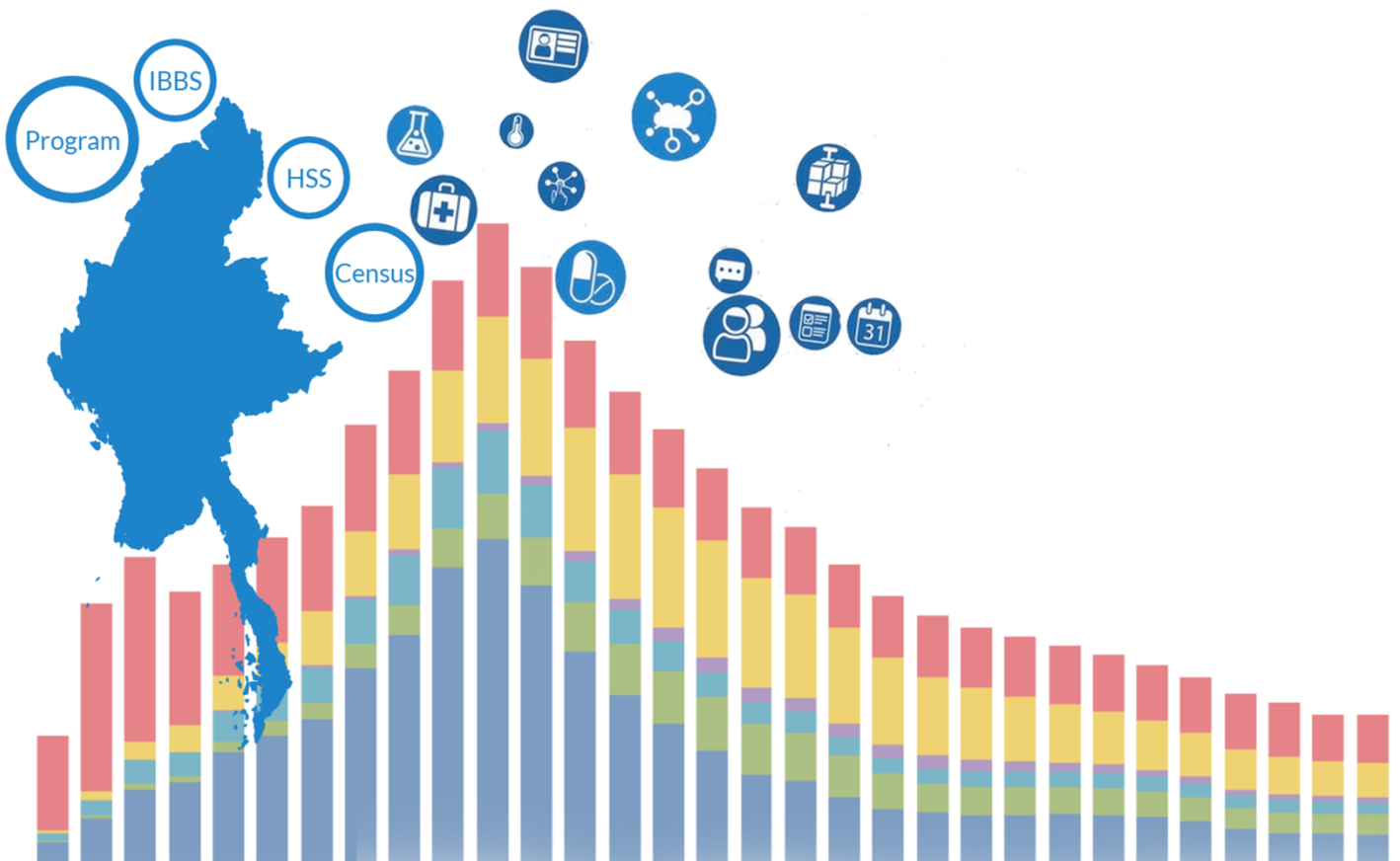# 2016 HIV Estimates & Projections

(National & Sub-National Levels)

National AIDS Program

Ministry of Health and Sports

Myanmar

March 2018

Contents

FIGURES

TABLES

ACKNOWLEDGMENTS

ACRONYMS

AEM	AIDS Epidemic Model
ART	Antiretroviral Therapy
BSS	Behavioural Surveillance Survey
FSW	Female Sex Worker
FT	Fast Track
GFATM	The Global Fund to Fight AIDS, Tuberculosis and Malaria
HSS	HIV Sero-Sentinel Surveillance
IBBS	Integrated Biological and Behavioural Surveillance
IDU	Injecting Drug Use
KP	Key Populations
MOHS	Ministry of Health and Sports
MSM	Men who have Sex with Men
NSP	National Strategic Plan
NAP	National AIDS Program
PEPFAR	The President's Emergency Plan For AIDS Relief
PLHIV	People Living with HIV
PSE	Population Size Estimates
PWID	People Who Inject Drugs
UNAIDS	The Joint United Nations Programme on HIV and AIDS
USAID	The United States Agency for International Development

EXECUTIVE SUMMARY

HIV is recognized as one of the priority in Myanmar. The National AIDS Program (NAP) under the Ministry of Health and Sports (MOHS) has been leading the national HIV response since late-1980s with coordinated national and international support.

The AIDS Epidemic Model (AEM) is a behavioral process model which simulates transmission dynamics in concentrated HIV epidemics such as in Myanmar. Myanmar has a decade-long experience generating HIV estimates and projection with AEM to track the country's HIV epidemic and monitor the efficacy of the national HIV response.

This report presents the results of the modelling at sub-national level. These results are essential for the preparation of sub-national operational plans, allowing States and Regions to develop tailored approaches to their local HIV epidemic.

Overall, at national level, the HIV epidemic is estimated to be declining slowly. However sub-national models reveal the real picture of the HIV epidemic in a number of Sates and Regions, which previously were assumed to have similar HIV epidemics to the national one:

The sub-national estimates show that Yangon Region, Kachin State, Shan (North) State and Sagaing Region HIV epidemics are not declining as the national one.

The HIV Epidemic at sub-national level is quite different from region to region. At national level, all modes of transmission are important, but at sub-national level there are some key modes of transmission driving the epidemic in a number of States and Regions:

- o Kachin State, Shan (North) State and Sagaing Region have an Injecting Drug Use (IDU) driven HIV epidemic.
- o Yangon Region and Mandalay Region have male to male sexually transmitted HIV epidemic.
- o Yangon Region, Mandalay Region, Sagaing Region and the Remaining States and Regions have a heterosexually transmitted HIV epidemic.

The AEM outputs show that the epidemic in Mandalay Region has been controlled in all aspects of transmission. This may need more validation and we may want to explore the reasons behind the decline in new infections, deaths and HIV prevalence to inform the response in other States and Regions.

Yangon Region epidemic calls for special consideration as the HIV epidemic is not controlled.

- o Adult HIV prevalence in Yangon Region is estimated to be high, at around 0.95%, due to male to male and heterosexually transmitted HIV epidemics which are not yet under-control. HIV Prevalence among Female Sex Worker (FSW) and Men Sex with Men (MSM) are very high, for example HIV prevalence among MSM in Yangon Region (2015) was estimated to be 26.6%[1], higher than Bangkok at 24.4%[2] in 2012. HIV prevalence among FSW in Yangon Region is also estimated to be very high at 24.6% (2015)[3].
- o Yangon Region contributes the most to the number of new HIV infections and People Living with HIV (PLHIV).

Kachin State needs to revisit its response strategy and to focus even more on HIV prevention and harm reduction.

- o Adult HIV prevalence in Kachin State is estimated to be very high, around 2.7%, while national HIV prevalence is estimated to be 0.57%. The epidemic is driven mainly by injecting drug use (IDU) and acquisition of HIV among female partners of People Who Inject Drugs (PWID)
- o A small epidemic among MSM is appearing.
- o The adult HIV prevalence is so high due to the large PWID population size (5% of 15-49 males) and a very high HIV prevalence (40%-80%) among PWID (2014).

Shan (North) State has room to improve antiretroviral (ART) coverage, while it should implement more effective HIV prevention interventions including harm reduction.

Sagaing Region is experiencing an early HIV epidemic and has potential to develop a larger IDU driven epidemic in the near future.

In the Remaining Regions and States HIV epidemic are mainly driven by heterosexual transmission at a lower level than the national level. There is heterogeneity of epidemics in the remaining Regions and States which needs further exploration.

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[1] IBBS among MSM 2015
[2] National Strategic Plan on HIV and AIDS in Myanmar 2016-2020 (NAP, MOHS 2017)
[3] IBBS among FSW 2015

Policy and Impact advice

o For the Baseline scenario (or 'business as usual'), overall the number of new infections will be declining in the long term except in some IDU driven epidemic regions.

o The Fast Track (90% Prevention coverage and 81% of all PLHIV on Treatment) scenario produces the highest impact compared to other scenarios: it also consumes the highest resources.

o The Main-driver Fast Track scenario (fast tracking prevention and treatment interventions for the Key Populations who drive the epidemic in respective regions) yields less new infections and fewer deaths compared to the prevention-only Fast Track scenario while they use around the same amount of resources.

o The Main-driver Fast Track scenario seems to be the most cost-effective scenario and should be the priority scenario for all States and Regions modelled, given limited resources.

o Overall, the prevention only Fast Track scenario (90% prevention coverage for Key Populations (KP)) yields high impact on new infections except in Kachin State and Shan (North) State, since their current prevention coverage is already quite high.

o Overall, Treatment only Fast Track scenario (81% of all PLHIV on treatment) yields less impact on new infections compared to other scenarios except in Kachin State and Shan (North) State as they almost reached the maximum prevention coverage.

o However, Treatment only Fast Track scenario does have a big impact on deaths (treatment saves lives).

o When we compare Treatment only Fast Track to the Fast Track scenario, the Fast Track scenario averts many more new infections and will consume fewer resources in the long term because of the effect of the prevention component.

o This means that prevention is still very important and should be further highlighted in the HIV programing. Additionally, prevention programs should not only focus on reaching Key Populations for testing but should also be focused on behavior change.

INTRODUCTION

HIV is recognized as one of the priority in Myanmar alongside Tuberculosis and Malaria. The National AIDS Program (NAP) under the Ministry of Health and Sports (MOHS) has been leading the national HIV response which commenced in the late-1980s with coordinated national and international support.

The AIDS Epidemic Model (AEM) is a behavioral process model which simulates transmission dynamics in concentrated HIV epidemics, such as in Myanmar. Myanmar uses the AEM: one of the most frequently used models to produce HIV estimates and projections for the adult population (15+ years), to track the country's HIV epidemic and monitor the efficacy of the national HIV response.

Myanmar has a decade-long experience generating HIV estimates and projections. Myanmar's first effort to produce the HIV estimates and projections started in 2003 to gain a better understanding of its HIV epidemic. In 2007, Yangon Region AEM was developed. The first Myanmar national HIV epidemic estimates and projections using AEM were completed in 2010 and have been repeated whenever updated behavioral data was available from national behavioral surveys to monitor changes over-time describing the epidemic and to evaluate the progress made by the national response to HIV.

To reflect the new geographic categorization approach outlined in the National Strategic Plan III, the national AEM model was separated into three models according to the HIV burden level in townships: high, medium and low, in early 2016. This was followed by an optimization analysis using AEM to identify the optimal level of programmatic combination between Prevention and Treatment that will provide the highest impact at a given resource level. These results were used to support the development of Myanmar's Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) concept note Round 11 and to inform the operationalization of the NSP-III.

As the Regions in Myanmar vary greatly in geographic and Key Populations, to reveal the diversity in the HIV epidemic in different States and Regions, it was decided to develop States and Regions AEM models initiating with the States and Region(s) which carried the greatest number of Key Populations and the highest HIV burden. AEM baseline models for Yangon Region, Mandalay Region and Kachin State were first developed in late 2016. Sub-regional estimates were expanded to Shan (North) State, Sagaing Region and the

Remaining regions in late 2017 followed by a policy analysis. The combination of these 6 models of sub-national estimates contributed to new Myanmar national estimates.

This report presents the results of the modelling at sub-national level which are essential for the preparation of the National Strategic Plan at sub-national level and for the design of tailored approaches to the local HIV epidemics. These estimates and projections at sub-national level also offer recommendations on how to orient the HIV response in the future.

METHODOLOGY

The Asian Epidemic Model (AEM) is a model, which mathematically replicates the key processes driving HIV transmission. It has extensive epidemiological and behavioral input requirements and offers the ability to examine future scenarios in which prevention and care efforts induce behavior change. It works with three workbooks: **baseline**, **intervention** and **impact analysis**.

