.9%	**2.3 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 11: Kampong Chhang Surveillance Data

Province: Kampong Chhnang	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	68	25	**36.8 %**		4.2%			38.8%	43.9%	39.3%	42.3%	42.9%	**36.8%**
Age <20	8	1	**12.5 %**					116	130	150	130	112	
Age 20-29	46	17	**37.0 %**										
Age>=30	14	7	**50.0 %**										
Indirect sex worker	29	7	**24.1 %**		29.3%					13.6%	25.5%	13.2%	**24.1%**
Age <20	5	1	**20.0 %**							88	47	38	
Age 20-29	23	6	**26.1 %**										
Age>=30	1	0	**0.0 %**										
Police	285	14	**4.9 %**	2.4 - 7.4	0.0%			3.5%		2.0%	3.7%	1.7%	**4.9%**
Age <30	20	2	**10.0 %**					171		150	298	300	
Age >=30	265	12	**4.5 %**										
ANC PC = 1 sites	250	8	**3.2 %**										**3.2%**
ANC RD = sites	250	4	**1.6 %**										**1.6%**
ANC (PC+RD)	500	12	**2.4 %**	1.1 - 3.7	3.1%			1.2%	0.9%	1.5%**	2.7%	3.3%	**2.4%**
Age 15-29	322	9	**2.8 %**					258	222	400	301	300	
Age 30-49	178	3	**1.7 %**										
TB patient male + female	197	8	**4.1 %**	1.3 - 6.9				1.7%	2.0%		4.0%	1.0%	**4.1%**
								58	50		149	299	
Blood donor *	627	4	**3.8 %**									3.7%	**3.8%**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 12: Kampong Speu Surveillance Data

Province: Kampong Speu	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	119	39	**32.8%**		9.8%			50.4%		47.1%	30.2%	36.8%	**32.8%**
Age <20	13	1	**7.7%**					115		119	96	117	
Age 20-29	81	26	**32.1%**										
Age>=30	25	12	**48.0%**										
Indirect sex worker	20	10	**5.0%**		16.7%					8.0%	10.0%	31.8%	**5.0%**
Age <20	6	1	**0.0%**							25	20	22	
Age 20-29	14		**7.1%**										
Age>=30		6											
Police	285	2	**2.1%**	0.4 - 3.8				1.1%		3.3%	2.0%	2.3%	**2.1%**
Age <30	43	4	**4.7%**					92		150	300	300	
Age >=30	242	7	**1.7%**										
ANC PC = 2 sites	249	9	**2.8%**										**2.8%**
ANC RD = 2 sites	249	16	**3.6%**										**3.6%**
ANC (PC+RD)	498	9	**3.2%**	1.7 - 4.7	0.0%			1.4%	2.0%	0.5%**	1.5%	4.0%	**3.2%**
Age 15-29	355	7	**2.5%**					210	250	400	265	300	
Age 30-49	143	3	**4.9%**										
TB Patients Male + Female	71		**4.2%**					2.9%	3.9%		2.2%	5.2%	**4.2%**
		3						70	75		135	116	
Blood donor *	420		**0.7%**									3.4%	**0.7%**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 13: Kampong Thom Surveillance Data

Province: Kampong Thom	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	84	17	**20.2 %**	11.6 - 28.8	6.7%					32.6%	29.5%	28.0%	**20.2 %**
Age <20	8	0	**0.0 %**							95	78	82	
Age 20-29	70	15	**21.4 %**										
Age>=30	6	2	**33.3 %**										
Indirect sex worker	53	5	**9.4 %**	14.7 -17.3	26.4%					34.2%	25.0%	15.4%	**9.4 %**
Age <20	11	0	**0.0 %**							79	51	52	
Age 20-29	37	5	**13.5 %**										
Age>=30	5	0	**0.0 %**										
Police	285	6	**2.1 %**	0.4 - 3.8	8.4%				2.9%	4.1%	2.7%	1.3%	**2.1 %**
Age <30	34	2	**5.9 %**						105	146	294	300	
Age >=30	251	4	**1.6 %**										
ANC PC = 2 sites	234	6	**2.6 %**										**2.6 %**
ANC RD = 2 sites	239	5	**2.1 %**										**2.1 %**
ANC (PC+RD)	473	11	**2.3 %**	0.9 - 3.7	0.4%				3.2%	4.05%**	2.0%	0.7%	**2.3 %**
Age 15-29	350	8	**2.3 %**						248	395	250	300	
Age 30-49	123	3	**2.4 %**										
TB Patients Male + Female	140	2	**1.4 %**	0.0 - 3.4				1.3%	2.6%		9.0%	0.8%	**1.4 %**
								77	76		100	120	
Blood donor *	1163	17	**1.5 %**										**1.5 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 14: Kampot Surveillance Data

