
**REVISING HIV ESTIMATES AND PROJECTION:
IMPLICATIONS OF THE NATIONAL SEXUAL
BEHAVIOR SURVEY**

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Introduction

In 2008, unprotected sex between heterosexuals remains the most important contributor to new and prevalent HIV infections in Thailand. The Thai Working Group on HIV/AIDS Projection updated their HIV projections for Thailand in 2005, and estimated a total of 1,070,000 adults had been infected with HIV since the start of the epidemic. Of these, 510,000 had died from AIDS, and 560,000 were currently living with HIV. An estimated 17,000 new infections occurred in 2005, declining slowly to 14,000 new infections in 2007.

Of all new infections in the 2005 projection, roughly one-third are women contracting HIV from their spouses who are either past or present clients of female sex workers. Many of the men currently passing HIV on to their wives were infected years in the past before condom use in sex work became the norm in Thailand. Given the significant increases in condom use and reductions in client numbers since the mid-1990s, however, at present less than 15% of all new infections are occurring among sex workers and their clients. Instead, for the next several years, the vast majority of new infections in Thailand will occur through husband-and-wife sex and male-male sex. Thus, further reductions of HIV risk in sex work, while possible, are not likely to make major changes in the shape of the epidemic in the near future. With the significant declines seen in young men visiting sex workers, many are concerned that a compensatory

increase in non-commercial casual sex in the younger generation will result in a second major wave of HIV infection in Thailand.

This paper will explore that proposition and discuss the future of the Thai epidemic by presenting revised HIV projections that incorporate new data on changes in sexual behaviors among heterosexual men and women in Thailand collected from The National Sexual Behavior Survey of Thailand 2006 (NSBS 2006). This new projection will also take into account expected changes in risk behaviors in both commercial and casual sex from 2007 until 2020. This revised scenario will then be compared to the current national HIV projection to illustrate the impact that heterosexual behavior changes are likely to have on the epidemic.

Background on the HIV Situation in Thailand

Thailand has been globally recognized as a success story in tackling the HIV epidemic, with a remarkable reduction in new HIV infections from 150,000 in the early 1990's to only 26,000 in 2000 (The Thai Working Group on HIV/AIDS Projection, 2001). But while incredible success was achieved in addressing sex work during the first decade of the epidemic, complacency and weakened prevention efforts have resulted in a slower decline in new infections in the second decade of the epidemic. Whereas new infections fell by 83% between 1990 and 2000, they will only fall by about 50% in the next decade, leaving almost 11,000 people a year contracting HIV in 2010 (Brown and Peerapatanapokin, 2005). The two major contributors to HIV infections during this second decade will be husband-to-wife transmission and sex between men, with sex work playing much less of a role than it did in the first decade. Promotion of condom use and STI treatment among sex workers and clients has changed the course of the Thai epidemic - but other prevention efforts will be needed in the future to make significant additional progress against the epidemic.

The other factor changing the course of the Thai epidemic is antiretroviral therapy, which is now universally available to people living with HIV through the Royal Thai Government. While this has little impact on new infections, it does keep many people with HIV alive who would otherwise

have died of various opportunistic infections. The net result is that the number of people currently living with HIV will decline only slowly instead of dropping very rapidly in response to the 10-fold reduction in incidence between 1990 and 2005. The impact of this will be highlighted later in the chapter.

Structure and Methodology of the HIV Projection Model Used

The Asian Epidemic Model (Brown and Peerapatanapokin, 2004) has been applied here to examine the future course of the Thai epidemic and take into account the changes in both commercial and casual sexual behaviors in Thailand since the last national data became available in 1993.]The Asian Epidemic Model (AEM) has previously been used in two rounds of Thai national modeling in 2000 and 2005. It provides HIV prevalence results for each key population modeled (direct and indirect female sex workers [FSW], clients, injecting drug users [IDU], men who have sex with men [MSM], and general population men and women) that are quite close to the actual observed HIV surveillance values in the country. The model's inputs include both biological data from the HIV and STI surveillance system and behavioral data from national behavioral surveys and sub-population specific studies among MSM, IDU and FSW. Using behavioral values measured over the years in Thailand, the model accurately reproduces over 15 years of past seroprevalence trends in each of the key populations. The required input parameters for each of those key populations are preliminarily behavioral in nature and include:

- Sizes of key populations-direct and indirect FSW and their clients, IDU, MSM
- Total male and female populations age 15 and over 15 years,
- Sexual risk behaviors-frequency of sexual contact and condom use, including marital, casual and commercial sex risk
- Injecting risk behaviors-frequency of injections, level of sharing, percent of injections shared
- Average duration one remains in the different at-risk populations, e.g., average time that a women remains a female sex worker

The next section will discuss the specific data inputs used for the behavior change scenario constructed for this paper.

