

**Strategic Information and M&E Working Group  
Technical and Strategy Group on AIDS**

**HIV Estimates and Projections  
Asian Epidemiological Model  
Myanmar 2010-2015**



## **Acknowledgements**

This report is the product of process that has started in early 2010 when a group of technicians from government and UN agencies participated in the regional project for Modes of Transmission. The work done in early 2010 demonstrated that it was essential to improve the understanding where new infections occur in order to provide policy makers and implementers with sound, forward looking advice.

The Strategic Information and M&E Working Group, after its formal establishment, carried on the work to establish a complete projection using the Asian Epidemiological Model. The Working Group consists of members from the Departments of Health, Health Planning and Medical Research as well as UNAIDS, WHO, PSI and MSI. The Working Group would like to thank all the managers and superiors that have supported this work which often required days spent working on the model.

Special thanks go to Wiwat Peerapatanapokin, who guided the process as a trainer, facilitator and specialist. Finally, the thanks of the Working Group go to the people, too numerous to mention, who provided support, advice and encouragement from the UNAIDS regional office as well headquarters.

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## List of Acronyms

AEM	Asian Epidemiological Model
ANC	Antenatal care
ARV	Anti-retro virals
BSS	Behavioural Sentinel Surveillance
EPP	Estimation and Projection Package
FRHS	Fertility and Reproductive Health Survey
FSW	Female sex workers
HSS	HIV Sentinel Surveillance
IBBS	Integrated Biological and Behavioural Surveillance
IDU	Injecting drug users
M&E	Monitoring and Evaluation
MSM	Men who have sex with men
NAP	National AIDS Programme
NSP	National Strategic Plan
PCSF	Population Change and Fertility Survey
PMCT	Prevention of mother to child transmission
PWID	People who inject drugs
RDS	Respondent driven sampling
STI	Sexually Transmitted Infections
TSG	Technical and Strategy Group

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## 1. Introduction

In 2010, Myanmar engaged in the regional project on modes of transmission of HIV. This project aimed at improving the understanding of the HIV epidemics by estimating the incidence of selected sub-populations. Initially, the work was carried out by an ad-hoc group comprising of staff from the Ministry of Health and United Nations agencies. Following the formation of the Strategic Information and M&E (SI/M&E) Working Group of the TSG, the responsibility for this work was given to the Working Group. The Working Group decided that the Asian Epidemiological Model (AEM) provided the most relevant incidence projections for the HIV epidemic in Myanmar. During 2010 and 2011 work continued on the development and refinement of the AEM.

In 2011, a new round of global estimation was launched. The global estimates use a software package of EPP and Spectrum. The latest version of the software has an integrated EPP/Spectrum interface making the work on fitting curves, specifying programme inputs and producing the results in Spectrum seamless. The Working Group spent considerable time on cleaning the sentinel surveillance data and subsequently fitting the curves using this software package.

Spectrum also allows the use of incidence results from AEM. This second method does not require the curve fitting in EPP. The Working Group found that the results obtained with the AEM and Spectrum corresponded closer to the known and/or expected epidemiological situations. The following report describes the models and the inputs that were used and finally shows the results obtained from the models.

## 2. Description of Models

### The Asian Epidemic Model (AEM)<sup>1</sup>

The Asian Epidemic Model is designed to help explain and explore the dynamics of an HIV epidemic in a given Asian country or geographical location, and in particular to help in understanding the relative importance of different transmission routes to the overall epidemic. AEM contains the key populations relevant to the epidemics of Asia (FSW and clients, IDU, MSM) and applies user-supplied size and behavioral data to calculate new and current HIV infections in each population over the entire course of the epidemic<sup>2</sup>.

Because the AEM models the entire history of the epidemic rather than just a single year, it requires the user to enter behavioral, epidemiological and size information from the beginning of the epidemic to the present. Extracting this time bound information from past studies and research reports can be a time-

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<sup>1</sup> The following description is taken from: Siripong, N et al (2011). "Refocusing Responses in Asia for Impact Report of the Modes of Transmission Project in Asia".

<sup>2</sup> Brown, T. and W. Peerapatanapokin (2004). "The Asian Epidemic Model: a process model for exploring HIV policy and programme alternatives in Asia." *Sex Transm Infect* **80 Suppl 1**: i19-24.

consuming process and is one of the initial hurdles faced in applying the AEM in new settings. The key data required are similar to, but not exactly the same as, those of the MoT workbook and include:

*Epidemiological data:* the average national HIV prevalence in each key affected population and in the general population along with the average prevalence of other sexually transmitted infections (STIs) in female sex workers, men who have sex with men and general population. Because AEM’s calculations are contact based rather than partner based, partner numbers are not required.

*Size estimates:* the size of each population expressed as a percent of the adult male or female population (aged 15-49 years).

*Behavioral data:* the number of sexual contacts in a week for FSW, IDU and MSM with various partner types, levels of condom use in these contacts, the percentage of IDU sharing needles, the percent of all injections shared and the frequency of injection.

*Start years of the epidemic:* the year in which HIV is first introduced among heterosexuals, MSM and IDU.

*Transmission probabilities and cofactors:* the probabilities of HIV transmission per contact with an infected partner for vaginal sex (male to female and female to male), anal sex and injection, along with cofactors for sexual contact in the presence of other STIs and circumcision. AEM does not directly include blood transfusions, although there are techniques for adding these in, as this has been a comparatively small issue in Asian epidemics.

*Duration of risk behavior:* AEM also allows for turnover (i.e., entry and exit from its different populations). To calculate this, users must also enter the average time that individuals stay in specific risk populations, e.g., average time in service for sex workers.

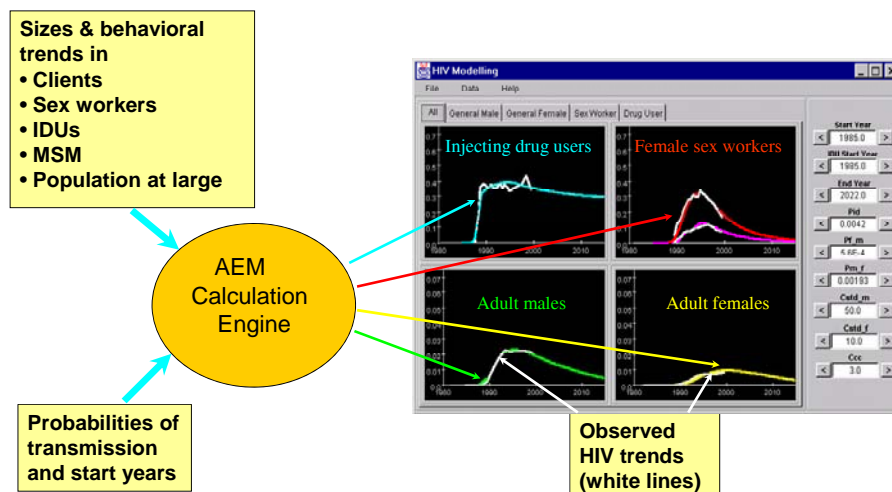


Figure 1. The AEM takes user supplied sizes and behavioral trends and applies adjustable probabilities of transmission to calculate HIV prevalence and new infections. The interface compares model prevalence directly with observed prevalence.



The user enters these data into the AEM Workbook, an Excel workbook that interfaces with the AEM software. The AEM software then extracts this behavioral information, the size of the various populations, the number of susceptible members of each population, and applies a set of start years and probabilities of transmission to calculate the number of new infections in each group in each year. The result of this calculation in terms of overall HIV prevalence trends in key populations is then displayed graphically in the AEM interface as shown in Figures 1 and 2, permitting direct comparison of the model trends with measured historical prevalence trends in HIV. This comparison is critical because AEM allows the transmission probabilities and cofactors to be adjusted in a country specific fashion to produce a fit to historical trends in HIV prevalence for each key population. If one sets a transmission probability or cofactor too high or too low, the model curves will come in higher or lower than observed trends as illustrated in Figure 2.

Once prevalence trends have been fit, AEM will produce both new and current infections in each population by each possible route of transmission, allowing charts similar to that shown in Figure 2 to be prepared. However, because AEM has calculated new infections for each year of the epidemic, it is also possible to display how the source of new infections changes over time (see Figure 7). Within any specific population, AEM also allows the user to also examine the sources of new infections, e.g., the number of infections contracted through injecting behavior, the number resulting from visiting sex workers, etc. In addition, because AEM is a full process model that simulates the actual processes that transmit HIV internally, it allows for projections of the likely future course of the epidemic and explorations of how that course could be altered through the behavioral impacts of alternative prevention efforts.