These sub-national AEM models utilized available data from a variety of sources as inputs: 2014 national census for general population data, Integrated Biological and Behavioral Surveillance (IBBS) 2009, 2014 and 2015; Behavioral Surveillance Survey (BSS) 2003, 2007, 2008 and 2011 for behavioral data of Key Populations, clients and partners; yearly HIV Sero-Sentinel Surveillance (HSS) and IBBS for HIV prevalence data; Population Size Estimates (PSE) for Key Populations for KP population data; and other ad hoc small scale surveys at local level for data triangulation. Program data such as ART data, prevention coverage data at local/national level from AIDS/STD teams and implementing partners are also used for program coverage, etc.

Five baseline models for Yangon Region, Mandalay Region, Kachin State, Shan (North) State, Sagaing Region and one baseline model for the Remaining States and Regions in Myanmar were developed using the above inputs. Subsequently, a Policy and Impact Analysis with various intervention scenarios was generated to assess the most cost-effective prevention and treatment combination coverage.

The AEM Impact Analysis was conducted both at sub-national and national level, measuring new HIV infections and HIV deaths which are the key criteria for success in the

national response. While the AEM baseline scenario divulges the local epidemic pattern, the impact analysis evaluates the impact of different interventions / programs and related costs, as well as compares the Baseline projections with alternative scenarios. The following aspects were compared: new HIV infections and HIV deaths; and resource needs for Prevention and Treatment, including incremental cost.

HIV estimates vary from year to year as statistical models are improved and as new data becomes available. Results from previous models **should not be compared** with current models. **Always use the latest projections available at country level.** We present average estimated values however these lay within an uncertainty range

PART I: RESULTS OF BASELINE HIV ESTIMATES AND PROJECTIONS

I.1. HIV prevalence among adults 15 year and above in Myanmar by States and Regions

The trend of the national HIV prevalence among adults (15+) reached its peak (0.75%) around the year 2004-2005 and shows a slow decline in the following years to reach 0.57% in 2016.

The trend and level of HIV prevalence among adults 15 year and above (15+) varies greatly by regions and states *(Figure 1)*.

Kachin State and Shan (North) State have relatively earlier peaks and higher HIV prevalence than the national average and other regions.

Kachin State shows the highest level of HIV prevalence among adults (15+) throughout the decades of the epidemic. This prevalence reached its peak (3.2%) in the years 2000-2002, and then declined slowly, maintaining a high level. In 2016, it was estimated to be 2.76% which was more than 4 times higher than the national average for the same year.

The HIV prevalence among adults (15+) in Shan (North) State shows a much lower level than that for Kachin State, but higher than the national average throughout the epidemic. The peak of HIV prevalence among adults (15+) in Shan (North) State (1.05%) was reached around the years 2002-2003 which is a bit later than Kachin State. The prevalence trend remains relatively stable and the HIV prevalence is estimated to be 0.95% in 2016.

Yangon Region started with a relatively low HIV prevalence among adults (15+) but this prevalence increased in 2000-2006 reaching the same level as Shan (North) State in recent years. The prevalence trend becomes stable in later years and the HIV prevalence among adults (15+) is estimated to be 0.96% in 2016.

Mandalay Region HIV prevalence among adults (15+) follows closely the national trend but with a slight deeper decline in recent years (after 2013) and it was estimated to be 0.55% in 2016.

The HIV prevalence among adults (15+) prevalence in Sagaing Region and Remaining 12 States and Regions combined, shows a lower level than that of the national average from

the beginning of the epidemic and remains lower at 0.36% for Sagaing Region and 0.34% for the Remaining States and Regions in 2016.
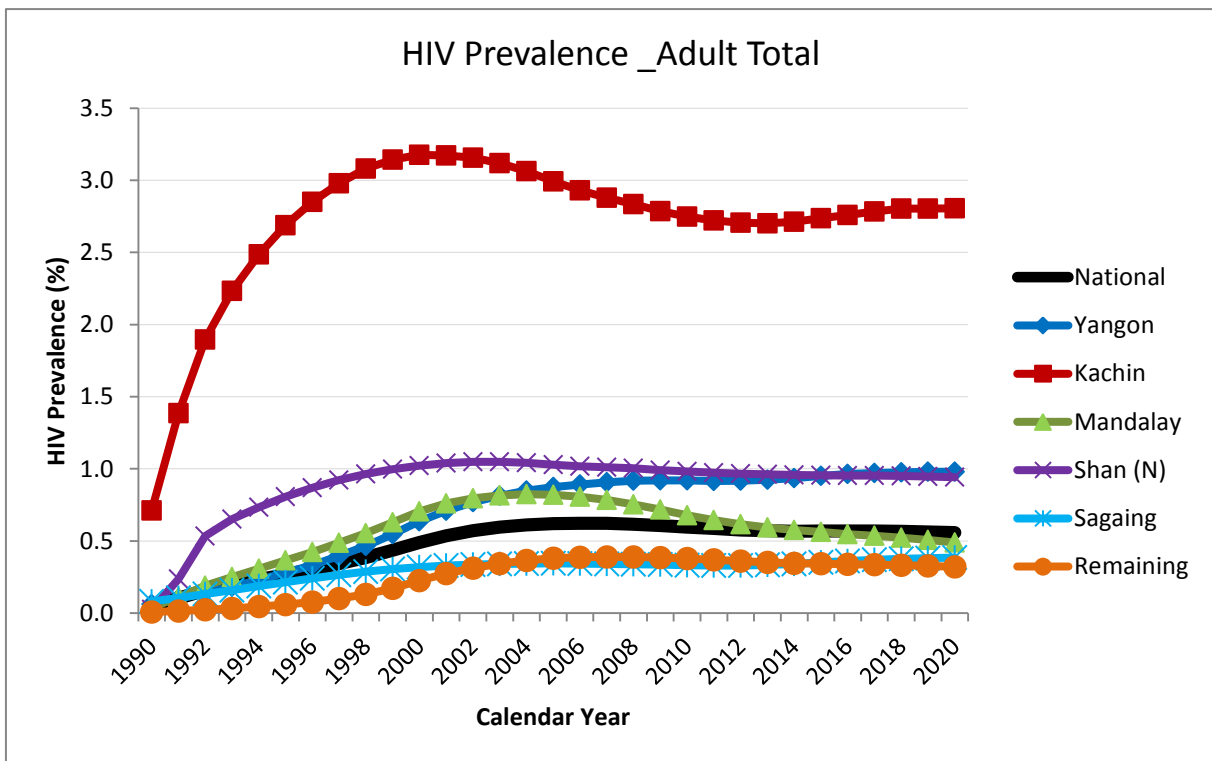
Figure 1: Trends of HIV prevalence among Total Adults (15+)

Looking into the HIV prevalence among adults (15+) disaggregated by sex *(Figure 2 and 3)*, the HIV prevalence for adult male is higher than that for adult female and for total adult for both national and all sub-national estimates. In 2016, the national estimated HIV prevalence among adult males (0.76%) was twice as high as that among adult females which was 0.39%.

In Kachin State, the estimated HIV prevalence among adult males (3.78%) is even 2.3 times higher than that for adult females (1.66%).

In addition, the trends of HIV prevalence among adult male and female show a different pattern. The male HIV prevalence trend follows the same pattern as that of total adult HIV prevalence in respective national and sub-national models. However, the adult female HIV prevalence trend shows a different pattern. The adult female HIV prevalence has been increasing continuously in Kachin State, Shan (North) State and Yangon Region. The national average and Mandalay Region adult female HIV prevalence show a closely similar trend which increases from the beginning up to the year 2009, and a slow slight decrease

thereafter. In Sagaing Region, although the level is lower than the national average, the trend shows a slow and steady increase from the beginning and continues so beyond 2015.

In 2016, the adult female HIV prevalence was highest in Kachin State (1.66%) followed by Yangon Region (0.68%), Shan (North) State (0.6 %), Mandalay Region (0.38%), Remaining States and Regions (0.26%) and Sagaing Region (0.24%). The estimated national adult female HIV prevalence average was (0.39%) in 2016. *(Figure 2 & 3)*
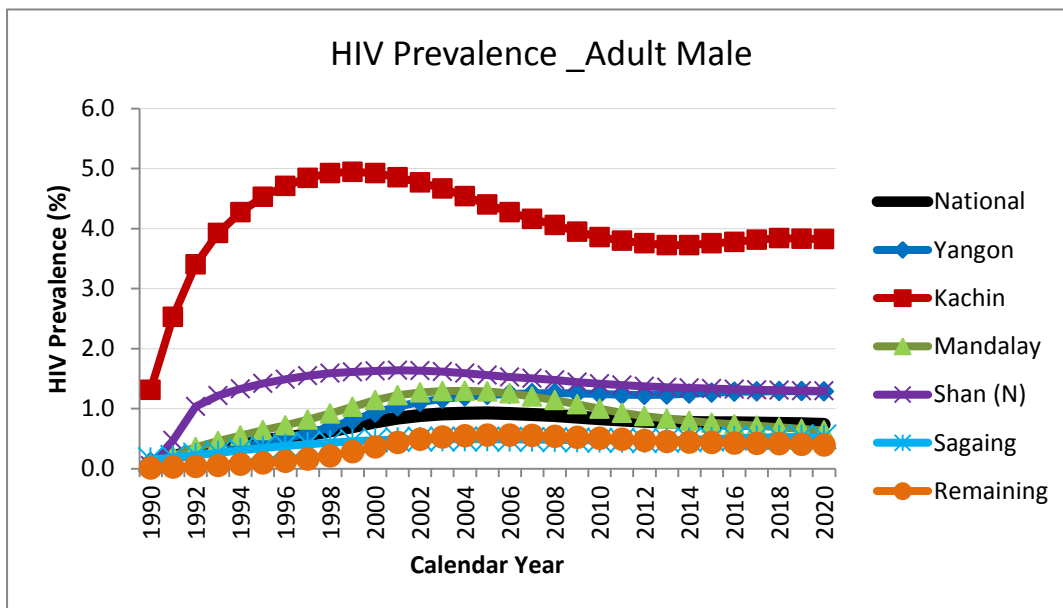
Figure 2: Trends of HIV prevalence among adults male (15+)
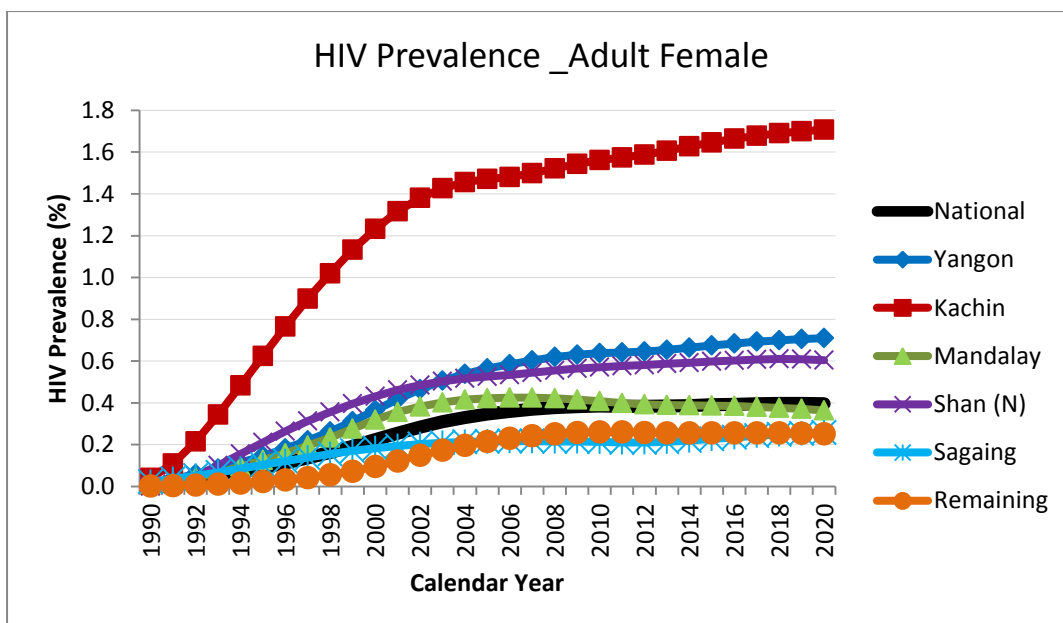
Figure 3: Trends of HIV prevalence among adults female (15+)