Province: Kampot	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	53	18	**34.0 %**		13.1%			41.6%		61.2%	51.8%	42.1%	**34.0 %**
Age <20	7	2	**28.6 %**					77		67	56	57	
Age 20-29	39	12	**30.8 %**										
Age>=30	7	4	**57.1 %**										
Indirect sex worker	38	3	**7.9 %**		37.7%					24.2%	10.6%	32.8%	**7.9 %**
Age <20										62	47	64	
Age 20-29	32	3	**9.4 %**										
Age>=30	6	0	**0.0 %**										
Police	297	8	**2.7 %**	0.9 - 4.5	30.9%			8.6%	2.5%	5.4%	1.3%	3.6%	**2.7 %**
Age <30	35	0	**0.0 %**					105	118	147	155	302	
Age >=30	262	8	**3.1 %**										
TB patient male + female	149	4	**2.7 %**					6.0%	0.0%		13.9%	4.7%	**2.7 %**
								50	29		101	150	
ANC PC= 1 sites	250	4	**1.6 %**										**1.6 %**
ANC RD= 3 sites	250	4	**1.6 %**										**1.6 %**
ANC (PC+RD)	500	8	**1.6 %**	0.5 - 2.7	4.0%			1.9%	2.2%	1.23%**	1.6%	1.0%	**1.6 %**
Age 15-29	354	6	**1.7 %**					208	275	407	255	306	
Age 30-49	146	2	**1.4 %**										
Blood donor *	460	4	**0.9 %**									2.8%	**0.9 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 15: Kandal Surveillance Data

Province: Kandal	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	100	23	**23.0 %**		7.4%		13.6%	13.3%	19.1%	21.4%	31.7%	25.6%	**23.0 %**
Age <20	26	3	**11.5 %**					105	115	103	104	78	
Age 20-29	68	20	**29.4 %**										
Age>=30	6	0	**0.0 %**										
Indirect sex worker	40	5	**12.5 %**		13.0%					9.0%	17.3%	27.7%	**12.5 %**
Age <20	13	0	**0.0 %**							100	100	65	
Age 20-29	24	5	**20.8 %**										
Age>=30	3	0	**0.0 %**										
Police	142	1	**0.7 %**	0.0 - 2.0	11.3%			6.2%	7.4%	8.0%	7.3%	4.0%	**0.7 %**
Age <30	9	0	**0.0 %**					97	162	150	150	150	
Age >=30	133	1	**0.8 %**										
ANC PC = 2 sites	250	4	**1.6 %**										**1.6 %**
ANC RD = 2 sites	245	0	**0.0 %**										**0.0 %**
ANC (PC+RD)	495	4	**0.8 %**	0.01 - 0.16	0.0%			3.0%	2.9%	4%**	3.0%	2.7%	**0.8 %**
Age 15-29	423	4	**0.9 %**					200	208	400	300	300	
Age 30-49	72	0	**0.0 %**										
TB Patients Male + Female	157	9	**5.7 %**					2.8%	1.6%		8.6%	6.0%	**5.7 %**
								144	125		151	149	

* PC: Provincial Capital * RD: Remaining District * Confidencial interval only on total for each group no age specific
** Women at reproductive age

Table 16: Koh Kong Surveillance Data

Province: Koh Kong	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	112	57	**50.9 %**		0.0%		39.2%	52.1%	52.0%	41.0%	41.7%	53.6%	**50.9 %**
Age <20	35	12	**34.3 %**					119	100	134	151	140	
Age 20-29	74	44	**59.5 %**										
Age>=30	3	1	**33.3 %**										
Indirect sex worker	71	9	**12.7 %**		19.3%		23.8%			17.6%		15.7%	**12.7 %**
Age <20	22	4	**18.2 %**							74		83	
Age 20-29	44	3	**6.8 %**										
Age>=30	5	2	**40.0 %**										
Police	107	9	**8.4 %**	3.1 - 13.7	34.4%		10.7%	14.3%	21.0%	25.8%	24.0%	10.7%	**8.4 %**
Age <30	22	1	**4.5 %**					7	100	151	150	149	
Age >=30	85	8	**9.4 %**										
Total	107	9	**8.4 %**										
ANC PC = 2 sites	154	4	**2.6 %**										**2.6 %**
ANC RD = 2 sites	57	3	**5.3 %**										**5.3 %**
ANC (PC+RD)	211	7	**3.3 %**	0.9 - 5.7	18.5%			5.3%	19.5%	5.95%**	8.0%	5.0%	**3.3 %**
Age 15-29	148	6	**4.1 %**					38	82	252	100	159	
Age 30-49	61	1	**1.6 %**										
TB Patients Male + Female	14	2	**14.3 %**										**14.3 %**

* PC: Provincial Capital * RD: Remaining District * Confidencial interval only on total for each group no age specific
* Blood donor data 2001 ** Women at reproductive age

