

AIDS Epidemic Model

**Projection for HIV/AIDS in Thailand
2010 -2030**

Summary Report

By

Thailand Working Group on HIV/AIDS Projection

ACKNOWLEDGEMENTS

The Thai Working Group on HIV/AIDS Projections (2010)

Department of Disease Control, Ministry of Public Health

Dr. Kumnuan Ungchusak

Dr. Anupong Chitvarakorn

Dr. Sombat Thanprasertsuk

Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health

Dr. Pasakorn Akarasewi

Dr. Chawetsan Namwat

Ms. Niramom Punsuwan

Ms. Supiya Jantaramanee

Mr. Watcharapol Sinor

Bureau of AIDS, TB and STIs, Department of Disease Control, Ministry of Public Health

Dr. Sumet Ongwandee

Dr. Angkana Jareanwattanachokcha

Dr. Cheewanun Lertpiriyasuwat

Mr. Surasak Thanaisawanyangkoon

National AIDS Management Committee

Dr. Petsri Sirinirun

Dr. Pairoj Saonuam

Ms. Pornthip Kemngen

National Health Security Office

Dr. Sorakij Phakicheep

Ms. Narisa Mantharngkul

East-West Center, USA

Dr. Tim Brown

Dr. Wiwat Peerapatanapokin

Policy Research and Development Institute Foundation

Dr. Wiput Phoolcharoen

Ms. Ganrawi Winitdhama

United Nation Population Fund

Dr. Taweessap Siraprapasiri

United Nation AIDS

Dr. Patchara Benjarattanaporn

Department of Health

Dr. Danai Tiwanda

Dr. Kittipong Jeng

Bangkok Metropolitan Administration

Dr. Piyathida Smutharaphut

Ms. Pannee Chaiposri

Armed Forces Research Institute of Medical Sciences, Royal Thai Army

Associate Prof. Dr. Ram Rangsin

Lt. Col. Dr. Kunakorn Kana

Thailand MOPH - U.S. CDC Collaboration

Dr. Dimitri Prybylski

Dr. Achara Teeraratkul

Ms. Suwimon Tanpradech

Ms. Kunjanakorn Pokasawad

Ms. Wiphawee Kiatchanon

Faculty of Medicine, Ramathibodi Hospital, Mahidol University

Prof. Dr. Pakwimol Supaluksuksakorn

Non Government Organizations

Ms. Thongphit Pinyasinwat, RaksThai foundation

Ms. Orapan Sangwonloy

Ms. Yaowaluk Jittakot, PSI

Ms. Surang Janyam, SWING

Data Analysis Working Group and contributors

1. Dr. Chawetsan Namwat, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
2. Dr. Panithee Thammawijaya, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
3. Mr. Surasak Thanaisawanyangkoon, Bureau of AIDS, TB and STIs, Department of Disease Control, Ministry of Public Health
4. Dr. Wiwat Peerapatanapokin, Policy Research and Development Institute Foundation
5. Ms. Ganrawi Winitdhama, Policy Research and Development Institute Foundation
6. Ms. Pannee Chaiposri, AIDS Control Division, Department of Health, Bangkok Metropolitan Administration
7. Dr. Achara Teeraratkul, Thailand MOPH - U.S. CDC Collaboration
9. Ms. Thananda Naiwattanakul, Thailand MOPH - U.S. CDC Collaboration
10. Ms. Suwimon Tanpradech, Thailand MOPH - U.S. CDC Collaboration
11. Ms. Kunjanakorn Pokasawad, Thailand MOPH - U.S. CDC Collaboration
12. Ms. Wiphawee Kiatchanon, Thailand MOPH - U.S. CDC Collaboration
13. Mr. Prin Visawakum, Thailand MOPH - U.S. CDC Collaboration
14. Ms. Chollada Nanthavisai, Thailand MOPH - U.S. CDC Collaboration
14. Ms. Niramon Punsuwan, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
15. Ms. Supiya Jantaramanee, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
16. Mr. Sahaphap Poonkesorn, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
17. Ms. Sarinya Pongpan, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
18. Mr. Watcharapol Srinor, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
19. Mr. Panuphit Thiengtham, Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health
20. Ms. Kakanang Tosangaun, HITAP
21. Ms. Pritthaporn Kingkaew, HITAP

Table of Contents

Acknowledgements

Chapter 1: Background	1
Chapter 2: Overview of the 2012 Thai National AEM Projection	2
2-I AIDS Epidemic Model (AEM)	2
1.1 AEM Structure	2
1.2 Key Inputs to the 2010 Projection	3
1.3 HIV Prevalence and the adjusted prevalence trends for fitting model	6
2-II Spectrum for HIV Projection among children	10
Chapter 3: Results of the 2012 HIV projection	11
3-I HIV Projection among 15+ by AEM	11
3-I-1 The current state of the Thai epidemic	11
3-I-2 HIV transmission among various adult at-risk sub-populations	13
3-I-3 Gender ratio in the Thai epidemic	17
3-II HIV projection among children less than 15 years old	18
Chapter 4: Recommendations for strengthening prevention in Thailand	19
Appendix A: Results of baseline projections	24

Table of figures and tables

Figures

Figure 1: Dynamics of HIV Transmission in Asian epidemics	2
Figure 2: Male and female at risk to HIV infection model in AEM	2
Figure 3: Observed HIV prevalence among “Direct sex workers” VS Adjusted HIV prevalence among “High frequency sex worker”	6
Figure 4: Observed HIV prevalence among high risk MSM in Bangkok VS Adjusted HIV prevalence among MSM	7
Figure 5: Observed HIV prevalence among IDU VS Adjusted HIV prevalence among IBBS-RDS	8
Figure 6: HIV prevalence among male military conscripts VS Adjusted HIV prevalence among general male	9
Figure 7: Median HIV prevalence among pregnant women VS Adjusted HIV prevalence among general female	9
Figure 8: Total number of adults currently living with HIV, new HIV infections and cumulative HIV infections over time in Thailand (Baseline scenario)	12
Figure 9: Trends in new infections among adults by sub-population	13
Figure 10: Changing routes of adult HIV transmission over time	13
Figure 11: New HIV infections among adult male and female populations	17

Tables

Table 1: Summary of characteristics and demographic distribution of sub-population data	3
Table 2: Summary of parameter inputs for the heterosexual, homosexual and injecting risk behaviors	4
Table 3: Actual number of new adult HIV infections by modes of transmission	14
Table 4: Percentage of new adult infections by modes of transmission	14
Table 5: Estimated number of children living with HIV, new infections, needs on antiretroviral treatment and new deaths per by year	18

Appendix tables

Table 1: Summary table of overall epidemic	24
Table 2: Summary table of number of adult living with HIV in year by gender in the baseline scenario	24
Table 3: Summary table of annual adult death by gender	25
Table 4: Summary table of new adult infections by mode of transmission	25
Table 5: HIV and deaths for all adults	26
Table 6: HIV and deaths for adult males	27
Table 7: HIV and deaths for adult females	29
Table 8: Number of new adult infections by mode of transmission	31
Table 9: Number of people living with HIV, currently needs ART and receiving ART	32
Table 10: Estimated number of children living with HIV, new infections, currently needs ART and annual deaths (Spectrum)	33

Chapter 1: Background

HIV remains a significant public health issue in Thailand despite prevention successes in the early to mid-1990s and the expansion of access to antiretroviral therapy (ART) in the 2000s. Data from the HIV sentinel surveillance system (HSS) and surveys among key affected population and the general population suggest continuing spread of HIV and the ongoing risk behaviors. The additional important strategic information to define the magnitude of the epidemic impacts which can be used to direct policy and program responses and resource allocation decisions include the total number of PLHIV and the number of new infections in each important sub-population. Started in 2005, the Thailand Ministry of Public Health by Bureau of AIDS and STI, the A2 Thailand and the Thai Working Group on HIV/AIDS Projections (2005) presented the HIV projection for HIV/AIDS in Thailand 2005-2025 using the Asian Epidemic Model. The results had been used to guide the National Strategic Plan.