I.2. HIV prevalence among Key Population in Myanmar by States and Regions

Estimated HIV prevalence among Female Sex Workers (FSW) has peaked *(Figure 4)* in the early phase of the HIV epidemic to decrease in the later phase while remaining above 5% in most regions and states. In 2016, the HIV prevalence among FSW is estimated to be 10.61% at National level, 23.57% in Yangon Region, 11.23% in Mandalay Region, 10.23% in Kachin State, 8.49% in Shan (North) State, 6.9% in Remaining States and Regions and 4.85% in Sagaing Region.
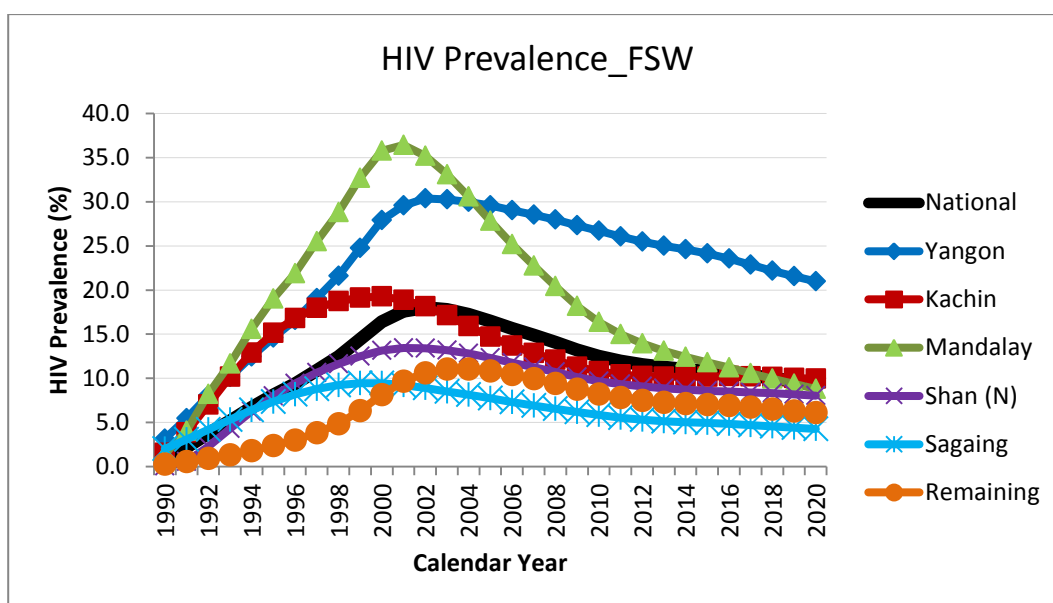
Figure 4: Trends of HIV prevalence among FSW

The trends of the estimated HIV prevalence among Clients of FSW *(Figure 5)* follow largely the FSW trends.

The estimated HIV prevalence among Clients of FSW shows two peaks along the years. In the early phase of the HIV epidemic, the HIV prevalence among Clients of FSW peaked in Kachin and Sagaing. A second peak can be observed a bit later in Mandalay, Yangon, Remaining States and Regions and National level.

The HIV prevalence among Clients of FSW has been declining steeply in Mandalay Region however the decline is quite slow in Yangon Region, Kachin State and Shan (North) State. Remaining States and Regions seem to follow the national trend.

In 2016, the HV prevalence among Clients of FSW is estimated to be 7.78% in Yangon Region, 4.04% in Mandalay Region, 3.73% in Kachin State, 2.84% in Remaining States and Regions, 2.06% in Shan (North) State and 1.69% in Sagaing Region in 2016.
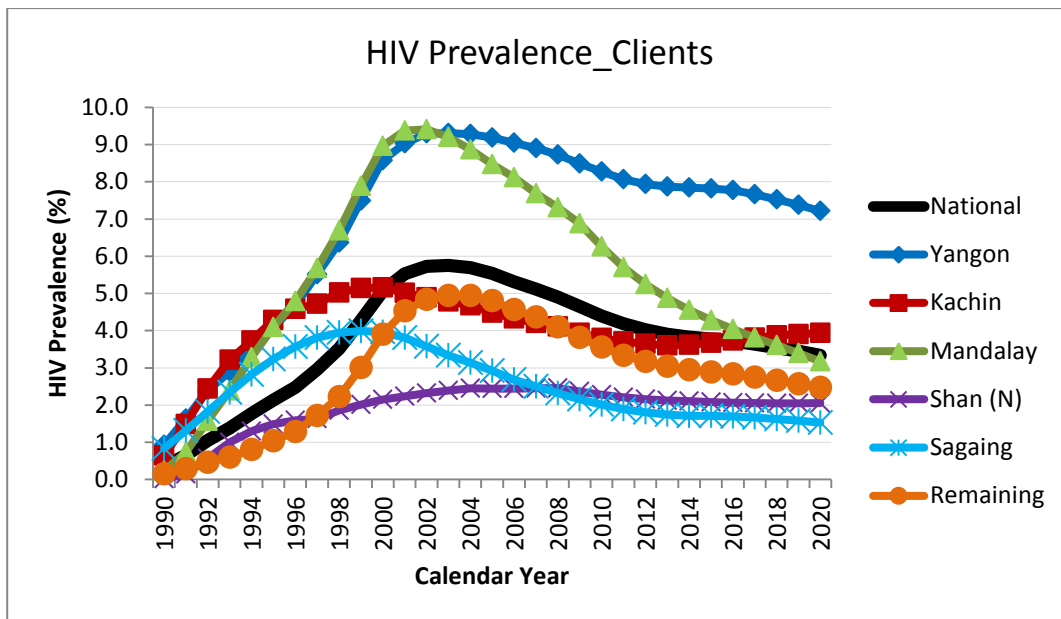
Figure 5: Trends of HIV prevalence among Clients of FSW

The estimated HIV prevalence among MSM *(Figure 6)*, has peaked around 2009 in Mandalay Region to decline steeply thereafter reaching 9.57% in 2016. However, in Yangon Region it has been increasing steadily since the beginning of the epidemic as well as in Kachin State yet at a much lower level. The HIV prevalence among MSM was estimated to be 19.15% in Yangon Region and 7.82% in Kachin State in 2016. At National level, in Sagaing Region and Remaining States and Regions, the estimated HIV prevalence among MSM has been stagnating since around 2009. In 2016, the HIV prevalence among MSM is estimated to be 8.69% at national level, 4.81% in Sagaing Region and 3.88% in Remaining States and Regions.
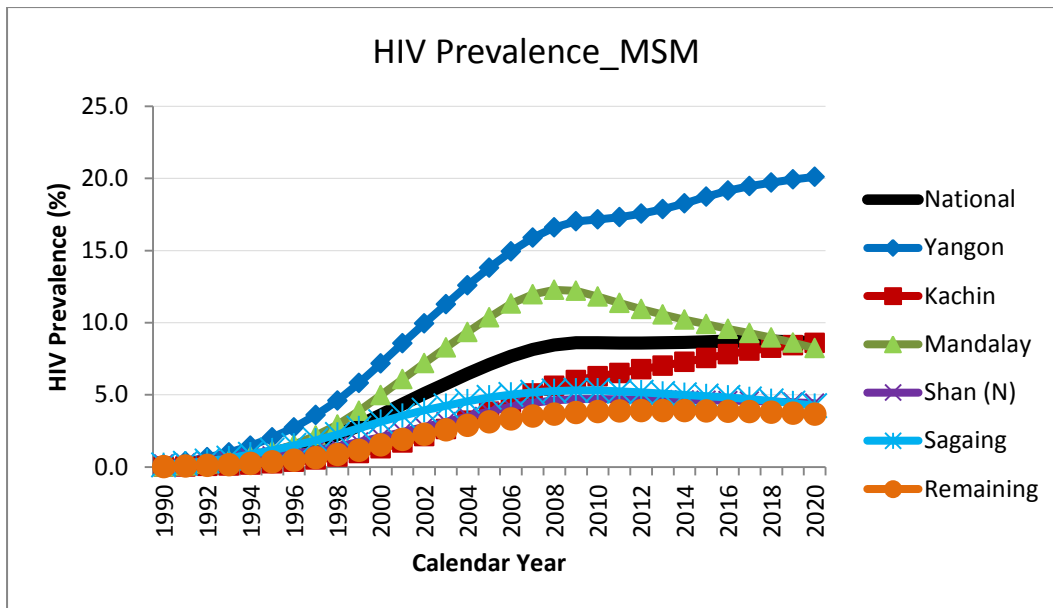
Figure 6: Trends of HIV prevalence among MSM

Estimated HIV prevalence among male PWID *(Figure 7)* has peaked in the early phase of the HIV epidemic in Kachin State, Yangon and Mandalay Regions, at national level and in Shan (North) State to decrease in the later phase while remaining very high except in Mandalay region. In 2016, HIV prevalence among PWID was estimated to be 25.5% at national level, 41.44% in Kachin State, 32.61% in Shan (North) State, 25.61% in Yangon Region, 20.77% in Sagaing Region, 12.53% in Mandalay Region, 6.90% in Remaining States and Regions. The HIV prevalence among PWID in Sagaing was lower in the first phase of the epidemic, but seems to have increased in recent years. In the Remaining States and Regions, the estimated HIV prevalence among PWID is still low.
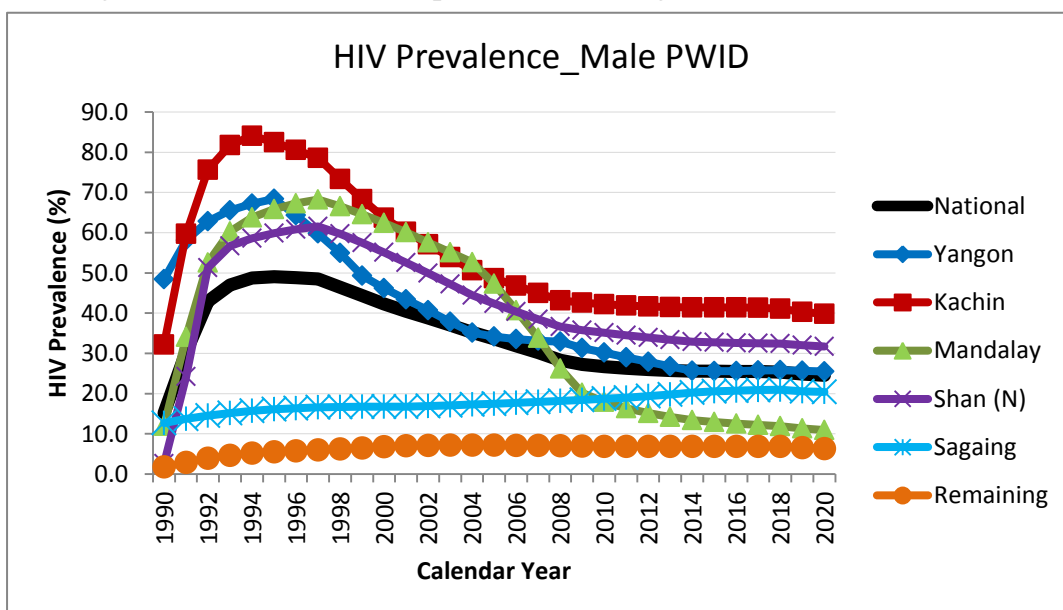
Figure 7: Trends of HIV prevalence among Male PWID

I.3. Annual New HIV Infections among adults 15 year and above in Myanmar (1990-2020) by population groups

The estimated annual number of new HIV infection among adults (15+) by population groups *(Figure 8)* revealed that national HIV epidemic was initially driven by IDU and then followed by sexual transmission. The epidemic reached its peak around the year 2000 with 28,000 estimated new HIV infections and started to decrease after that. The momentum of decline became slower after the year 2010 and even much slower after the year 2015.