Table 17: Kratie Surveillance Data

Province: Kratie	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	90	22	**24.4 %**		5.3%			28.6%		25.0%	22.5%	32.1%	**24.4%**
Age <20	12	0	**0.0 %**					77		100	102	81	
Age 20-29	68	17	**25.0 %**										
Age>=30	10	5	**50.0 %**										
Indirect sex worker	45	6	**13.3 %**		6.3%					8.9%	22.9%	17.5%	**13.3%**
Age <20	6	0	**0.0 %**							56	35	57	
Age 20-29	38	5	**13.2 %**										
Age>=30	1	1	**100.0 %**										
Police	300	6	**2.0 %**	0.4 - 3.6	6.5%			3.7%		1.5%	1.7%	1.7%	**2.0%**
Age <30	67	1	**1.5 %**					108		137	303	300	
Age >=30	233	5	**2.1 %**										
TB patient male + female	64	6	**9.4 %**					28.0%	8.3%		12.5%	1.9%	**0.094**
								50	24		56	52	
ANC PC= 1 sites	219	4	**1.8 %**										**1.8%**
ANC RD= 3 sites	200	7	**3.5 %**										**3.5%**
ANC (PC+RD)	419	11	**2.6 %**	1.0 - 4.1	2.1%			0.3%	10.0%	0.86%**	0.0%	0.8%	**2.6%**
Age 15-29	274	7	**2.6 %**					350	270	810	200	254	
Age 30-49	145	4	**2.8 %**										
Blood donor *	397	12	**3.0 %**									2.6%	**3.0%**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 18: Pailin Surveillance Data

Province: Pailin	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	109	33	**30.3 %**		9.9%						31.7%	37.9%	**30.3 %**
Age <20	20	4	**20.0 %**								110	124	
Age 20-29	85	28	**32.9 %**										
Age>=30	4	1	**25.0 %**										
Indirect sex worker	24	1	**4.2 %**		36.8%						17.3%	8.6%	**4.2 %**
Age <20	12	0	**0.0 %**								69	70	
Age 20-29	11	1	**9.1 %**										
Age>=30	1	0	**0.0 %**										
Police	93	9	**9.7 %**	3.7 - 15.7	38.4%						7.3%	6.6%	**9.7 %**
Age <30	38	2	**5.3 %**								162	61	
Age >=30	55	7	**12.7 %**										
ANC PC = 2 sites	162	9	**5.6 %**										**5.6 %**
ANC RD = 2 sites	179	11	**6.1 %**										**6.1 %**
ANC (PC+RD)	341	20	**5.9 %**	3.4 - 8.4	0.0%						3.0%	0.5%	**5.9 %**
Age 15-29	142	11	**7.7 %**								181	182	
Age 30-49	199	9	**4.5 %**										

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific

Table 19: Phnom Penh Surveillance Data

Province: Phnom Penh	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	162	30	**18.5 %**		5.8%		30.5%	41.6%	44.4%	61.3%	47.4%	26.3%	**18.5 %**
Age <20	40	5	**12.5 %**					173	162	150	154	152	
Age 20-29	116	22	**19.0 %**										
Age>=30	6	3	**50.0 %**										
Indirect sex worker	145	20	**13.8 %**		2.0%		20.2%			7.0%	6.4%	10.5%	**13.8 %**
Age <20	12	2	**16.7 %**							100	210	153	
Age 20-29	113	17	**15.0 %**										
Age>=30	20	1	**5.0 %**										
Police	169	10	**5.9 %**	2.3 - 9.5	1.7%		6.6%	5.2%		8.7%	8.5%	5.4%	**5.9 %**
Age <30	36	2	**5.6 %**					153		150	153	166	
Age >=30	133	8	**6.0 %**										
ANC PC = 2 sites	696	24	**3.4 %**										
ANC RD = 2 sites													
ANC (PC+RD)	696	16	**2.3 %**	1.2 - 3.4	0.6%		3.0%	3.2%	0.8%	3.75%	4.5%	2.7%	**3.4 %**
Age 15-29	475	16	**3.4 %**					186	248	**	511	600	
Age 30-49	221	8	**3.6 %**							400			
TB Patients Male + Female	150	24	**16.0 %**				11.3%	11.5%	15.4%		14.0%	16.7%	**16.0 %**
								192	91		150	150	
Hospital patients									7.7%	11.3%	10.5%	9.3%	
									495	400	400	400	
Blood donor *												2.9%	

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 20: Prey Veng Surveillance Data

Province: Prey Veng	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	151	26	**17.2 %**		5.0%			29.7%		29.3%	7.3%	17.4%	**17.2 %**
Age <20	48	10	**20.8 %**					91		150	150	149	
Age 20-29	93	14	**15.1 %**										
Age>=30	10	2	**20.0 %**										
Indirect sex worker	32	4	**12.5 %**		8.6%					34.0%	31.0%	11.4%	**12.5 %**
Age <20	10	2	**20.0 %**							100	100	149	
Age 20-29	21	2	**9.5 %**										
Age>=30	1	1	**100.0 %**										
Police	157	3	**1.9 %**	0.0 - 4.0	0.0%			3.8%		6.0%	4.0%	3.3%	**1.9 %**
Age <30	40	0	**0.0 %**					133		150	150	150	
Age >=30	117	3	**2.6 %**										
ANC PC = 2 sites	250	2	**0.8 %**										**0.8 %**
ANC RD = 2 sites	250	7	**2.8 %**										**2.8 %**
ANC (PC+RD)	500	9	**1.8 %**	0.6 - 3.0	0.0%			1.3%	4.8%	2.1%	2.1%**	1.7%	**1.8 %**
Age 15-29	379	5	**1.3 %**					452	230	400	190	300	
Age 30-49	121	4	**3.3 %**										
TB Patients Male + Female	319	13	**4.1 %**					0.0%	5.1%		8.0%	0.7%	**4.1 %**
								210	99		100	302	
Blood donor *	232	6	**2.6 %**										**2.6 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 21: Pursat Surveillance Data