With the recent updates on the HIV epidemic status and the current program responses, the various strategic information, including updated surveillance results from the HSS and community behavioral surveillance (BSS) and integrated behavioral and biomarker surveillance (IBBS) among different key populations, updated intervention program results (HIV care and antiretroviral treatment, prevention of mother to child HIV transmission, etc.), population structural change, etc. The Bureau of Epidemiology, in cooperation with the Thailand and the Thai Working Group on HIV/AIDS Projections (2010), the A2 Thailand, and the Thailand MoPH-U.S. CDC Collaboration operate the Projection for HIV/AIDS in Thailand 2010 -2030 using the recent update version of Asian Epidemic Model, entitled AIDS Epidemic Model (AEM) for HIV projection among adult 15+ years old and the Spectrum for HIV projection among children lesser than 15 years old.

Chapter 2:

Overview of the 2012 Thai HIV Projection Models

2-1. AIDS Epidemic Model (AEM) for HIV Projection among Adults

1.1 AEM Structure

AEM is a semi-empirical process model that replicates the transmission dynamics of HIV in Asian settings (Figure 1 and Figure 2). The behavioral linkages with the dynamics of HIV transmission and antiretroviral treatment program are used as the key components to calculate the number of new infections through routes of transmission, including marital sex, extra-marital (casual) sex, sex work, male-male sex, needle sharing, and mother-to-child transmission. Specific outputs of the model include number of new, current and cumulative of HIV infections and AIDS related deaths each year. The strengths of AEM on using the dynamics of the HIV epidemics derived by risk behavioral patterns led to the selection of AEM to project HIV epidemic status among adults, age 15 years old and above.

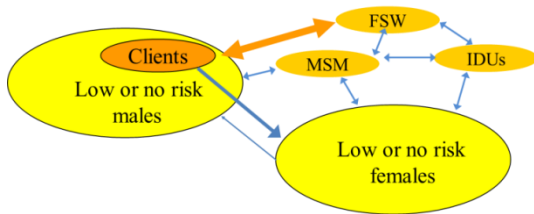


Figure 1: Dynamics of HIV Transmission in Asian epidemics

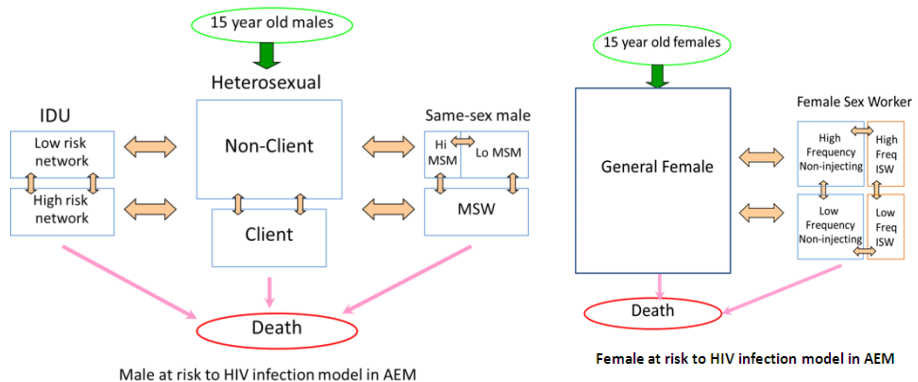


Figure 2: Male and female at risk to HIV infection model in AEM

Dynamics of HIV transmission: Behaviors and linkages between populations affect to the new infections include:

- Subpopulation: IDU, MSM, FSW, MSW, male clients of FSW, low risk male and general female
- Transmission route include homosexual, heterosexual, injecting drug using, intra-marital, extramarital (casual sex) and mother to child transmission
- Built in turn-over of each population

1.2 Key Inputs to the AEM

1.2.1 Size of sub-population and average duration in the groups

Population:

- General population: Male and female
- Higher & Lower frequency Female sex workers
- Male clients of sex workers
- Injecting Drug Users (IDUs)
- Men who have sex with men (MSM)
- Male sex worker (MSWs)

Data sources: Triangulated results from the HIV surveillance results, program based monitoring data and the population demographic distribution.

Table 1: Summary of characteristics and demographic distribution of sub-population data

Key population	Size (%15-49 adults)	Average duration in risk behaviors
General population		
- Male 15-49 y	17,033,441	-
- Female 15-49 y	18,370,367	
Clients of sex workers	10% of male	5 years
Female sex workers (FSW)	0.73% of female	
- High frequency	21.6% of all FSW (16.6% venue, 5% non-venue)	5.4 years
- Low frequency	78.4% of all FSW	4.0 years
Male sex workers	0.1% of male	5 years
MSM	3% of male	24 years
IDU	0.24% of total	15 years

1.2.2 Risk Behavioral Patterns

Data sources: Triangulated results from the HIV surveillance results, and program based monitoring data.

Table 2: Summary of parameter inputs for the heterosexual, homosexual and injecting risk behaviors

Key inputs - Heterosexual

Female sex workers	High frequency	Low frequency
Average clients per day	2.8	0.8
Average working days per week	6.5	6.5
% Condom use at last sex	82	70
Duration of sex (year)	5.4	4
STI prevalence (%)	2.4	1.6
Clients of sex workers		
Average duration of buying sex (year)	5	
% Circumcision	11.1	
Causal sex		
% Male engaging	20.0	
% Female engaging	6.9	
% Condom use at last sex	62.8	

Key inputs – Male Homosexual

Estimated size of MSM-Single group = 3% of 15-49 males

MSM	
Average duration of same-sex behavior (years)	24
# anal sex contacts last week	1.07
% MSM with female partners	25.9
% condom use in last anal sex	69.4
STI prevalence (%)	0.14
MSW	
Average duration of same-sex behavior (years)	5
# anal sex contacts last week	6.0
% MSW with female regular partners	63.2
% MSW visit female sex workers	10
STI prevalence	4.0

Key Inputs – Injecting Drug Use

Injecting behavior	
% male IDUs who share needles	25.8
% all injections shared	60.0
# injections per day	0.8
Average duration of injecting behavior (years)	15.0
Sexual behavior	
% male IDUs visiting female sex workers	10
% condom use with female sex worker	Same as FSW inputs
% condom use with spouse / regular partner	26.0
# contacts with regular partners (per week)	0.25

1.3 HIV Prevalence and the adjusted prevalence trends for fitting model

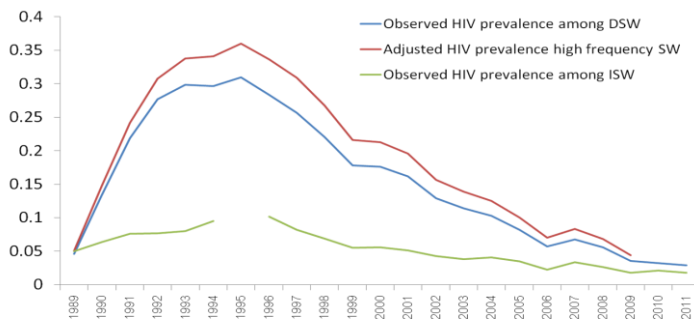
Regarding to the limited surveillance system for the selected population and/or for the selected provinces, HIV prevalence data of the following population are not directly taken for AEM workbook. The calibration process to obtain the HIV prevalence data and trends are included: FSW, MSM, IDU and General population.

1.3.1 Female sex workers - FSW

Limitations:

- The existing HSS is available among direct and indirect venue based FSW nationwide. RDS survey among street-based FSW was available only at some sentinel provinces as one-time round.
- There are increasing number of street based FSW who are ex-direct SW and higher risk to HIV infection. These women were classified as high frequency SW.