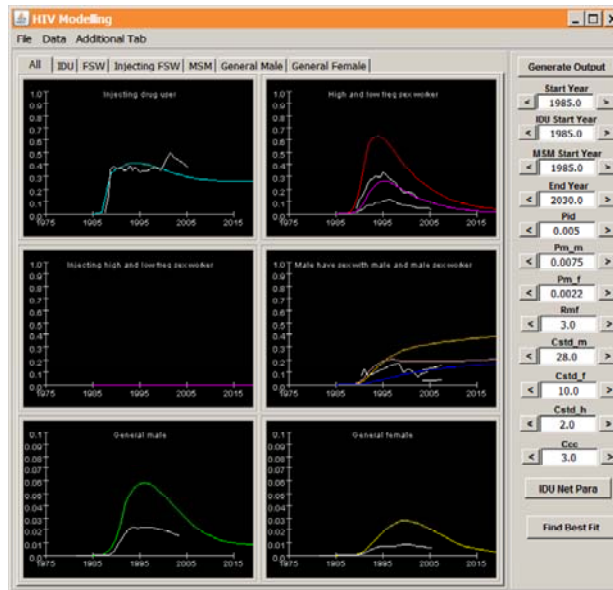


Figure 2. An example: setting the male to female probability of transmission in vaginal sex too high. The model produces past trends in HIV prevalence (colored lines) that are substantially higher than observed trends (the white lines)

## Spectrum 2011<sup>3</sup>

The Spectrum programme has been developed to support national estimates and projections. The 2011 version of Spectrum includes the Estimates and Projections Package (EPP) used to generate an epidemic curve that used to be a separate program. Its functions are now integrated into Spectrum. However, the AEM incidence data can also be directly imported into the Spectrum.

The AIDS Impact Model, known as AIM, is one module within Spectrum and is used for projecting the impact of the AIDS epidemic. AIM requires an assumption about the past and future course of adult HIV incidence and treatment coverage. A demographic projection must be prepared first, before AIM can be used. DemProj, one of the Spectrum modules, is used to make the demographic projection. The demographic projection is modified by AIM through AIDS deaths and the impact of HIV infection on fertility. The Epidemiology section of AIM calculates the number of HIV infections, need for ART, and AIDS deaths.

AIM (and the entire Spectrum system of models) is designed to produce information useful for policy formulation and dialogue within a framework of computer programs that are easy to use. The focus is on generating information useful for policy and planning purposes rather than on carrying out detailed research into the underlying processes involved. For this reason, the program is designed to be used by program planners and policy analysts.

AIM module consists of six menu items:

1. Program statistics – PMCT, adult ART and child treatment data
2. Eligibility for Treatment – CD4 count threshold for eligibility
3. Incidence – Incidence calculation with EPP or direct input (for example AEM)
4. Sex/age pattern – male and female proportion either calculated by EPP/AEM or default
5. Advanced options – special parameters
6. Results – outputs

After the definition of the population data in DemProj, the Spectrum requires that programme coverage data is added in the “Programme Statistics” section (Figure 3). These data include past and future (expected) coverage for PMCT and ARV treatment.

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<sup>3</sup> Adapted from: Stover, John. 2009. AIM: A Computer Program for Making HIV/AIDS Projections and Examining the Demographic and Social Impacts of AIDS. Washington, DC: Futures Group International, Health Policy Initiative, Task Order 1.

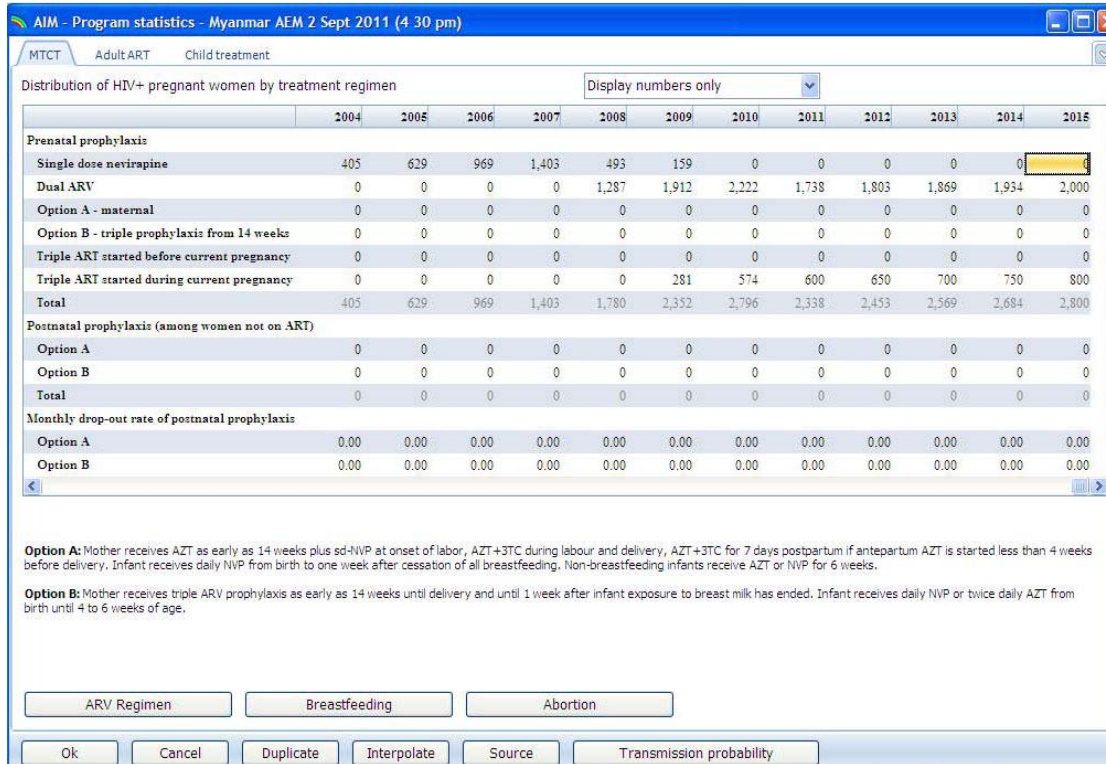


Figure 3. Programme statistics for PMCT and ART need to be added in this section – Known and expected coverage for PMCT and adult as well as child treatment are filled. Other factors such as breastfeeding pattern, ARV regimen and abortion can also be filled if available.

The next step involves establishing the incidence curve of HIV. This can be done either through a curve fitting with EPP or by directly inputting incidence data derived from another source (Figure 4).

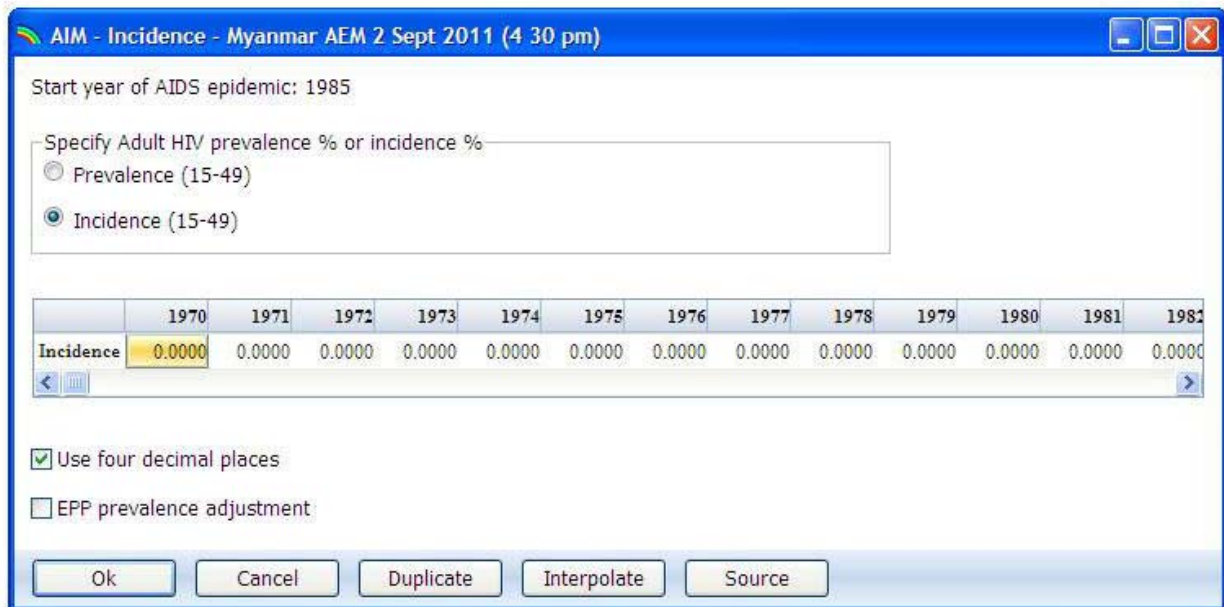


Figure 4. The distribution of new infections that results from the curve fits shown in the preceding figure.