Province: Pursat	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	71	45	**63.4 %**		1.4%		44.2%	49.5%		64.1%	52.0%	58.6%	**63.4 %**
Age <20	14	7	**50.0 %**					103		131	100	70	
Age 20-29	49	36	**73.5 %**										
Age>=30	8	2	**25.0 %**										
Indirect sex worker	66	9	**13.6 %**		0.1%		27.0%			28.0%	23.5%	10.7%	**13.6 %**
Age <20	13	1	**7.7 %**							25	17	75	
Age 20-29	48	8	**16.7 %**										
Age>=30	5	0	**0.0 %**										
Police	302	3	**1.0 %**	0.0 - 2.1	5.0%		8.2%	1.7%	13.9%	3.9%	4.0%	4.6%	**1.0 %**
Age <30	29	1	**3.4 %**					58	137	153	299	303	
Age >=30	273	2	**0.7 %**										
ANC PC = 2 sites	200	3	**1.5 %**										**1.5 %**
ANC RD = 2 sites	300	5	**1.7 %**										**1.7 %**
ANC (PC+RD)	500	8	**1.6 %**	0.5 - 2.7	0.4%		2.2%	2.3%	4.3%	2.0%	2%**	2.8%	**1.6 %**
Age 15-29	335	7	**2.1 %**					174	279	404	103	400	
Age 30-49	165	1	**0.6 %**										
TB Patients Male + Female	118	12	**10.2 %**				10.0%		14.0%		14.1%	12.6%	**10.2 %**
									50		78	95	
Blood donor *	500											0.3%	