Figure 3: Observed HIV prevalence among “Direct sex workers” VS Adjusted HIV prevalence among “High frequency sex worker”



High frequency FSW: Adjusted HIV prevalence from HSS among direct venue based FSW and IBBS-RDS among street based FSW

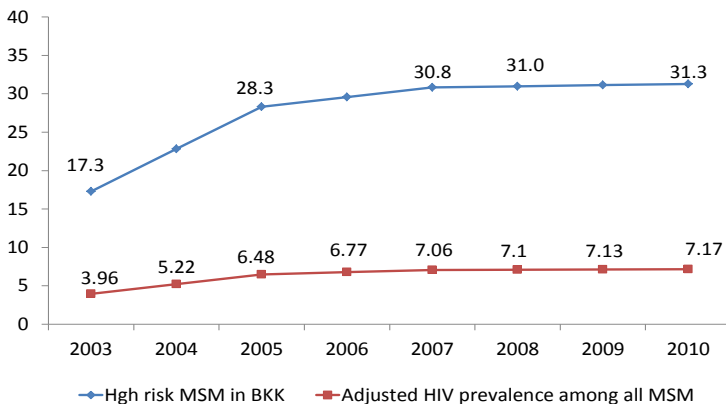
Low frequency FSW: HSS among indirect venue based FSW

1.3.2 Men who have sex with men - MSM

Limitations:

There are only HIV prevalence data among high risk MSM and TG in 12 sentinel provinces. No data representativeness for all MSM in Thailand.

Figure 4: Observed HIV prevalence among high risk MSM in Bangkok VS Adjusted HIV prevalence among all MSM



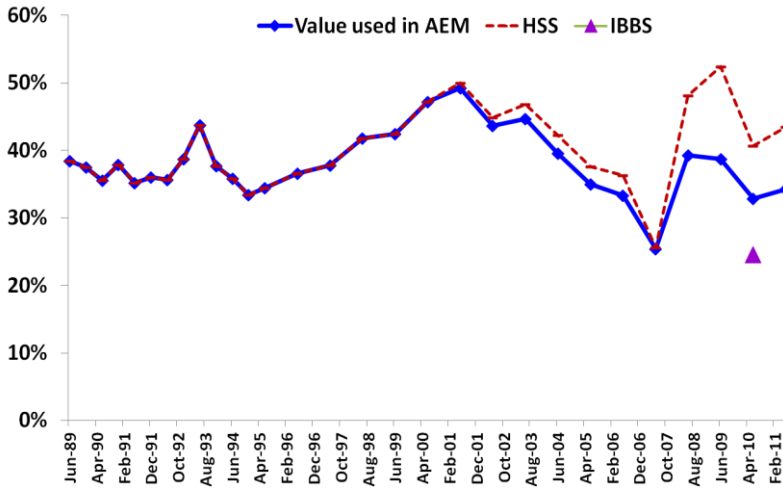
MSM: Adjusted HIV prevalence to represent all type of MSM (MSM-high risk, low risk and TG) by triangulating the different data sources and calibrating for weighted HIV prevalence among MSM-single group.

(Data sources: BSS data among male military conscripts, male factory workers and male students, 2006 community based household survey, IBBS among MSM and TG in 12 sentinel provinces and IBBS among male military conscripts)

1.3.3 Injecting Drug Use - IDU

HIV prevalence among IDU is adjusted from HSS at drug treatment centers nationwide and the IBBS-RDS among IDUs in 3 sentinel provinces.

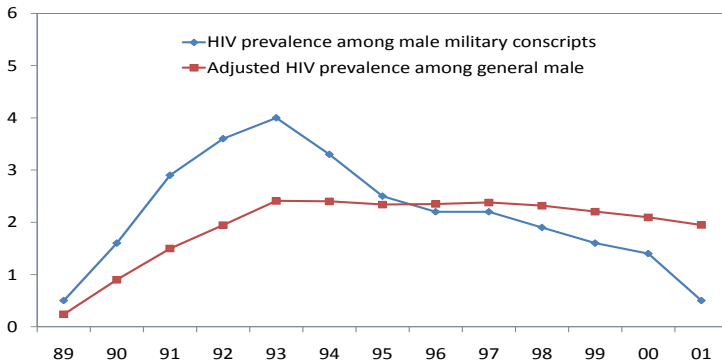
Figure 5: Observed HIV prevalence among IDU VS
Adjusted HIV prevalence among IBBS-RDS



1.3.4 General Population- Male

Adjust HIV prevalence among male military conscripts (age 21-24 years) to represent the general male population (age 15-49 years) using “Male conscript to general male converting tool”

Figure 6: HIV prevalence among male military conscripts VS Adjusted HIV prevalence among general male
Pre-ART Era, Thailand, 1989-2001

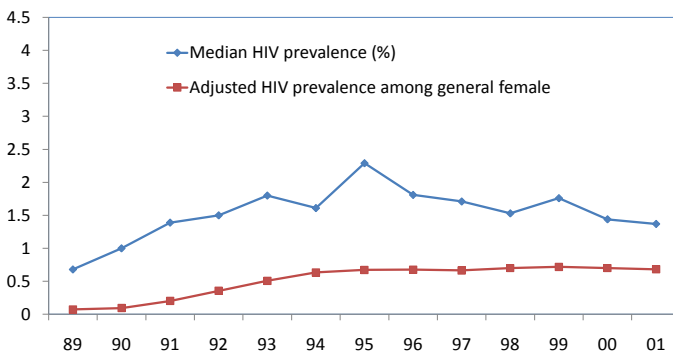


Source: HIV serosurveillance, The Armed Force s Research Institute of medical Science

1.3.5 General Population- Female

Adjust HIV prevalence among ANC pregnant women to represent the general female population (age 15-49 years) using “ANC to general female converting tool”

Figure 7: Median HIV prevalence among pregnant Women VS Adjusted HIV prevalence among general female
Pre-ART Era, Thailand, 1989-2001



Source: HIV serosurveillance, Thailand, Bureau of Epidemiology

2-II. Spectrum for HIV Projection among Children

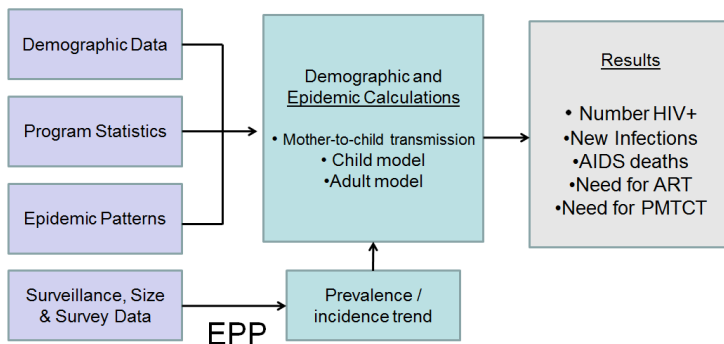
Spectrum is the HIV/AIDS modeling tool that integrated with EPP (Estimation and Projection Package) – base on curve fitting model using HIV prevalence trends and sizes for key populations. Generally, Spectrum results revealed the HIV projection among all age-group. For Thailand HIV projection, the spectrum results will be limited to children only.

For Thailand Spectrum, we use the HIV direct incidence result from Thailand 2013 AIDS Epidemic Model (AEM) to apply in Spectrum software 2014.

The structures of Spectrum are:

- Demographic data from the UN Population Divisions 2012 Population Prospects. These new demographic data are informed by the latest census and surveys available from each country.
- Program Statistics: we update the information of PMTCT, Adult ART and Child treatment
- Epidemic Patterns which are based on persons aged 15-49 years, will now be adjusted by the number of people receiving ART aged 15-49 years instead of persons aged 15 years and older
- Surveillance, Size and Survey Data: apply the HIV direct incidence result from Thailand 2010 AIDS Epidemic Model (AEM) – epidemic curve

The structure of Spectrum



Chapter 3:

Summary Results of the 2010 HIV Projection

3-I. HIV Projection among 15+ by AEM

It needs to be emphasized that the number of new infections for each year in this projection has been based on the assumption that risk behaviors and STI rates remain constant from 2010 onwards, called “baseline scenario”. If risk behaviors or STI rates change by any means, the number of new infections will increase or decrease accordingly.