Number of Male Clients and Female Sex Workers

To determine the size of the client population for AEM over time, the proportion of male visiting sex workers in the general population has been determined in the NSBS 2006 and from two previous national surveys: 1) the Survey of Partner Relations and Risk of HIV Infection (PR) conducted by the Thai Red Cross Society and Chulalongkorn University in 1991 (Sittitrai et al. 1992), and 2) the Survey on Effectiveness of AIDS Media on Behavior and Attitudes (MAIDS) conducted by the Institute for Population and Social Research, Mahidol University in 1993 (Thongthai et al, 1994).

Table 1 shows the age-specific percent of men visiting sex workers in the last year from each of those surveys. When adjusted for the age structure of the population, the percentage of men aged 15 and above visiting sex workers decreased substantially from 18.9% in 1990 to 9.2% in 1993, and then to 6.3% in 2006. This represents a major change in commercial sex behavior among heterosexual Thai males and has contributed to the observed declines in HIV prevalence around the country.

This massive reduction in men visiting female sex workers was a truly national phenomenon, occurring around the country in the early 1990s (see regional changes reported in Table 2). Men in most regions reduced their risk of exposure as clients by 50% or more. However, there has been more limited change since 1993. Only in the North and Northeast has there continued to be a substantial decline in men visiting sex workers after 1993 - in the other regions it stabilized at 10-13% levels. The North, of course, felt the strongest impacts of the epidemic, so the massive risk reduction is not unexpected. The Northeast has the lowest HIV prevalence among the regions, but has also been traditionally a more conservative part of country - note that the proportion of men visiting sex workers in the Northeast in 1990 was already roughly half the value seen in other parts of the country.

Table 1 Percentage of males aged 15 and above reporting visiting sex workers in the last year, by age groups

Age group	Percent visiting female sex workers in last year		
	PR 1990	MAIDS 1993	NSBS 2006
15-19	21.9	12.4	7.4 *
20-24	37.2	24.1	8.2
25-29	30.5	15.9	8.6
30-34	17.9	6.0	6.4
35-39	12.3	5.1	8.4
40-44	13.6	2.0	4.3
45-49	9.8	2.1	5.6
50+	5.0 **	1.5 **	2.2
Total	18.9	9.2	6.3

Source : Integrated Analysis and Advocacy Team (A2),2006, and Chamrathirong et al.,2006.

Note: PR 1990: Survey of Partner Relations and Risk of HIV Infection 1990.
MAIDS 1993: Survey on Effectiveness of AIDS Media on Behaviors and Attitudes 1993
NSBS 2006 : National Sexual Behavior Survey of Thailand 2006
* This percentage obtained from respondents aged 18-19 years.
** These are assumed numbers since the surveys did not include age 50+

Table 2 Percentage of general males visiting female sex workers in the last year, by regions

Region	Percent visiting female sex workers in last years		
	PR 1990	MAIDS 1993	NSBS 2006*
Bangkok	30.4	13.4	10.4
Central	25.2	10.6	9.5
North	26.3	10.1	1.9
North-East	14.1	8.7	4.3
South	23.7	12.3	13.2

Source : Integrated Analysis and Advocacy Team (A2), 2006 and Chamrathirong et al., 2006.

Note : This percentage obtained from respondents aged 18-49 yearold

In the 2005 national projection, the percentage of clients was adjusted according to results from: 1) the review of the 100% condom survey conducted by the Institute for Population Research, Mahidol University in 1997 (Chamrathirong et al.,1999) and 2) behavioral surveillance surveys among three high risk groups conducted by the Ministry of Public Health between 1995 and 2002 (Integrated Analysis and Advocacy Team or A2,2006). These showed little change from the 9% level of clients seen in 1993, so this was kept fixed from 1993 through the end of the projection period.

