HIV/AIDS ESTIMATES AND PROJECTIONS 2005 - 2010

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Preface

The World Health Organization (WHO) and the Joint United Nations Program on HIV/AIDS (UNAIDS), estimate the by the end of 2004 there were approximately 36-44 million people living with HIV globally, and more than 30 million had already died of AIDS. Each year, there are approximately five million people infected with HIV and more than three million die of AIDS. Each day, there are approximately 14,000 people infected with HIV and 95% of them live in developing countries.

In Vietnam, the case of HIV infection was detected at the end of December 1990 in Ho Chi Minh City. By 2005, the HIV/AIDS epidemic had spread out to all of the 64 provinces and all cities, with 93% of districts having HIV infected people. In some provinces, people infected with HIV/AIDS have been detected in all districts. By the end of May 2005, there had been 95,871 cases of HIV infection detected, among whom 15,618 cases had progressed to AIDS, and 8,975 people had died. However, these statistics underestimate the exact number of people infected with HIV/AIDS because of the variety of transmission routes as well as long incubation without symptoms. As a result, the number of HIV infections is in reality much higher than that reported. Therefore, besides report statistics, the estimates and projections process plays a very important role in providing information for policy advocacy and planning, as well as HIV/AIDS prevention and care interventions.

Over the years, the Ministry of Health has collaborated with professionals and experts of different Ministries and Departments as well as international experts in conducting periodic HIV/AIDS estimates and projections. In order to prepare for the development and implementation of National Strategies on HIV/AIDS Prevent and Control to 2010 with a Vision to 2020, the Ministry of Health has collaborated with Ministries, Departments and professionals from Family Health International (FHI), East-West Center (EWC), UNAIDS, WHO and other organizations to conduct HIV/AIDS estimates and projections in Vietnam till 2010. The research results are incorporated in the publication of "HIV/AIDS Estimates and Projection in Vietnam 2005-2010". This publication is made with the aim of providing colleagues with essential information regarding the HIV/AIDS estimates and projection procedures and methods, as well as results of these calculations up to 2010, I am pleased to introduce this publication to all audiences and hope this book will be used as a useful reference for HIV/AIDS intervention planning and resource management in the provinces.

On the occasion of publishing this publication, we would like to acknowledge and give our sincerely gratitude to different Ministries and Departments, Family Health International, UNAIDS, WHO and other international organizations for their support and assistance in HIV/AIDS estimates and projections activities as well as other HIV/AIDS prevention activities in Vietnam.

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Acronyms

AIDS	Acquired Immuno-Deficiency Syndrome
ANC	Antenatal care
CDC	Centers for Disease Control and Prevention
EPP	Estimation and Projection Package
EWC	East - West Center
FHI	Family Health International
FSW	Female Sex Worker
HCMC	Ho Chi Minh City
HIV	Human Immunodeficiency Virus
IDU	Injecting Drug User
MOLISA	Ministry of Labor, Invalids and Social Affairs
MSM	Men have sex with men
NIHE	National Institute for Hygiene and Epidemiology
PMTCT	Prevention mother-to-child transmission
STD	Sexually transmitted diseases
TB	Tuberculosis
UNAIDS	Joint United Nations Program on HIV/AIDS
USAID	United States Agency for International Development
WHO	World Health Organization

Agencies and institutions involved in the process of projection and estimation of HIV/AIDS 2005 - 2010

- *General Department of Preventive Medicine and HIV/AIDS Control, Ministry of Health*
- *Sub-Committee on HIV Surveillance, National Institute for Hygiene and Epidemiology (NIHE), Ministry of Health*
- *Family Health International (FHI)*
- *East – West Center*
- *Joint United Nations Program on HIV/AIDS (UNAIDS)*
- *World Health Organization (WHO)*

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I. Background – a process to carefully analyze the epidemic in Vietnam

Estimation and projection of HIV/AIDS plays an increasingly important role in the planning and evaluation of national HIV/AIDS programs. National programs need to know where the epidemic is currently concentrated to assist in directing their prevention efforts. They need estimates of future burden and impacts to anticipate prevention and care needs and to adequately plan for impact mitigation. And, increasingly, international bilateral and multilateral aid agencies are insisting countries show that their programs are making a difference as a condition of continued funding.

In concentrated epidemics, such as that in Vietnam, the estimation of HIV is not a straightforward process. While HIV surveillance data has been routinely collected since 1994 in Vietnam, the translation of surveillance results into estimates requires a careful review of what populations surveillance data represents and critical analysis of existing data from numerous other sources. Because HIV is heavily concentrated in specific at-risk populations, estimates must be based on the size and prevalence of HIV in each of these populations. The extent of infection beyond these at-risk populations must be determined through samples in lower risk populations such as women attending antenatal clinics or men being recruited into the military. Careful analysis of the consistency and representativeness of existing HIV surveillance data, the findings from other ad hoc studies, and the validity of available size estimates must be made. Only by critically reviewing the full range of available sources of information can one hope to prepare informed estimates and projections to assist policymakers and planners.

Since June of 2003, the Vietnam Technical Working Group on HIV Estimates and Projections has been undertaking an intensive, careful, in-depth and comprehensive process to use the available data to ascertain the current levels of HIV infection and the short-term trends in the Vietnamese national epidemic. The purpose of this process has been to triangulate from the numerous available data sets to arrive at a range for the current number of HIV infections that is

consistent with available data, realistic in its trends over time, and represents a best scientific estimate of how the HIV epidemic is currently progressing in the country. This paper will describe that process, discuss the data and assumptions used in making the estimates, and present the Technical Working Group's best estimate of the current HIV situation in Vietnam.

Past estimation and projection approaches

The last estimation and projection process in Vietnam was conducted in 2000 using data available through the end of 1999. This data included sentinel surveillance data from 20 provinces, reported HIV infections and AIDS cases, and estimates of the sizes of the general population and the key at-risk populations: injecting drug users (IDU), female sex workers (FSW), and sexually transmitted disease (STD) patients. This process made use of a point prevalence estimate for 1999 and applied the EPIMODEL program developed in the mid-1980s by the World Health Organization to make projections on a national basis. The process used then is described here so that the reader can understand the improvements made in this round of estimates and projections.

Estimation of HIV seroprevalence rates

For the purposes of national estimation, the Northern, Central and Southern regions were considered separately in the 2000 process. The provinces in Vietnam were classified into seven ecological regions, which had different cultural socio-economic conditions that influenced HIV transmission.

- *For provinces with rather good HIV testing and reporting systems, the HIV seroprevalence rates were used directly, with the condition that the sample size of each population had to exceed 50.*
- *For provinces that had not yet conducted sentinel surveillance, had no information about HIV prevalence rates, or had tested less than 50 for each estimation population, the mean of HIV prevalence rates for provinces in that ecological region was used (once again including only those sentinel sites and non-sentinel sites with sample size of more than 50).*

Estimation of population sizes

High and low estimates for the size of the general population and each at-risk population were made in each province and then summed to obtain the overall population for the country.

Numbers of injecting drug users (IDUs) were estimated from the reports of the Ministry of Labor, Invalids and Social Affairs (MOLISA). This data was then compared against reports from the Provincial AIDS Committees and adjusted, if necessary.

- *The lowest number of IDUs was calculated by multiplying the reported number of drug users by the proportion injecting, data which was obtained from a MOLISA study done in 1998.*
- *The highest number of IDUs was estimated by using the estimated number of drug users from MOLISA*

Numbers of female sex workers (FSWs) were estimated using data from the same sources used for estimation of IDU.

- *The lowest number of FSWs was calculated as the higher of the number reported by MOLISA and the number estimated by the provinces.*
- *The highest number of FSWs was taken to be the MOLISA value.*

Numbers of STD patients were estimated based on the official reported data of the National Institute of Dermatology and Venereology, which maintains a vertical reporting system for STDs from provincial to central level.

- *The lowest number of STD patients was estimated by using the reported number.*
- *The highest number of STD patients was calculated by multiplying the reported number by 7, based on the opinions of STD experts that only 15% of STD patients went to public STD clinics for treatment.*

Data on the population aged 15-49 in all provinces in 1999 was provided by the General Statistics Department.