3-I-1: The current state of the Thai epidemic

From the baseline scenario, the following was state of the Thai HIV epidemic in 2010:

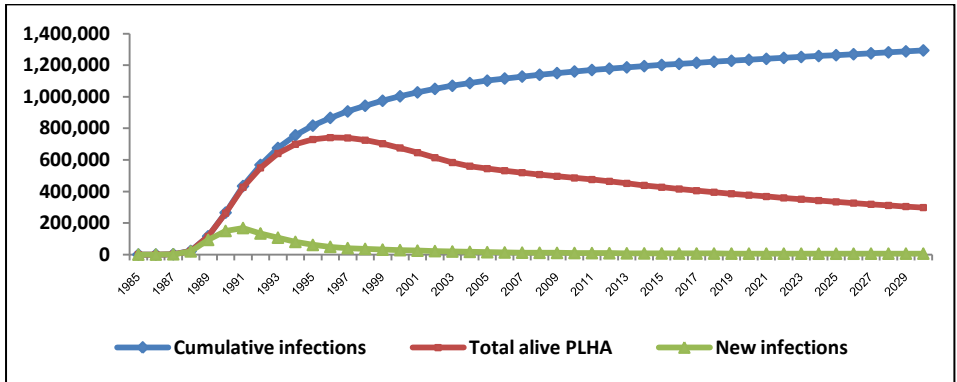
- 1,160,465 adults have been infected with HIV in Thailand since the start of the epidemic.
- 674,822 of these people have subsequently died of AIDS.
- 485,646 people are currently living with HIV.
- 10,011 new infections will occur that year.

The state of the Thai HIV epidemic in 2012 was:

- 1,178,686 adults have been infected with HIV in Thailand since the start of the epidemic.
- 714,603 of these people have subsequently died of AIDS.
- 464,086 people are currently living with HIV.
- 8,719 new infections occur this year.

Trends of numbers of adults currently living with HIV, new HIV infections and cumulative HIV infections over time in Thailand from 1985 to 2030 are demonstrated in Figure 8. After 2012, numbers of new HIV infections and adults currently living with HIV will continually decrease and are estimate to be and 6,139 respectively in 2030.

Figure 8: Total number of adults currently living with HIV, new HIV infections and cumulative HIV infections over time in Thailand (baseline scenario)



3-I-2: HIV transmission among various adult at-risk sub-populations

The Thai epidemic has significantly changed its character as the epidemic has moved among the various at-risk populations, and prevention efforts have succeeded or failed in the different groups. The following figures and tables illustrate the changing dynamics of the Thai HIV epidemic.

Figure 9: Trends in new infections among adults by sub-population

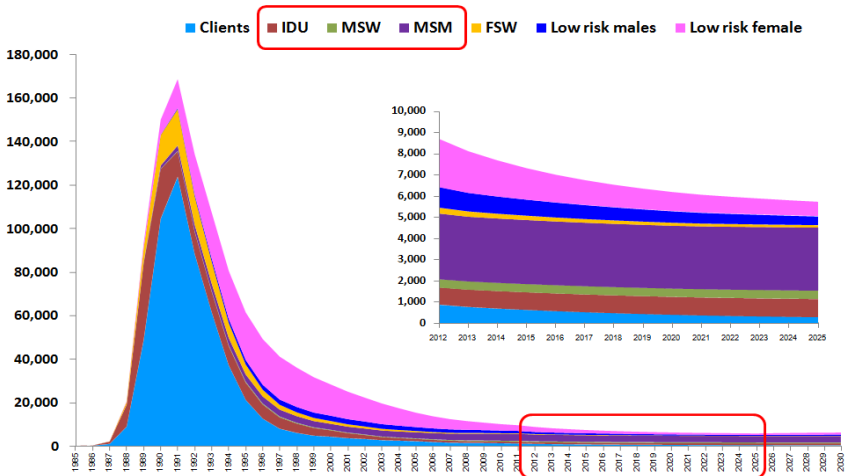


Figure 10: Changing routes of adult HIV transmission over time

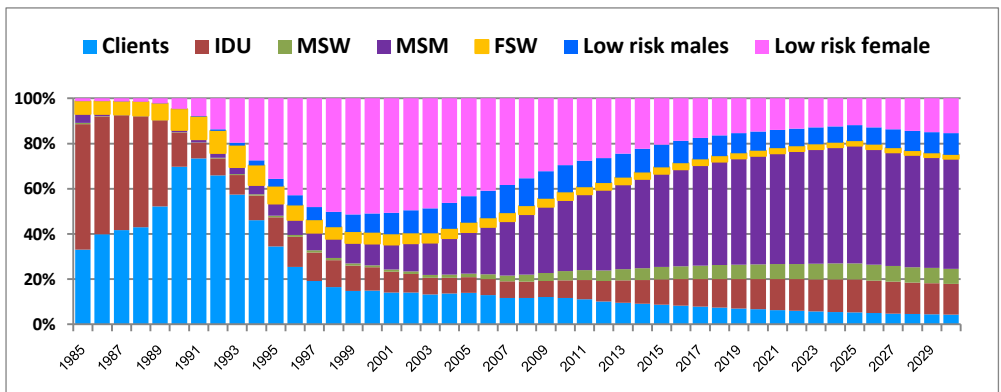


Table 3: Actual number of new adult HIV infections by modes of transmission

Year	1988	1995	2000	2005	2010	2015	2020	2025	2030
Husband to wife	96	21,576	13,790	6,125	2,716	1,342	793	593	873
Wife to husband	3	2,111	2,264	1,578	1,081	659	465	352	574
Male-male sex	31	3,393	2,934	3,026	3,544	3,418	3,367	3,385	3,396
Needle sharing	9,999	7,795	2,906	1,054	779	815	826	836	840
Sex Work	10,165	26,059	5,437	2,646	1,432	793	522	389	318
Casual sex	3	393	912	837	459	298	213	167	138
Total	20,498	61,328	28,241	15,266	10,011	7,324	6,186	5,722	6,139

Table 4: Percentage of new adult infections by modes of transmission

% new infections from each transmission route	1988	1995	2000	2005	2010	2015	2020	2025	2030
Husband to wife	1	35	49	40	27	18	13	10	14
Wife to husband	0	3	8	10	11	9	8	6	9
Male-male sex	0	6	10	20	35	47	54	59	55
Needle sharing	49	13	10	7	8	11	13	15	14
Sex Work	50	42	19	17	14	11	8	7	5
Casual sex	0	1	3	5	5	4	3	3	2
Total	100	100	100	100	100	100	100	100	100

The HIV epidemic in Thailand first started among IDUs in mid-1980s. In 1988, transmission among IDUs and among FSWs and their clients were driving the epidemic with 49% and 50% of new infections respectively (Table 4 and 5). However, by early 1990s the transmission among FSWs and their clients and then clients to their wives dominated the epidemic; accounting for almost eighty percent of new infections. During the 1990s, IDUs gradually came to account for around 10% of new infections, owing to the absence of strong prevention efforts for them. Similarly, from the 1990s, new infections among MSM accounted for consistently increasing proportions of total new infections, largely due to the failure to mount substantial prevention efforts in this population.

In early-1990s, HIV transmission between sex workers and clients was converted greatly as a result of the national 100% condom use program while transmission between husband and wife still kept rising as infected men passed HIV to their regular female partners. By 2000, 49% of new infections were occurring through husband-to-wife transmission, while transmission among sex workers and clients accounted for less than one-fifth of new infections. In the same period, wife-to-husband transmission contributed 10%: this means a total of 59% of new infections occurred between husbands and wives in 2000. By this year, IDU and MSM sub-populations were each contributing around 10% of total new infections. The epidemic has become quite heterogeneous. Of the groups contributing in a major way to new infections, only clients were receiving much prevention support through programs targeted at sex work. Very limited pilot-level programs existed to address IDU, MSM or husband-to-wife transmission.

It should be noted that the annual number of new adult HIV infections declines slowly from 10,000 in 2010 to just over 7,000 and 6,000 in 2015 and 2020 respectively. Despite decreasing trend, the transmission is still in a rather high level, and indicates the need for expanded and targeted prevention efforts to address the ongoing sources of new infections.

Transmission between spouses is the major contributor to new infections

In 2010, transmission from husbands to wives contributes 27% of total new infections, while transmission from wives to husbands contributes 10%, resulting in a total 37% of all transmissions occurring within marriages and regular partnerships. Although these transmissions would decreased and be accounted for 27% of total new infections in 2015, partly due to reducing numbers of male clients infected from FSW, the lack of specific prevention programs to address this transmission route will result in 2,000 new infections occurring among this group in that year.