For the revised projections presented below, the proportion of adult males visiting sex workers was reduced from 9.2% in 1997 to 6.3% in 2007 according to the results of the NSBS (Chamrathirong 2006). The percentage of clients was kept fixed at this level until the end of the projection period. This represents a reduction of 30% in the number of clients used in the 2005 national projection.

The size of the female sex worker population in the revised projection was kept the same as in the 2005 national projection. However, the proportion between direct and indirect sex workers was adjusted based on the change in number of clients. findings. The number of direct sex workers in 2007 was reduced by 70% (from 24,890 in the original projection to 6,808 in the revised one), and kept stable at this level until the end of the projection. The number of indirect sex workers was increased correspondingly to produce a stable number overall number of female sex workers. The number of indirect sex workers thus increased from 113,387 in the national projection to 131,470 in the projection here (16% increase).

Casual Sex among General Males and Females

Casual sex for men and women is defined here as either premarital or extramarital sexual contact with a partner of the opposite sex who is not a sex worker outside of a primary relationship. Values prior to 1996 used in the 2005 national projection came from the Behavioral Surveillance Surveys in Bangkok conducted between 1993 and 1996 by OPTA (1996). Those surveys found that approximately 6% of male factory workers reported sex an with outside partner other than a sex

worker in the preceding year (Mills et al, 1997). However, the value used in the original projection for men was adjusted downward to 5% to reflect the fact that the male general population was somewhat older than the factory worker samples and probably had somewhat less casual sex. Based on a Behavioral Surveillance Survey in 2004 (Bureau of Epidemiology 2004), this percentage was assumed to rise from 5% in 1996 to 20% by 2004 and kept at that value from 2005 forward in the original national projection.

Among the female general population, a Bangkok survey in 1994 found that 4.1% of women between 1-5 and 30 years of age reported sex with more than one partner in the last year (Peerapatanapokin 1994). This was adjusted downward to reflect the older age and somewhat lower risk of the general female population, including a large rural female population. Thus, a value of 2%, half of the measured value, was used, which agreed fairly well with the 1.7% of women reporting sex outside of a monogamous relationship in the Survey of Partner Relations in 1990. Based on risk reported by women in the 2004 Behavioral Surveillance Survey, this percentage was assumed to rise from 2% in 1996 to 10% by 2004. In the 2005 projections it was kept constant at that value through the remainder of the projection.

The NSBS in 2006, however, found somewhat lower casual sex risk: 12% for males and 0.5% for females in the last year (Chamrathirong et al. 2006). Thus, in the revised projection the proportion having casual sex was brought down to 12% for men between 2005 and 2007, and from 10% to 0.5% for women.

Condom Use Rate

Condom use rose rapidly in Thailand in response to intensive and extensive intervention efforts through the mid-1990s, rising from 30% levels at the time of the Partner Relations Survey to 60% levels at the time of the MAIDS and 80% levels by the 100% condom evaluation in 1997. The level of condom use has remained high since 1999, and the value used in the national projection was 82% between clients and direct

sex workers, and 70% between clients and indirect sex workers. These levels agreed reasonably well with what was measured in the NSBS, so they were left unchanged in the revised projection.

Condom use has always been much lower in Thailand in casual sex than in commercial sex, to a great extent because condoms are seen as inappropriate for relationships by many. In the original 2005 projection, condom use in casual sex was kept stable at 36% over the projection period. However, again NSBS has reported an increase in condom use in casual sex, so in the revised projection condom use increases from 36% in 2005 to 48% in 2007 and then remains there through the end of the projection.

Assumptions

In order to explore the potential impact of behavior changes in commercial and casual sex and condom use occurring since the last national projection was prepared in 2005, we compared the projection results of the original national projection with a revised scenario incorporating new data from the NSBS as described above. To summarize:

The original national projection used the following assumptions on heterosexual behaviors:

- The percentage of males visiting sex workers would be around 9% in 2005 and remains unchanged until 2020.
- Condom use in commercial sex remains stable at 82% from 2005 through the end of the projection period.
- The percentage of casual sex in the last year post-2005 remained stable at 20% for males and 10% for females.
- Condom use in casual sex between men and women remains stable at 36% over the projection period.