Estimation of number of HIV infections

In each province, HIV infections were estimated for each population. These values were then summed for each province and then the provinces summed to yield the national estimate. In detail the calculation was as follows for each group:

- *Number of HIV infections in each high risk population (IDUs, FSWs, STD patients) = estimated seroprevalence rate x estimated population size*
- *Number of HIV infected males = (estimated number of males aged 15-49 x seroprevalence among antenatal women) + estimated number of infected IDUs + 22% of HIV infected STD patients**
- *Number of HIV infected females = (estimated number of females aged 15-49 x seroprevalence among antenatal women) + number of HIV infected CSWs + 78% of HIV infected STD patients**

- *Number of HIV infected infants = number of infected females aged 15-49 x birth rate (1.8%) x assumed prenatal transmission rate (30%)*

*The gender distribution of HIV infected STD patients was based on the gender distribution of reported STD patients (22% of reported patients were male and 78% were female)

Projection of HIV/AIDS

These estimates were then fed into the EPIMODEL program to make projections. HIV infection was projected separately among the heterosexual population based on the high and low scenarios for HIV estimates in 1999 and among the population of injecting drug users for the whole country. The specific input parameters used in running EPIMODEL were:

For the heterosexual population a 1993 start year with low and high estimates for 1999 of 91,000 and 117,000 HIV infections respectively. Transmission was assumed to continue after 1999 and the position and gamma parameters in EPIMODEL were set to 242 and 5. Annual HIV growth was set at 1%, and prevalence became stable in 2006. An annual overall population growth rate of 1.8% was assumed.

For the IDU population: a 1989 start year with low and high estimates for 1999 of 16,000 and 24,000 HIV infections respectively. Transmission was assumed to continue after 1999 and the position and gamma parameters in EPIMODEL were set to 280 and 5. Annual HIV growth was set at 6% reaching 40% in 2005.

In both cases above, mean progression from HIV to AIDS was taken to be 10 years

Results of the 2000 process

By the end of 1999, the cumulative estimate of HIV infections in Vietnam was estimated to be between 91,000 to 117,000. It was projected that by the year 2000, the cumulative number of HIV infections would grow to between 118,000 and 152,000, that between 11,600 and 14,600 would develop AIDS, and that 9,500 to 12,000 would die as a result of AIDS. By the year 2005, it was projected that the cumulative number of HIV infections would reach between 198,000 and 256,000, that 52,000 to 66,000 would develop AIDS, and that between 47,000 and 60,000 would die as a result of AIDS.

Since this last estimation and projection process was conducted in 2000, several improvements in tools and data have occurred. UNAIDS has developed a new Estimation and Projection Package (EPP), which substantially increases the sophistication of the models used to better fit the types of epidemics seen in

higher risk populations over that of EPIMODEL, while also allowing countries to be modeled easily at sub-national levels. The available data in the country has also been expanding – with the expansion of the surveillance system to 30 and then 40 provinces, several additional ad hoc surveys that have been done in the intervening time, and expanding availability of size estimates for at-risk populations from behavioral surveillance. Based upon these improvements, a new and more in-depth estimation and projection process was undertaken in 2003. This new process is described in the next section.

II. The process of preparing the current 2005 - 2010 estimates

In June 2003, two training workshops on Estimation and Projection in Asia were organized in Bangkok by UNAIDS, WHO, CDC, Family Health International and the East-West Center. Attendees from each Asian country were trained in the use of new estimation and projection methodologies developed by UNAIDS and its partners. These new methodologies focus on improving estimates in low level and concentrated epidemics in a locally relevant manner and include:

- *UNAIDS workbooks. These spreadsheets allow the user to define the populations affected by the epidemic in a country-specific manner. The user then enters high and low estimates for the HIV prevalence and the size of each of these populations and sums them to obtain a point estimate of the total number of HIV infections. The primary inputs required are the number of people and the HIV prevalence in a given year for each user-defined population. If enough data is locally available, HIV point estimates can be made for different years to obtain trends in the epidemic.*
- *UNAIDS Estimation and Projection Package (EPP). The EPP allows the user to define the relevant populations in a country-specific manner, and to enter the sizes and HIV prevalence data for each of these populations. EPP then fits a smooth curve to the HIV trends in each population and sums them to obtain the trends in national HIV prevalence over time. EPP has more intensive data requirements than the spreadsheets in that the user must enter HIV prevalence trends over time in each defined population, rather than point estimates of prevalence as in the case of the spreadsheets.*

Four technical staff from Vietnam were present at the Bangkok meeting and initiated a six-month long process to prepare revised estimates and projections for Vietnam, building on the methodologies presented at the meeting and the extensive data available in the country. Upon their return they organized the Technical Working

Group and began collating the available data for critical review and use in the estimation process.

The work began by requesting each province to send complete surveillance and case finding results to NIHE. These were organized into spreadsheets containing the surveillance data for each sentinel population and the case finding data from the provinces. Based upon this data and a review of the trends in the provinces, 12 provinces were selected for follow-up field visits. The provinces selected for field visits included: a) some provinces with inconsistent data or epidemiologically unrealistic trends; b) a balanced set of provinces in all three geographic regions of the country (North, Central and South); and c) a mix of both sentinel and non-sentinel provinces. These field visits occurred between Aug 15th and 26th. During the visits, the team sought out other sources of data in the provinces, examined possible sources of bias in the data, explored the issues affecting data quality, and considered problems of staffing, training and protocol implementation.

After the completion of the field visits, a technical meeting was held from September 3-6 in Ha Long to present the results of the field visits, review the quality of the data available, decide on projection methodologies and prepare a concrete plan for completion of the estimates and projections. In attendance were national consultants from NIHE, the AIDS Division of the Ministry of Health, Quang Ninh provincial health authorities, and other research and governmental agencies in Vietnam, along with international consultants from Family Health International, East-West Center, UNAIDS and WHO.

At this meeting a careful review was made of the HIV prevalence trends for injecting drug users, sex workers, STD clinic attendees, antenatal clinic women, and military recruits, using both the surveillance data itself and the findings from the field visits. Outliers, i.e., data points that were inconsistent with other data from the same population, were removed in several provinces. Additional data cleaning needs and specific follow-up questions were defined for some provinces. The following decisions were made regarding the data to be used in establishing trends for estimation and projection:

- *For injecting drug users, a combination of the center-based and community-based results would be used to establish trends, except in provinces where prisons were used to fill surveillance quotas.*
- *For sex workers, trends would be determined from center data, as community samples were often biased downward and often did not actually recruit sex workers for testing.*
- *For pregnant women, overall antenatal clinic surveillance trends would be used, but the more complete set of PMTCT tests for pregnant women*

in the provinces in 2002 would be collected from the provinces and compared with the surveillance data to ensure consistency.

- *For STD patients, only male data would be used, as female data collection was comparatively recent and the composition of the samples was unknown. In some provinces problems were identified with recruiting sufficient sample size, resulting in lower risk dermatology patients being used to fill quotas – data from these provinces was excluded from the analysis.*
- *For the military, the decision was made not to use the trends as changes in recruitment and HIV testing practices over time meant that the populations sampled and procedures had changed and results were not directly comparable from one year to the next. However, a decision was taken that the 2002 data would be used as an indication of current prevalence levels in the general male population after downward adjusting the data for injecting drug use and male clients of sex workers (see below).*

At the conclusion of the meeting, next steps were identified, to ensure that existing data was gathered and used and that estimates and projections for the country would be realistic. These included:

- *Gathering more data at the provincial level on the urban or rural residence of clients at antenatal clinic surveillance sites and conducting further analysis of existing data at NIHE to determine an appropriate urban/rural ratio for HIV prevalence in the country.*
- *Collecting and preparing summary tables of other studies of HIV prevalence in the provinces to verify that they were consistent with the HIV levels found in surveillance data.*
- *Preparing detailed tables of the size estimates for the important populations from a variety of sources including the Census, MOLISA, mapping exercises conducted for behavioral surveillance, provincial health authorities estimates of population sizes, and size estimates from other ad hoc studies.*
- *Developing maps of HIV prevalence in the country for each key population based on both 2002 and cumulative HIV surveillance data. These maps were used to determine how to cluster the provinces that were epidemiologically similar to one another to reduce statistical fluctuations in the estimates.*
- *Preparing detailed spreadsheets of reported HIV and AIDS by age, gender, province and year to be used in the validation of the projection results.*