Transmission in this group is largely a delayed consequence of infections in other at-risk populations such as FSWs and clients, IDUs and MSM. At-risk males and

former sex workers who contracted HIV through their risk behaviors transmit HIV to their current or future spouses over a period of many years. Because the STI levels are low, this transmission occurs gradually at a rate of about 10% per year. This provides opportunities to intervene, both by preventing the primary infection of the at-risk partner and by encouraging expanded testing and protective measures in couples in which that one or both partners has a history of risk behavior.

Transmission among MSM is growing rapidly

MSM have been a neglected population in terms of prevention in Thailand. While there was substantial focus on them in mid-1980s, that focus was lost once the IDU and heterosexual epidemics exploded. MSM contract HIV in regular partnerships, casual partnerships and through contacts with both MSWs and FSWs; their contribution to the overall Thai epidemic is growing rapidly. In 2010, this transmission route contributed 35% of new infections. If effective prevention efforts for MSM are not expanded, this will increase to 54% and 59% by 2020 and 2025 respectively. Although the overall new adult infections are declining over time, the lack of good HIV prevention efforts in this population means that almost 3,400 MSM will continue to be infected every year for the foreseeable future. The transmission may not stop there either since about one third of MSM also have sex with women [van Griensven et al. 2005], including FSWs, casual female partners and wives. Thus, HIV infections will not remain contained within this male sub-population unless accessible potent preventive programs are provided.

Transmission among IDUs remains an ongoing problem

In 2010, new infections among IDUs accounted for 8% of total new infections. By 2015, this proportion will increase to 11%. Again, this is a legacy of weak prevention, which will continue to produce more than 800 infections per year for the next decade unless IDU prevention efforts are strengthened substantially.

Transmission among FSWs and their clients continues

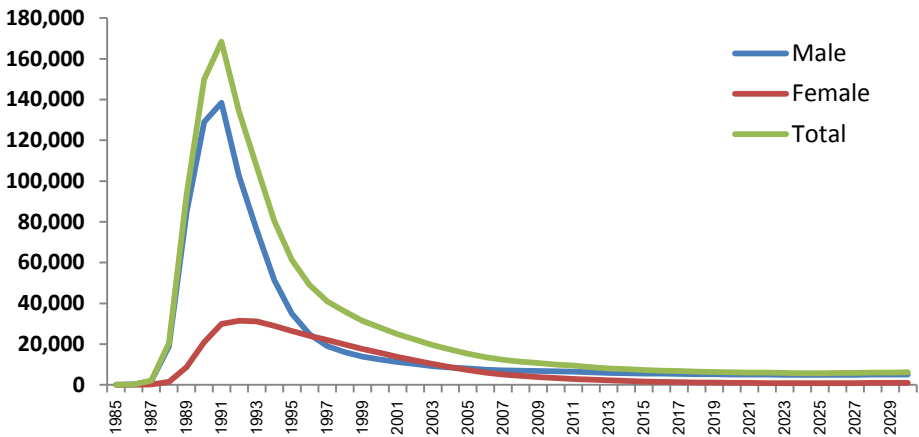
In 2010, the proportion of new infections among sex workers and clients is about 14% of new infections, decreasing very gradually to 11% in 2015. This will still produce almost 800 infections a year in 2015. As the recent national survey has shown, only about 80% of clients used a condom the last time they visited a sex worker, so there is room for substantial improvement and strengthening of sex work prevention efforts.

Transmission from premarital and extramarital sex does contribute today

The number of new infections from extra-marital (casual) sex non-marital is lower than the number of new infections from all the groups discussed previously. However, since condom use is still at only 35.8% in casual sex; casual sex contributes around 4% of new infections in 2015 and fewer after that. While these numbers do decline slowly over time, casual sex will continue to contribute 100 to 300 new infections a year for the next decade.

3-I-3: Gender ratio in the Thai epidemic

Figure 11: New HIV infections among adult male and female populations



As seen in Figure 11, in the early days of the Thai HIV epidemic, the number of males newly infected was substantially higher than the number of females because of the high number of clients of sex workers contracting HIV and the high rates of transmission among at-risk male populations such as MSM and IDUs. In 1990, the ratio of males to females infected was 6.1. With the radical reductions in transmission between clients and sex workers, the resulted from successful prevention efforts and the rise in husband-to-wife transmission in the mid-1990s, new infections among females actually exceeded those among males from 1995 to 2004. By 2005, when the number of new infections in males and females were roughly equal, the ratio of current males to females living with HIV had fallen to 1.6. However, today and for the near future, continuing transmission among MSM and IDUs has once again made new male infections more common.

3-II. HIV Projection among children less than 15 years old

The results on HIV projection among children lesser than 15 years old were calculated, using Spectrum. The results were shown in Table 5

Table 5: Estimated number of children living with HIV, new infections, needs on antiretroviral treatment and receiving ART by year.

	2000	2005	2010	2015
Living with HIV				
Total	7,836	11,065	10,136	6,769
Male	3,993	5,637	5,174	3,464
Female	3,843	5,428	4,963	3,305
New infections				
Total	1,378	748	212	88
Male	709	386	109	45
Female	669	363	103	43
Currently ART needs				
Total	2,929	5,370	8,004	5,606
Male	1,492	2,735	4,085	2,868
Female	1,435	2,634	3,919	2,738
Receiving ART				
Total	835	5,010	7,039	5,142
Male	426	2,555	3,590	2,622
Female	409	2,455	3,449	2,520

Chapter 4:

Recommendations for strengthening prevention in Thailand

Similar to the previous exercise in 2005, this present projection suggests that over ten thousand new infections will continue occurring each year with a growing number of people urgently in need of treatment. Therefore increased and sustained support for both effective prevention and treatment in Thailand is still critical. The current findings emphasizes mixed nature of new infections, which are divided among all of the at-risk populations in the country, calls for a multi-faceted response that provides access to prevention services for all these populations, and ensures referrals and access to ARV care, as necessary. Some of the specific needs that arise from the projection work are described below.

Prevention interventions for sero-discordant couples (couples where one partner is infected and the other is not)

Husband-to-wife and wife-to-husband transmission continually dominate new infections in the Thai epidemic, yet programs for discordant couples have been limited. Effective responses require first making couples aware of their discordance and then offering them strategies for reducing transmission. Such strategies might include:

- Development and promotion of VCT for HIV among couples and those preparing to marry.
- Campaigns to encourage those with risk behavior to learn their status and act on it to protect their partners. Couples counseling services should be offered when one partner is identified as HIV positive.
- Interventions to support condom use among discordant couples.
- Effective prevention program for “upstream” risk population, e.g. MSM, IDUs, or sex workers, can help limiting new infection among couples.

Prevention for MSM, MSWs and transgendered individuals

Both in Thailand and regionally, the fastest growing transmission route in Asian epidemics is male same-sex behavior, in particular anal sex. The high prevalence among MSM around the country documented in the TUC studies is a cause for serious concern. As the projection shows, around 3,300-3,500 new infections will occur among MSM and MSWs each year and by the mid-2020s around 60% of overall annual new infections will come from these populations. Scale-up of interventions for these sub-populations is urgently needed, including:

- Advocate policy makers for awareness of this urgent situation, making strategic planning and prioritization and commitment to provide long-term strong support.

- Partner and community resource mobilization for comprehensive multilevel interventions covering individual, MSM/MSWs/TG group, and social structure or contextual levels.
- Mobilization of the MSM community to take a more active and aggressive role in HIV prevention in their ranks.
- Ensuring ready access to condoms and lubricants in all settings in which male same-sex behaviors occur to increase condom use rate up to at least 80%.
- Expanded access for MSM and MSWs to subsidized or low-cost public and private sector STI services.
- Expansion of the establishment-based components of the 100% condom use program to cover MSWs and their clients.
- Development and scale-up of outreach and services for non-establishment based MSWs, MSM and transgender in cruising areas.
- Expanded efforts to promote learning one's status, improved access to testing in community-friendly venues and referrals to treatment services when needed for MSM, MSWs and transgendered individuals.