The revised projection reflects the decreased commercial and casual sex behaviors reported in the NSBS through 2007. In summary:

- The percentage of males visiting sex workers drops from 9% between 1993 and 2005 to 6.3% in 2007 and remains at that level in subsequent years.
- Condom use in commercial sex remains the same as in the 2005 national projection (82%).
- The percentage of casual sex drops from 20% during 2004-2005 to 12 % in 2007 for males and from 10% to 0.5% for females over the same period. It is kept constant at this level subsequently.
- Condom use rate in casual sex increases from 36% in 2005 to to 48% in 2007 and stabilizes there .
- Results of the HIV Projection

The result of HIV Projection

The revised HIV projection based on the behavioural assumptions presented above is presented in Figure 1. This shows the expected trends in the HIV epidemic from 2007 to 2020 including the effect of antiretrovirals. The estimated numbers of new, current and cumulative HIV infections over the course of the epidemic are displayed. Table 2 presents a direct comparison of the numbers from the revised projection between 2000 and 2020 in comparison with the original 2005 national projection.

Figure 1

Estimated number of new HIV infections, people living with HIV and cumulative HIV, revised projection using NSBS data, 1985-2020

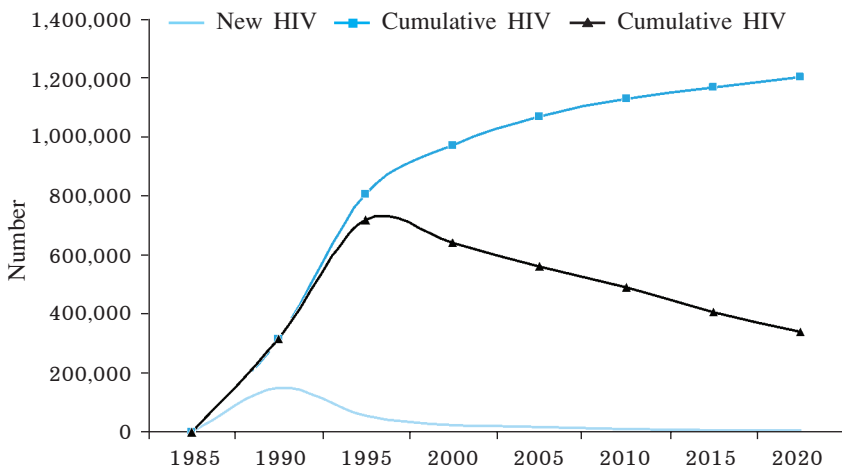
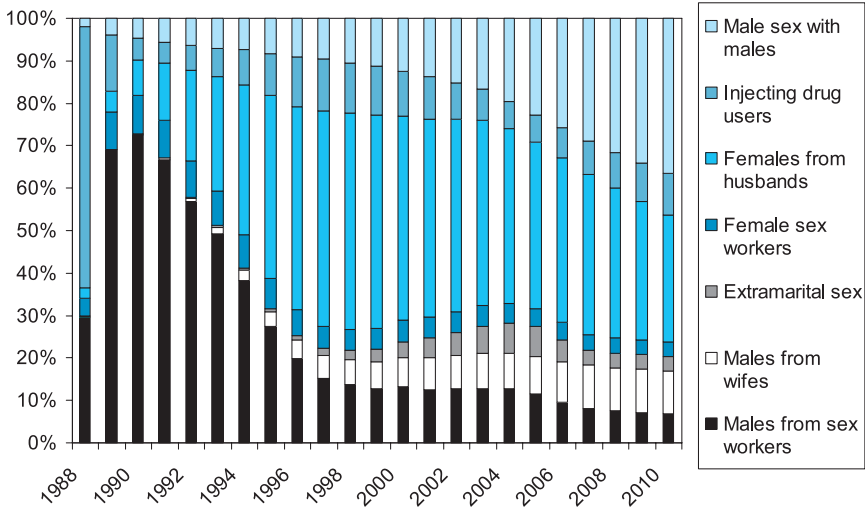