In the month and a half following the Ha Long meeting these intermediate outputs were prepared. From October 13th to 22nd, 5 technical staff from NIHE, Hanoi Medical College and the AIDS Division went to Bangkok to work closely with East-West Center and FHI staff in preparing draft estimates. While in Bangkok the following tasks were undertaken:

- *The maps of HIV prevalence in different populations were used to group the provinces of Vietnam into 11 clusters that had similar epidemiological patterns and were geographically contiguous. The map showing these clusters is included in the Annex. Data for each surveillance population within these clusters was then grouped to determine the overall prevalence trends at the cluster level.*
- *A decision was made to divide the population into 6 key sub-populations for purposes of estimation. These sub-populations and the corresponding prevalence trends to be used were:*
    - *Injecting drug users (with prevalence taken from all sentinel surveillance data). In Ho Chi Minh City and the Central Coast cluster two populations of drug users were used – one representing an epidemic in the early 1990s among older drug users and the other representing an epidemic starting in the late 1990s among younger drug users.*
    - *Sex workers (with prevalence taken from center-based sentinel surveillance data).*
    - *Clients of sex workers (with prevalence approximated by HIV prevalence among STD patients)*
    - *Male non-clients of sex workers (with prevalence approximated by downward adjustment of the military conscript data for 2002 to remove current injecting drug users and current clients of sex workers).*
    - *Urban females (with HIV prevalence taken from ANC sentinel data since most sentinel sites are in urban area).*
    - *Rural females (with HIV prevalence set at one-half the level for urban women based on analysis of provincial reports on urban/rural residence of clients of ANCs in 2002).*

    NOTE: *Men who have sex with men are acknowledged as a risk population in Vietnam, but due to the lack of surveillance data, they have not been directly included as a separate population in the estimates presented here. While they are indirectly included through the general population male infections estimated from*

military conscripts, in the future as epidemiological data becomes available, serious consideration should be given to including them directly as a population in the estimates.

- *A decision was taken to use the Estimation and Projection Package to prepare two sets of estimates: a low scenario and a high scenario. The low scenario would use the MOLISA numbers for the size of populations of IDUs, adjusted upward by 20% to correct for underreporting, and the high scenario would use twice these values. For sex workers, the low scenario used the MOLISA numbers and the high scenario twice this value. For clients the low scenario used 5% of adult males and the high scenario 10% of the adult males. For other populations, census data was used. The rationale behind these size estimates and the choice of prevalence trends is explained in more detail in the following section. The high and low scenarios provide an estimate of the range of uncertainty in the prevalence levels for Vietnam and the median of the two provides an estimate of the current prevalence levels in the country.*
- *EPP curve fits were then prepared for each sub-population in each cluster. These were then summed automatically within EPP and the national results used as inputs to the Spectrum program to prepare the estimates shown in the following sections.*
- *The resulting modes of transmission by risk category, male/female ratios, and levels of infection were then validated against reported AIDS cases and HIV infections and other ad hoc studies of prevalence in the country.*

The assumptions made during this process on population sizes and prevalence levels are laid out in more detail in the next two sections. This is followed by the detailed results of this process in the remainder of the report. These estimates represent the Vietnam Working Group's best technical assessment of the current HIV situation in Vietnam and the current trends in the national epidemic based upon the extensive data available in the country.

III. Assumptions on population size and seroprevalence in 2005 - 2010

Two scenarios were prepared in 2003: a low scenario and a high scenario. These reflect a plausible range for HIV infections in Vietnam at the present time. This section documents the assumptions about population size and HIV prevalence used in each scenario. In each scenario HIV infections were calculated in each of six key populations for each of the 11 clusters chosen. These six populations are:

- *Injecting drug users. Their needle sharing puts them at high risk and HIV prevalences above 40% are not uncommon around the country.*
- *Female sex workers. Multiple sexual partners and other sexually transmitted diseases put them at higher risk of HIV, and HIV prevalence in this population has been growing in the last few years reaching 10 to 15 percent in some places.*
- *Clients of sex workers. Men who visit sex workers place both themselves and their wives at elevated risk of HIV. Most men contracting STDs are clients of sex workers and the rates of HIV among STD patients are also growing, typically to the 1 to 2 percent range now.*
- *General population males who are not currently IDUs or clients of sex workers. At first it might not seem these men are at high risk for HIV and most of them are not. However, a number of them in the past may have shared needles as IDUs or visited sex workers, even though they may have stopped these riskier behaviors now. These men, along with low level heterosexual transmission from female partners, ensure that there will be some HIV among the general male population, even those who are not currently injecting or visiting sex workers.*
- *Two general female populations – urban women and rural women. Women in Vietnam who are not sex workers are primarily at risk through higher risk male partners (IDUs or clients), but prevalence levels among these*

women have been growing nationally, so they cannot be excluded from the estimates. Analysis of existing surveillance data showed that urban women had twice the HIV prevalence of rural women, so they were broken out as two separate populations for estimation and projection purposes.

Estimation of population sizes

For the low scenario, the following assumptions were made about the size of each of the key populations:

- *Injecting drug users (IDUs). The available data was the MOLISA estimates of drug users by province along with the estimate of the proportion of those drug users who injected. However, in some provinces, e.g., Quang Ninh, it was found that even more HIV infections among injectors had been reported than the total number of drug users. Accordingly, it was decided that a slight upward adjustment was needed on these numbers. It was felt by the Technical Working Group that the MOLISA estimate of 10,000 IDUs in Hanoi was one of the best in the country. Reported AIDS cases attributed to IDUs in Hanoi are 211 out of a national total of IDU related cases of 2442, implying that injectors in Hanoi represent approximately 8.5% of all injectors in the country. Based on this, the national number of injectors would be 10,000/0.085 or approximately 120,000, an upward revision of roughly 20% from the MOLISA numbers of 97,000 nationally. This revised number of injectors was then distributed among the provinces in accordance with the ratios in the MOLISA estimates.*
- *In two clusters, Ho Chi Minh City and the Central Coast region, epidemiological data implied two epidemics among injectors – an older one in the mid-1990s and a newer one starting in the late 1990s. This explains the fall and subsequent rise in surveillance data for IDUs in those clusters. For these older epidemics, the population was set to the size of the estimated injecting population in 1995. The 2002 IDU population was then adjusted downward by subtracting off the IDUs from the mid-1990s epidemic who would still be alive today.*
- *Female sex workers (FSW). For female sex workers, the MOLISA estimate was used as the low value.*
- *Clients of sex workers. In epidemics with a sex work component, clients of sex workers can make a significant contribution to the epidemic. However, no direct studies have measured this in the general male population in Vietnam. Some studies among youth (15-24) have found values from 0 to 10% visiting sex workers in the last year and populations at higher risk,*

e.g., truck drivers, sometimes report values as high as 40-60%. It was felt that lower values were more appropriate, and in keeping with the types of lower levels of sex work visitation found in surveys around Asia a range of 5 to 10% was used, with 5% of adult males 15-49 being the lower value for number of clients of sex workers.

