

CHAPTER 1

INTRODUCTION

The aim of this thesis is to identify and describe trends in the incidence of HIV/AIDS in border Southern Thailand provinces, using statistical models. The statistical methods include computation of incidence rates, crude odds ratios and odds ratios adjusted for age effects using the Mantel-Haenzel method of adjustment for covariates. Models are based on logistic regression.

In the present chapter we introduce the basic concepts of HIV/AIDS. These include definition of HIV/AIDS, HIV/AIDS transmission, background and rationale, HIV/AIDS situation and literature review.

Chapter 2 we includes a dcscription of the methods used in the study. These methods comprise study design, method of data selection, data management and method of data analysis.

Chapter 3 some preliminary results are presented. First, the incidences of HIV/AIDS cases by province, gender, type of disease and method of transmission are plotted. Second, crude odds ratios are plotted to measure the strength of association, and to compare risks of HIV/AIDS infection, over different years and for the different provinces and compare the crude odds ratios with the age-adjusted odds ratios, using the Mantel - Haenszel method of adjustment.

Finally, we present the resents of modeling the incidence of HIV/AIDS cases separately for males and females with the different years and different provinces combined using logistic regression. The logistic model is used because of its ability to handle any number of covariates simultaneously.

1. HIV/AIDS

1.1 Definition

The acquired immunodeficiency syndrome (AIDS) was originally defined for surveillance purposes by the Centers for Disease Control in the US, prior to the identification of HIV as the etiological agent, as the presence of a reliably diagnosed "opportunistic" disease. This indicates the absence of known causes of the underlying immune defects, such as malignant neoplasm (Cease et al, 1987: 4249).

After the demonstration in 1984 that the human immunodeficiency virus (HIV) is the etiological agent of AIDS, reliable tests for the HIV antibody as well as for the virus itself became available. Since that time, the case definition of AIDS has undergone several revisions with regard to inclusion and exclusion criteria. Despite this complexity, the simple common denominator of AIDS is infection with HIV and subsequent development of persistent constitutional symptoms and/or AIDS defining disease, such as secondary infections, neurological disease (Cease et al, 1987: 4250).

1.2 HIV/AIDS transmission

Epidemiological studies have demonstrated that HIV/AIDS transmission can be divided into three categories (WHO, 1996: 361-368)

- 1) Sexual transmission.
- 2) Blood transmission.
- 3) Perinatal transmission.

Well into the second decade of the epidemic, there is absolutely no evidence that HIV is transmitted by casual contact or that the virus can be spread by insects, such as by a mosquito bite. No evidence exists to support any other routes of transmission, including through food, water, toilets, swimming pools, sweat, tears, shared eating and drinking utensils, second hand clothes, air borne or casual contact in the home or elsewhere (Constance and Wofsy, 1991: 47-48).

1.3 Sexual transmission.

HIV is spread primarily through sexual. This mode of transmission accounts for approximately 75% of HIV infections worldwide contact (WHO, 1996: 363). The virus can be transmitted from an infected person to his or her sexual partner: man to woman, woman to man, man to man, woman to woman and via donated semen. For both anal and vaginal intercourse, the receptive partner is at greater risk of contracting HIV than the insertive partner. In vaginal intercourse, the woman is generally more vulnerable to HIV infection than the man, because a larger surface (vagina and cervix) is exposed and semen contains a far higher concentration of HIV than vaginal and cervical fluids (Guiman et al, 1987: 2039). However, anal intercourse carries a higher risk of transmission than vaginal intercourse, because it is more likely to injure the tissue of the receptive partner. Oral sex appears to pose far less of risk of HIV transmission than vaginal and anal intercourse. For all forms of sex, the risk of transmission is greater where there are abrasions of skin or mucous membranes (Padian, 1987: 788-790).

1.4 Blood transmission

The virus can be transmitted by blood and blood products. This mode of transmission occurs from exposure to infected blood, through blood transfusion or via transplanted organs or tissue. This can occur in individuals who share contaminated needles for intravenous drug use and in those who receive transfusions of blood or blood products (Mandell et al, 1994: 920-923). The risk of contracting HIV infection from a transfusion of a unit of infected blood is estimated to be over 95%

Among drug users who inject, this route of transmission is significant because exposure is repeated so often. As a result, needle-sharing by drug users is a major cause of AIDS in many countries and in some countries it is the predominant cause (Magura et al, 1989: 459-460). A small number of cases of transmission of HIV via semen used in artificial insemination and tissues used in organ transplantation have been well documented. Therefore, donors of such tissues are now screened for HIV infection prior to transplantation.