Figure 2

Percent distribution of new HIV infections by mode of transmission, 1988-2010



Source : Brown and Peerapatnanapokin, 2005

Figure 2 shows the percent distribution of new infections by different modes of transmission from 1988 to 2010. The majority of new infections in 2007 continue to be heterosexual in nature with contributions coming from all possible heterosexual modes: husband-to-wife (38%), wife-to-husband (10%, largely former sex workers to their husbands), client to sex worker (4%), sex worker to client (8%), and through casual sex (3%). Altogether, these account for 63% of new infections in 2007. The next largest, and still growing, contribution comes from men who have sex with men, with male-male sex accounting for 29% of new infections in 2007, growing steadily to 37% by 2010. New infections among injecting drug users account for the remaining 8%, and will remain roughly stable through 2010.

The reason for the strong dominance of husband-to-wife infections (38% of all new infections) is that large numbers of clients contracted HIV in the late 1980s and early 1990s, before condom use between sex workers and

clients rose to high levels. Figure 1 shows this clearly for the period from 1989 to 1995. However, husband-to-wife transmission occurs much more gradually than transmission between sex workers and clients because in marriage there is less impact from HIV-transmission enhancing sexually transmitted infections, which are extremely common among sex workers. One study of male blood donors in the North found that only 20% of them had transmitted to their wives after 2 years. The large discordance in husband-wife HIV infection creates great urgency in developing ways of reducing husband-to-wife and wife-to-husband transmission in discordant couples, a component of the national response which has been seriously lacking through the present. The contribution of casual sex to HIV transmission will also be gradually increasing as these behaviours continue with less than 50% condom use.

The other major concern apparent in the figure is the rapidly rising contribution of men who have sex with men. This is also quite apparent in epidemiological data coming in from around the country. Among men having sex with men in Bangkok, HIV prevalence increased from 17% in 2003 to 28% in 2005 and to 31% in 2007 (van Griensven et al.2005). By comparison, the HIV prevalence among the other at-risk populations in 2006 (MOPH, 2006) was: female direct sex workers (4.6%), male sex workers (12.9%), seafarers (2.75%), and IDUs (40-50%).

Table 3

Comparison of new infections, cumulative HIV and people living with HIV between the 2005 national projection and the revised projection based on NSBS, 2000-2020

Year	New HIV infections		Cumulative HIV		People living with HIV/AIDS	
	2005 Projection	Revised Projection	2005 Projection	Revised Projection	2005 Projection	Revised Projection
2000	26,158	26,158	976,107	976,107	642,121	642,121
2001	23,268	23,268	999,375	999,375	614,710	614,710
2002	20,955	20,955	1,020,330	1,020,330	590,630	590,630
2003	19,002	19,002	1,039,332	1,039,332	572,474	572,474
2004	17,673	17,673	1,057,005	1,057,005	565,067	565,067
2005	16,513	16,323	1,073,518	1,073,328	562,243	562,062
2006	15,174	14,310	1,088,692	1,087,638	556,848	555,826
2007	13,936	12,659	1,102,628	1,100,297	546,578	544,275
2008	12,787	11,535	1,115,415	1,111,832	532,522	528,946
2009	11,753	10,574	1,127,168	1,122,406	516,632	511,862
2010	10,853	9,757	1,138,020	1,132,163	499,324	493,467
2011	10,097	9,084	1,148,117	1,141,247	481,770	474,944
2012	9,473	8,537	1,157,589	1,149,784	464,414	456,740
2013	8,959	8,094	1,166,549	1,157,878	447,640	439,240
2014	8,535	7,734	1,175,084	1,165,613	431,475	422,464
2015	8,184	7,441	1,183,268	1,173,053	416,099	406,589
2016	7,890	7,199	1,191,157	1,180,253	401,700	391,788
2017	7,640	6,996	1,198,797	1,187,249	387,877	377,652
2018	7,426	6,825	1,206,223	1,194,074	374,966	364,501
2019	7,241	6,679	1,213,464	1,200,753	362,737	352,098
2020	7,082	6,554	1,220,546	1,207,306	351,132	340,380

Note : The 2005 national projection was prepared by Brown and Peerapatanapokin in 2005

Figure 3 Comparisons of estimated number of new HIV infections between the 2005 national projection and the revised projection, 2000-2020