- *General male population (including former IDUs and clients). The size of this general male population was calculated by subtracting the current low estimate of the number of IDUs and the current low estimate of clients of central coast clusters, the IDUs from the mid-1990s epidemic who were still living were also subtracted.*
- *Urban general female population. Number of urban women was calculated by subtracting the low estimate of the number of sex workers from the urban 15-49 female population. This assumes that all FSW are resident in urban areas.*
- *Rural general female population. The number of rural women was taken from the 15-49 rural female population estimates. This assumes that no FSW are resident in rural areas.*

For the high scenario, the following assumptions were made about the size of each of the key populations:

- *Injecting drug users (IDUs). The high estimate was obtained by taking the low estimate described earlier and doubling it. This gave an overall national estimate of IDUs of 240,000 which were then distributed to the provinces according to the MOLISA reported proportions by province. The one exception to this was Quang Ninh where the high number was taken to be the number of reported HIV infections attributed to IDUs.*
- *Female sex workers (FSW). For female sex workers, triple the MOLISA estimate was used as the high value.*
- *Clients of sex workers. The high range was set at 10% of adult males 15-49, which is still a moderate value for the Asia region.*
- *General male population (including former IDUs and clients). As in the low scenario, this was calculated by subtracting the current high estimate of the number of clients and the current high estimate of the number of IDUs from the current 15-49 male population.*
- *Urban general female population. Number of urban women was calculated by subtracting the high estimate of the number of sex workers from the urban 15-49 female population. This assumes that all FSW are resident in urban areas.*

- *Rural general female population. The number of rural women was taken from the 15-49 rural female population estimates. This assumes that no FSW are resident in rural areas.*

Estimation of HIV seroprevalence rates

An important part of the 2003 estimation and projection process was a very careful review of the available data sources. As outlined above, this included field visits to several provinces, careful examination of trends in each sentinel population, and removal of outliers from the data set. As a result of this process the decision was made to use the following data for estimation of current HIV prevalence and trends in both the low and high scenarios:

- *Injecting drug users (IDUs). Prevalence trends were calculated from the combined rehabilitation center and community sentinel surveillance in sentinel provinces and from case finding data in other provinces. In all case samples with n < 30 were discarded.*
- *Female sex workers (FSWs). Because prevalence in sex worker community samples was problematic, only the trends in rehabilitation centers were used. Once again only samples of 30 or more were used.*
- *Clients of sex workers. For clients, the prevalence among STD patients was used with downward adjustment of 40%.*
- *Urban women 15-49. For urban women, 15-49 the sentinel HIV prevalence data was used directly, as most sentinel sites were urban in nature.*
- *Rural women 15-49. Based on a careful analysis of the relative urban and rural prevalence in a large sample of ANC attendees in all provinces in 2002 (91,057 ANC attendees), HIV prevalence for rural women was set at one-half of the sentinel values.*

For the general male population, ideally one would like to apply the military recruit prevalence to males in the 15-49 age range. However, this would introduce double counting since many of these military recruits may be current clients of sex workers or injecting drug users who are already counted in the categories outlined above. Thus, these numbers were adjusted downward to reflect the contribution of these other risks.

The military HIV prevalence was adjusted downward by subtracting out the percentage of infections that would be expected to result from the HIV prevalence among young injectors and from young current clients of sex workers. Nationally it was assumed that 75% of injectors were under age 30, while a value of 85% was used for HCMC. This gave significantly estimates for both low and high scenarios

for the general male population prevalence since most of the current military recruit HIV prevalence was then attributable to injecting drug users.

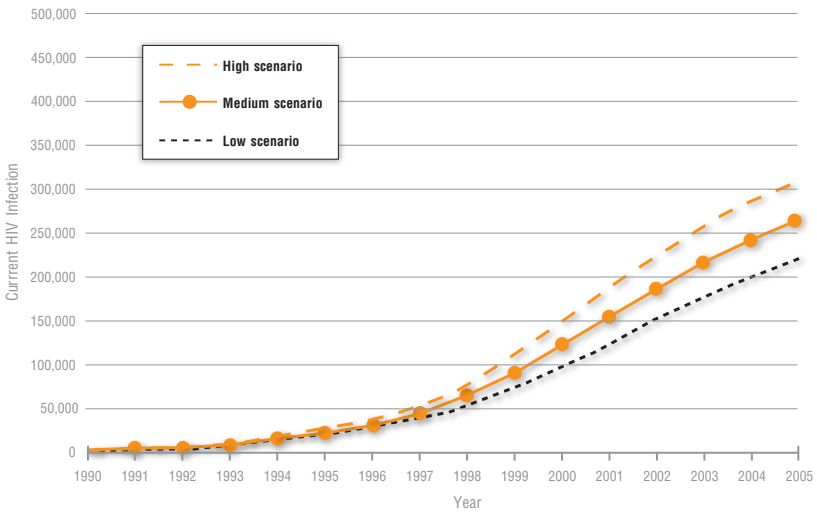
Because of small sample sizes and inconsistent results for HIV prevalence among specific sentinel populations within two clusters, prevalence values were calculated from those in adjacent clusters. In the Northwest cluster, values were adjusted for STD patients and military from the adjacent Hanoi and the North Plateau clusters. For the Southeast cluster, values for sex workers and STD patients were adjusted based on the High Plateau and the Mekong River clusters.

Calculating HIV prevalence and trends for Vietnam - EPP

Once these prevalence trends were finalized, they were entered into the UNAIDS Estimation and Projection Package and two sets of projections were prepared: the low scenario and the high scenario. In each scenario, the corresponding set of low or high population numbers for each of the six key populations were used. The prevalence trends for each of these populations in each of the 11 clusters were entered into EPP as separate projections and fit using the package. EPP then combined these individual projections in order to calculate the adult population HIV prevalence (i.e., percent of the adult population living with HIV) for Vietnam as a whole. Finally, the SPECTRUM program from Futures Group was then used to calculate the total and cumulative numbers of current infections, deaths and AIDS cases. The medium scenario was then calculated by averaging the results of the low and high scenarios. The results of this process are presented in the next section.

IV. The results from Vietnam estimation and projection.

Figure1 >> Number of people living with HIV in Vietnam
1990 - 2005 - Low, medium, and high scenarios (includes adults and children)



In 2003 an estimated 215,000 people are living with HIV in Vietnam. Figure 1 shows the trends in current HIV infections in Vietnam for three scenarios: high, medium and low. The medium scenario is calculated as the average of the high and low scenarios. All three scenarios show a steady upward trend in the number of HIV infections in the country, highlighting the need for expanded, effective prevention programs. In the medium scenario an estimated 215,000 people in Vietnam are living with HIV/AIDS (PLWHAs) as of 2003. In the high and low scenarios, the numbers are approximately 255,000 people and 175,000 respectively. By 2005, this will grow to an estimated 263,000 Vietnamese people living with HIV/AIDS in the medium scenario. The corresponding numbers for high and low scenarios are 308,000 and 218,000 respectively.

For the next several years, more than 40,000 people a year will contract HIV in the absence of stronger prevention programs. Figure 2 shows the new, cumulative, and current numbers of HIV infections in Vietnam between 1990 and 2005 in the medium scenario. The cumulative HIV infections will expand rapidly over the next few years growing from 245,000 in 2003 to 319,000 people by

2005. From 2003 to 2005, there will be over 37,000 new infections per year on a national basis. The country will see an increasing burden of HIV-related mortality with annual AIDS deaths almost doubling from 2003 to 2005. Cumulative AIDS deaths will continue to climb steadily from 30,000 in 2003 to 56,000 by 2005.

Figure 2 >> New, cumulative, and current number of HIV infections in Vietnam 1990 - 2005 - medium scenario