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

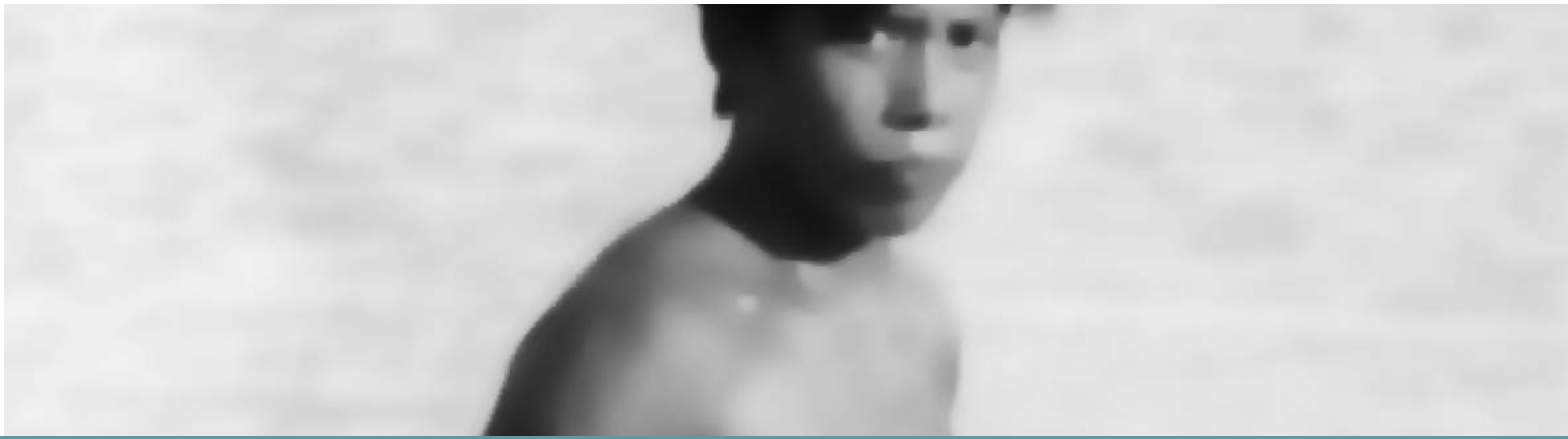


Table 22: Rattanakiri Surveillance Data

Province: Rattanakiri	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	31	4	**12.9 %**		16.2%		21.4%	35.0%	34.2%	21.2%	46.9%	21.7%	**12.9 %**
Age <20	9	0	**0.0 %**					20	38	33	32	23	
Age 20-29	21	3	**14.3 %**										
Age>=30	1	1	**100.0 %**										
Indirect sex worker	20	1	**5.0 %**		23.1%					23.3%	15.6%	30.0%	**5.0 %**
Age <20	3	0	**0.0 %**							30	32	40	
Age 20-29	17	1	**5.9 %**										
Age>=30													
Police	140	4	**2.9 %**	0.1 - 5.7	57.8%		3.9%	14.9%	0.9%		1.0%	2.1%	**2.9 %**
Age <30	31	0	**0.0 %**					74	111		98	96	
Age >=30	107	4	**3.7 %**										
ANC PC = 2 sites	240	4	**1.7 %**										**1.7 %**
ANC RD = 2 sites	159	13	**8.2 %**										**8.2 %**
ANC (PC+RD)	399	17	**4.3 %**	2.3 - 6.3	0.0%			6.2%	2.5%	2.07%**	1.1%	1.3%	**4.3 %**
Age 15-29	312	14	**4.5 %**					113	201	386	183	310	
Age 30-49	87	3	**3.4 %**										
TB Patients Male + Female	19	0	**0.0 %**						0.0%			0.0%	**0.0 %**
Blood donor *	40	6	**15.0 %**										**15.0 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 23: Siem Reap Surveillance Data

Province: Siem Reap	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	160	59	**36.9 %**		4.8%		35.1%	49.0%		38.0%	18.0%	28.7%	**36.9 %**
Age <20	34	8	**23.5 %**					100		150	150	150	
Age 20-29	118	45	**38.1 %**										
Age>=30	8	6	**75.0 %**										
Indirect sex worker	150	33	**22.0 %**		4.5%		19.6%			33.0%	23.3%	20.0%	**22.0 %**
Age <20	30	6	**20.0 %**							100	100	150	
Age 20-29	114	26	**22.8 %**										
Age>=30	6	1	**16.7 %**										
Police	169	11	**6.5 %**	2.8-10.2	2.9%		9.8%	10.0%		6.0%	9.3%	2.9%	**6.5 %**
Age <30	36	2	**5.6 %**					100		150	150	140	
Age >=30	133	9	**6.8 %**										
ANC PC = 2 sites	250	17	**6.8 %**										**6.8 %**
ANC RD = 2 sites	250	4	**1.6 %**										**1.6 %**
ANC (PC+RD)	500	21	**4.2 %**	2.4-6.0	2.5%		4.0%	1.1%	4.4%	1.75%**	4.7%	5.7%	**4.2 %**
Age 15-29	343	13	**3.8 %**					248	204	400	300	300	
Age 30-49	157	8	**5.1 %**										
TB Patients Male + Female	150	7	**4.7 %**				0.5%	1.5%	5.0%		9.0%	2.7%	**4.7 %**
								259	100		100	150	
Blood donor *	654	19	**2.9 %**									1.8%	**2.9 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