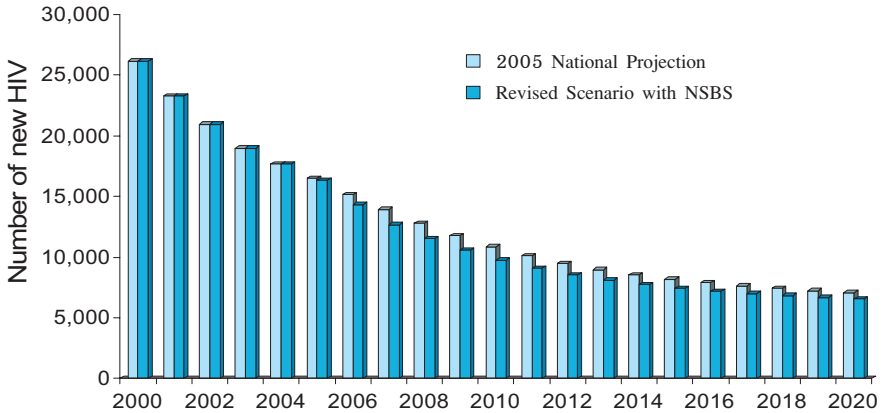


Figure 3 shows that the revised projection estimates a slightly lower number of new HIV infections, as compared to the original 2005 projection from 2005 to 2020. This results almost entirely from the reduction in casual sex risk measured by NSBS. This reduction is due to smaller percentages having casual sex and higher levels of condom use in casual sex than assumed in the 2005 projection. All told, these changes in behaviour have the effect of reducing new infections by 800 per year, with the total result that 13,239 infections are averted between 2005-2020. With the introduction of program to address HIV risk in discordant couples, stronger programs for MSM, more efforts to reduce the percentage of youth engaging in casual risk, and a renewed effort to reduce risk in sex work, the infections averted might be much higher.

Figure 4

Comparisons of number of people living with HIV between the baseline and the behavior change scenarios, 2000-2020

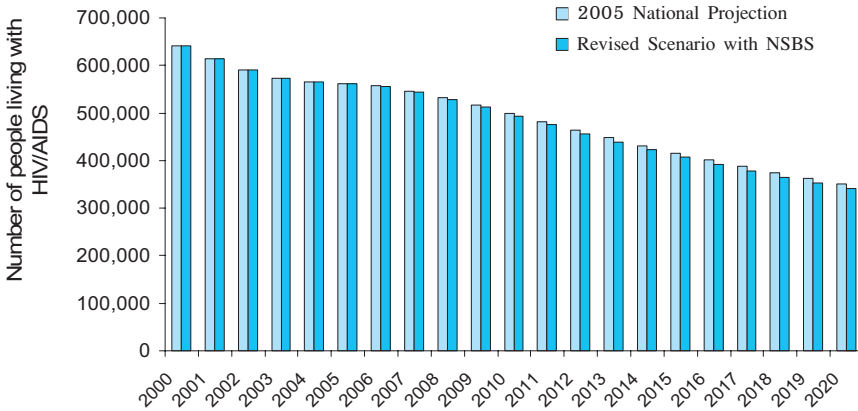


Figure 4 shows that the relatively limited additional behaviour changes reported in the NSBS only result in a small decline in the total number of people living with HIV. This highlights the need for a revitalized national prevention program in Thailand to bring these numbers down much more rapidly.

Discussion

The revised projection has not substantially changed the basic picture painted by the national projection in 2005. The future course of the Thai HIV epidemic will continue to be driven by heterosexual HIV transmission for the next several years. However, in parallel, a rapidly rising epidemic among MSM in spreading through the country, also requiring urgent attention and prevention focus.

The projections here highlight that all modes of heterosexual transmission are currently in play: spousal transmission, casual sex transmission, and ongoing sex work transmission. Thus, effective programs will need to address all of these. **While Thailand does have effective models for prevention in sex work, by far the most challenging issue is addressing spousal transmission, where few effective program models exist in any**

country - and are badly needed, especially since it is contributing almost half of new infections today. The contribution of young people infected through casual sex will also grow gradually unless condom use between them is promoted more effectively than it has been in the past. However, because of the nature of the relationships involved, attempts to promote condom use in casual sex remain an intervention challenge.

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