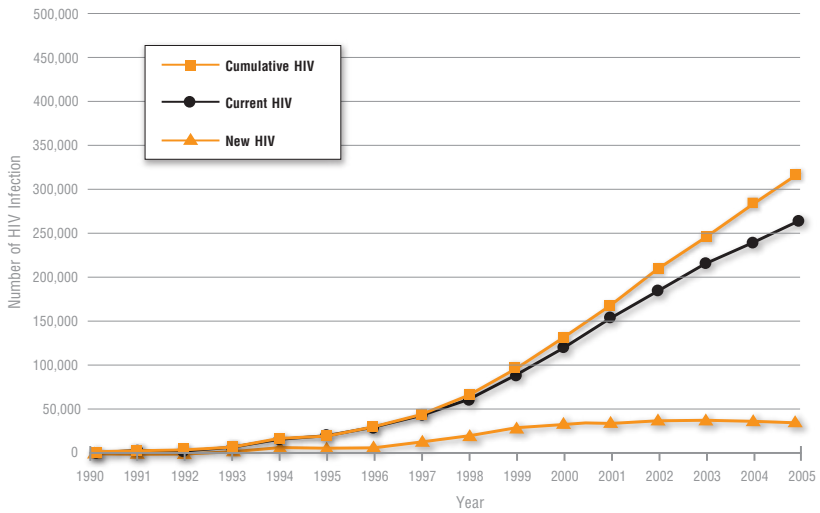
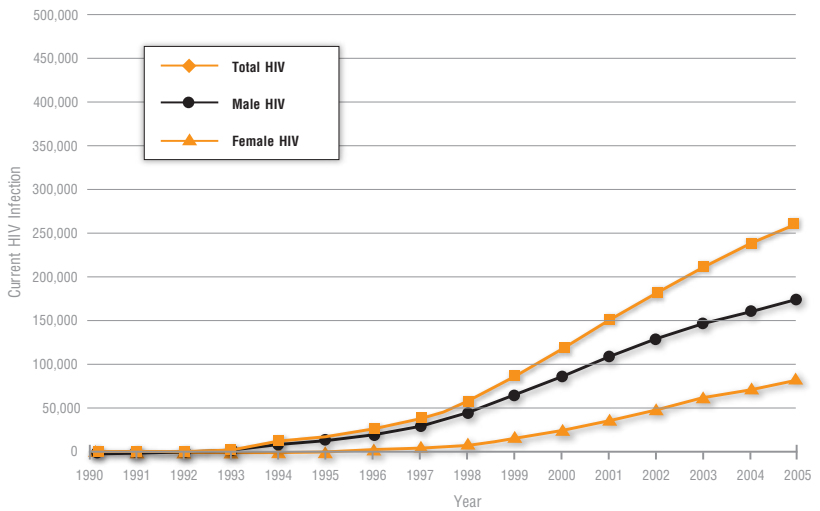
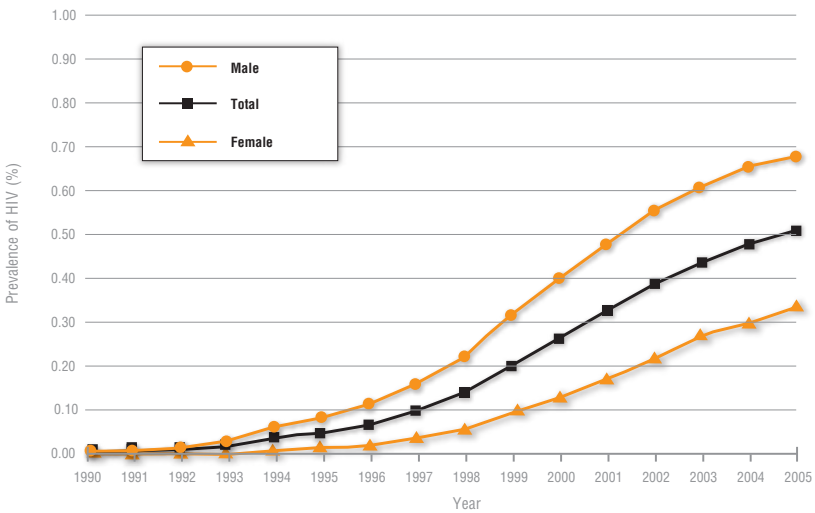


Figure 3 >> Number of people living with HIV/AIDS in Vietnam 1990 - 2005 by sex



Infected men greatly outnumber infected women by 2.3 to 1 in 2003. Figure 3 shows the current HIV infections for men and women in the medium scenario. In 2003, there were 213,000 PLWHAs, of whom almost 150,000 are male and 65,000 are female. But the proportion of female cases will grow over time. By 2005, 176,000 males and 86,000 females will be living with HIV, a lower ratio of 2.3 to 1.

Figure 4 >> Prevalence of HIV infections among adults age 15 - 49 in Vietnam 1990 - 2005 by sex



More than 0.6% of men and almost 0.34% of women will be living with HIV in 2005. In the medium estimation, national HIV prevalence (the percentage of all adults living with HIV) will increase from 0.44% in 2003 to 0.51% in 2005 as shown in Figure 4. Prevalence will continue to rise for both men and women and it is estimated that over 1% of the adult male population will be living with HIV by the year 2005. Female prevalence will have grown to almost half a percent (0.34%) in that same time frame.

AIDS-related illness and death in Vietnam will climb rapidly over the next 3 years. As of September 31, 2003, the cumulative AIDS cases reported in the country were 11,020 people. Of these, 6,195 PLWHA have already died of AIDS and the remaining 4,825 are currently ill with AIDS. This is approximately one-third to one-fifth of the estimated number through 2002 of 11,000 which will grow to 17,500 in 2003 (Figure 5). By 2005 in Vietnam, there will cumulatively be over 72,000 AIDS cases with 56,000 of whom are male and 16,000 of whom are female. Deaths will track this closely. Figure 6 below shows that 56,000 people will have died of AIDS by 2005. The projected new AIDS deaths will increase from 9,000 in 2003 to 14,300 in 2005.

Figure 5 >> New, cumulative, and current number of AIDS cases in Vietnam 1990 - 2005

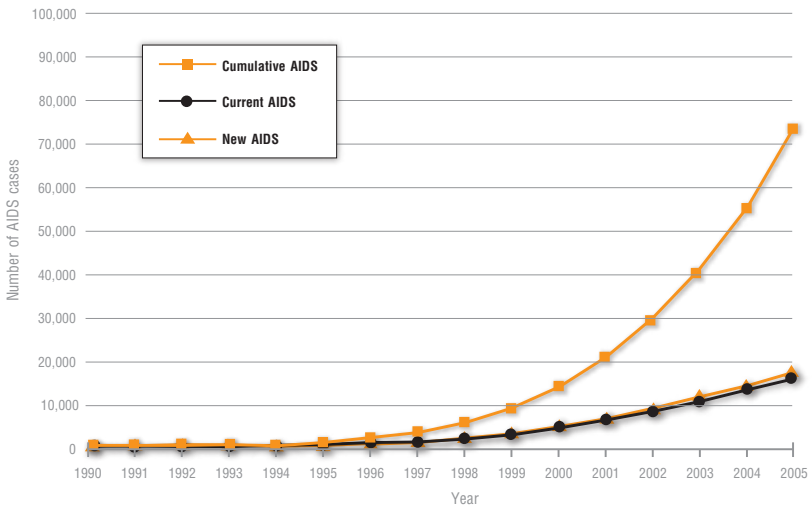


Figure 6 >> New and cumulative of AIDS death in Vietnam 1990 - 2005

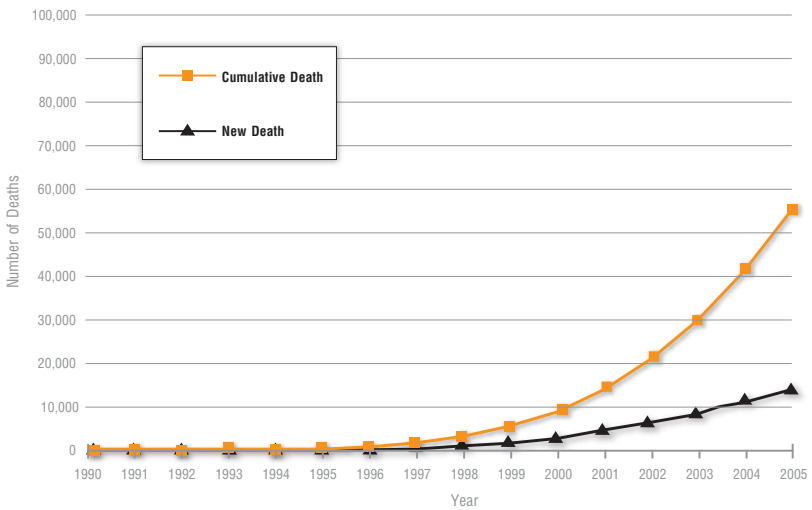
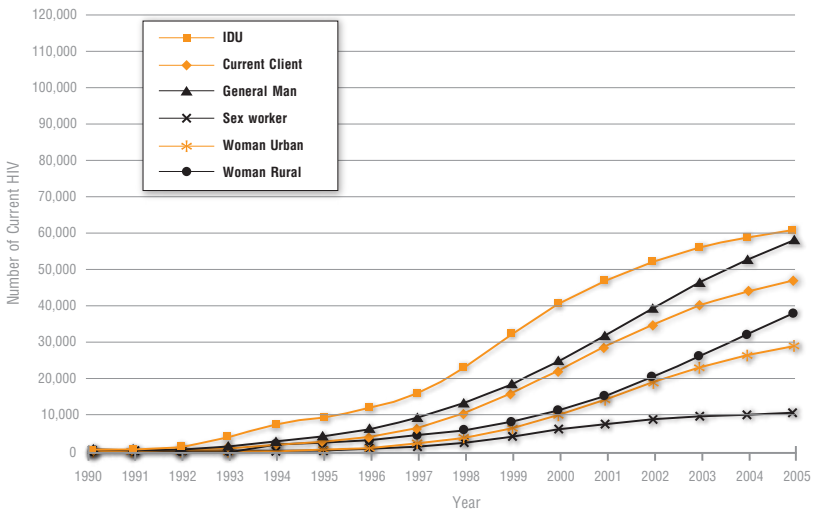
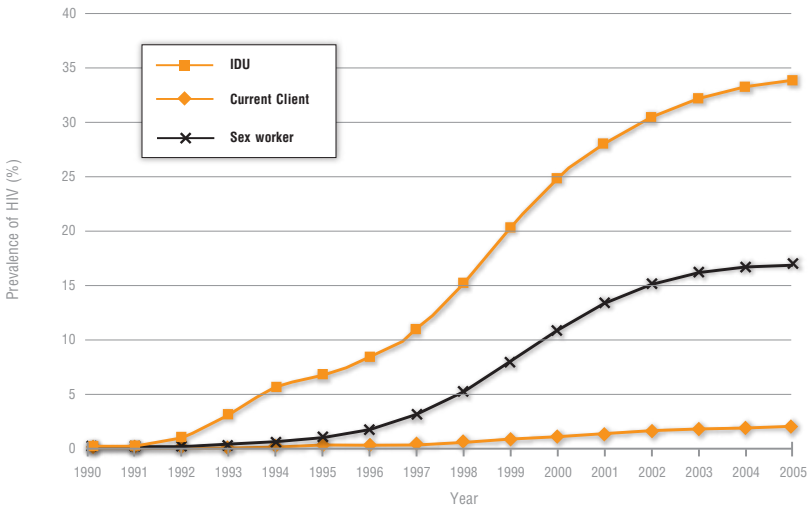