The Spectrum software then lets users generate HIV specific data based on the population, programme statistics and incidence. There is a large choice of pre-defined options to choose from (Figure 5). These include age and gender specific options among others. The data can be displayed with pre-set graphics or as tables for export to other programmes.

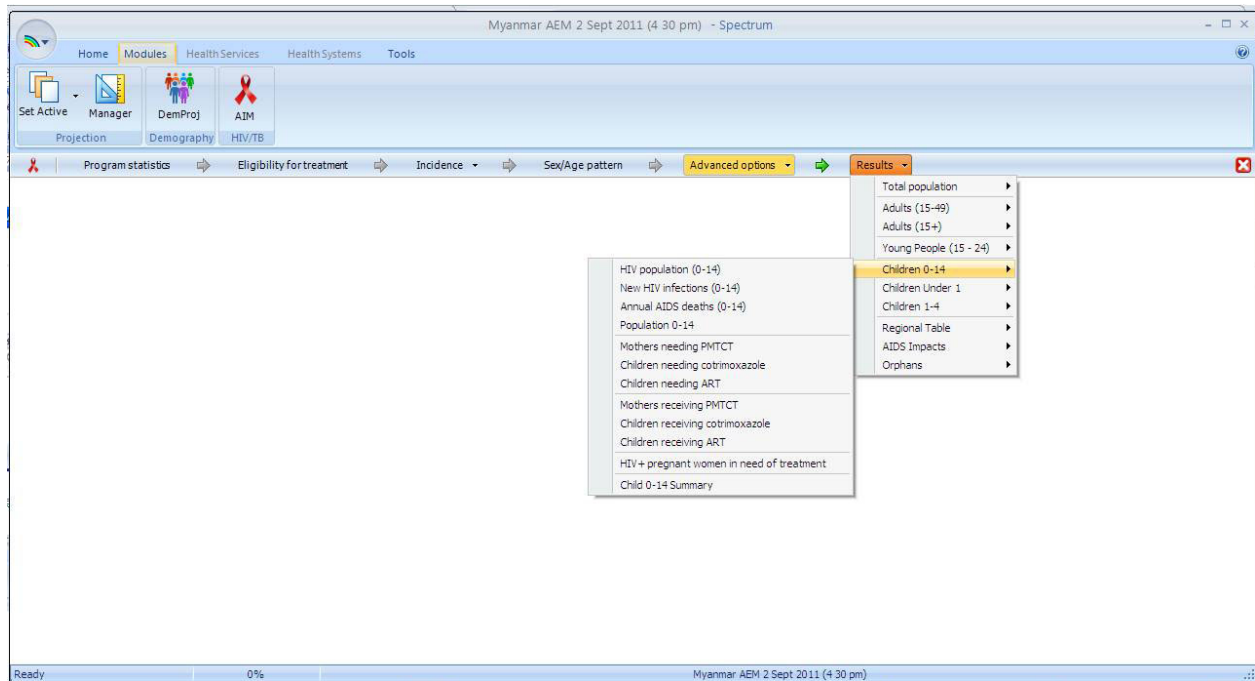


Figure 5. Results page from Spectrum – Children and women

### 3. Basic Inputs – Population

Spectrum and AEM demand a detailed population breakdown. The default choice of Spectrum is the UN Population data. The Working Group considered that the 2010 update represented a low estimate. The Working Group tried to fit the Spectrum population to the official Government projection, but this proved impossible. As a result the Working Group decided to calculate the population data with the available information. Inputs used were:

- Base population: Census 1973
- Total Fertility Rate and Age Specific Fertility Rate: Population Change and Fertility Survey (PCFS) 1991 / Fertility and Reproductive Health Survey (FRHS) 1997, 2001, 2007
- Life expectancy – Fertility and Reproductive Health Survey (FRHS) 2007
- Infant Mortality Rate – UN East Asia default
- Population growth rate – 1.04 for 2010

The resulting population for 2010 was 52 million and 55 million in 2015. The Working Group decided to disregard international migration. These population figures were subsequently used for the AEM as well as Spectrum.

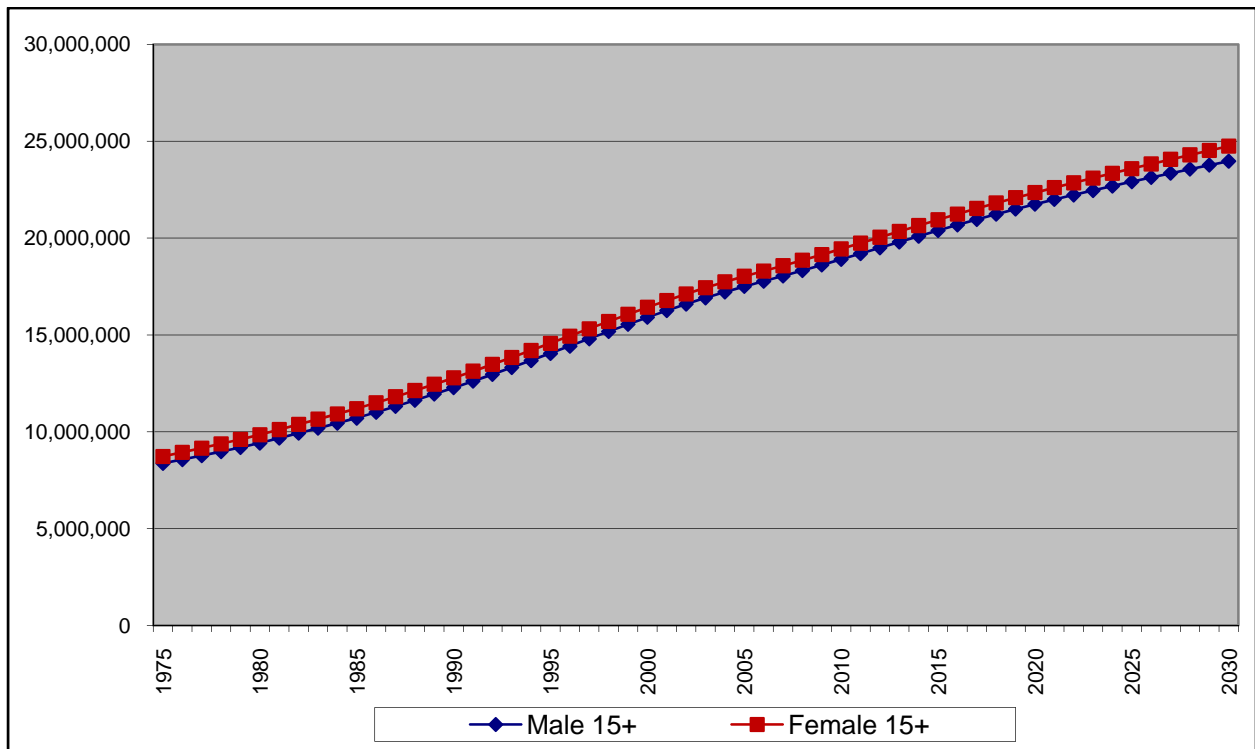


Figure 6. Myanmar Population of male and female population over 15 years old estimated for AEM and Spectrum estimations 2011

## 4. Inputs to AEM

### Sex workers – high and low frequency

The number of sex workers was set at just below 70,000 for 2010. Up to this point, the numbers of sex workers were estimated at 40,000 to 80,000 with a mid-point of 60,000. The Working Group decided on the use of a figure in the upper half of the estimate to ensure that the expected coverage of the NSP falls within these estimates. A number of attempts have been made to estimate the size of the sex worker population (NAP 2010, PSI 2011). The figures resulting from these mapping exercises estimated the number of sex workers from about 40,000 to 70,000. However, the mapping approach has likely provided an underestimate and the correction factors that were introduced were not based on research.

The BSS of 2007 (NAP, 2007) was used to estimate the ratio of low frequency to high frequency sex workers. The respondent driven sampling (RDS) methodology used in the BSS allows distinguishing brothel, street end entertainment based sex workers. The former two categories were classified as high frequency. They constituted 62% of the sex worker population.

The condom use data (defined as “condom use at last sex with a paying customer”) derived from research with sex workers was considered too high to be true (up to 95% - NAP, PSI). The Working Group decided to use condom data of male clients (NAP BSS General Population). Triangulation with PSI TRaC data showed similar results.

### Clients of sex workers

The data on male visiting sex workers in the last year of the BSS 2007 (NAP 2007) was used (=6% of male adult population). Likewise, the duration of being client was calculated from data of the BSS 2007.

### Other heterosexual

There is little information available on casual sex with non-commercial partners. The Working Group used data from the BSS 2007 (NAP General Population 2007, NAP Out-of-school Youth 2007, PSI TRaC 2008 and 2010).