In 2016, the estimated annual number of new HIV infections nationally is 11,129 rounded to 11,000. The annual number of new HIV infections among PWID is estimated to be 3,200 (29%); among low risk females 3,019 (27%); among clients of FSW 2,717 (24%); among MSM: 1,277 (11%); among FSW 598 (5%).
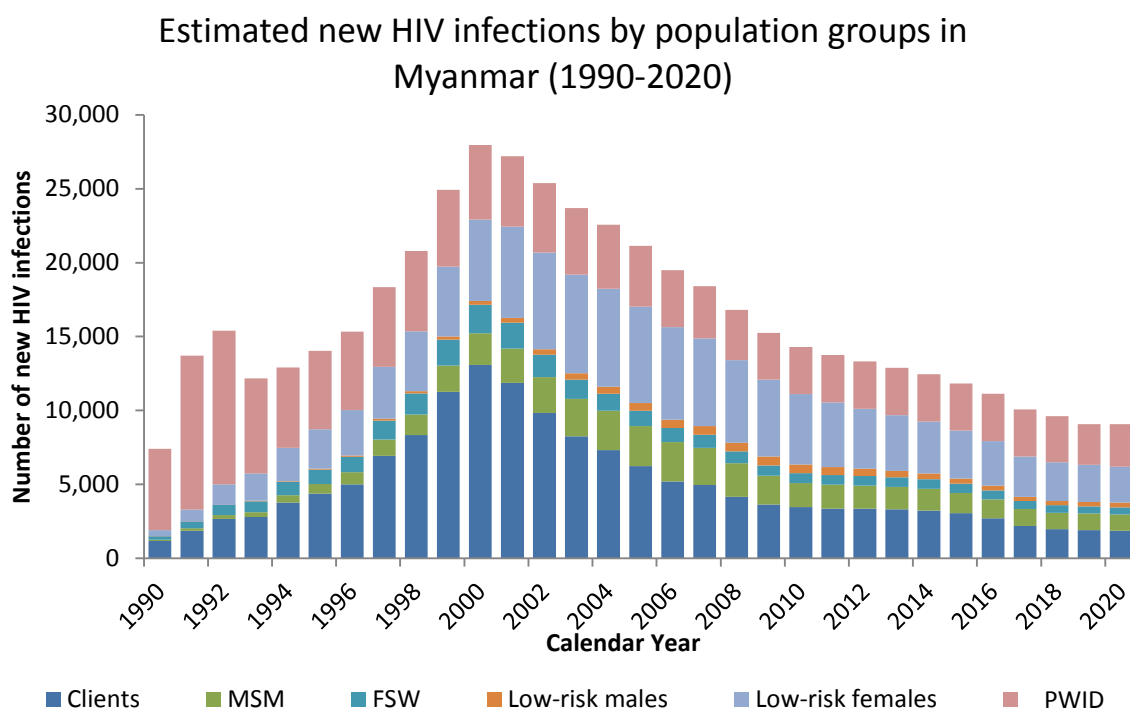
Figure 8: Estimated new HIV infections by population groups in Myanmar (1990-2020)

I.4. Annual New HIV Infections by population groups and by States and Regions

Estimation and projection modelling for state and regional level clearly depicts the epidemic at sub-national level and highlights the critical need to formulate an HIV response plan and strategies tailored to the local epidemic profile. Although the national epidemic seems to be under control with less new infections projected in the years to come, this cannot be applied equally to all states and regions. In fact, some regions are having static and alarmingly high number of new HIV infections.

The leading mode of transmission also differs by states and regions: needle sharing and husband to wife transmission play the leading role in Kachin State, Shan (North) State and Sagaing Region; sexual transmission including sex work, husband to wife, and male to male sex are driving the HIV epidemic in Yangon Region, Mandalay Region and Remaining States and Regions.

The HIV epidemic in Kachin State is clearly driven by IDU *(Figure 9)*. It reached its peak in early 1990. Although it is declining in general, the momentum of the decline does not show a satisfactory epidemic control. The number of annual new infection remains somewhat stable from the year 2010 onwards. Also, a very small and stable number of new HIV infections among MSM were observed since 2000. In 2016, needle sharing among PWID accounts for 73% of the estimated 2,011 new HIV infections in Kachin State, Husband to wife transmission accounts for 19%.

Kachin State is bearing a disproportionately high burden of the HIV epidemic. It contributes about 3% of the total national population (15 and above) but contributes 18% of annual new HIV infections and 15% of people living with HIV in Myanmar.

The HIV epidemic picture of Shan (North) State *(Figure 9)* shows a similar pattern with Kachin State: it is IDU driven and the HIV epidemic is insufficiently controlled, it is somewhat a replica of Kachin State at lower level. It was estimated that there were 1,142 new HIV infections in 2016 in Shan (North) State. Among them 69% was attributable to needle sharing among PWID and 22% to husband to wife transmission.

Estimated new HIV infections by population groups in Kachin State (1990-2020)
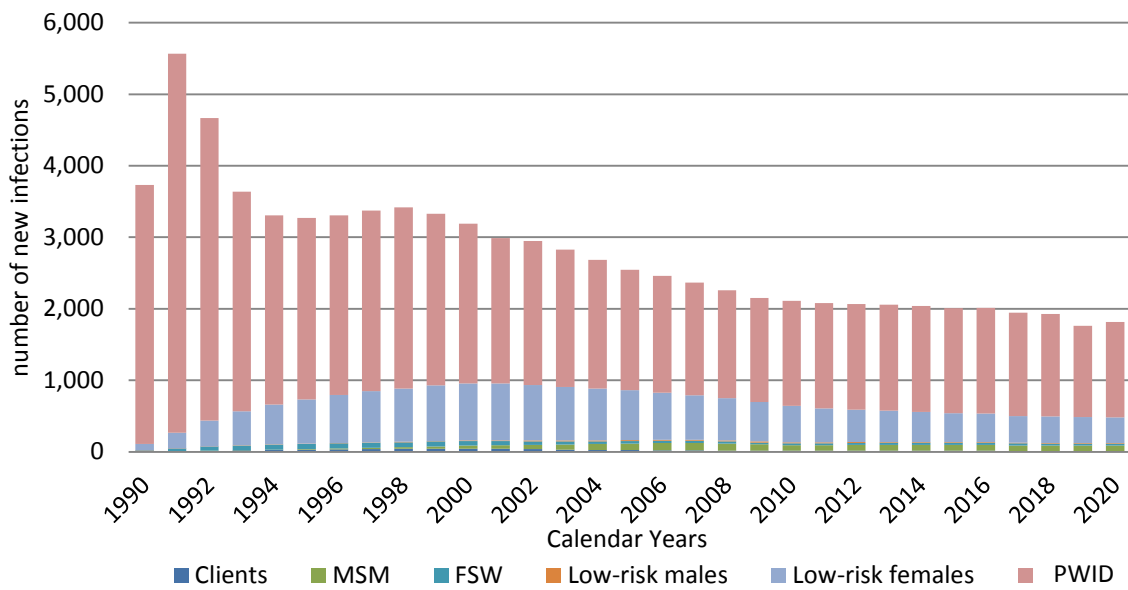
Estimated new HIV infections by population groups in Shan (North) State (1990-2020)
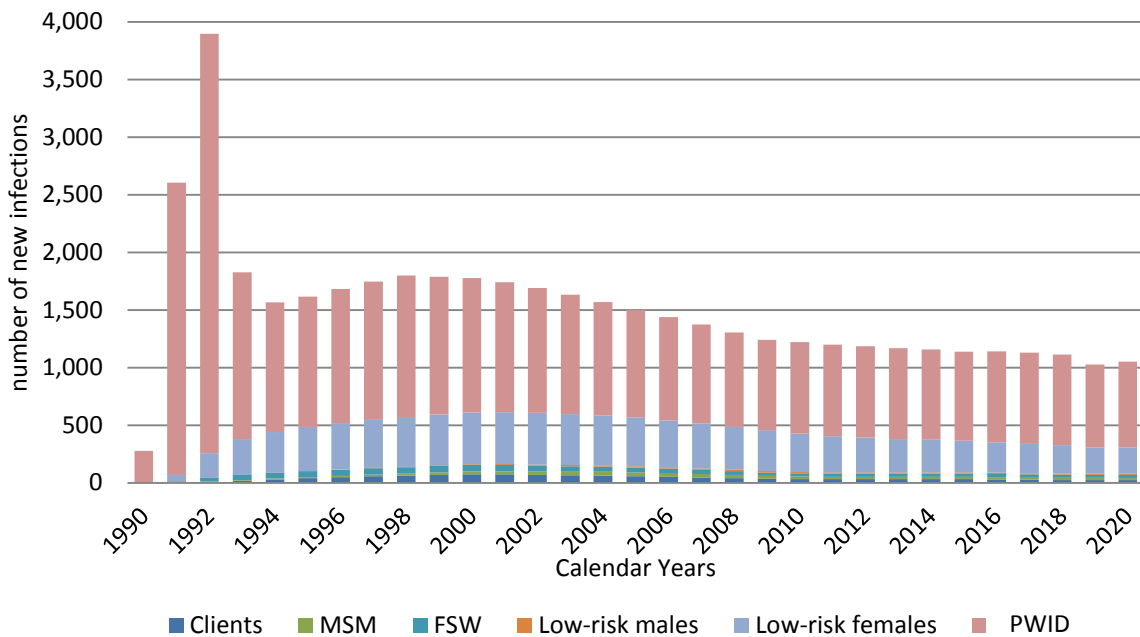
Figure 9: Estimated new HIV infections by population groups in Kachin State and Shan (North) State (1990-2020)

Yangon Region HIV epidemic was driven by sex work and clients in its early phase and male-to-male sex has become a co-driver seat since the late 1990s *(Figure 10)*. Currently, the epidemic is driven by MSM, FSW and their clients. The epidemic has been declining overall however insufficiently. Indeed, since 2009 a stagnating substantial number of new infections among MSM and clients is observed. In 2016, it was estimated that there were 3,021 new HIV infections in Yangon Region of which 44% was attributable to sex work, 25% to husband to wife transmission, 24% to male to male sex, 3% to casual sex, 3% to wife to husband transmission and 1% to needle sharing.

Looking into Mandalay Region epidemic *(Figure 10)*, the early phase of epidemic was driven by injecting drug use and followed by a heterogeneous mix of sexual transmission (FSW, clients and MSM) peaking around the year 2000 . Afterwards, Mandalay Region maintains this heterogeneous mixture of transmission but shows a very steep decline in new HIV infections since the year 2000. The number of new HIV infections among PWID and MSM has been declining very steeply since the year 2010. In 2016, it was estimated that there were 777 new HIV infections of which 32% are attributed to sex work, 27% to husband to wife transmission, 20% to needle sharing among drug users, 15% to male to male sex, 4% to wife to husband and 2% to casual sex.

Sagain Region has a mixed epidemic driven by PWID, MSM, FSW and their clients *(Figure 11)*. The decline in new HIV infections is not very strong and, on the contrary, there is a clear increase of new HIV infections among PWID since 2005; however, since 2009, new HIV infections among MSM and low risk females are decreasing. New HIV infections among FSW and their clients are stable.

In 2016, Sagaing Region was estimated to have had 1,061 new HIV infections with the infections found mostly among PWID, low risk female, MSM, clients and FSW. Modes of transmission in 2016 were as follows: 53% of new infections would be by needle sharing among PWID, 27% by husband to wife transmission, 13% by sex work, 4% by male to male sex, 2% by casual sex and 1% by wife to husband infection.

The number of new HIV infections in the Remaining States and Regions *(Figure 11)* is also estimated to be declining at a faster rate than the national epidemic. About 3,118 new HIV infections are estimated to have occurred in 2016 with the biggest share among clients of FSW and low risk females.