Figure 7 >> Numbers of adults age 15 - 49 living with HIV in Vietnam 1990 - 2005 by risk group



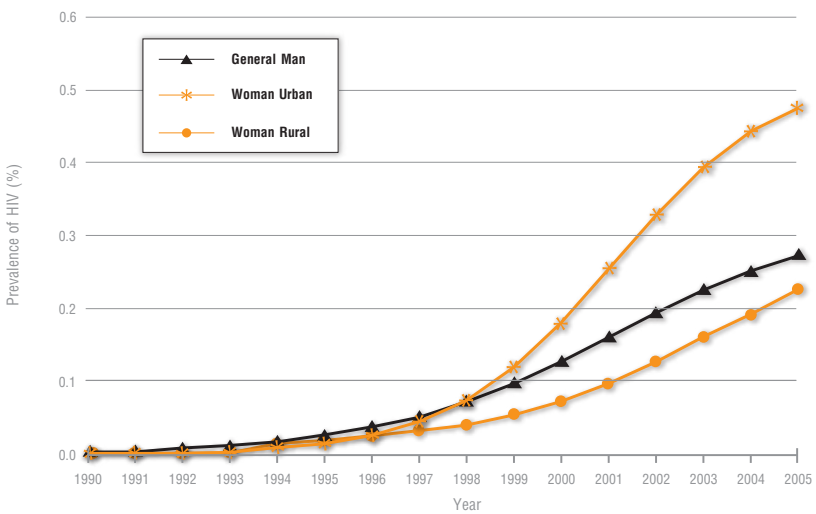
Injecting drug use, sex work, and husband-to-wife transmission are all fueling the Vietnamese epidemic. Figure 7 reveals that the number of PLWHAs in each population group will keep increasing for the near future. While the relative number of IDUs will be at 1st place between 2003 and 2005, and the rate of growth will slow in this population, it will continue to contribute substantially to the national epidemic. Meanwhile infections among clients and general population males (many of whom are former clients or injecting drug users) will continue to rise rapidly through 2005. With its large size, the client and general male populations will come to dominate the epidemic in that time frame. For example, HIV infections among general population males are projected to increase from 25,000 in 2000 to more than 58,000 in 2005. The number of HIV positive clients is also increasing rapidly from 22,600 in 2000 to 47,500 in 2005 (about 3,000-5,000 new infections per year). The number of commercial sex workers infected will be lower than other female population in 2005 (10,600 cases versus 29,000 cases among urban women and 38,000 among rural women) as husband-to-wife transmission grows in importance. But strengthening of programs for risk reduction in sex work, for both sex workers and clients will remain critical. While the number of sex workers is small, their infection by male clients and subsequent infection of other clients is an essential link in the chain that leads to many husbands infecting their wives. Interrupting that chain by condom promotion or reducing the numbers of clients have proven to be extremely effective approaches in neighboring countries.

Figure 8 >> Prevalence of HIV infections among adults age 15 - 49 in Vietnam 1990 - 2005 among IDUs, current clients and sex workers



Prevalence among IDUs has been the highest of any group since the HIV epidemic started in Vietnam in the early 1990s. It will continue to grow, from an estimated 32% in 2003 to 33.7% by 2005. Client prevalence is rising as well, from 1.7% in 2003 to 2% in 2005 (Figure 8). The other populations will remain below 1% at the end of 2005: 0.27% for general men, 0.47% for urban women and 0.22% for rural women. However, the higher prevalence in IDU and client populations, which are disproportionately living in urban areas, helps to explain why prevalence among urban women is higher than that among rural women and general population men who are not current IDUs or clients (Figure 9).

Figure 9 >> Prevalence of HIV infections among adults age 15 - 49 in Vietnam 1990 - 2005 among General men, Urban and rural women



V. Conclusions from 2005 - 2010 estimations and projections

- *The number of people living with HIV in Vietnam has been sharply increasing in the past 3-5 years. The number of people living with HIV almost more than doubled during the four-year period between 1999 and 2003 from approximately 96,000 to 245,000. The number of people becoming infected each year doubled between 1998 and 2003 from about 21,000 per year to more than 39,000 per year.*
- *In 2003, HCMC had the greatest number of HIV infected people, accounting for a fourth of all infections in the country. The city has the fastest growing epidemic in the country with HIV prevalence among adults aged 15-49 estimated to be about 1.2%, making this one of the worst epidemics in Vietnam*
- *The northern coastal cities of Quang Ninh and Hai Phong are also experiencing serious epidemics with an estimated 1.1% of adults infected.*
- *0.7% of adults in the capital city of Hanoi are infected.*
- *The epidemic is in a rapid growth phase with far more people becoming infected each year than dying each year, so the prevalence of HIV will continue to rise for the foreseeable future.*
- *The number of infected females relative to males is increasing each year and in 2003 it stood at about 2.3 males infected for each female. This is down and is indicative of increasing heterosexual transmission as an increasing number of males infected through sex work or drug use infect their regular female partners.*
- *The prevalence of HIV is highest among injecting drug users. The national prevalence among IDUs stands at approximately 33% although the prevalence is much higher in areas such as HCMC, Hai Phong and Quang Ninh.*

- *After IDUs, female sex workers have the highest prevalence. At a national level the prevalence among FSWs has reached approximately 16%, again with higher pockets in selected cities such as Hai Phong, HCMC, Hanoi and Can Tho.*
- *The prevalence of HIV among male clients of sex workers is also steadily increasing.*
- *There is a great deal of variability around the country in terms of timing of the epidemic. The epidemics in HCMC and the Northeast coast started earlier but epidemics in other parts of the country are much more recent and have only taken off in the last couple of years.*

VI. Recommendations

- *HIV cannot be projected in a reliable way very far into the future because so many things can alter the course of the epidemic, including successful prevention programs, and treatment of HIV-infected people with anti-retroviral therapy. Therefore, in terms of planning, it is best to focus on the short-term (i.e. 3-5 years into the future).*
- *Injecting drug use is still the source of a major number of infections in Vietnam, and as drug users become infected they not only infect other drug users, but they also infect their sexual partners, both regular and commercial. It is therefore important to keep a strong prevention focus on reduced sexual risk among IDUs in addition to reduced needle sharing.*
- *In many places the prevalence among sex workers has risen rapidly in recent years, either through injecting drug use or sexual contact with infected IDUs. It is now especially important to focus on the prevention of sexual transmission between sex workers and their non-injecting clients. Interaction between these two populations represents a large potential for HIV spread. HCMC, Hanoi, Hai Phong, Quang Ninh and Can Tho stand out as places where the potential for sexual transmission between sex workers and their clients is the greatest, but sex work prevention programs need to be urgently expanded and strengthened nationwide.*
- *Clients of sex workers are among the fastest growing populations of HIV-infected people so the time to focus prevention efforts on this sub-population is NOW.*
- *In terms of preparedness of the medical care system, there will be an additional 5,000 to 10,000 new AIDS cases per year for at least the next 3 years.*