Prevention intervention for FSWs and clients

While transmission through sex work has gone down from the high levels at the earlier stages of the epidemic, it continues to be a significant contributor to the epidemic. The number of clients in the country still exceeds 2 million; this creates a large population with elevated risk. The shift to indirect forms of sex work has made traditional and structured approaches less effective, and the health care reforms of the late 1990s have weakened public sector STI treatment and outreach services nationwide. Some of the specific changes needed are:

- Revisiting and maintaining the 100% condom use program to make it workable in the current contexts of more indirect sex work and the existing health infrastructure that has more limited capacity for STI/HIV outreach.
- Ensuring ready access to condoms and continued high levels of condom use in commercial sex through targeted subsidy programs.
- Development and expanded intervention for non-brothel based sex workers and other non-establishment sex workers who may not be reached by the 100% condom use program.
- Strengthening of STI treatment and outreach services for those engaging in sex work, both sex workers and clients.
- Expanded access to HIV testing and referrals for treatment when needed for sex workers.

Prevention for drug users (IDUs and non-IDUs)

Despite their important role since the early days of the Thai epidemic, programs for IDUs have been weak and limited. As a result, the prevalence among IDUs remains high at over 40% nationwide. The growing use of non-injecting drugs by youth, such as methamphetamines, also contributes substantially to potential sexual risk for HIV. In light of this, programs needed include:

- Expanded efforts to reduce drug use among the young, both injecting and non-injecting. This will involve both primary prevention to keep people from starting drugs and expanded treatment programs to help them stop using.
- Campaigns to raise awareness and knowledge about HIV transmission through needle sharing and sexual activity and their prevention among drug users.
- Policy changes to create a more enabling environment for HIV prevention among drug users and reduce barriers to accessing clean equipment.
- Efforts to reduce needle sharing among IDUs through outreach and peer education among IDUs in communities and expanded clinic-based programs to reduce needle sharing.

Prevention for youth

Half of the sex work clients in Thailand are aged 15-24, as are most of the sex workers. Many drug users are also young. Furthermore, casual sex is a small but important source of new infections, many of which will occur among young people. Youth behaviors in Thailand are in flux, creating further risk for acquiring HIV among the large generation of young Thai people. In light of these changes, a number of programs are needed, including:

- Targeted outreach and peer education for young clients, sex workers, MSM and drug users. The needs of young members of these populations are unique, and they have the highest risk in each of these groups. This means they should receive special attention in prevention efforts.
- A program that promotes HIV/AIDS awareness and knowledge among general youth and provides them with the necessary knowledge and skills sets for HIV prevention before they engage in risk behaviors. Where possible, such programs should be specially targeted at youth with higher risk, e.g., street children, out-of-school youth and vocational school students.
- Expansion of access to friendly and non-judgmental STI and other reproductive health services for youth to reduce the contribution of STIs to HIV transmission and address other urgent issues such as youth pregnancy and STIs.

Prevention for marginalized people and people in closed settings

A number of specific populations, including migrant laborers, fishermen, prisoners and illegal immigrants have elevated risk for HIV, and need access to prevention and health services. Such programs need to be designed with appropriate attention to language, culture, beliefs and barriers to accessing health and social services. Appropriate interventions to reduce sexual transmission risk and needle sharing should also be made available in closed/supervised settings such as prisons and youth detentionment facilities.

Control of STIs remains an urgent priority

Despite past successes in controlling STIs, the health care reforms started in 1997 have resulted in fewer STI clinics and less outreach to promote prevention and STI care among sex workers [MOPH Thailand and WHO Regional Office 2005]. Most clinics under the new hospital-based STI service system are not fully functional; frequently lacking outreach, partner notification, condom promotion and counseling services. Sex workers were also reported less likely to use the new services because of the unfriendly attitudes of other patients and hospital staff, and inadequate attention to their specific needs and concerns.

STI control is critically important for HIV prevention as the risk of HIV transmission is higher with a concurrent STI. Changes in the level of STIs often indicate changes in levels of condom use and can serve as an early warning system for rising HIV transmission. Therefore, it is critical to strengthen these services and guarantee that quality STI services are readily available again. Quality and friendly STI services are needed not only for FSWs and their clients as in the past, but also for MSM, MSWs and young people who engage in higher-risk sexual behaviors. Specific attention should be paid to their needs as services are expanded.

Availability of VCT services

While VCT services should be widely available both for prevention and treatment purposes, their availability has been limited and the services are not well attended. There are few targeted services meeting the specific needs of populations such as MSM, sex workers, drug users and higher risk youth; some of the groups most in need of VCT. In addition to HIV testing, the package of services available should include couples counseling, disclosure counseling, premarital counseling, and referrals to CD4 testing and treatment when needed. Positive prevention to protect the partners of the PLHIV should also be a part of VCT and treatment service. Making testing more widely available and promoting it among those at risk are essential if people are to start treatment before they become seriously ill. Initiating treatment earlier will improve survival and reduce other medical care costs for those with HIV.

Expansion of treatment access and support for adherence

The public system to provide quality ART has been scaled up rapidly. However, better links need to be made between sex workers, IDUs, MSM and MSWs, and available treatment services. Targeted prevention efforts in these populations should include a 'referral to treatment' component for anyone showing signs of HIV-related illness or testing HIV positive. VCT services should be used to get people into therapy in a timely fashion. An effort to expand access to CD4 testing is also needed if people are to receive ARVs before falling ill, which will improve survival and quality of life.

As the costs associated with second line therapies are likely to make up a large part of the total costs of ART, the Royal Thai Government needs to continue its efforts to ensure affordable access to these drugs. Effective prevention, coupled with efforts to keep these costs down will ensure the sustainability of publicly-financed ART.

Finally, expansion of programs to support those on ART is needed, e.g., the community support groups which have worked with hospitals to assist those starting ART. This type of social and emotional support is critical to promote understanding of adherence, provide a supportive environment that improves adherence and support the continued well-being of PLHIV. With improved adherence, survival will improve, the need for second line therapies will be reduced and the development of ARV drug resistance will be reduced.

APPENDIX A: RESULTS OF BASELINE PROJECTIONS

Table 1: Summary table of overall epidemic (AEM)

Year	New HIV in year	Living w/ HIV end year	Cumulative HIV end year	New deaths in year	Cumulative deaths end year
1985	12	15	12	0	0
1990	149,865	262,562	265,889	2,383	3,329
1995	61,328	729,361	817,397	30,734	88,039
2000	28,241	676,005	1,003,254	55,079	327,252
2005	15,266	544,743	1,102,423	30,805	557,683
2010	10,011	485,646	1,160,465	20,422	674,822
2015	7,324	426,707	1,201,840	19,246	775,136
2020	6,186	376,634	1,234,670	15,196	858,038
2025	5,722	334,192	1,264,077	13,914	929,888
2030	6,139	297,879	1,294,077	12,796	996,201
2035	5,759	266,881	1,323,569	11,668	1,056,750
2040	5,458	239,548	1,351,421	10,618	1,112,064
2045	5,355	217,361	1,378,345	9,393	1,161,353
2050	5,283	200,133	1,404,899	8,441	1,205,364

Table 2: Summary table of number of adult living with HIV in year by gender in the baseline status (AEM)

Year	Male	Female	Total	M/Fratio
1985	15	1	15	
1990	231,442	31,120	262,562	7.4
1995	563,213	166,148	729,361	3.4
2000	458,146	217,860	676,005	2.1
2005	332,393	212,351	544,743	1.6
2010	280,879	204,767	485,646	1.4
2015	241,165	185,542	426,707	1.3
2020	212,366	164,268	376,634	1.3
2025	190,084	144,108	334,192	1.3
2030	171,328	126,551	297,879	1.4
2035	156,236	110,644	266,881	1.4
2040	143,525	96,023	239,548	1.5
2045	133,449	83,913	217,361	1.6
2050	125,694	74,440	200,133	1.7

Table 3: Summary table of annual adult death by gender (AEM)

Year	Male	Female	Total
1985	0	0	0
1990	2,220	163	2,383
1995	25,428	5,306	30,734
2000	43,043	12,036	55,079
2005	23,652	7,153	30,805
2010	14,343	6,079	20,422
2015	13,303	5,943	19,246
2020	9,973	5,223	15,196
2025	9,195	4,719	13,914
2030	8,476	4,320	12,796
2035	7,707	3,960	11,668
2040	7,062	3,557	10,618
2045	6,363	3,030	9,393
2050	5,835	2,606	8,441