Estimated new HIV infections by population groups in Yangon Region (1990-2020)
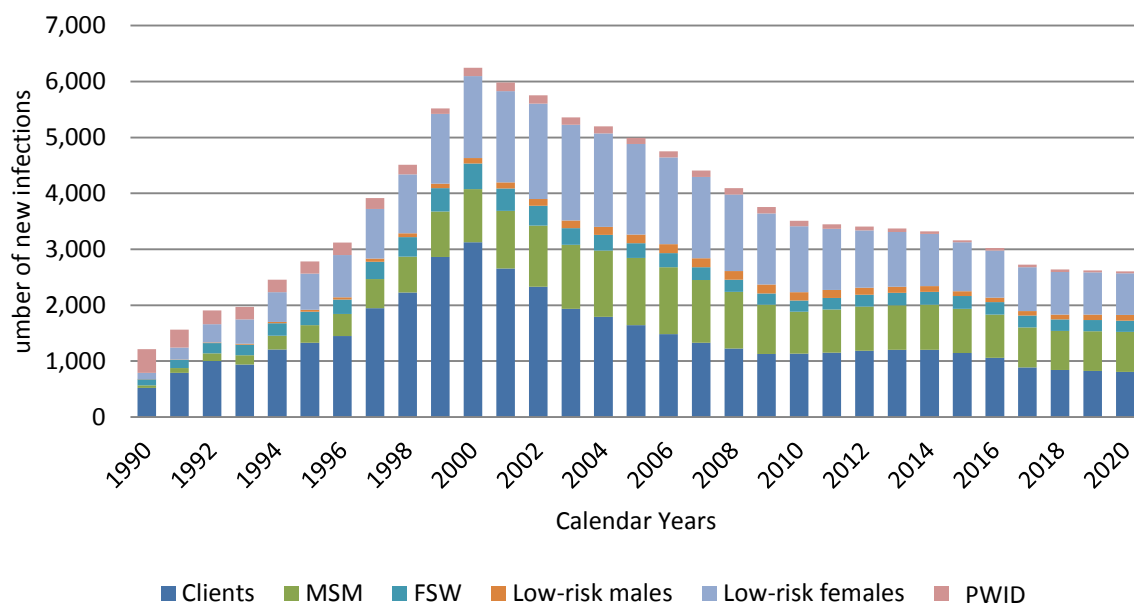
Figure 10: Estimated new HIV infections by population groups in Yangon Region and Mandalay Region (1990-2020)

Estimated new HIV infections by population groups in Sagaing Region (1990-2020)
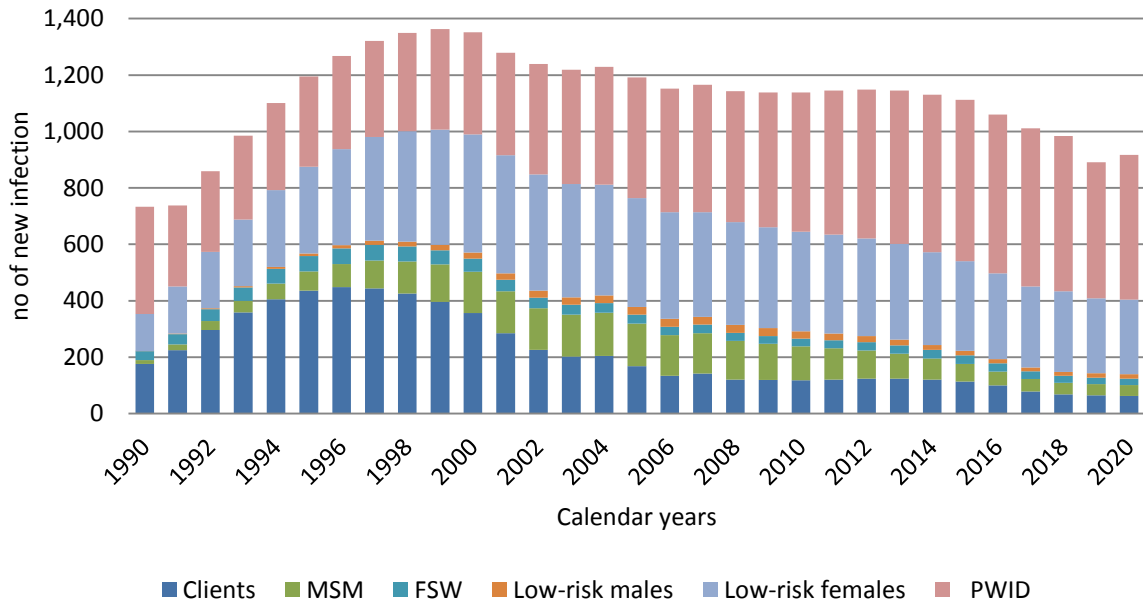
Estimated new HIV infections by population groups in Remaining States & Regions (1990-2020)
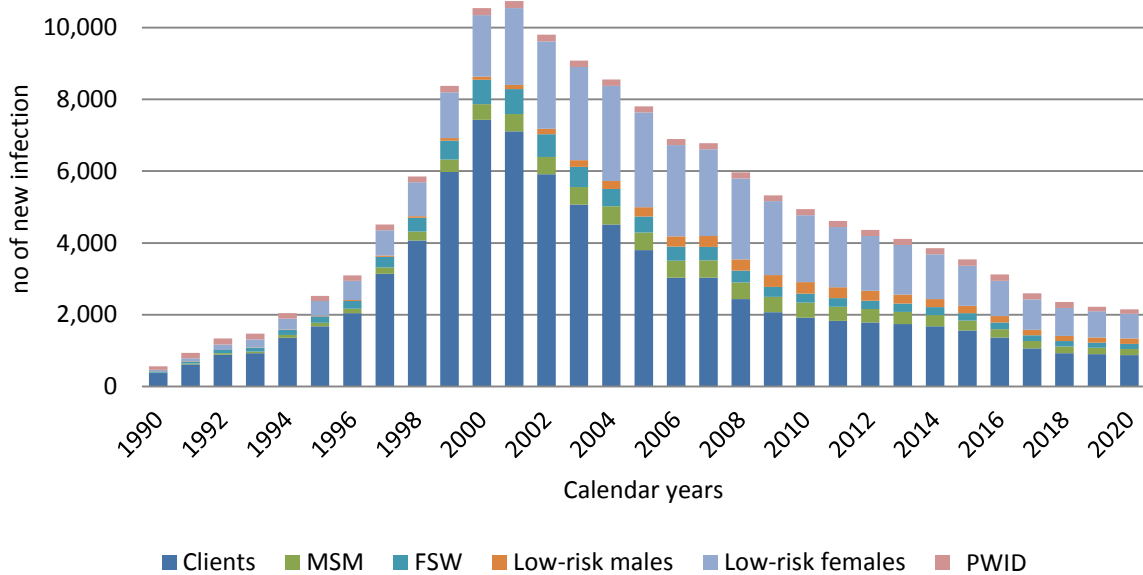
Figure 11: Estimated new HIV infections by population groups in Sagaing Region and Remaining States and Regions (1990-2020)

I.5. Trends of People Living with HIV (PLHIV), new HIV infections, deaths and PLHIV on ART among adult 15 year and above by States and Regions, 1990-2020

I.5.1. Trend of PLHIV (adults 15+) (Figure 12 &13)

Overall an increasing trend in the number of PLHIV from the beginning of the epidemic is seen in all geographic regions except in Mandalay Region. A continuous increasing trend is seen in Yangon Region, Kachin State, Shan (North) State and Sagaing Region among which the momentum is highest in Yangon Region. The Remaining Regions combined show the highest momentum of increase though the trend starts declining slightly after 2010.

The estimated number of PLHIV in Mandalay Region reached its peak around the years 2003 to 2007 and starts to decline after 2008. In 2016, the number of PLHIV at national level was estimated to be 211,000 (rounded) with an estimated 55,300 (26%) in Yangon Region; 31,600 (15%) in Kachin State; 25,500 (12%) in Mandalay Region; 17,500 (8%) in Shan (North) State; 14,000 (7%) in Sagaing Region and 67,600 (32%) in Remaining States and Regions.
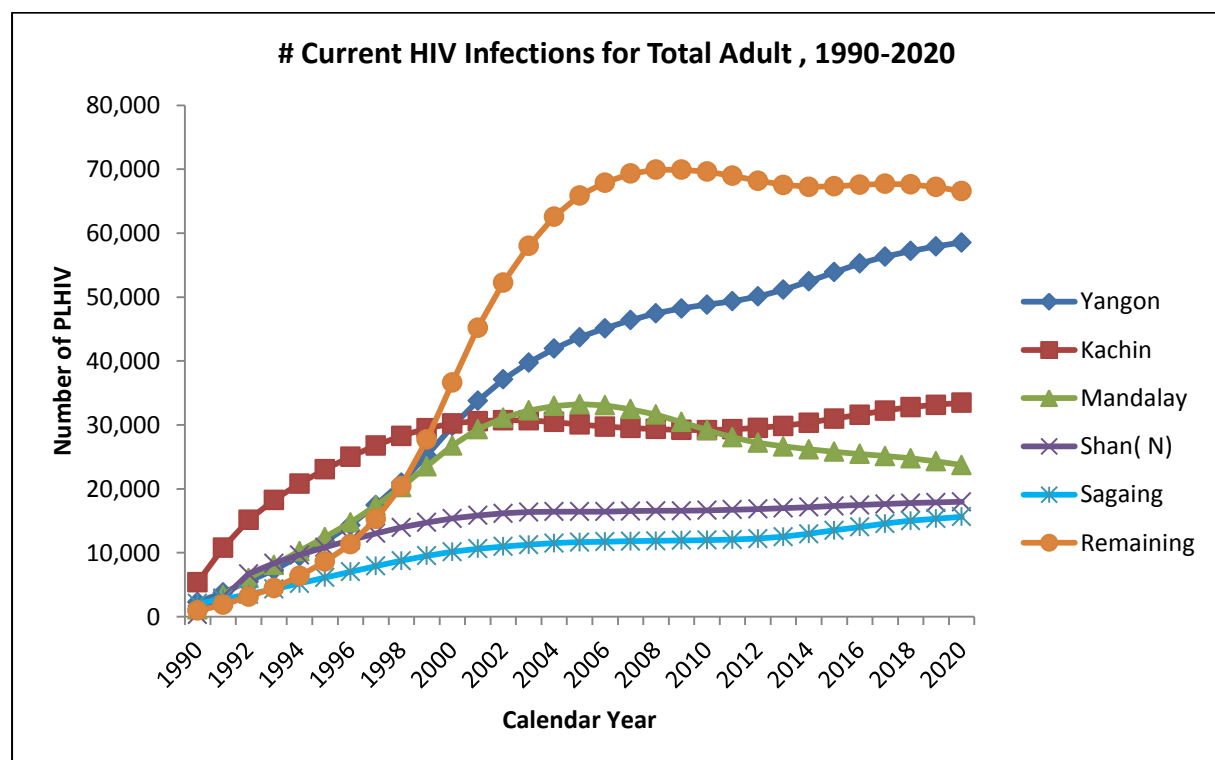
Figure 12: Estimated number of PLHIV (adults 15+) (1990-2020)

In 2016, Yangon Region, Kachin State and Mandalay Region contribute nearly 60% of all estimated PLHIV *(Figure 13)*. Historically, Kachin State, Mandalay Region and Yangon Region have always shown the largest number of PLHIV however Kachin State showed the biggest proportion of PLHIV at the beginning of the epidemic. Currently, it is Yangon Region and Remaining Sates and Regions which are presenting the largest number of PLHIV *(Figure 12)*.
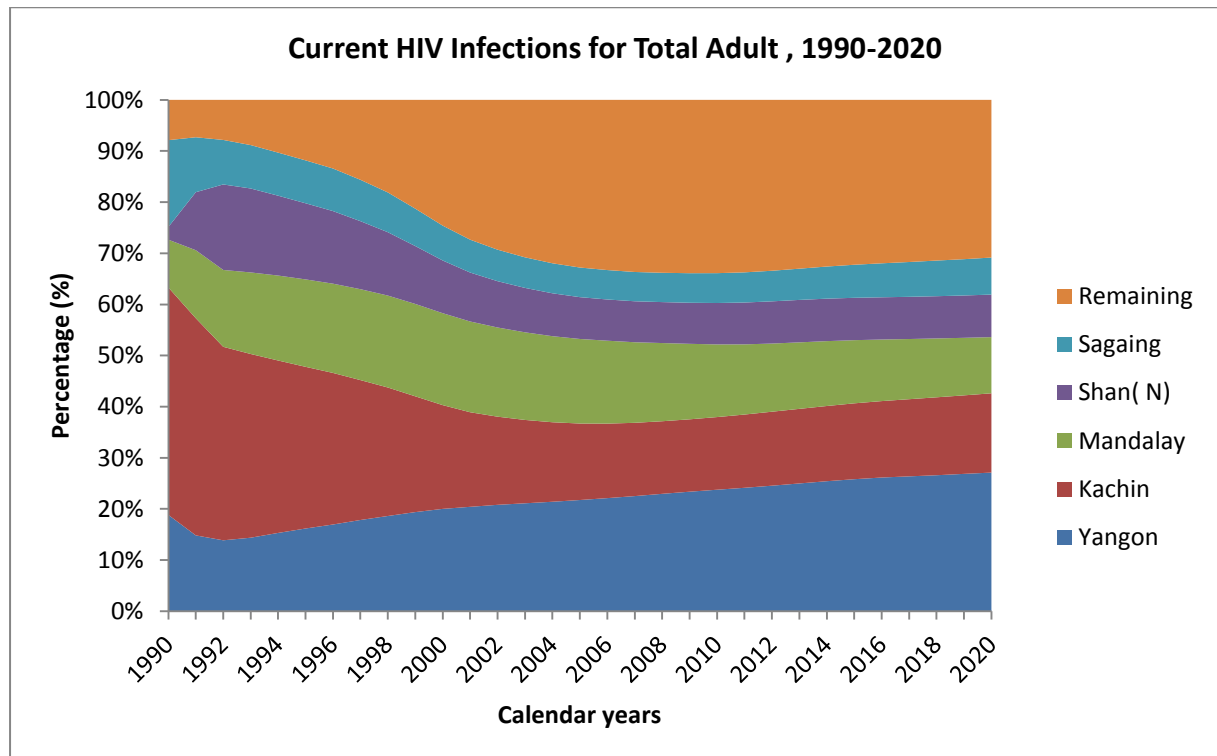
Figure 13: Proportion of PLHIV (adult 15+) among States and Regions (1990-2020)

I.5.2. *Trend of New HIV infections (adults 15+)* (Figure 14)

Overall new HIV infections are declining in Myanmar however the degree of decline is not equally steep in every region. For example, Remaining States and Regions and Mandalay Region show the fastest decline in new infections while Kachin State and Shan (North) State show a very limited decline and Sagaing Region appears to plateau.