1.5 Perinatal transmission

HIV can be transmitted from an infected mother to her fetus during pregnancy, or to her infant during delivery or during the postpartum period through breast feeding. However, it is felt that maternal transmissions to the fetus/infant occur most commonly in the perinatal period (Ryder et al, 1989: 13-19).

Studies of transmission prior to birth suggest that 30-50% of infants born of seropositive mothers will be infected before birth. There is also some evidence to suggest that women who have developed an HIV-related illness are more likely than those who are symptomless to pass on infection to their children before birth.

2. Background and Rationale

Currently, HIV/AIDS is continuing to infect persons around the world with no end in sight (WHO, 1996: 361-368). HIV/AIDS is a serious problem in South and South-East Asia. In South-East Asia, Thailand is one of the most seriously affected countries. Now, HIV/AIDS has become a major public health concern and Thailand is facing this problem seriously. The sentinel HIV/AIDS surveillance found that the sexual intercourse and the IVDU group are the high risk groups. Intravenous drug use with shared unsterilized needles was a major factor in the initial spread of HIV/AIDS in Thailand (Chin, 1995: 1-4). Also high-risk-group sexual behaviour, and unprotected intercourse with infected persons were contributory causes of the widespread HIV/AIDS.

This information will be useful for prioritizing target behaviors for HIV control among risks group. The implementation of control measures will be facilitated. The aim of this study is to identify and describe trends in the incidence of HIV/AIDS in border Southern Thailand provinces.

2.1 HIV/AIDS situation

Since the first case of AIDS was reported in the United States in 1981, the spread of the AIDS epidemic has been closely monitored as a global issue by the World Health Organization (WHO, 1996: 361-368). AIDS is threatening all countries, developed and developing, alike. The AIDS pandemic is one of the most serious public health challenges to confront mankind in recent times. As the pandemic moves through the second decade its full impact will be more evident than ever before (Nelson, 1994: 1499). Estimates released by WHO in 1996 revealed that an estimated 22.6 million people have been infected by HIV (WHO, 1996: 361-368). There are waves of epidemics with somewhat different characteristics in different regions of the world, depending upon the demographics of the country or region in question and the timing of the introduction of HIV into the population. The worst-affected area is sub-Saharan Africa, where WHO estimates over 14 million people have been infected (Ministry of Public Health, 1996: 193). The most alarming trends of HIV infection are in South and Southeast Asia, where the epidemic is spreading in some areas as fast as it was a decade ago in sub-Saharan Africa. The mid 1996 estimated cumulative total of adults infected with HIV in Asia was more than 3.8 million, 90% of them in South and Southeast Asia (WHO, 1996: 361-368). While the majority of reported infections appeared in two countries, Thailand and India, high rates of HIV spread in specific populations have been seen elsewhere in the region based on the available data on HIV infections around the world (WHO, 1997: 17-18). It is estimated that the total number of HIV infections which have developed AIDS in adults and children ranges between 30-40 million, and 12-18 million, respectively. (Ministry of Public Health, 1997: 1-4). Of all infections, 80-90% had occurred in developing countries by the end of 1996 as shown in the following figure.