The condom use among spouses was calculated at 5% from PSI TRaC 2010 data. This is important, since AEM uses this parameter to calculate HIV transmission in discordant couples.

### People who inject drugs

The number of males who inject drugs was set at 75,000 (=0.5% of the male population 15-49 years of age) in 2010 and then kept stable over the years. Before 2010, the number was calculated as 0.5% of the male population aged 15-49. People who inject drugs are the only sub-population that has not been enumerated. The number of 75,000 was arrived at by consensus of in-country stakeholders, but it requires to be confirmed through an assessment as soon as possible.

No data on females injecting drugs as well as sex work and injecting drugs was available. The Working Group decided not to include these two sub-populations in the model. It is noted however that efforts should be made to understand the scope of female injectors.

## Men who have sex with men – higher risk and lower risk

The proportion of men who have sex with men is estimated as 1.53% of the males aged 15-49 years. This estimated was calculated with data from the BSS on General Population and Out-of-school Youth (Nap 2007). The data on condom use and sex acts stems from the IBBS 2009 and PSI TRaC 2008 and 2010.

Of the total number of men who have sex with men, one sixth was considered as high risk. The Working Group considered this a reasonable assumption, but research is needed to assess the actual proportion. Alternatively, the men who have sex with men population could be modeled as one single population in future, but this would also require additional information.

The higher risk segment of the men who sex with men population has a higher frequency of sexual acts. The condom use of both groups is assumed to be the same.

Population	Estimated number	% of 15-49 male or female population	Average duration
Female sex workers	~70,000	0.45%	8 yrs
People who inject drugs	~75,000	0.50%	9 yrs
Men who have sex with men	~230,000	1.53%	20 yrs
Clients of sex workers	~830,000	5.60%	5 yrs

Table 1. Summary of inputs for key populations at risk in the AEM projection (all data for 2010)

## Other parameters

The default parameters for the transmission probability and progression from HIV to AIDS were used. For PMCT, the coverage of ARV prophylaxis was set at 4% in 2003 and then increased gradually to 80% in 2015.

## HIV Prevalence

The average annual prevalence rate for sex workers (1992 to 2011) and people who inject drugs (1992 to 2011) was used. For the general female population an adjustment factor of 0.3 was applied to the ANC surveillance data from the years 2007 to 2011. This reflects an adjustment for both rural-urban differences as well as for women who are not sexually active.

The prevalence data for men who have sex with men have shown a very big drop since the first round of surveillance in 2007. The Working Group considers that the drop is unlikely to be due to a falling prevalence in the sub-population only, but rather to methodological issues. The Working Group decided to use only data from 2007 to 2009 until more data becomes available. The prevalence for these years was then adjusted by 0.7.

## ART provision

The coverage of Art was set at 31% in 2010. This was increased to 78% in 2015 in line with the NSP targets (=70,000 adults on treatment by the end of 2015).

## 5. Inputs to Spectrum

### Programme statistics and parameters

For PMCT and ART the actual data up to 2010 was filled. For the subsequent years the targets of the NSP 2011-2015 were used.

Abortion and breast feeding are not known.

Eligibility for treatment was set at the 200 CD4 count threshold until the end of 2011. As of the beginning of 2012 the threshold was increased to 350 CD4 count in line with national treatment guidelines.

### Incidence

Incidence was taken from the AEM. The incidence in AEM reflects the population of adults 15 years and older. The incidence needed was adjusted to the values of the population 15-49 years of age as required by Spectrum.

### Sex/age pattern

The sex ratio was calculated from the outputs of AEM.

### Advanced options

The advanced options needed adjustments in order to align the need for ART results of AEM and Spectrum. Initially, Spectrum calculated considerably lower numbers of people in need of treatment than AEM regardless of eligibility criteria. The advanced options of Spectrum allow adjustment to the settings of transmission parameters. The following was adjusted:

CD4 Level	Default value	Final value used
> 500	0.01	0.007
350 - 499	0.01	0.007
250 - 349	0.01	0.007
200 - 249	0.03	0.02
100 - 199	0.2	0.15
50 - 99	0.3	0.15
< 50	0.44	0.25

Table 2. Spectrum-AIM transition parameters – probability of HIV Mortality without ART



## 6. Results

All results shown are based on the assumption that 2010 behaviours remain unchanged (=AEM Baseline) and that ART treatment is scaled up as in planned in the Operational Plan of the NSP 2011-2015.

The AEM version created in September 2011 was used for all data and graphs<sup>4</sup>.

### Incidence

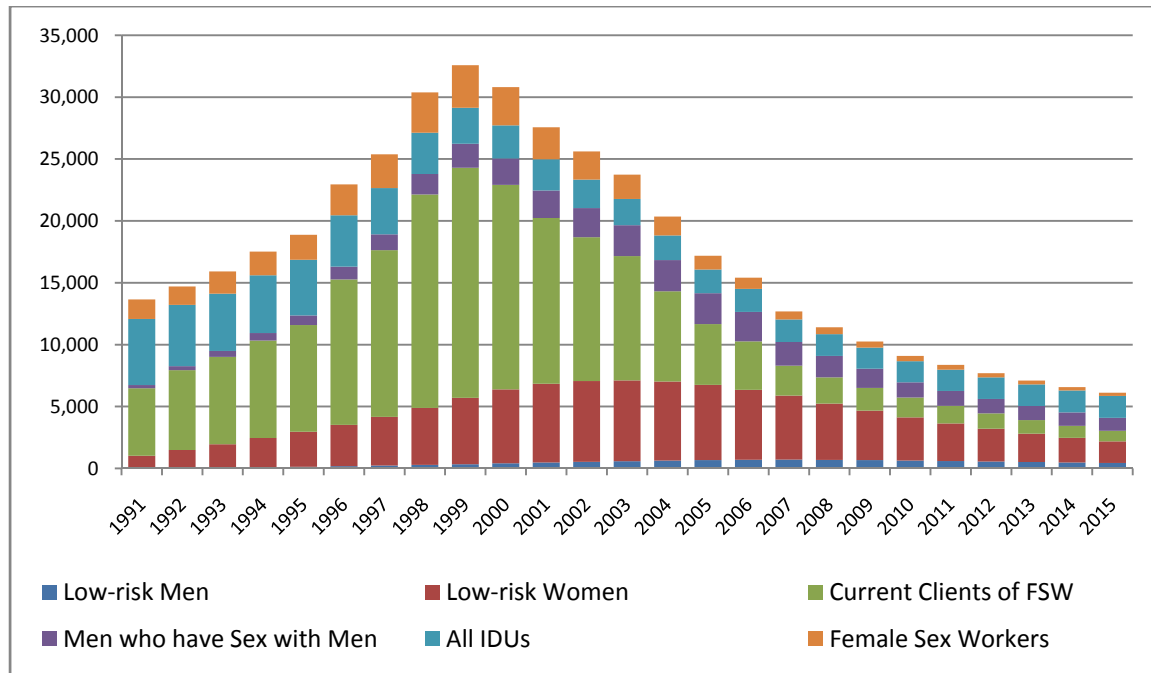


Figure 7. Incidence by key affected population – Myanmar 1995-2020

Figure 7 shows the estimated yearly incidence broken down by key affected populations. AEM suggests that the peak of new infections occurred in 1999. The decline in new infections is continuous following the peak, but levels out to some extent after 2010.

The relative weight of new infections shifts considerably throughout the years as is demonstrated in Figure 8. The late 1990s saw a large proportion of sex workers and clients becoming infected. This eventually resulted in a large increase of women being infected by their male partners. Following 2010, this pattern shifts again and the injecting drug users and men who have sex with men contribute an increasing proportion of new infections towards the total. Low risk women continue to provide a substantial part of the new infections, but the numbers of new infections per year are declining as well.

<sup>4</sup> File name: AEM Baseline\_Myanmar 3.2\_v4 (5 pm 2 Sept 2011).