Table 4: Summary table of new adult infections by mode of transmission (AEM)

Year	Injection Drug User	Male sex with male	Commercial sex (Client & FSW)	Female from Husband	Male from wife	Casual sex	Total
1985	7	1	5	0	0	0	13
1990	22,327	633	119,822	6,834	169	81	149,866
1995	7,795	3,393	26,059	21,576	2,111	393	61,327
2000	2,906	2,934	5,437	13,790	2,264	912	28,243
2005	1,054	3,026	2,646	6,125	1,578	837	15,266
2010	779	3,544	1,432	2,716	1,081	459	10,011
2015	815	3,418	793	1,342	659	298	7,325
2020	826	3,367	522	793	465	213	6,186
2025	836	3,385	389	593	352	167	5,722
2030	840	3,396	318	873	574	138	6,139
2035	839	3,381	270	714	437	117	5,758
2040	829	3,331	176	679	341	102	5,458
2045	814	3,268	218	713	252	90	5,355
2050	798	3,204	211	778	210	82	5,283

Table 5: HIV and deaths for all adults (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
1985	12	12	15	0	0
1986	173	185	188	1	1
1987	2,108	2,294	2,283	13	14
1988	20,498	22,792	22,656	125	139
1989	93,232	116,023	115,081	807	946
1990	149,865	265,888	262,562	2,383	3,329
1991	168,485	434,374	426,393	4,655	7,985
1992	133,977	568,351	549,682	10,688	18,673
1993	107,223	675,574	640,709	16,196	34,868
1994	80,495	756,069	698,767	22,437	57,305
1995	61,328	817,397	729,361	30,734	88,039
1996	49,082	866,478	741,187	37,255	125,294
1997	41,005	907,483	739,237	42,955	168,249
1998	35,975	943,458	724,885	50,327	218,576
1999	31,554	975,012	702,843	53,596	272,172
2000	28,241	1,003,254	676,005	55,079	327,252
2001	24,908	1,028,162	646,023	54,891	382,143
2002	22,182	1,050,344	614,181	54,024	436,167
2003	19,500	1,069,844	583,449	50,232	486,399
2004	17,313	1,087,157	560,282	40,479	526,878
2005	15,266	1,102,423	544,743	30,805	557,683
2006	13,621	1,116,044	531,689	26,675	584,358
2007	12,316	1,128,360	519,187	24,819	609,177
2008	11,406	1,139,766	507,190	23,403	632,580
2009	10,688	1,150,454	496,057	21,820	654,400
2010	10,011	1,160,465	485,646	20,422	674,822
2011	9,503	1,169,967	475,638	19,511	694,333
2012	8,719	1,178,686	464,086	20,270	714,603
2013	8,134	1,186,820	451,258	20,962	735,565

Table 5 (Cont.): HIV and deaths for all adults (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
2014	7,695	1,194,515	438,629	20,325	755,890
2015	7,324	1,201,839	426,707	19,246	775,136
2016	7,012	1,208,852	415,538	18,182	793,317
2017	6,752	1,215,604	405,032	17,258	810,575
2018	6,533	1,222,137	395,092	16,472	827,048
2019	6,347	1,228,483	385,644	15,794	842,842
2020	6,186	1,234,669	376,634	15,196	858,038
2021	6,056	1,240,725	367,933	14,758	872,796
2022	5,961	1,246,686	359,347	14,547	887,343
2023	5,874	1,252,560	350,837	14,384	901,727
2024	5,795	1,258,355	342,384	14,247	915,974
2025	5,722	1,264,077	334,192	13,914	929,888
2026	5,827	1,269,904	326,316	13,703	943,592
2027	5,931	1,275,835	318,750	13,497	957,089
2028	6,017	1,281,852	311,490	13,277	970,365
2029	6,086	1,287,938	304,536	13,040	983,405
2030	6,139	1,294,077	297,879	12,796	996,201

Table 6: HIV and deaths for adult males (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
1985	12	12	15	0	0
1986	162	173	175	1	1
1987	1,957	2,130	2,119	13	14
1988	18,956	21,086	20,956	119	133
1989	84,492	105,578	104,682	766	899
1990	128,980	234,559	231,442	2,220	3,119
1991	138,522	373,081	365,725	4,240	7,359
1992	102,552	475,632	458,994	9,283	16,642
1993	76,022	551,654	521,187	13,829	30,470
1994	51,455	603,109	553,769	18,873	49,343
1995	34,872	637,981	563,213	25,428	74,771
1996	24,942	662,923	557,775	30,381	105,151
1997	19,017	681,940	542,357	34,434	139,585
1998	16,053	697,992	517,565	40,846	180,431
1999	13,816	711,808	488,664	42,717	223,148
2000	12,525	724,333	458,146	43,043	266,191
2001	11,163	735,496	427,138	42,170	308,361
2002	10,224	745,720	397,531	39,831	348,191
2003	9,186	754,906	370,015	36,703	384,894
2004	8,576	763,482	348,015	30,576	415,470
2005	8,029	771,511	332,393	23,652	439,121
2006	7,528	779,039	319,549	20,371	459,493
2007	7,151	786,190	308,055	18,646	478,138
2008	6,984	793,174	297,746	17,292	495,430
2009	6,871	800,045	288,505	16,112	511,543
2010	6,717	806,762	280,879	14,343	525,886
2011	6,584	813,346	274,085	13,378	539,264
2012	6,142	819,488	266,074	14,154	553,417
2013	5,899	825,387	257,293	14,680	568,097
2014	5,751	831,139	248,847	14,197	582,294
2015	5,621	836,760	241,165	13,303	595,598
2016	5,504	842,264	234,276	12,393	607,991
2017	5,399	847,663	228,065	11,610	619,601

Table 6 (Cont.): HIV and deaths for adult males (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
2018	5,304	852,967	222,407	10,962	630,563
2019	5,218	858,185	217,199	10,426	640,989
2020	5,139	863,325	212,366	9,973	650,961
2021	5,075	868,399	207,763	9,678	660,640
2022	5,033	873,432	203,241	9,555	670,194
2023	4,994	878,427	198,776	9,459	679,654
2024	4,959	883,386	194,352	9,383	689,036
2025	4,926	888,312	190,084	9,195	698,231
2026	4,966	893,278	185,979	9,071	707,302
2027	5,007	898,286	182,042	8,945	716,246
2028	5,043	903,328	178,282	8,803	725,049
2029	5,072	908,401	174,710	8,644	733,693
2030	5,094	913,495	171,328	8,476	742,169

Table 7: HIV and deaths for adult females (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
1985	1	1	1	0	0
1986	12	13	13	0	0
1987	151	164	163	1	1
1988	1,542	1,706	1,699	6	7
1989	8,740	10,446	10,399	40	47
1990	20,884	31,330	31,120	163	210
1991	29,963	61,293	60,668	416	626
1992	31,426	92,719	90,688	1,406	2,031
1993	31,202	123,921	119,523	2,367	4,398
1994	29,040	152,961	144,998	3,564	7,962
1995	26,456	179,416	166,148	5,306	13,268
1996	24,139	203,556	183,413	6,875	20,143
1997	21,988	225,544	196,880	8,521	28,664
1998	19,922	245,466	207,321	9,481	38,145

Table 7(Cont.): HIV and deaths for adult females (AEM)