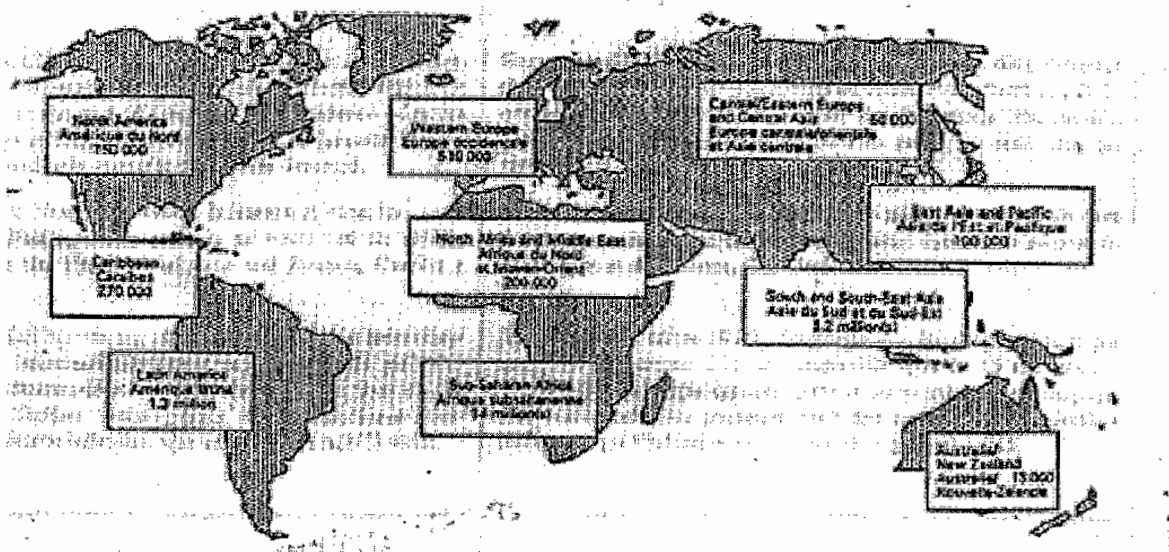


Figure 1: the global distribution of the estimated total number of adult AIDS cases from the late 1970s until the end of 1996.

A forecast of the situation in the year 2000, using WHO conservative assumptions from HIV and AIDS reports and estimates (WHO, 1997: 14) is as follows.

(a) The epidemics in North America and Europe will have stabilized, with the number of new infections and the number of deaths from AIDS coming into equilibrium. But in Central and Eastern Europe, HIV is spreading, in places quite rapidly. The Ukraine recently reported a substantial increase in newly infected injecting drug users in cities bordering the Black Sea. For example, the percentage of HIV-infected people among those injecting drugs in Nikolayev rose from 1.7% in January 1995 to 56.5% 11 months later.

(b) In Latin America, epidemics will increasingly occur among women and adolescents. In Brazil, where HIV transmission through injecting drug use predominates, high prevalence rates will occur among teenage women.

(c) The epidemic in Asia will have exceeded one million per year. HIV is spreading in India. In Bombay, over a very short period of time, HIV prevalence has reached 50%

(d) The situation is unstable; epidemics may suddenly occur, with rates of infection increasing several fold within only a few years. For instance, in South Africa between 1993 and 1995, HIV prevalence in pregnant women increased from 4.4 % to 11% in the Orange Free State and from 9.6% to 18% in KwaZulu/Natal.

Table 1: Cases of AIDS to 20 November 1996

Country	Number of cases
Africa	553,291
Americas	749,800
Asia	53,974
Europe	179,339
Oceania	7,596
World total	1,544,067

Source : WHO, Weekly Epidemiological Record, 29 November 1996.

2.2 HIV infection and AIDS in Thailand

Thailand is currently the developing country in South-East Asia and most seriously affected by HIV. Thailand was widely considered to be the "quiet achiever" within the South East Asian countries, having sustained continuous and substantial economic growth over the past two decades as it vies for 'newly industrialized country' status. Nevertheless, this should not obscure the fact that Thailand is still a predominantly (over 60%) rural, agrarian-based country (Vanichseni et al, 1989). A country of 5,140,000 square kilometers, it is divided into four geographic regions, the central region, including Bangkok capital city, the northern region, the northeastern and the southern regions. The populations of the northeastern, the northern and the southern regions are 19, 12 and 7 million, respectively. Administratively, the country is divided into 76 provinces, 784 districts, 7,100 tambols and

65,000 villages. The population was 60 million in November 1996 with a growth rate of 1.3 percent per annum approximately (Ministry of Public Health, 1997: 1-4).

The first case of full-blown AIDS was reported in Thailand in September 1987. Progressive numbers of AIDS cases as well as persons with HIV were reported throughout the following years. This was followed by an explosive spread of HIV infection among injecting drug users (IDUs) in 1987 and 1988. The virus then spread to male and female sex workers and their clients, with the result that heterosexual transmission became increasingly common. By 1991, many provinces started reporting cases of perinatal transmission. The majority of persons suffering from HIV/AIDS are in the 15-44 years age group, and include both males and females at a ratio 7.5:1 (Kongsin, 1995: 122-125).

During the ten year period since the first case was reported, the Thai government together with various organizations, both government and non-government, has been vigorously implementing a massive campaign on AIDS prevention. The prevalence of HIV infection in Thailand has shown an alarming increase. Table 2 shows the number of reported AIDS cases and symptomatic HIV patients, from the start of the epidemic to the end of November 1996, according to weekly epidemiological surveillance reports.

Table 2: Cases of HIV infection in Thailand from 1984 to November 1996.