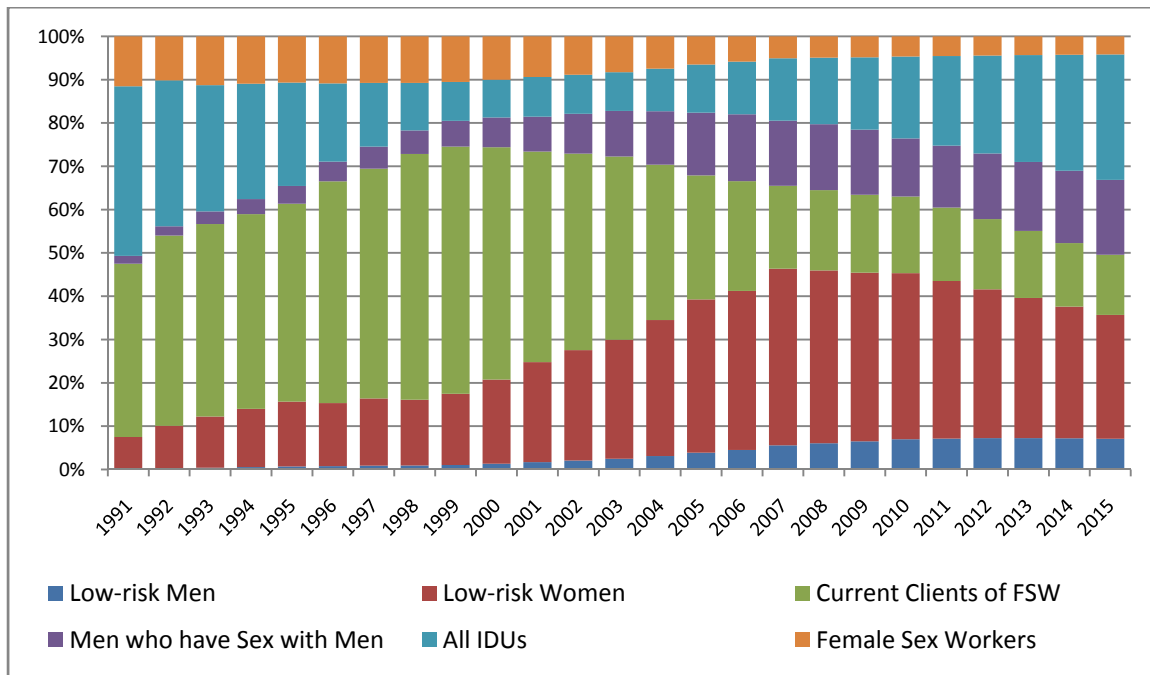


Figure 8. Distribution of new infections among key affected populations – Myanmar 1995-2020

Figure 9 shows the total number of new adult infections for women and men. Up to 1999 the number of men newly infected grew very quickly until the peak in 1999. The peak for women arrived later and at a lower level.

The proportion of women as of the total new infections continued to grow until 2007 when it was close to 1:1. Figure 10 shows the ratio of female to male new infections from 1995 to 2020. In the years following 2007, the male proportion of new infections is becoming increasingly bigger. And by 2015 more than 2 men are estimated to be infected for each woman. This can be largely attributed to the fact that the incidence of people who inject drugs remains high and the incidence of men who have sex men declines slower than the average.

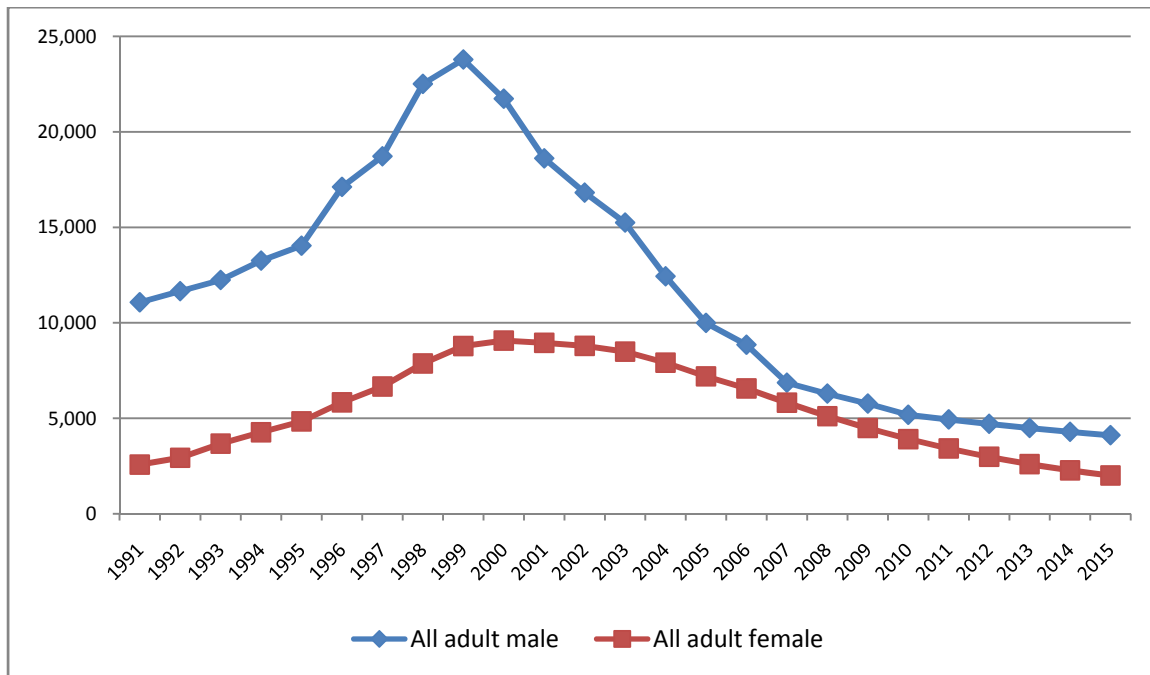


Figure 9. Number of total new infections by male and females over 15 years of age – Myanmar 1995-2020

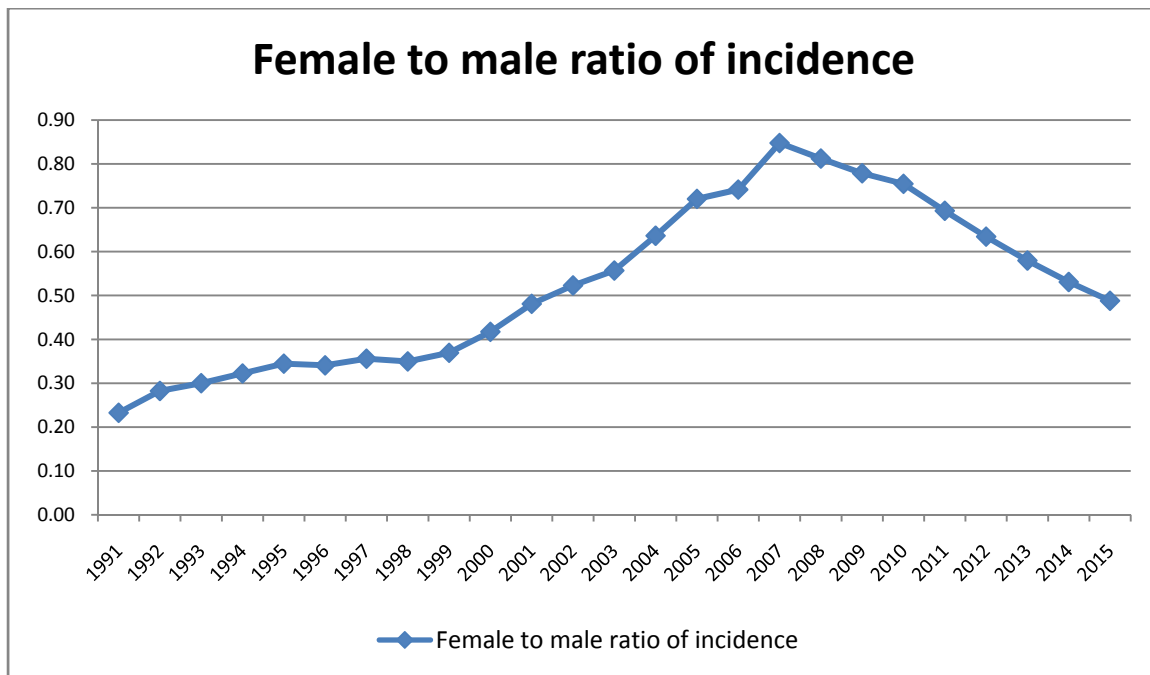


Figure 10. Ratio of female to male new infections per year – Myanmar 1995-2020

The AEM also allows seeing the new infections by transmission route. Sexual transmission was the main route of transmission in 2010 contributing a total of 77% to new infections. The model suggests that this proportion will have decreased to 67% in 2015. Transmission through casual sex and mother to child transmission are relatively small and will be falling with general decline of incidence.