Year	New HIV in year	Cumulative HIV in year	Living with HIV end year	New deaths in year	Cumulative deaths end year
1999	17,739	263,205	214,180	10,879	49,025
2000	15,716	278,921	217,860	12,036	61,061
2001	13,746	292,667	218,884	12,721	73,782
2002	11,958	304,625	216,649	14,193	87,975
2003	10,314	314,939	213,434	13,529	101,505
2004	8,736	323,675	212,267	9,904	111,409
2005	7,237	330,912	212,351	7,153	118,562
2006	6,093	337,005	212,140	6,304	124,865
2007	5,165	342,171	211,132	6,173	131,039
2008	4,422	346,593	209,443	6,111	137,150
2009	3,817	350,410	207,552	5,708	142,858
2010	3,294	353,704	204,767	6,079	148,937
2011	2,919	356,622	201,552	6,133	155,070
2012	2,576	359,198	198,013	6,116	161,186
2013	2,235	361,433	193,965	6,282	167,468
2014	1,944	363,377	189,782	6,127	173,595
2015	1,703	365,080	185,542	5,943	179,538
2016	1,508	366,588	181,262	5,788	185,326
2017	1,353	367,941	176,966	5,649	190,975
2018	1,229	369,170	172,685	5,510	196,485
2019	1,129	370,299	168,445	5,369	201,854
2020	1,047	371,345	164,268	5,223	207,077
2021	981	372,326	160,170	5,079	212,156
2022	928	373,255	156,106	4,992	217,149
2023	880	374,134	152,061	4,925	222,074
2024	836	374,970	148,032	4,864	226,938
2025	796	375,765	144,108	4,719	231,657
2026	861	376,626	140,337	4,633	236,290
2027	924	377,550	136,708	4,553	240,842
2028	974	378,524	133,208	4,474	245,316
2029	1,014	379,538	129,826	4,396	249,712
2030	1,045	380,583	126,551	4,320	254,032

Table 8: Number of new adult infections by mode of transmission (AEM)

Year	Injection Drug User	Male sex with male	Commercial sex (Client & FSW)	Female from Husband	Male from wife	Casual sex	Total
1985	7	1	5	0	0	0	13
1986	90	1	80	2	0	0	173
1987	1,060	5	1,016	27	0	0	2,108
1988	9,999	31	10,165	296	3	3	20,497
1989	35,038	179	55,914	2,046	33	22	93,232
1990	22,327	633	119,822	6,834	169	81	149,866
1991	11,031	1,376	142,296	13,130	481	172	168,486
1992	9,563	2,134	102,883	18,199	941	258	133,978
1993	8,942	2,774	72,900	20,852	1,433	322	107,223
1994	8,579	3,151	44,742	21,823	1,834	365	80,494
1995	7,795	3,393	26,059	21,576	2,111	393	61,327
1996	6,418	3,478	15,756	20,629	2,279	522	49,082
1997	5,173	3,443	10,111	19,265	2,362	651	41,005
1998	4,239	3,314	7,731	17,561	2,368	761	35,974
1999	3,503	3,126	6,098	15,655	2,326	847	31,555
2000	2,906	2,934	5,437	13,790	2,264	912	28,243
2001	2,299	2,936	4,524	12,015	2,178	956	24,908
2002	1,813	2,962	4,005	10,372	2,055	976	22,183
2003	1,432	2,989	3,284	8,902	1,914	979	19,500
2004	1,181	3,005	2,986	7,449	1,740	951	17,312
2005	1,054	3,026	2,646	6,125	1,578	837	15,266
2006	972	3,120	2,183	5,144	1,458	743	13,620
2007	900	3,258	1,784	4,355	1,357	662	12,316
2008	824	3,390	1,642	3,703	1,260	588	11,407
2009	745	3,500	1,588	3,164	1,168	521	10,686
2010	779	3,544	1,432	2,716	1,081	459	10,011
2011	804	3,591	1,289	2,393	1,000	426	9,503
2012	792	3,495	1,096	2,098	855	382	8,718
2013	799	3,448	968	1,803	769	348	8,135
2014	808	3,432	874	1,550	710	321	7,695
2015	815	3,418	793	1,342	659	298	7,325
2016	819	3,405	723	1,176	612	277	7,012
2017	821	3,394	663	1,045	571	258	6,752
2018	823	3,385	610	942	532	242	6,534

Table 8 (Cont.): Number of new adult infections by mode of transmission (AEM)

Year	Injection Drug User	Male sex with male	Commercial sex (Client & FSW)	Female from Husband	Male from wife	Casual sex	Total
2019	825	3,376	563	859	497	227	6,347
2020	826	3,367	522	793	465	213	6,186
2021	828	3,365	487	741	435	201	6,057
2022	831	3,372	457	698	411	191	5,960
2023	833	3,377	432	660	389	183	5,874
2024	835	3,382	409	624	370	174	5,794
2025	836	3,385	389	593	352	167	5,722
2026	838	3,388	371	666	405	160	5,828
2027	839	3,390	355	735	458	153	5,930
2028	840	3,392	341	792	504	148	6,017
2029	840	3,395	329	837	542	142	6,085
2030	840	3,396	318	873	574	138	6,139

Table 9: Number of people living with HIV, currently needs ART and receiving ART (AEM)

Year	Living w HIV	Currently need ART	Receiving ART
1995	729,361	44,813	0
1996	741,187	57,023	0
1997	739,237	67,677	0
1998	724,885	75,856	0
1999	702,843	81,673	0
2000	676,005	85,572	898
2001	646,023	88,382	3,590
2002	614,181	91,750	11,624
2003	583,449	96,417	21,816
2004	560,282	107,852	51,290
2005	544,743	126,636	94,368
2006	531,689	146,146	117,001
2007	519,187	164,116	137,898
2008	507,190	180,341	156,740
2009	496,057	194,951	173,700
2010	485,646	208,445	191,319
2011	475,638	220,366	205,155
2012	464,086	299,367	232,816
2013	451,258	299,782	245,306

Table 9(Cont.): Number of people living with HIV, currently needs ART and receiving ART (AEM)

Year	Living w HIV	Currently need ART	Receiving ART
2014	438,629	299,157	251,958
2015	426,707	298,079	256,926
2016	415,538	296,673	260,496
2017	405,032	294,927	262,910
2018	395,092	292,824	264,366
2019	385,644	290,371	265,028
2020	376,634	287,593	265,038
2021	367,933	284,431	262,536
2022	359,347	280,749	259,211
2023	350,837	276,580	255,429
2024	342,384	271,976	251,237
2025	334,192	267,162	246,826
2026	326,316	262,105	242,193
2027	318,750	256,872	237,406
2028	311,490	251,537	232,580
2029	304,536	246,168	227,747
2030	297,879	240,817	222,928

Table 10: Estimated number of children living with HIV, new infections, currently needs ART (Spectrum)

Total: Male and Female

Year	Living w HIV	New Infection	Currently need ART	Receiving ART
2000	7,836	1,378	3,133	835
2001	8,759	1,336	3,607	1,670
2002	9,638	1,272	4,133	2,505
2003	10,280	1,030	4,642	3,340
2004	10,762	884	5,132	4,175
2005	11,065	748	5,584	5,010
2006	11,191	627	6,133	5,845
2007	11,139	508	6,707	6,687
2008	10,930	400	7,089	6,985
2009	10,586	301	7,619	7,179
2010	10,136	212	7,880	7,039
2011	9,597	176	7,548	6,584
2012	8,952	148	7,074	5,915
2013	8,251	122	6,524	5,142
2014	7,525	104	5,922	5,142
2015	6,769	88	5,416	5,142

Male only

Year	Living w HIV	New Infection	Currently need	Receiving ART
2000	3,993	709	1,598	426
2001	4,459	687	1,840	852
2002	4,906	655	2,108	1,278
2003	5,235	530	2,367	1,703
2004	5,481	455	2,617	2,129
2005	5,637	386	2,848	2,555
2006	5,703	323	3,128	2,981
2007	5,679	262	3,421	3,410
2008	5,575	206	3,615	3,562
2009	5,401	155	3,886	3,661
2010	5,174	109	4,019	3,590
2011	4,901	91	3,849	3,358
2012	4,574	76	3,608	3,017
2013	4,218	63	3,327	2,622
2014	3,849	54	3,020	2,622
2015	3,464	45	2,762	2,622

Female only

Year	Living w HIV	New Infection	Currently need	Receiving ART
2000	3,843	669	1,535	409
2001	4,300	648	1,767	818
2002	4,732	617	2,025	1,227
2003	5,045	500	2,275	1,637
2004	5,280	429	2,515	2,046
2005	5,428	363	2,736	2,455
2006	5,488	304	3,005	2,864
2007	5,460	246	3,286	3,277
2008	5,355	194	3,474	3,423
2009	5,184	146	3,733	3,518
2010	4,963	103	3,861	3,449
2011	4,696	85	3,699	3,226
2012	4,378	72	3,466	2,898
2013	4,033	59	3,197	2,520
2014	3,676	51	2,902	2,520
2015	3,305	43	2,654	2,520