VII. Data gaps

The process of doing estimates and projections for 2003 was facilitated by the large amount of available data in the country. However, it was also apparent that there were important pieces of missing information including the following:

- *The proportion of men in different parts of the country, in different age groups, and in rural and urban areas who buy commercial sex and the frequency with which they do so is essential for doing the national estimate. Although in the past the number of male STD patients has been used as a proxy for clients of sex workers, that population does not function well as a proxy because it is unknown what proportion of sex worker clients actually have STDs and seek treatment at public clinics or with private physicians. In addition to needing this information to do the national estimates, it is also needed for understanding what the future course of the epidemic is likely to be, especially if appropriate interventions are not put into place.*
- *In addition to knowing about the number of men buying sex in Vietnam, information about the prevalence of HIV among clients of sex workers is also needed. In the past the prevalence of HIV among STD clients has been used as a proxy for the prevalence of HIV in clients of sex workers, but the extent to which this is accurate is not known. It may be possible that clients with who both have STDs and seek treatment are more likely to be HIV positive than those who don't. If this were the case, then using HIV prevalence among STD patients to approximate all clients of sex workers would result in an overestimate of the number of people infected with HIV. More information about this is needed.*
- *More information is needed about the reliability of the data among military recruits. In particular, what is not known is what proportion of the military recruits may be current or former injecting drug users and/or current or former clients of sex workers. If the data from the military*

recruits are to be useful for helping estimate the background levels of HIV among general population males, then it is important to know more about the characteristics of the recruits. Behavioral data on the proportion of military that have current or previous risk behavior would be very helpful. It would also be very helpful to know the degree to which the military is screening out drug users before they get to the point of HIV testing. For example, in HCMC the levels of HIV in the military were quite high, and reportedly they are even higher in 2003. However, the degree to which IDUs have been screened out is not known.

- *More information is needed on the background prevalence of HIV among general population males. It is typically easier to get this information for females because HIV testing of pregnant women is common and provides a reasonable proxy for background prevalence of HIV among females. However it is more difficult to find a source of this information for males. Right now the HIV prevalence data from military recruits is being used as a proxy for general populations males, but more information is needed about the extent to which this is a reasonable proxy.*
- *Information on the ratio of infected males to females is also extremely important for validating estimates and projections of HIV infection. Various sources of data can be used including reported AIDS cases, reported AIDS deaths, and reported HIV infections. Other supporting data include newly reported TB cases and blood donor data. All of these various sources should be tracked to provide a convergence of evidence about the ratio of infected males to females and how it is changing over time.*
- *In general more information is needed about the history of injecting drug use in the various other surveillance populations (sex workers, military, STD patients) so that a picture can emerge about the extent to which modes of transmission other than needle sharing are responsible for HIV spread. This is important information since the main mode of transmission in the past has probably been needle-sharing, but that is likely to change in the future. Ad hoc epidemiological studies could help furnish some of this information. Or some of it could become part of the regular surveillance system.*
- *More and better information is needed about the size of the key risk populations such as IDUs, sex workers and clients of sex workers. Research validating the MOLISA numbers would be helpful.*
- *Although MSM may be an important part of the epidemic in HCMC or elsewhere, there is very little information about either the size of the at-risk population of MSM or on the prevalence of HIV in this population.*

VIII. Annex

Vietnam HIV Provincial Clusters Map

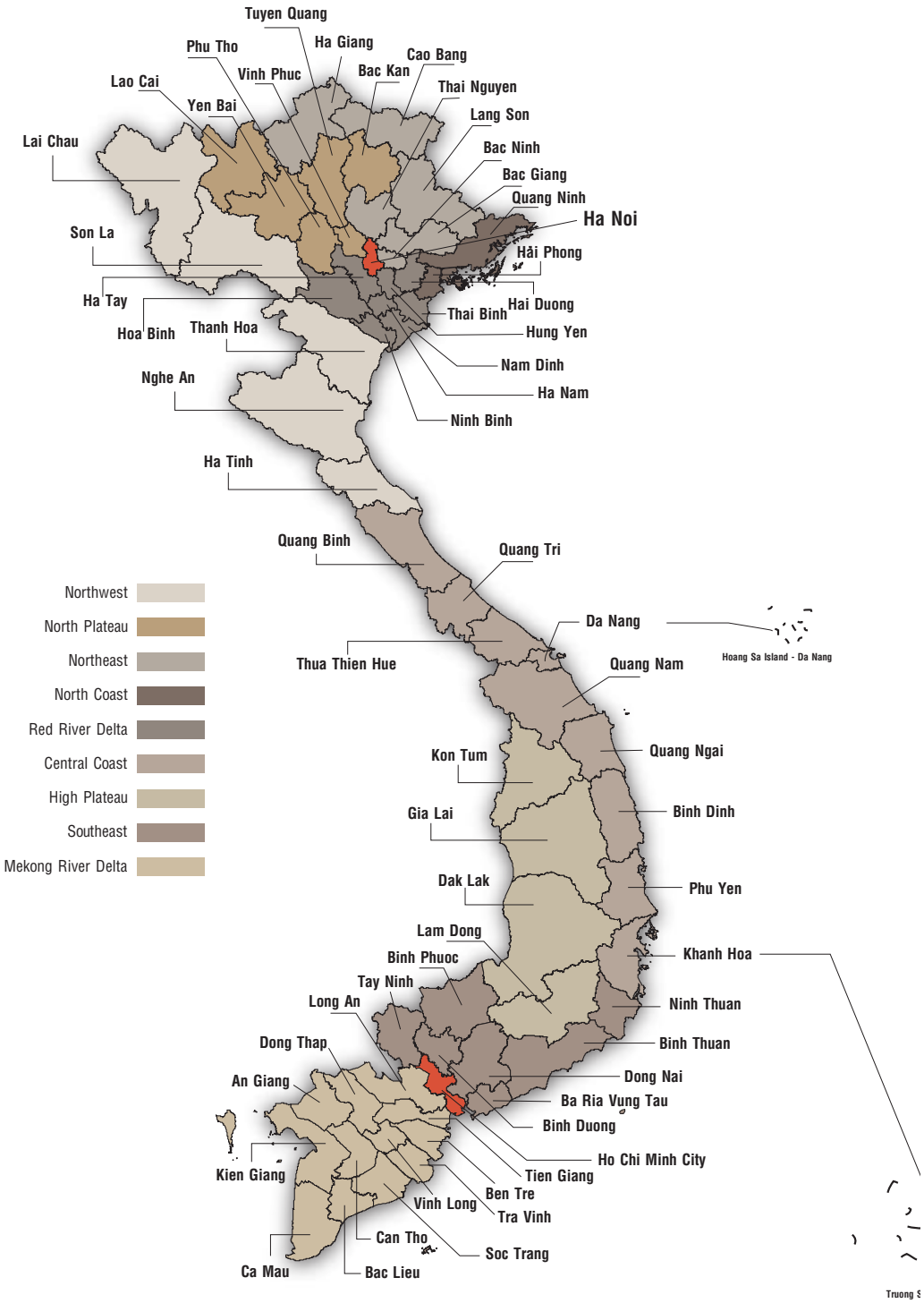


Figure 10 >> Number of people living with HIV/AIDS in Vietnam 1990 - 2005 by cluster of provinces