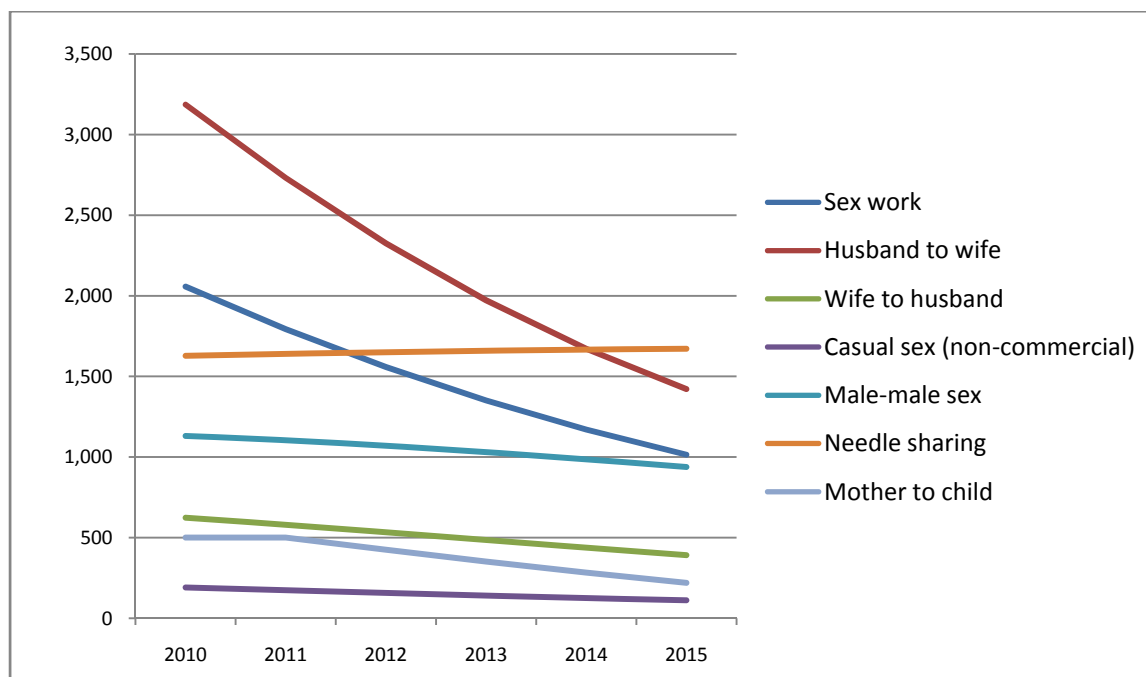


Figure 11. New infections by transmission route – Myanmar 2010-2020

## Death

Figure 12 shows the estimated number of people dying each year of AIDS related illnesses<sup>5</sup>. It is estimated that from over 19,000 deaths in 2010, the number will decline to around 11,500 in 2015. The declining number of deaths results from the reduced number of new infections as well as the scale up of ARV treatment. It should be noted that the number of deaths also depends on the availability of 2<sup>nd</sup> line treatment as well as the quality of ART services.

<sup>5</sup> AEM does not directly calculate the number of deaths with ART provision. In order to calculate the number of deaths for 2010 the following calculation was performed with data from the 'Summary results with ART' table: Current HIV in the year 2009 plus the new HIV infections in the year 2010 minus the number of current HIV in the year 2010. This was repeated for the subsequent years.

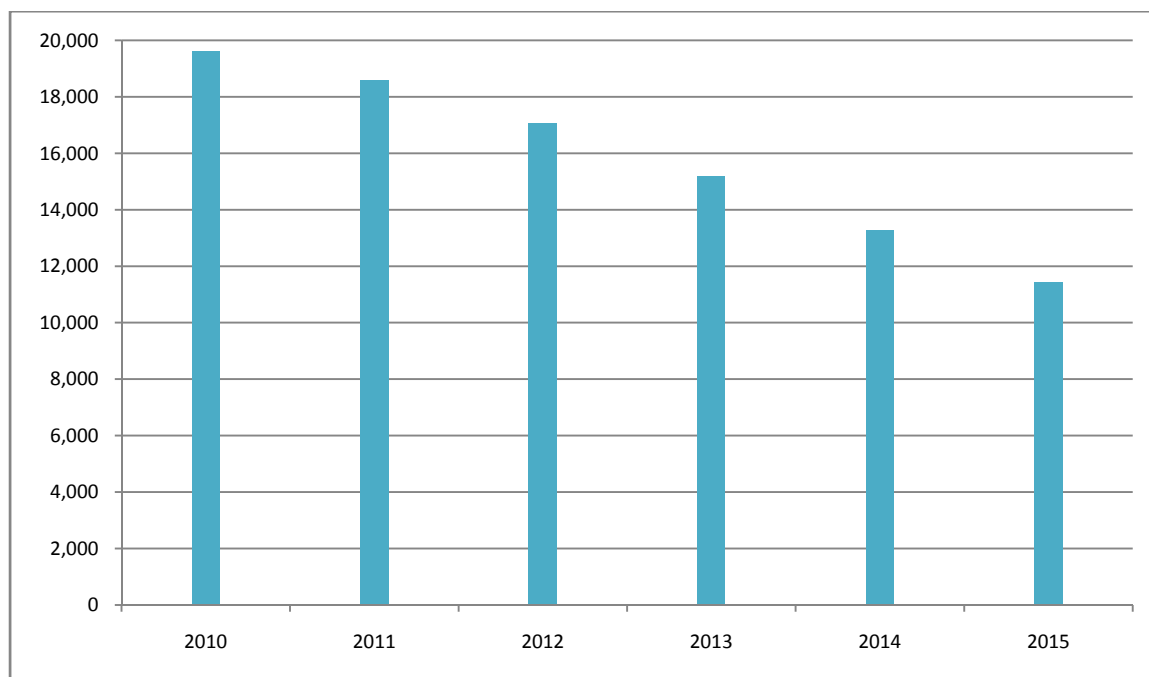


Figure 12. Number of estimated annual deaths due to AIDS – Myanmar 2010-2020

### Prevalence and number of people infected with HIV

The Working Group established specific population data for this round of estimations as explained earlier. The fact that the population used in this projection of HIV data in Myanmar was lower than in previous projections had predictable results: The prevalence of the general population was marginally higher while the number of people living with HIV was lower.

AEM calculates prevalence for population aged 15 years and more. In an aging HIV epidemic with an increasing number of people on ART, there will be an increasing number of people of higher ages. The data from AEM indicates that prevalence for the adult population peaked in 2003 or 2004 as shown in Figure 13. The male prevalence peaked shortly before, while the female prevalence peak followed a couple of years later. By 2015, the prevalence will have decreased to 0.43% of the adult population.

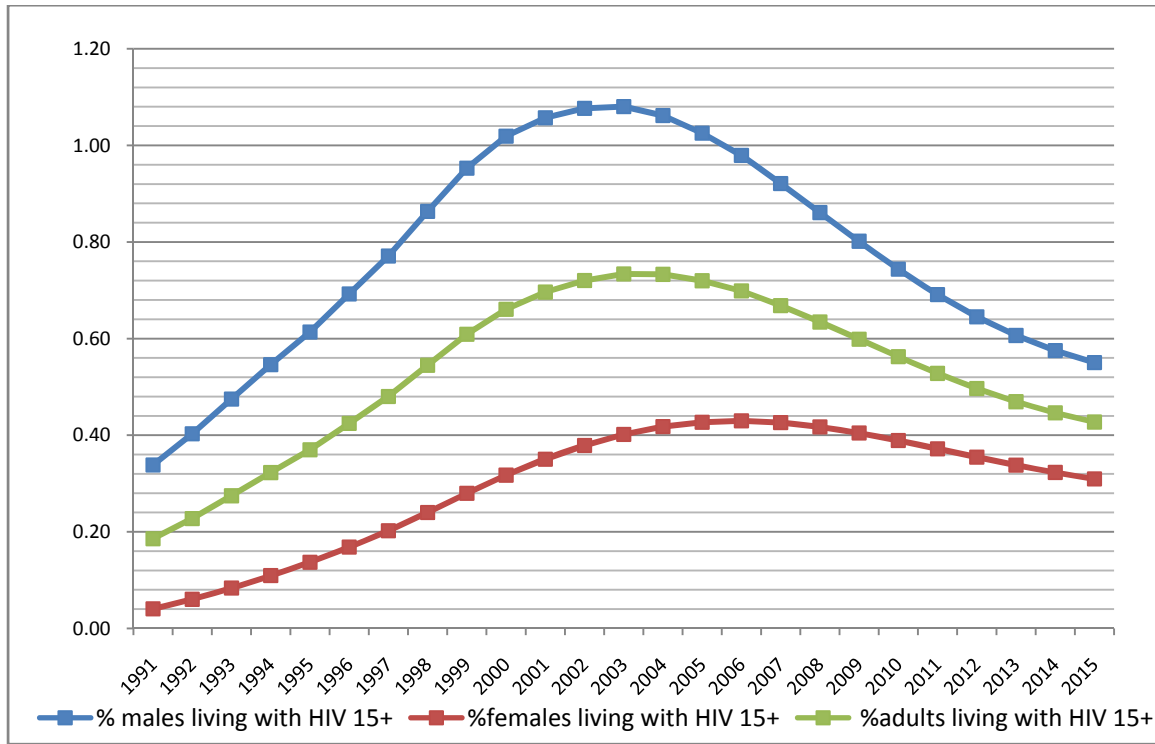


Figure 13. HIV prevalence of adult population aged 15+ = Myanmar 2010-2020

The peak in prevalence corresponds to approximately 250,000 people who were infected with HIV in 2004. This figure falls relatively quick following the peak and will reach 177,000 in 2015.