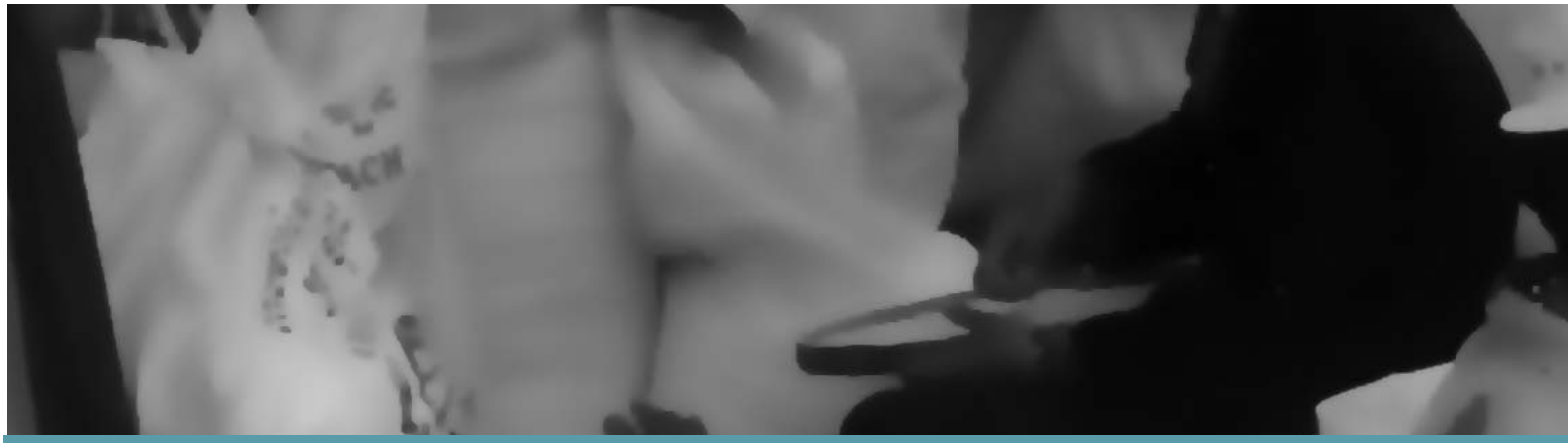


Table 24: Sihanoukville Surveillance Data

Province: Sihanoukville	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	148	39	**26.4 %**		0.0%		37.7%	51.5%		57.3%	42.0%	22.0%	**26.4 %**
Age <20	18	1	**5.6 %**					99		150	150	150	
Age 20-29	128	38	**29.7 %**										
Age>=30	2	0	**0.0 %**										
Indirect sex worker	152	25	**16.4 %**		9.0%		22.7%			24.0%	18.3%	10.0%	**16.4 %**
Age <20	30	0	**0.0 %**							100	15	150	
Age 20-29	107	23	**21.5 %**										
Age>=30	15	2	**13.3 %**										
Police	150	7	**4.7 %**	1.3 - 8.1	4.5%		21.2%	13.7%		11.8%	15.3%	7.1%	**4.7 %**
Age <30	6	0	**0.0 %**					51		153	150	155	
Age >=30	144	7	**4.9 %**										
ANC PC = 2 sites	148	7	**4.7 %**										**4.7 %**
ANC RD = 2 sites	74	1	**1.4 %**										**1.4 %**
ANC (PC+RD)	222	8	**3.6 %**	1.1 - 6.1	0.0%		4.4%	2.1%	2.9%	3.75%**	3.0%	3.9%	**3.6 %**
Age 15-29	147	6	**4.1 %**					95	278	400	200	257	
Age 30-49	75	2	**2.7 %**										
TB Patients Male + Female	90	22	**24.4 %**				3.6%				18.8%	10.5%	**24.4 %**
											48	76	
Blood donor *	124	9	**7.3 %**										**7.3 %**

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 25: Stung Treng Surveillance Data

Province: Stung Treng	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group		Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	65	19	**29.2 %**		7.1%			16.7%	22.6%	33.3%	29.1%	38.0%	**29.2 %**
Age <20	13	1	**7.7 %**					60	53	51	55	50	
Age 20-29	48	17	**35.4 %**										
Age>=30	4	1	**25.0 %**										
Indirect sex worker	10	3	**30.0 %**		16.7%					10.0%	0.0%	30.0%	**30.0 %**
Age <20										20	14	20	
Age 20-29	10	3	**30.0 %**										
Age>=30													
Police	192	6	**3.1 %**	0.0 - 6.5	31.9%			2.6%	0.0%	0.8%	0.0%	0.9%	**3.1 %**
Age <30	22	2	**9.1 %**					77	113	129	152	216	
Age >=30	170	4	**2.4 %**										
ANC PC = 2 sites	126	5	**4.0 %**										**4.0 %**
ANC RD = 2 sites	190	2	**1.1 %**										**1.1 %**
ANC (PC+RD)	316	7	**2.2 %**	0.6 - 3.8	0.0%			0.8%	3.5%	0.25%**	1.2%	1.1%	**2.2 %**
Age 15-29	211	6	**2.8 %**					264	172	405	163	271	
Age 30-49	105	1	**1.0 %**										
TB Patients Male + Female	44	5	**11.4 %**						8.3%		2.9%	0.0%	**11.4 %**
									12		35	22	

* PC: Provincial Capital * RD: Remaining District * Confidencial interval only on total for each group no age specific
** Women at reproductive age

Table 26: Svay Rieng Surveillance Data

Province: Svay Rieng	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	73	26	**35.6 %**		0.0%			36.2%	23.9%	25.0%	26.1%	7.1%	**35.6 %**
Age <20	20	9	**45.0 %**					69	88	100	92	56	
Age 20-29	50	17	**34.0 %**										
Age>=30	3	0	**0.0 %**										
Indirect sex worker	47	12	**25.5 %**		0.0%					17.5%	14.3%	5.2%	**25.5 %**
Age <20	6	1	**16.7 %**							57	61	58	
Age 20-29	40	11	**27.5 %**										
Age>=30	1	0	**0.0 %**										
Police	300	3	**1.0 %**	0.0 - 2.1	0.0%			0.0%	5.0%	0.7%	3.0%	0.7%	**1.0 %**
Age <30	25	0	**0.0 %**					106	140	150	266	300	
Age >=30	275	3	**1.1 %**										
ANC PC = 2 sites	299	6	**2.0 %**										**2.0 %**
ANC RD = 2 sites	300	4	**1.3 %**										**1.3 %**
ANC (PC+RD)	599	10	**1.7 %**	0.7 - 2.7	3.1%			0.9%	0.9%	2.5%**	2.6%	1.3%	**1.7 %**
Age 15-29	405	6	**1.5 %**					325	223	400	349	399	
Age 30-49	194	4	**2.1 %**										
TB Patients Male + Female	229	12	**5.2 %**					0.0%	2.6%		3.5%	4.9%	**5.2 %**
								146	76		200	244	
Blood donor *	595	7	**1.2 %**										**1.2 %**

* PC: Provincial Capital * RD: Remaining District * Confidencial interval only on total for each group no age specific
* Blood donor data 2001 ** Women at reproductive age

Table 27: Takeo Surveillance Data

Province: Takeo	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers								24.6% 69	24.1% 58	41.4% 99	32.5% 83	11.5% 96	
Indirect sex worker										6.7% 45	26.4% 53	19.4% 62	
Police								2.3% 128		3.3% 122	1.3% 300	2.7% 299	
ANC (PC+RD)								0.9% 218		3.3%** 800	0.7% 300	4.1% 290	
TB Patients Male + Female								3.0% 167	2.5% 80		4.3% 301	5.0% 300	
Blood donor*	505	38	7.5 %										7.5%

* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001
** Women at reproductive age

Table 28: Preah Vihear Surveillance Data

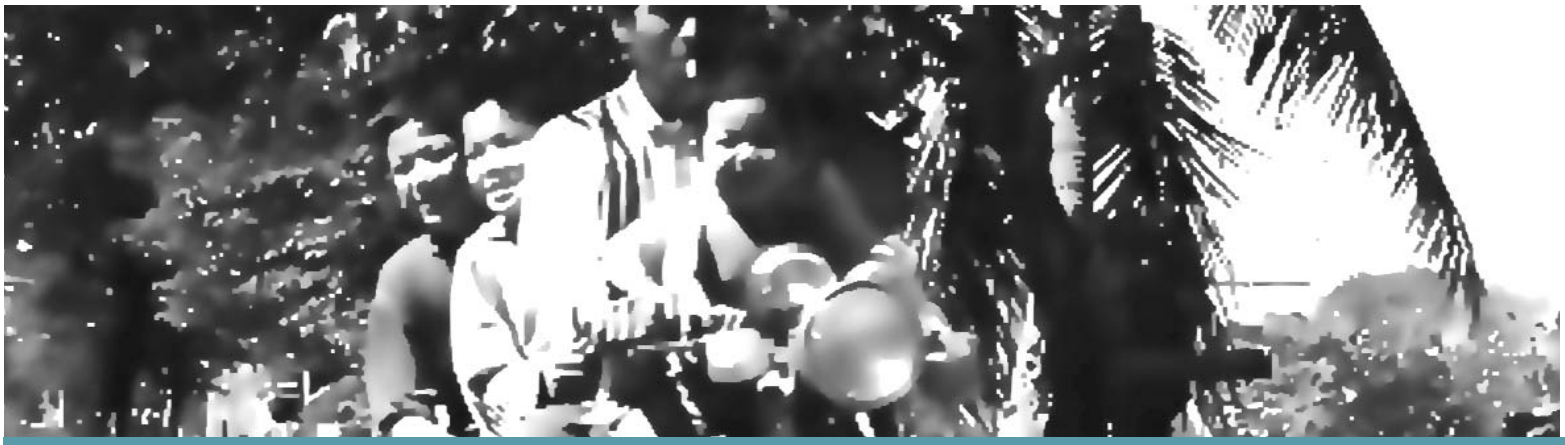
Province: Preah Vihear	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	50	15	30.0 %		1.9%							13.0% 46	30.0 %
Age <20	6	0	0.0 %										
Age 20-29	39	12	30.8 %										
Age>=30	5	3	60.0 %										
Indirect sex worker	17	0	0.0 %		0.0%							7.7% 39	0.0 %
Age <20	7	0	0.0 %										
Age 20-29	5	0	0.0 %										
Age>=30	5	0	0.0 %										
Police	227	7	3.1 %	0.8 - 5.4	9.8%							1.1% 277	3.1 %
Age <30	37	1	2.7 %										
Age >=30	190	6	3.2 %										
ANC PC = 2 sites	197	2	1.0 %										1.0 %
ANC RD = 2 sites	235	3	1.3 %									1.4%	1.3 %
ANC (PC+RD)	432	5	1.2 %	0.2 - 2.2	2.7%							296	1.2 %
Age 15-29	232	2	0.9 %										
Age 30-49	200	3	1.5 %										
TB Patients Male + Female	37	1	2.7 %										2.7 %
TB Patients Male												8.7% 40	
Blood donor *	9												