Categories	Years			Cumulative
	1996	1995	1984-1994	
AIDS cases	12,045	18,912	22,040	52,997
HIVsymptomatic patient	5,439	7,949	8,821	22,209

Source : Ministry Of Public Health, Division of Epidemiology, Weekly epidemiological surveillance reports.

Of the 52,997 reported AIDS cases, about 85% or 44,154 were male and 8,843 female. Of these, 14,413 have died. The majority of reported cases were in the 20-49 years age group, with a peak in the 25-29 years group.

Many studies and surveys have been conducted in Thailand by different institutes to document the extent of the HIV/AIDS epidemic. In 1989, the Ministry Of Public Health conducted serological surveillance among high-risk groups and the general population in Bangkok and Pattaya. One year later, these activities were expanded to cover high risk groups in every province in the country. The surveys were conducted twice a year, in June and December. The number of HIV infections attributed to each method of transmission, according to these surveys (December 1996), are shown in Table 3

Table 3: Number of reported AIDS cases and symptomatic HIV patients for each method of transmission in Thailand at the end of December 1996.

Methods of transmission	AIDS cases	Symptomatic HIV patients
Sexual intercourse	42,596	17,787
Intravenous drug	3,470	1,715
Blood transfusion	45	18
Perinatal	2,908	878
Unknown	3,978	1,811

Source: Ministry of Public Health, Division of Epidemiology, Weekly epidemiological surveillance reports.

2.3 HIV infection and AIDS in Southern Thailand

Southern Thailand is divided into 14 provinces. In this study we focus only five provinces, comprising Songkla, Satun, Yala, Pattani and Naratiwat. These provinces share a physical border with Malaysia. Six border crossings are found at Betong in Yala province, Sungaigolok and Tak Bai in Naratiwat province, Changlon and Padang Besar in Songkla province and Talo Kabo in Satun province as illustrated in the following figure.

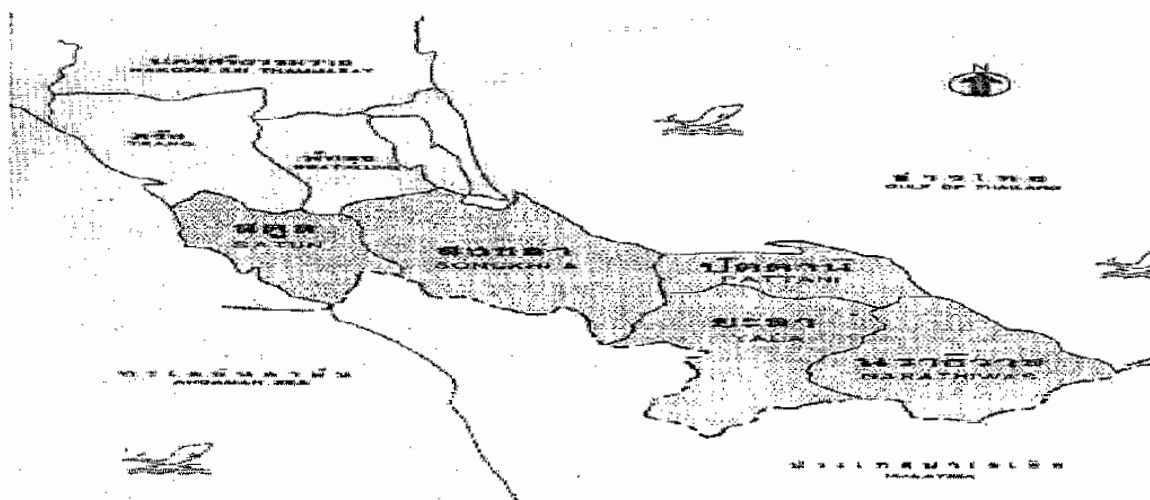


Figure 2: The location of Southern Thailand border provinces

These areas are experiencing a rapid spread of HIV with the increase of commercial sexual activity in Southern of Thailand. HIV/AIDS infection in the South of Thailand from 1988 to 1996 is indicated in Table 4. Although the infection rate appears low at present in the South of Thailand when compared with the North and Central regions, incidence of other sexually transmitted diseases and various socio-economic factors indicate that the population is still at high risk of an increase in HIV infections. The South, with its own particular ethnic and religious makeup, including Buddhism and Islam, and due to its proximity to Malaysia, has a particular set of issues to examine concerning HIV infection and AIDS. The South receives workers not only from other parts of Thailand, but also from neighboring Myanmar. The pursuit of improving their economic means and the separation

from their families places migratory workers in a vulnerable position where they are more likely to undertake risky behaviour, and places this group as a special risk group. These factors apply to both sexual and IVDU behaviour. Another important risk group is adolescent males (Ministry of Public Health, 1996: 163-167).