The timing of the epidemic peaks differs by region: the three peaks in the 90s represents the beginning of the epidemic among PWID in Kachin, Shan (North) States and Mandalay

Region; the three peaks in the early 2000 signifies dominance of the sexual transmission in Yangon Region, Mandalay Region and Remaining States and Regions before declining overall everywhere.

In 2016, the number of new HIV infections is estimated to be 11,000 (rounded figure) at national level with an estimated 3,100 in Remaining States and Regions; 3,000 in Yangon Region; 2,000 in Kachin State; 1,100 in Shan (North) State; 1,100 in Sagaing Region and 800 in Mandalay Region.
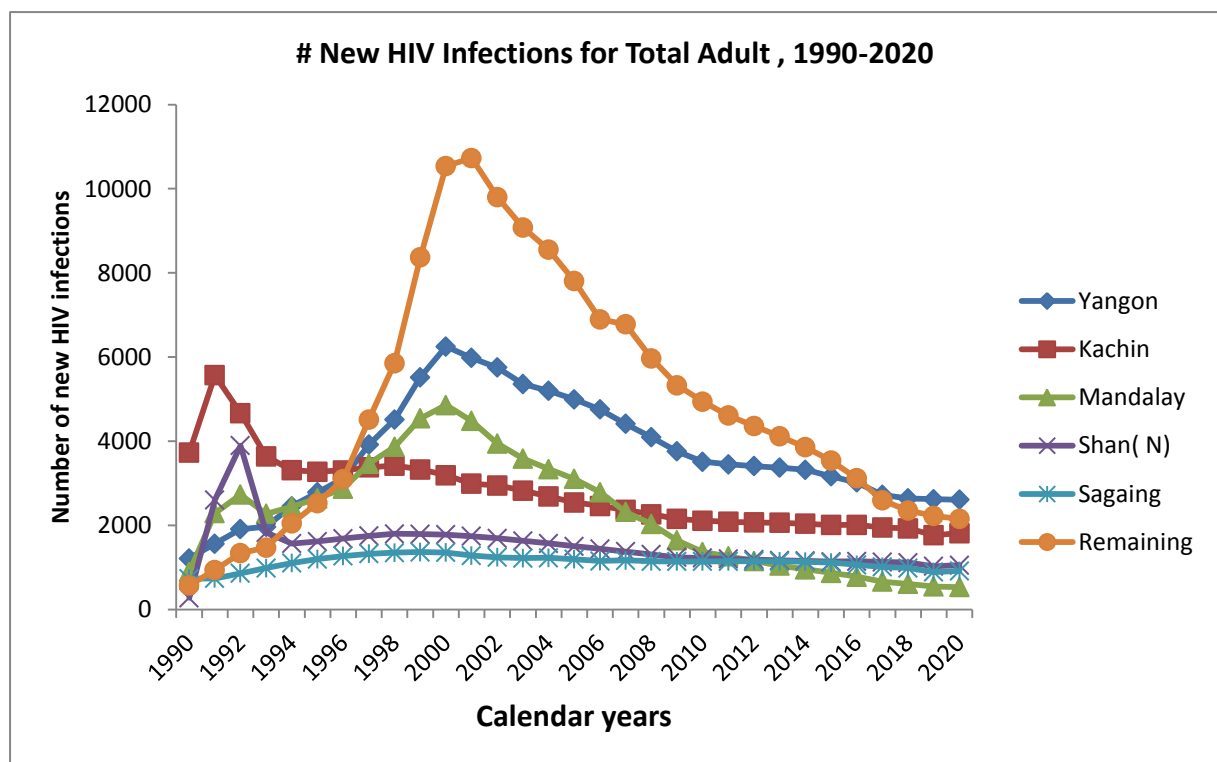
Figure 14: Estimated number of new HIV infections (adults 15+) (1990-2020)

In 2016, Yangon Region and Kachin State contributed nearly 50% of the estimated number of new HIV infections *(Figure 15)*. Since around 2000, Mandalay Region and Remaining States and Regions are contributing less to the estimated number of new HIV infections than Shan North, Sagaing Region, Yangon Region and Kachin State.

New HIV Infections for Total Adult , 1990-2020
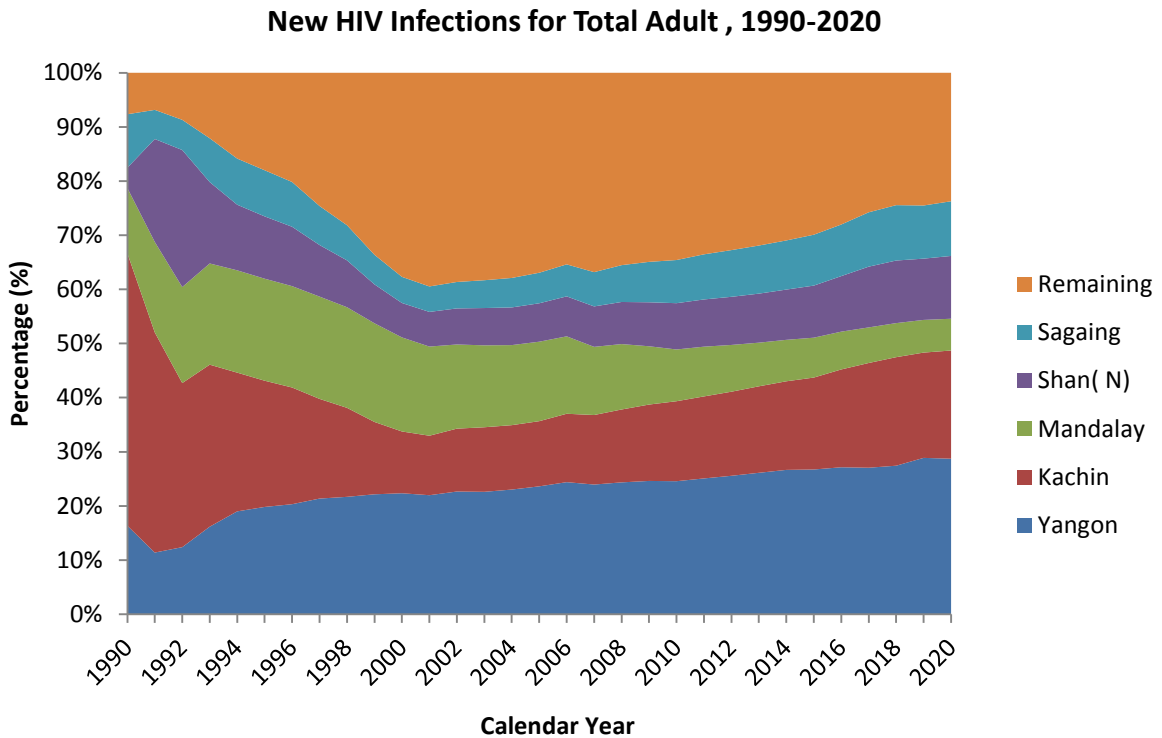
Figure 15: Proportion of new HIV infections (adult 15+) among States and Regions (1990-2020)

Yangon and Mandalay Regions account for around 50% of all new HIV infections among FSW and clients *(Figure 16)*.

New HIV Infections by Sex Work Transmission (M/F) , 1990-2020
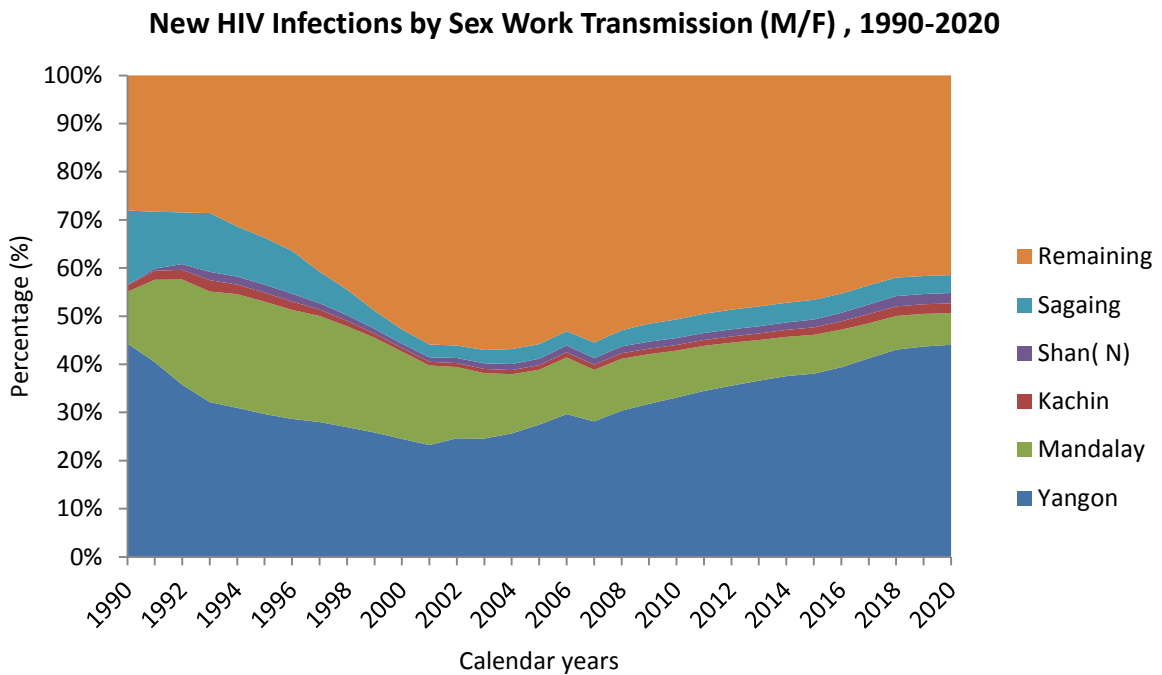
Figure 16: Proportion of new HIV infections by sex work transmission among States and Regions (1990-2020)

Yangon Region accounts for around 60% of new HIV infections among MSM *(Figure 17)*

New HIV Infections by Male to Male Sex Transmission, 1990-2020
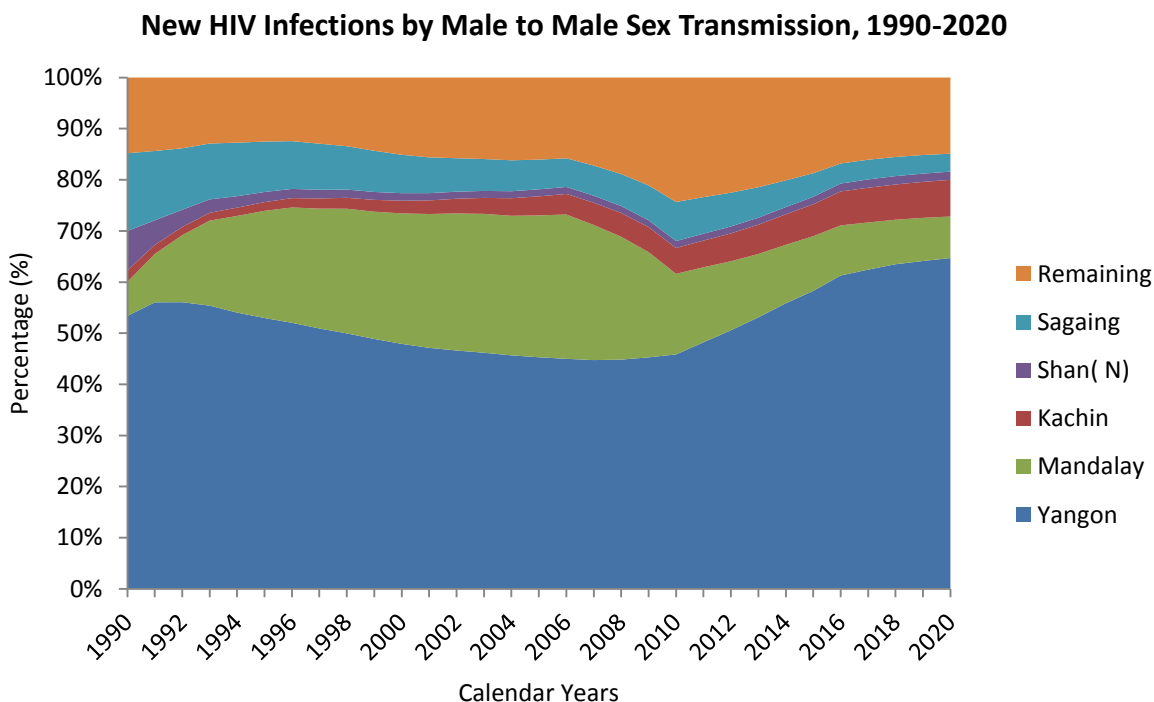
Figure 17: Proportion of new HIV infections by Male to Male sexual transmission among States and Regions (1990-2020)

Kachin and Shan (North) States and Sagaing Region account for around 90% of new HIV infections among PWID *(Figure 18)*.