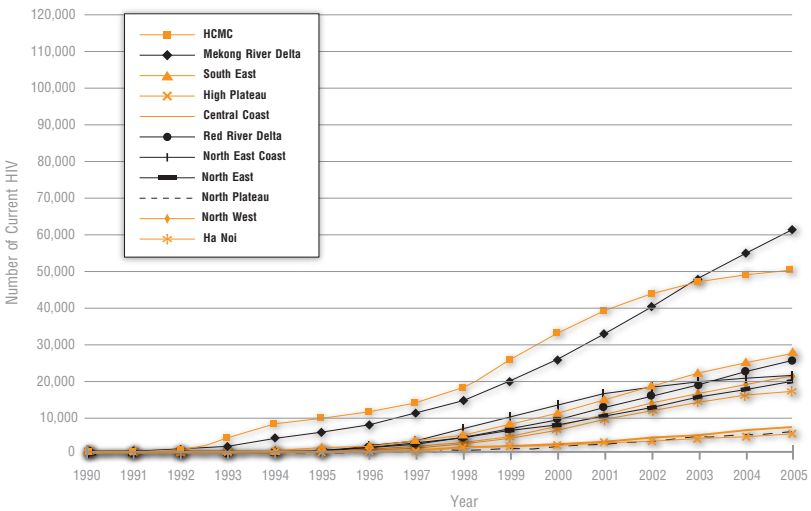


Figure11 >> Prevalence of HIV infections among adults age 15 - 49 in Vietnam 1990 - 2005 by risk cluster of provinces

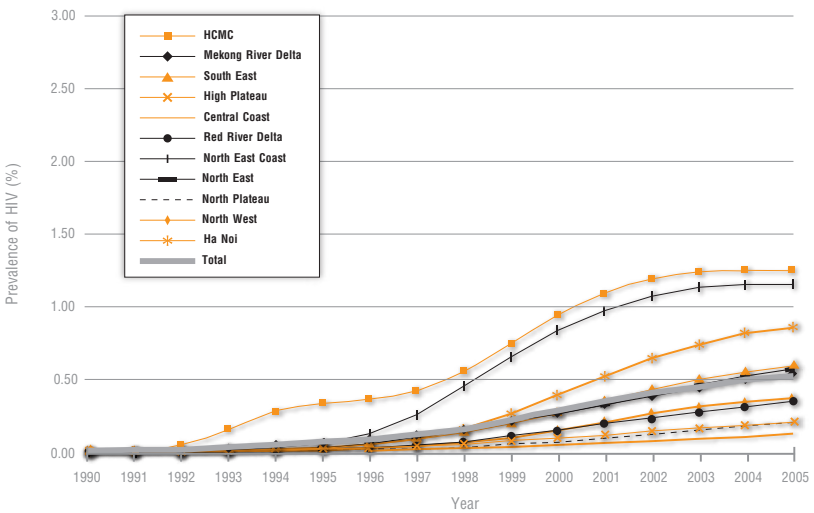


Table 1: Number of people living with HIV/AIDS in Vietnam 1991 - 2000 by cluster of provinces

Number of total HIV by cluster	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HCMC	310	1.310	4.499	8.284	9.990	11.454	13.661	18.152	25.503	33.124
Mekong River Delta	693	1.100	1.782	4.224	5.816	8.004	10.886	14.712	19.639	25.649
South East	86	256	423	870	1.401	2.231	3.471	5.282	7.783	10.950
High Plateau	17	36	74	211	373	627	974	1.397	1.877	2.404
Central Coast	44	79	141	382	605	927	1.331	1.799	2.308	2.877
Red River Delta	-	1	67	363	838	1.467	2.541	4.276	6.712	9.592
North East Coast	-	49	90	367	817	1.796	3.748	6.796	10.268	13.432
North East	-	1	72	373	647	1.387	2.672	4.466	6.271	8.039
North Plateau	-	-	2	157	224	376	551	808	1.183	1.705
North West	-	88	138	407	655	1.106	1.813	2.973	4.793	7.364
Ha Noi	-	41	68	223	409	825	1.503	2.658	4.442	6.810
Total	1.150	2.960	7.355	15.810	21.775	30.200	43.150	63.320	90.780	121.945

Table 2: Number of people living with HIV/AIDS in Vietnam 2001 - 2010 by cluster of provinces

Number of total HIV by cluster	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
HCMC	39.227	43.894	47.124	49.099	50.199	50.374	50.060	49.536	48.750	48.034
Mekong River Delta	32.571	40.113	47.693	54.845	61.316	66.470	70.441	73.377	75.065	75.965
South East	14.590	18.394	21.959	25.041	27.623	29.527	30.896	31.859	32.338	32.516
High Plateau	2.982	3.612	4.264	4.908	5.527	6.062	6.518	6.899	7.180	7.395
Central Coast	3.547	4.353	5.250	6.168	7.082	7.937	8.745	9.505	10.156	10.723
Red River Delta	12.645	15.822	19.101	22.455	25.826	28.889	31.604	33.952	35.774	37.244
North East Coast	16.085	18.231	19.769	20.714	21.208	21.256	21.079	20.824	20.484	20.205
North East	10.083	12.559	15.250	17.811	20.015	21.648	2.830	23.681	24.176	24.481
North Plateau	2.389	3.223	4.147	5.085	5.982	6.751	7.394	7.917	8.292	8.559
North West	10.469	13.657	16.550	19.084	21.353	23.241	24.800	26.064	26.917	27.498
Ha Noi	9.472	12.077	14.318	16.061	17.339	18.115	18.562	18.812	18.870	18.879
Total	154.060	185.935	215.425	241.270	263.470	280.270	292.930	302.425	308.000	311.500

Table 3: Prevalence of HIV infections among adults age 15 - 49 in Vietnam 1991 - 2000 by cluster of provinces

Number of total HIV by cluster	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HCMC	0,012	0,049	0,159	0,282	0,331	0,367	0,427	0,552	0,754	0,951
Mekong River Delta	0,010	0,015	0,022	0,052	0,069	0,091	0,121	0,159	0,207	0,262
South East	0,003	0,008	0,013	0,026	0,040	0,062	0,094	0,139	0,199	0,272
High Plateau	0,001	0,002	0,004	0,011	0,018	0,030	0,045	0,063	0,082	0,102
Central Coast	0,001	0,002	0,004	0,009	0,014	0,021	0,030	0,039	0,048	0,059
Red River Delta	0,000	0,000	0,001	0,007	0,015	0,026	0,043	0,071	0,109	0,151
North East Coast	0,000	0,004	0,007	0,027	0,059	0,125	0,255	0,450	0,661	0,840
North East	0,000	0,000	0,003	0,015	0,025	0,051	0,096	0,156	0,213	0,265
North Plateau	0,000	0,000	0,000	0,007	0,010	0,016	0,023	0,033	0,046	0,065
North West	0,000	0,002	0,003	0,010	0,015	0,025	0,040	0,065	0,101	0,151
Ha Noi	0,000	0,003	0,005	0,015	0,027	0,053	0,094	0,161	0,262	0,390
Total	0,004	0,009	0,020	0,042	0,056	0,075	0,105	0,150	0,209	0,273

Table 4: Prevalence of HIV infections among adults age 15 - 49 in Vietnam 2001 - 2010 by cluster of provinces

Number of total HIV by cluster	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
HCMC	1,095	1,190	1,241	1,258	1,250	1,225	1,191	1,153	1,115	1,079
Mekong River Delta	0,324	0,387	0,447	0,500	0,543	0,575	0,597	0,608	0,611	0,608
South East	0,352	0,431	0,500	0,555	0,595	0,621	0,636	0,641	0,640	0,632
High Plateau	0,123	0,144	0,166	0,186	0,203	0,218	0,229	0,237	0,242	0,245
Central Coast	0,070	0,084	0,098	0,112	0,125	0,137	0,148	0,157	0,165	0,171
Red River Delta	0,193	0,235	0,275	0,315	0,352	0,384	0,411	0,432	0,448	0,458
North East Coast	0,978	1,076	1,134	1,156	1,150	1,126	1,092	1,055	1,020	0,988
North East	0,323	0,391	0,461	0,524	0,572	0,605	0,624	0,633	0,635	0,631
North Plateau	0,089	0,116	0,145	0,173	0,198	0,218	0,234	0,245	0,252	0,255
North West	0,209	0,264	0,311	0,349	0,380	0,404	0,421	0,433	0,439	0,441
Ha Noi	0,527	0,652	0,752	0,820	0,860	0,878	0,880	0,872	0,860	0,845
Total	0,335	0,392	0,442	0,481	0,510	0,530	0,542	0,547	0,547	0,544

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GENERAL DEPARTMENT OF PREVENTIVE MEDICINE AND HIV/AIDS CONTROL

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