The Ministry Of Public Health obtains its information about AIDS cases from different sources, including government, private and non-government organizations. The Thai epidemic is spread predominantly through heterosexual. Research has shown that a large percentage of Thai men frequently visit commercial sex workers . It is common, for instance, that adolescent males have their first sexual experience with prostitutes. Infected clients then transmit the virus to their wives, girlfriends and other partners, rapidly spreading the epidemic into the general population. At the end of December 1996, the percentages of reported cases for each method of transmission in Southern Thailand were similar to the overall country and worldwide figures, sexual intercourse accounting for 65.18% of HIV/AIDS cases, IVDU for 19.07%, perinatal transmission for 5.4%, blood transfusion for 0.09% and unknown cause 11.2% (see Table 5) (Ministry Of Public Health, 1996: 264).

Table 4: HIV infection in Southern Thailand, from 1988 to the end of December 1996.

Categories	Year					
	1988-1994		1995		1996	
	illness	death	illness	death	illness	death
AIDS cases	1,253	429	1,298	358	831	179
HIV symptomatic patients	625	109	622	81	534	45

Source : Ministry Of Public Health, Division of Epidemiology, Weekly epidemiological surveillance reports.

Table 5: AIDS/HIV cases for each method of transmission in Southern Thailand at the end of December 1996.

Methods of transmission	AIDS cases	Symptomatic HIV patients
Sexual intercourse	2,874	1,275
Intravenous drug	750	464
Blood transfusion	3	3
Perinatal	235	45
Unknown	486	229

Source: Ministry Of Public Health, Division of Epidemiology, Weekly epidemiological surveillance reports.

Sexual intercourse is the primary means of transmission for HIV infection in Southern Thailand, followed by IVDU and perinatal transmission (Ministry of Public Health, 1997: 1-4).

For these reasons the epidemic will persist in the future. It presents an emergency situation. Because no cure or vaccine exists at this time, the impact of this epidemic is more than a health issue. Its impact has already been felt in a wide range of other areas, notably the family, arguably the most important institution in our society.

3. Literature Review

3.1 Prevention of HIV infection

As no HIV vaccine exists and there is no cure for HIV infection, primary prevention strategies have emphasized education to change behaviour and thereby reduce HIV transmission. Widespread voluntary testing of individuals who possibly are engaging in high-risk behaviour, together with counseling of infected individuals, should prove helpful in behavioural modification programs for infected individuals, who might otherwise have

been unaware of their HIV status and who could infect their sexual partners. The practice of safe sex is the most effective way to avoid contracting and spreading HIV infection. Abstinence from sexual relations is the only absolute, but on the other hand a number of relatively safe practices can markedly decrease the chances of transmission of HIV infection. Partners engaged in monogamous sexual relationships who wish to be assured of safety should both be tested for the HIV antibody. Any divergence from the monogamous nature of the relationship by either party places both at risk. The most effective way to prevent transmission of HIV infection among IDUs is to stop the use of injecting drugs. Addiction to injecting drugs is an illness. For those who continue to inject drugs, the avoidance of sharing of needles and other paraphernalia is the next best way to avoid transmission of infection (Mertens et al, 1996: 1365-1368).

3.2 Incidence of HIV/AIDS among sexual transmission

Commercial sex workers (CSWs) have a major role in spreading HIV in most developing and developed countries. Several studies have been performed among CSWs and a behavioural change has been observed. For example, a prospective study of Kenyan female CSWs reported an increase in the proportion of sexual encounters in which condoms were used, among those who received HIV counseling and testing plus AIDS education 39%, relative to those who did not 30% (Hee, 1994: 87).

In the Cross River State of Nigeria, a study by Wilson et al (1993), 80 CSWs were trained as peer educators, over 1.5 million condoms were distributed, and 2,732 AIDS education meetings were held for CSWs and the general public. It was found that consistent condom use increased among men (25.4% at pre-test to 44.7 % at post-test) and women (8.6% at pre-test to 58.3% at post-test) over a one year period.