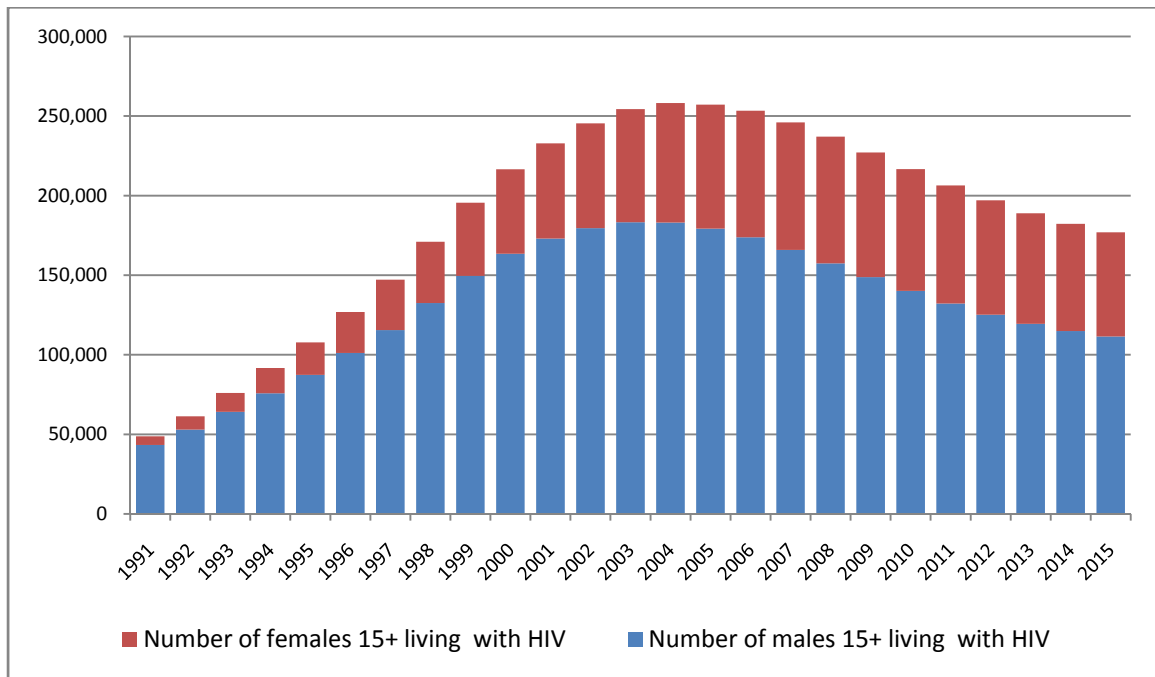


Figure 14. Number of people living with HIV – Myanmar 2010-2020

## Treatment needs and PMCT

Treatment needs were taken from AEM for eligibility criteria of less than 200 CD4 count. For the eligibility criteria of less than 350 CD4 count, Spectrum data was used for the years of 2012 to 2015.

In this scenario, the lower threshold suggests that about 90,000 will need ARV treatment in 2015. The higher threshold is over 30% percent higher with just under 120,000 adults needing treatment in 2015. It is estimated that in 2010 about 31% of the people in need were women. This proportion will rise to 36% in 2015 (from Spectrum).

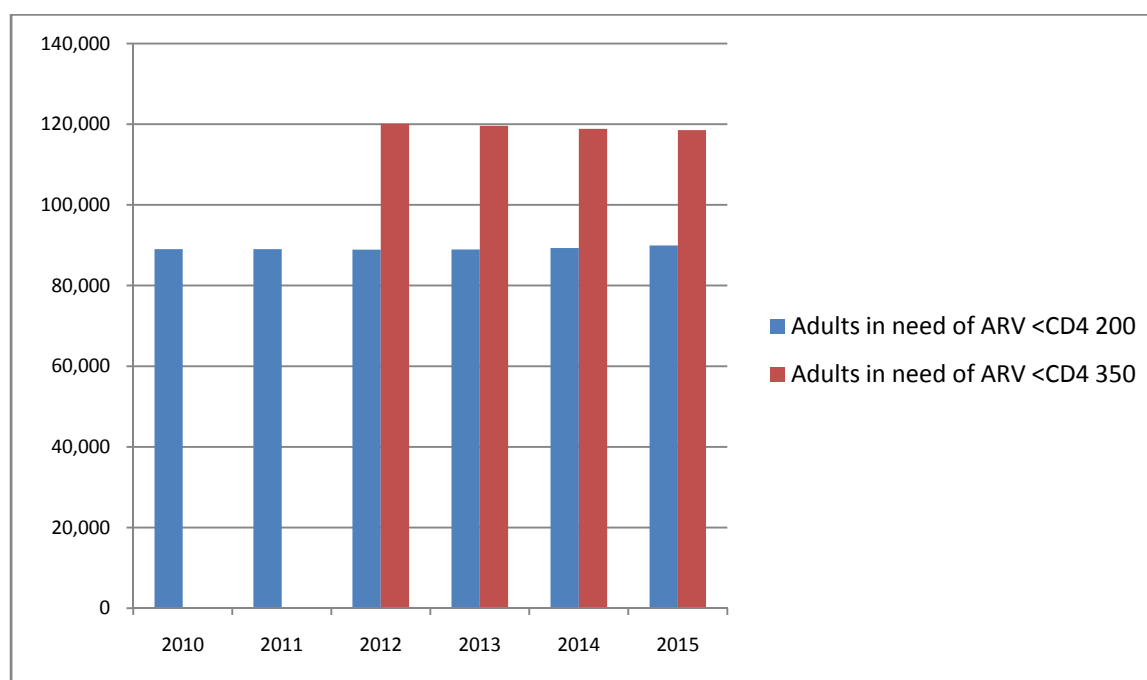


Figure 15. Number of adults over 15+ years in need of treatment with eligibility less than 200 CD4 count and less than 350 CD4 count – Myanmar 2010-2020

AEM does not produce results for children or pregnant women who are HIV positive. Therefore, the Working Group used Spectrum to calculate these data. The treatment needs for children aged 0-14 are considerably higher than in previous estimates. This supports the reports received from ART providers showing relatively high treatment figures for children.

The number of pregnant HIV positive women who are in need of PMCT services is estimated to slowly decline from about 4,000 in 2010 to just under 3,000 in 2015.

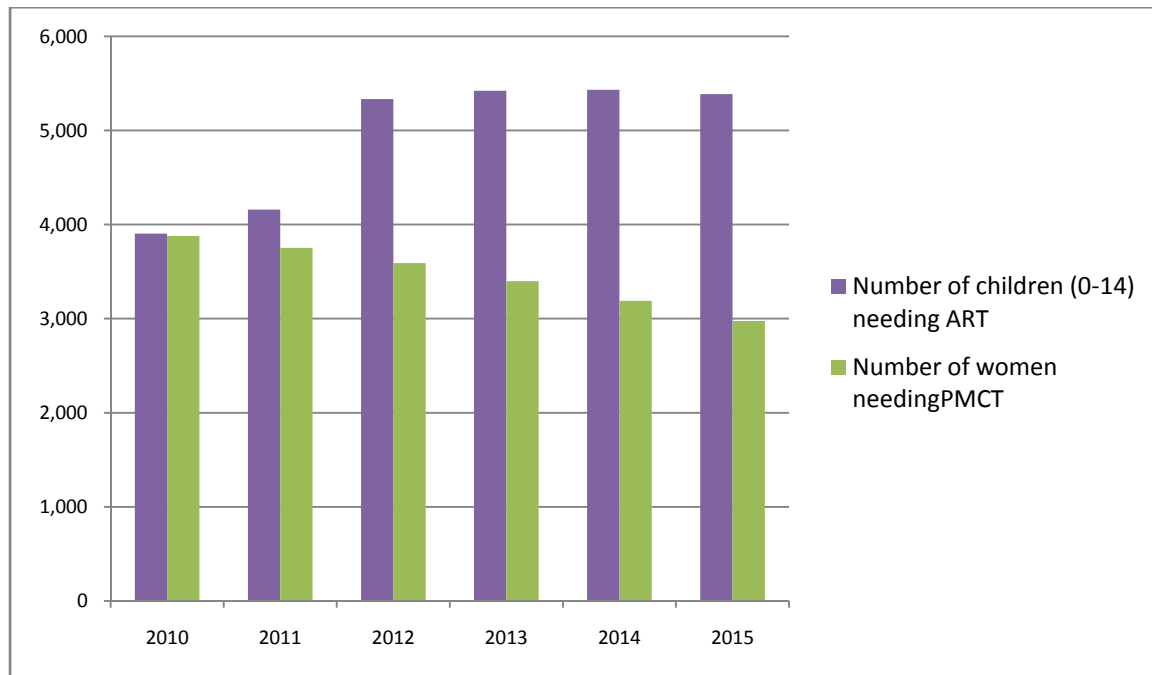


Figure 16. Number of children in need of ART and number of women in need of PMCT services – Myanmar 2010-2015



## 7. Discussion and recommendations

### Suitability of model

The development of the AEM is time and data intensive process. The process in Myanmar has led to a thorough review of the available data, vetting of the existing data sets and the triangulation with data that has not been included so far in the national projections. This in itself is a considerable achievement. The fact that data of different sources, including non-governmental organisations, have been used as inputs to the model has improved the plausibility and reliability of the results.