New HIV infections by Needle Sharing , 1990-2020
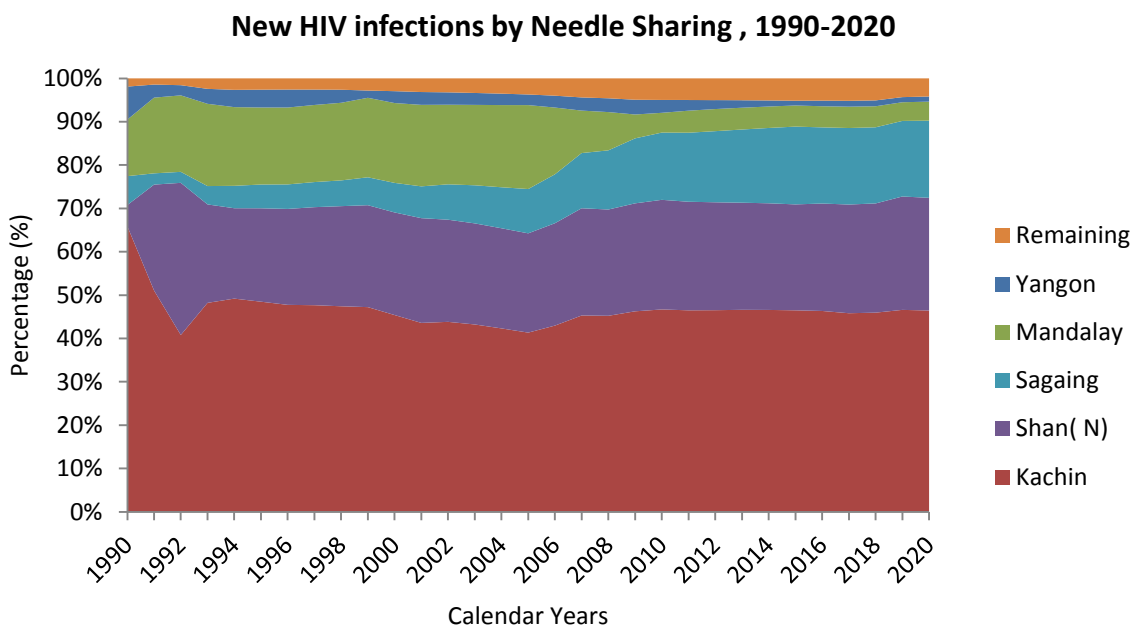
Figure 18: Proportion new HIV infections by Needle Sharing among States and Regions (1990-2020)

I.5.3. Trend of HIV deaths (adults 15+) (Figure 19 & 20)

The increasing trend in the number of death was seen before ART was available in Myanmar. The number of deaths started to decrease with the introduction of ART in 2005 and a deeper decrease was seen with the increasing availability of ART. Overall, the estimated number of HIV death has been declining however with a much slower speed in Shan North. Please refer to the number of PLHIV on treatment for a more in-depth assessment of the correlation between ART coverage and number of deaths.
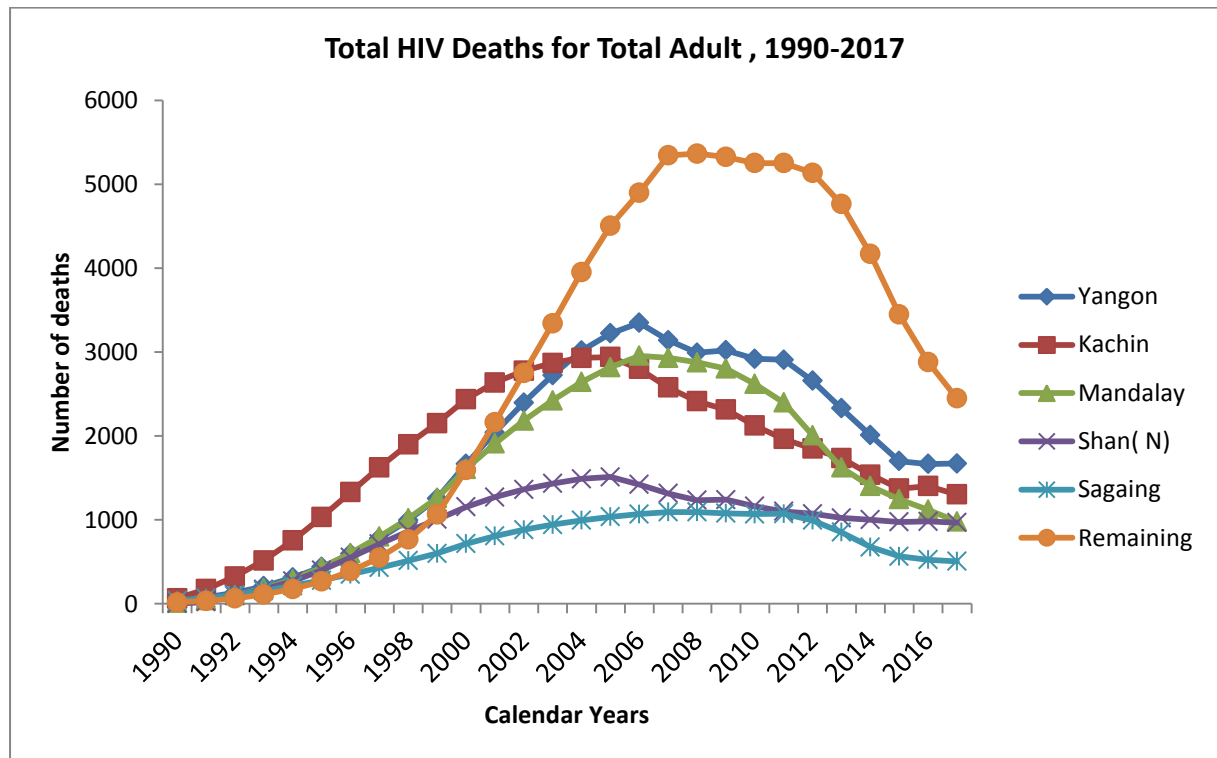
Figure 19: Estimated number of HIV deaths (adults 15+) (1990-2020)

In 2016, the 5 regions modelled represented almost 70% of all HIV deaths among adults. Historically, Kachin State had the highest number of HIV deaths *(Figure 20)*.

Total HIV Deaths for Total Adult , 1990-2017
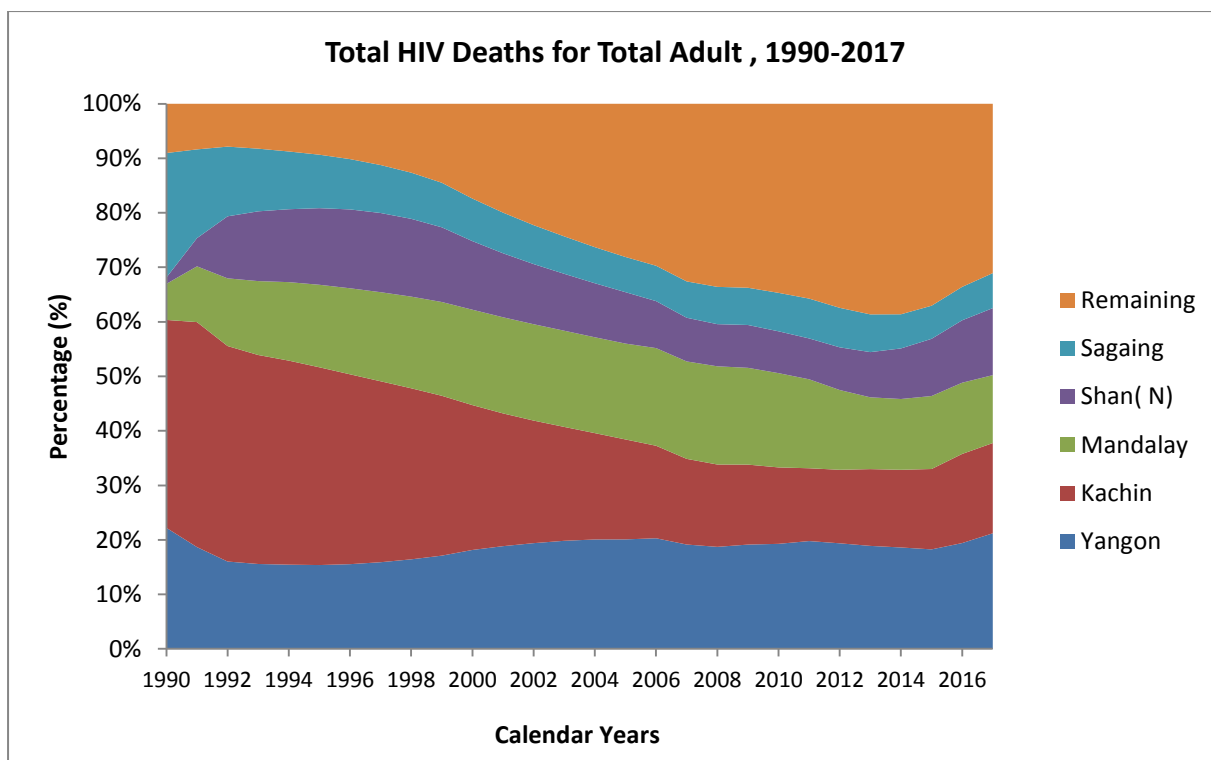
Figure 20: Proportion of HIV deaths (adult 15+) among States and Regions (1990-2020)