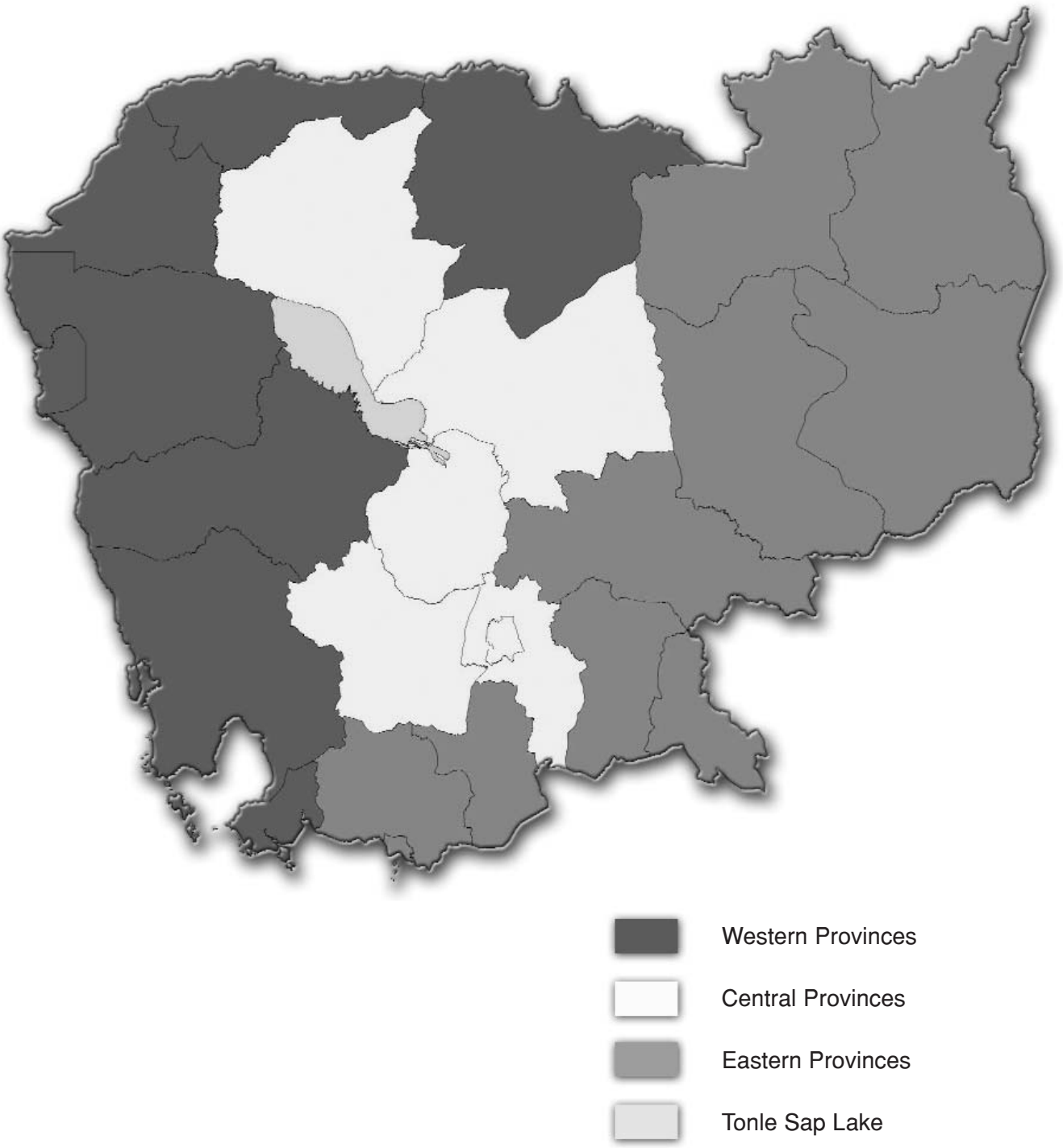
* PC: Provincial Capital
* RD: Remaining District
* Confidencial interval only on total for each group no age specific
* Blood donor data 2001

Table 29: Surveillance Data for All Provinces

All Provinces	HIV prevalence in 2002					HIV prevalence (%) (sample size)							
Target group	Sample size	Number positive	HIV prevalence	95% CI (%)	Percent refusal	1994	1995	1996	1997	1998	1999	2000	2002
Direct Sex workers	2109	608	**28.8 %**		4.8%		37.9%	38.3%	39.3%	42.6%	33.2%	31.1%	**28.8 %**
Age <20	412	79	**19.2 %**				1007	1859	1132	2284	2259	2180	
Age 20-29	1544	469	**30.4 %**										
Age>=30	153	60	**39.2 %**										
Indirect sex worker	1232	183	**14.9 %**		11.6%		24.7%			19.2%	19.8%	16.1%	**14.9 %**
Age <20	242	22	**9.1 %**				549			1358	1488	1799	
Age 20-29	896	152	**17.0 %**										
Age>=30	94	10	**10.6 %**										
Police	4375	136	**3.1 %**		14.6%		8.1%	5.5%	6.0%	6.2%	4.7%	3.1%	**3.1 %**
Age <30	631	22	**3.5 %**				954	1775	1325	2650	4141	4711	
Age >=30	3742	114	**3.0 %**										
TB Patients Male + Female	2356	198	**8.4 %**				2.5%	3.9%	5.2%		7.9%	6.0%	**8.4 %**
							602	1826	1035		2166	2739	
Hospital patients									6.0%	12.2%	11.0%	10.0%	
									1155	1173	1061	1016	
ANC PC = 2 sites	5124	155	**3.0 %**										**3.0 %**
ANC RD = 2 sites	4042	104	**2.6 %**										**2.6 %**
ANC (PC+RD)	9166	259	**2.8 %**		1.9%		2.6%	1.7%	3.2%	2.4%**	2.6%	2.3%	**2.8 %**
Age 15-29	6343	177	**2.8 %**				870	3429	5003	8879	5397	6562	
Age 30-49	2821	82	**2.9 %**										
Blood donor	1566	423	**2.70 %**									2.7%	**2.7%**

* PC: Provincial Capital * RD: Remaining District * Confidencial interval only on total for each group no age specific
** Women at reproductive age



APPENDIX 3: Surveillance Regions Map

Surveillance regions in Cambodia