The detailed results of incidence for key affected populations are highly relevant for the HIV response in Myanmar. There are clear indications that the incidence is declining. However, the decline does not affect all sub-populations to the same degree. There are important programmatic conclusions to draw from this which will be discussed further down.

### Data needs and gaps

The AEM is data intensive and requires data that is often not routinely collected. It is therefore not surprising that the development of the AEM for Myanmar revealed a number of data gaps. Filling these gaps should be a priority of research and surveillance. Many of the gaps can be filled by appropriately designing existing data collection tools, such as BSS and HSS. Priority should be given to the following issues:

- Establishing at least a second set of behavioural data in order to establish a link between programme coverage and behaviours
- Improve the understanding of condom use in different populations and with different partners; at present the assessed condom use rate at last sex so high (over 95% with sex workers) that this more likely represents the knowledge of what should be done rather than actual consistent condom use
- Measure trends in STI prevalence among key populations at risk
- Assess the best manner to model men who have sex with men: At present there is not sufficient information to distinguish between higher and lower risk MSM. At the same time there is only HIV prevalence data on two cities available. It may be best to extend the HSS to further locations and to improve the sampling in existing locations in order to establish a better understanding of the national prevalence rate among all men who have sex with men.
- Measure the size of the injecting drug user population. The behavioural surveys will also need to include additional questions on injecting behaviours.

## Implications for programmes

The AEM suggests that the HIV response in Myanmar has been successful in turning the epidemic. There is however no time for complacency since there are still considerable challenges ahead:

- Incidence decreased and will continue to decrease in transmission related to sex work. Investments in prevention programmes for sex workers and clients need to be sustained and where possible intensified in order to further reduce new infections. Infections from (former) clients of sex workers to their female regular partners continue to constitute an important part of the new infections, albeit decreasing. Challenges to reach this population effectively and the likelihood that funds will be limited for the foreseeable future confirms the need to cut the transmission between sex workers and clients.
- New infections through the use of contaminated injecting equipment will become an increasingly important proportion of the total new infections. There is an urgent need to improve the scale and effectiveness of prevention programmes for injecting drug users. While it is thought that the injecting sub-population is relatively isolated from the rest population, the drug use patterns can shift quickly (Amphetamine injecting, poly drug use etc.) which can lead to connections between sex work and injecting populations as in other countries.
- Infections among men who have sex with men remain relatively high and the decrease is slower than with other major routes of transmission. There is a need to intensify prevention efforts for men who have sex with men, notably for the hidden part of the population.
- HIV transmission through casual sex was small and is expected to fall further. Prevention efforts in this area are unlikely to achieve a significant reduction of new infections.
- The number of people in need of ART based on eligibility criteria of less than CD4 count is higher in the AEM than with previous models. The AEM does not calculate the treatment needs for the 350 CD4 count eligibility, but Spectrum can be used to produce these estimates. The results suggest that nearly 120,000 people are eligible for treatment with this higher threshold which will be implemented by Myanmar as of 2012. A fast scale up of treatment is needed to save a maximum number of lives.
- The number of women needing PMCT is declining. Spectrum suggests that there will be a decline of about 25% from 2010 to 2015. The PMCT programme will therefore have to test an increasing number of women to maintain the number of HIV positive women that are detected.
- Earlier detection of HIV will be necessary to reduce transmission of HIV in discordant couples as well as to ensure access to ART.
- Research and surveillance and M&E will all need to be strengthened to ensure that data going into the models are of increasing quality.

Table 3. Summary tables of HIV Estimation and Projections 2010-2015 - Myanmar

	Source	2010	2011	2012	2013	2014	2015
<b>Percentage of adults over 15 years infected with HIV</b>							
Male	AEM	0.74	0.69	0.64	0.60	0.57	0.55
Female	AEM	0.39	0.37	0.35	0.34	0.32	0.31
Total	AEM	<b>0.56</b>	<b>0.53</b>	<b>0.50</b>	<b>0.47</b>	<b>0.45</b>	<b>0.43</b>
<b>Number of adults over 15 years infected with HIV</b>							
Male	AEM	140,139	132,177	125,216	119,467	114,915	111,499
Female	AEM	76,475	74,218	71,818	69,489	67,337	65,443
Total	AEM	<b>216,614</b>	<b>206,395</b>	<b>197,034</b>	<b>188,956</b>	<b>182,252</b>	<b>176,941</b>
<b>New infections among adults over 15 years</b>							
Male	AEM	5,182	4,939	4,710	4,493	4,292	4,112
Female	AEM	3,909	3,423	2,987	2,604	2,278	2,006
Total	AEM	<b>9,091</b>	<b>8,362</b>	<b>7,696</b>	<b>7,097</b>	<b>6,570</b>	<b>6,118</b>
<b>Routes of transmission</b>							
Sex work	AEM	22%	21%	20%	19%	18%	18%
Husband to wife	AEM	34%	32%	30%	28%	26%	25%
Wife to husband	AEM	7%	7%	7%	7%	7%	7%
Casual sex (non-commercial)	AEM	2%	2%	2%	2%	2%	2%
Male-male sex	AEM	12%	13%	14%	15%	16%	16%
Needle sharing	AEM	17%	19%	21%	24%	26%	29%
Mother to child	AEM	5%	6%	6%	5%	4%	4%
Total	AEM	100%	100%	100%	100%	100%	100%
<b>Percentage of new infections by key population at risk (without ART)</b>							
Current male clients of sex workers	AEM	18%	17%	16%	15%	14%	13%
People who inject drugs	AEM	19%	21%	23%	26%	28%	31%
Men who have sex with men	AEM	14%	14%	15%	16%	17%	17%
Female sex worker	AEM	5%	5%	4%	4%	4%	4%
Other males	AEM	7%	7%	7%	7%	7%	7%
Other females	AEM	38%	36%	34%	32%	29%	27%
Total	AEM	100%	100%	100%	100%	100%	100%

Table 3. (continued)

	Source	2010	2011	2012	2013	2014	2015
<b>Number of adults over 15 newly eligible for ART</b>							
Male	AEM	14,640	13,555	12,401	11,242	10,121	9,075
Female	AEM	7,296	7,117	6,838	6,477	6,055	5,594
Total	AEM	21,936	20,672	19,239	17,719	16,176	14,669
<b>Adults over 15 in need of ART (CD4 &lt;200)</b>							
Males	AEM	61,449	60,581	59,651	58,933	58,499	58,346
Females	AEM	27,568	28,457	29,238	30,007	30,788	31,578
Total	AEM	89,017	89,038	88,889	88,941	89,287	89,924
<b>Adults over 15 in need of ART (CD4 &lt; 350)</b>							
Males	Spectrum			80,089	78,759	77,376	76,420
Females	Spectrum			40,041	40,862	41,478	42,108
Total	Spectrum			120,130	119,621	118,854	118,528
<b>Number of children 0-14 years with HIV infection</b>							
Male	Spectrum	4,792	4,924	4,993	5,002	4,952	4,849
Female	Spectrum	4,651	4,779	4,845	4,853	4,804	4,704
Total	Spectrum	9,443	9,703	9,839	9,855	9,756	9,553
<b>Children needing cotrimoxazole</b>							
Male	Spectrum	7,054	7,076	7,024	6,921	6,768	6,572
Female	Spectrum	6,847	6,868	6,817	6,716	6,567	6,376
Total	Spectrum	13,900	13,943	13,841	13,637	13,335	12,948
<b>Total need for ART children 0-14 years</b>							
Male	Spectrum	1,981	2,110	2,707	2,752	2,758	2,735
Female	Spectrum	1,922	2,048	2,626	2,670	2,675	2,652
Total	Spectrum	3,903	4,158	5,333	5,422	5,432	5,387
<b>PMTCT</b>							
Number of HIV+ pregnant women	Spectrum	4,563	4,415	4,224	3,999	3,753	3,502
Mothers needing PMTCT	Spectrum	3,878	3,752	3,591	3,399	3,190	2,976