Nicholus (1992); reported of 1,115 21 year old male military conscripts, of whom 77 were HIV-1 seropositive, sex with female prostitutes was identified as the principle of HIV-1 transmission. With a mathematical model including data on the conscripts' age at first sexual contact, frequency of sex with female prostitutes and province of origin, as

well as province specific HIV-1 seroprevalence in prostitutes, the probability of HIV-1 transmission per sexual contact was estimated to be 0.031 (95% confidence limits [CL] 0.025 - 0.040). In the self-reported frequency of contacts, the estimate was 0.056 (95% CL 0.041 - 0.075). The transmission probability was significantly greater among men with a history of sexually transmitted diseases.

A study from Thailand (Kunanusont, 1991: 14-20) found the following result. Among heterosexual men, unprotected sex with female prostitutes is the primary factor contributing to HIV transmission. Of 55 HIV-positive male STD clinic patients with no risk factors other than heterosexual activity, 46 had used prostitutes in the previous year.

In the spring of 1991. Theetranont et al (1991) studied a random sample of young men from Upper Northern Thailand (mean age 21 years) interviewed by trained medical students from Chiang Mai University. Serum samples were obtained and analyzed for the prevalence of HIV-1 antibodies and for syphilis, and risk factors for HIV infection were assessed. It was found that CSWs were the principal risk factor, that consistent condom use was rare, and the rates of HIV infection were rising rapidly. Sociodemographic background, homosexual behaviour, drug use and a history of STDs were found to be significant risk factors. The conclusions were that education campaigns should be intensified to reduce the frequency of contact with CSWs and to encourage consistent use of condoms.

3.3 Incidence of HIV/AIDS among the IVDU transmission

Various studies have shown that increased awareness of the problems associated with HIV/AIDS contributes to a decrease in high risk behaviour. Studies carried out amongst homosexual/bisexual men in San Francisco, New York, Chicago and other places show that in general, the trend is towards lower risk behaviour through the reduction of the number of sexual partners and an increase in condom use and monogamous relationships.

Several evaluations of the impact of counseling and testing on both IV drug-using and non drug using heterosexual persons and HIV discordant couples have been reported. As early as 1984, a survey was conducted in New York on AIDS related behavioural change among IVDUs, 145 methadone maintenance patients and 115 incarcerated drug users. They found that over 60 percent of their respondents reported making changes to avoid AIDS: no longer sharing needles although continuing IV drug use, decreased needle sharing, stopping IV drug use completely or attempting to sterilise their needles. The study also found that 48 percent had decreased their number of sexual partners, and condoms or other hygienic measures were being used in order to practise safer sex.

Ciesielski (1994: 131-141) examined behavioural change among discordant couples, and found that there were substantial reductions in unprotected sex. Consistent condom use at follow-up ranged from 44% to 90% of couples who continued to be sexually active.

A report from Liverpool indicates that since 1986, the municipal drug dependency clinic has been providing drug users with sterile needles and syringes in exchange for previously used ones. In the initial month of the program, the ratio of those in treatment to those not in treatment using the facility was 1.75 to 1.

A study from Thailand found HIV rates of up to 1% among IDU from surveillance by the Thanyarak Hospital for drug treatment (Viravaidya, 1993: 13-19), and the Bangkok Metropolitan Administration Health had reported HIV rates climbed from about 1% at the start of 1985 to 32-43% by August-September 1988. From mid 1990 to mid 1991, prevalence rates in Bangkok stabilized in the 30% range Department (Vanichseni, 1989: 75-82).

In June 1989, the first national sentinel serosurvey was undertaken in 14 provincial capitals (Ungchusak, 1991: 55). Surveys revealed high rates of HIV/AIDS infection similar to Bangkok in various other provinces around the country, even among IDUs in the most recent of the 6-monthly national surveys. In June 1991, median seroprevalence was found to be 30%, and the median provincial HIV infection rate among newly admitted male and female prisoners were 12%, and 5%, respectively.

Although self-reported behaviour may be inaccurate, reported HIV transmission may be facilitated by widespread sharing of needles. Nationwide, 20% of people sharing of needles, injection equipment, or the same 'load' of drug and significantly associated with HIV seropositivity rarely cleaned injecting equipment while only 1.7% who used public gathering sites to inject drugs reported cleaning the needles (Vanichseni et al, 1990: 45-51).

One study using a capture-recapture method estimated the number of IDUs in Bangkok to be about 36,000 . It is estimated that there are 75,000 IDUs in Thailand, of whom about 40% are HIV infected. The total number of HIV infected individuals in Thailand at 30 June 1994 was estimated to be about 500,000 - 600,000. (Nelson:1994: 1499-1501).