I.5.4. Trend of PLHIV on ART (adults 15+) *(Figure 21)*

Program data highlight the rapid scale up of ARV treatment in Myanmar with a steep increase in the number of PLHIV in treatment in Yangon Region and Remaining States and Regions however Shan (North) State shows a much slower increase in the number of PLHIV in treatment. A moderate increase in number of PLHIV on ART was seen in Kachin State, Mandalay Region and Sagaing Region. Table (3) gives the absolute number of people in treatment by region and adjusted by residence.
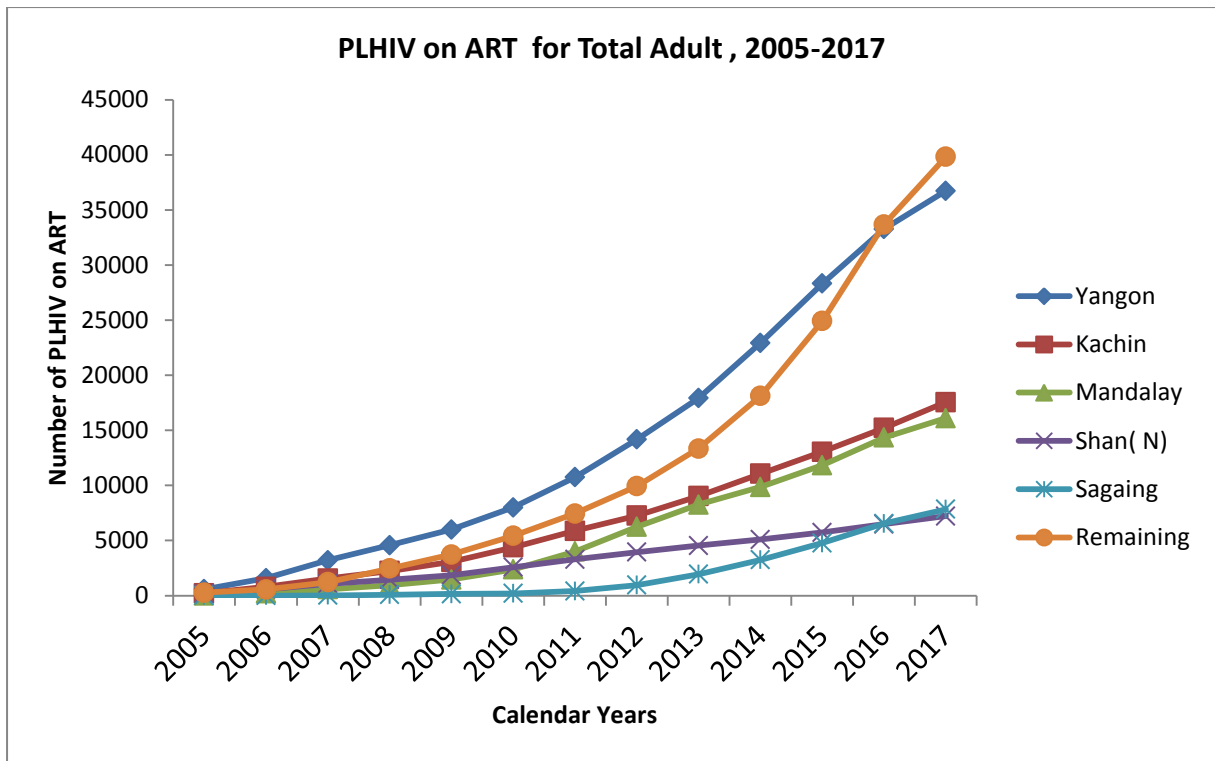
Figure 21: Number of PLHIV on ART (adults 15+) (2005-2017)
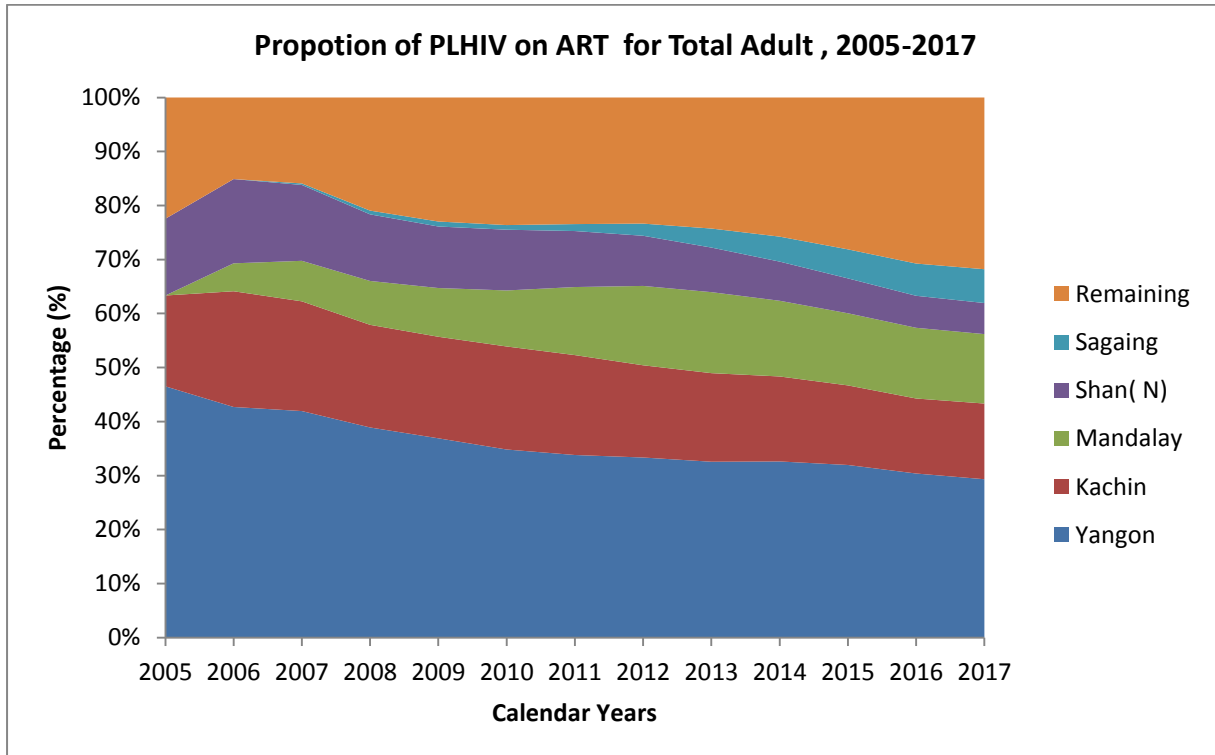
Figure 22: Proportion of PLHIV on ART (adult 15+) among States and Regions (2005-2017)

About 75% of all PLHIV on ART live in the 5 regions modelled. The proportion of PLHIV accessing treatment is increasing in Sagaing Region since roughly 2010 while in Shan (North) State, it is decreasing *(Figure 22)*.

I.6. Contribution Table (Summary Tables)

The three following tables summarize some of the data used to build the baseline model of the HIV epidemic.

Population Summary (Table 1)

This summary highlights the concentration of FSW and MSM populations in Yangon Region and Mandalay Region. For example, Yangon Region hosts 15% of the nation's general population while it is estimated to be home to 18% of the FSW and 23% of the MSM populations. Mandalay Region hosts 12% of the nation's general population while it is estimated to be home to 19% of the FSW and 17% of the MSM populations. On the contrary Kachin State, Shan (North) State and Sagaing Region host respectively 3%, 5% and 11% of the national population but concentrate respectively 26%, 19% and 23% of the estimated PWID population highlighting the burden of IDU in these last three regions.

Table 1: Population Summary

	National	Yangon	Mandalay	Kachin	Shan (N)	Sagaing	Remaining
# Population (2014 census)	50,279,900	7,360,703	6,165,723	1,642,841	2,520,258	5,325,347	27,265,028
% contribution	*100%*	*15%*	*12%*	*3%*	*5%*	*11%*	*54%*
# FSW (PSE 2015)	66,056	11,560	12,379	3,240	3,876	5,806	29,194
% contribution	*100%*	***18%***	***19%***	*5%*	*6%*	*9%*	*44%*
# MSM (PSE 2015)	125,759	29,419	21,892	5,735	2,855	12,146	53,712
% contribution	*100%*	***23%***	***17%***	*5%*	*2%*	*10%*	*43%*
# PWID (PSE 2014)	83,338	2,706	10,218	21,328	15,447	19,296	14,343
% contribution	*100%*	*3%*	*12%*	***26%***	***19%***	***23%***	*17%*

Table 2: HIV Epidemic Summary 2016

	National	Yangon	Mandalay	Kachin	Shan (N)	Sagaing	Remaining
# Population (2014 census)	50,279,900	7,360,703	6,165,723	1,642,841	2,520,258	5,325,347	27,265,028
% contribution	100%	15%	12%	3%	5%	11%	54%
# PLHIV	211,379	55,263	25,456	31,587	17,460	14,042	67,571
% contribution	100%	26%	12%	15%	8%	7%	32%
Adult Prevalence	0.57%	0.96%	0.55%	2.76%	0.95%	0.36%	0.34%
#new infection	11,129	3,021	777	2,011	1,142	1,061	3,118
% contribution	100%	27%	7%	18%	10%	10%	28%
# death	8,578	1,665	1,121	1,403	982	526	2,881
% contribution	100%	19%	13%	16%	11%	6%	34%

Table 3: ART Summary 2017 June

	National	Yangon	Mandalay	Kachin	Shan (N)	Sagaing	Remaining
# PLHIV	213,567	56,316	25,136	32,230	17,620	14,547	67,717
# on ART*	129,010	37,112	16,657	17,889	7,200	8,570	41,582
% contribution	100%	29%	13%	14%	6%	7%	32%
ART coverage (all PLHIV)	60%	66%	66%	56%	41%	59%	61%

 # on ART at sub-national level is adjusted for original residence of people on ART

In June 2017, ART coverage was above 50% in all regions except for Shan North State where it is only 41%.

PART II: POLICY AND IMPACT ANALYSIS

The policy analysis using the Asian Epidemic Model (AEM) was to identify the optimal programmatic mix between Prevention and Treatment that will provide the highest impact. Different combinations of prevention and treatment coverage were set and the resulting impacts and resource needs were compared.

II.1. Inputs for Policy and Impact Analysis

The following tables *(Table 4,5,6)* summarize prevention coverage based on program data and estimated population size by Key Population. The Unit cost is estimated based on the NSP III unit costs but adjusted by regions based on the HIV burden (high, medium and low burden). The higher number of high burden townships in a region, the higher will be the cost. Prevention coverage is estimated using **"reached"** and **"tested"** program data adjusted for **mobility** and **duplication**.

Table 4: FSW Program coverage and Unit cost 2016

FSW	National	Yangon	Mandalay	Kachin	Shan (N)	Sagaing	Remaining
Size estimate (PSE 2015)	66,056	11,560	12,379	3,240	3,876	5,806	29,194
Prevention coverage	52%	82%	48%	35%	14%	32%	52%
Unit cost (USD)	73.08	73.13	76.41	80.50	73.93	77.92	69.76

Table 5: MSM program coverage and Unit cost 2016

MSM	National	Yangon	Mandalay	Kachin	Shan -N	Sagaing	Remaining
Size estimate (PSE 2015)	125,759	29,419	21,892	5,735	2,855	12,146	53,712
Prevention coverage	40%	42%	47%	19%	48%	39%	37%
Unit cost (USD)	41.80	43.37	47.05	53.56	36.92	41.92	37.78

Table 6: PWID program coverage and Unit cost 2016

PWID	National	Yangon	Mandalay	Kachin	Shan N	Sagaing	Remaining
Size estimate (PSE 2014)	83,338	2,706	10,218	21,328	15,447	19,296	14,343
Prevention coverage	45%	55%	42%	58%	63%	29%	3%
Unit cost (USD)	142.40	142.05	146.33	147.20	143.39	139.82	134.00
# on MMT	12,474	609	2,085	5,211	1,785	2,636	148
MMT coverage	15%	23%	20%	24%	9%	17%	1%
Unit cost MMT (USD)	209.75	209.75	209.75	209.75	209.75	209.75	209.75

II.2. Policy scenarios description

Baseline Scenario: the model studies the impact on the epidemic and cost of the response in the regions using a business as usual policy, applying 2016 prevention coverage and June 2017 treatment coverage up to 2020 and beyond *(Table 7)*.

Prevention only Fast Track Scenario: the model studies the impact on the epidemic and cost of the response in the regions applying an intervention focusing on prevention only, with a 90% prevention coverage target for Key Populations by 2020, sustaining this coverage beyond 2020; and using June 2017 treatment coverage up to 2020 and beyond.

Treatment only Fast Track Scenario: the model studies the impact on the epidemic and cost of the response in the regions applying an intervention focusing on treatment only, with a 81% treatment coverage target for all populations by 2020 and sustaining this coverage beyond 2020; and using 2016 prevention coverage up to 2020 and beyond.

Main driver Fast Track Scenario: the model studies the impact on the epidemic and cost of the response of an intervention focusing on fast tracking prevention and treatment

interventions for the KPs who drive the epidemic in respective regions, with a 90% prevention coverage and a 81% treatment coverage by 2020 and beyond; And for other KPsor population maintaining 2016 prevention coverage and June 2017 treatment coverage.

Fast Track scenario: the model studies the impact on the epidemic and cost of the response in the regions applying Fast Track in the response reaching prevention coverage of 90% for KP and 81% treatment coverage for all population by 2020 and beyond.

Table 7: AEM Scenarios in Policy and Impact Analysis

	Baseline	Prevention only FastTrack	Treatment only FastTrack	Main Driver Focus	FastTrack
Prevention coverage by 2020	same as 2016	90% for KP	same as 2016	-90% for main driver KP(s) -same as 2016 for others	90% for KP
Treatment coverage by 2020	same as 2017-June	same as 2017-June	81% for all population	-81% for main driver KP(s) -same as 2017-June for others	81% for all population

II.3. Results of Policy and Impact Analysis

II.3.1. Resource Needs by scenarios, 2016-2030

From a national level perspective *(Figure 23)*, the Fast Track scenario is the most resource consuming approach while the cheapest is "continuing business as in 2016 " (without any scale up). Prevention only Fast Track and Main driver focus scenarios are cheaper strategies than the treatment approach in the long run. However if we analyze the resource needs by region, we see different scenarios yielding different impacts and cost effectiveness depending on the pattern of epidemic.
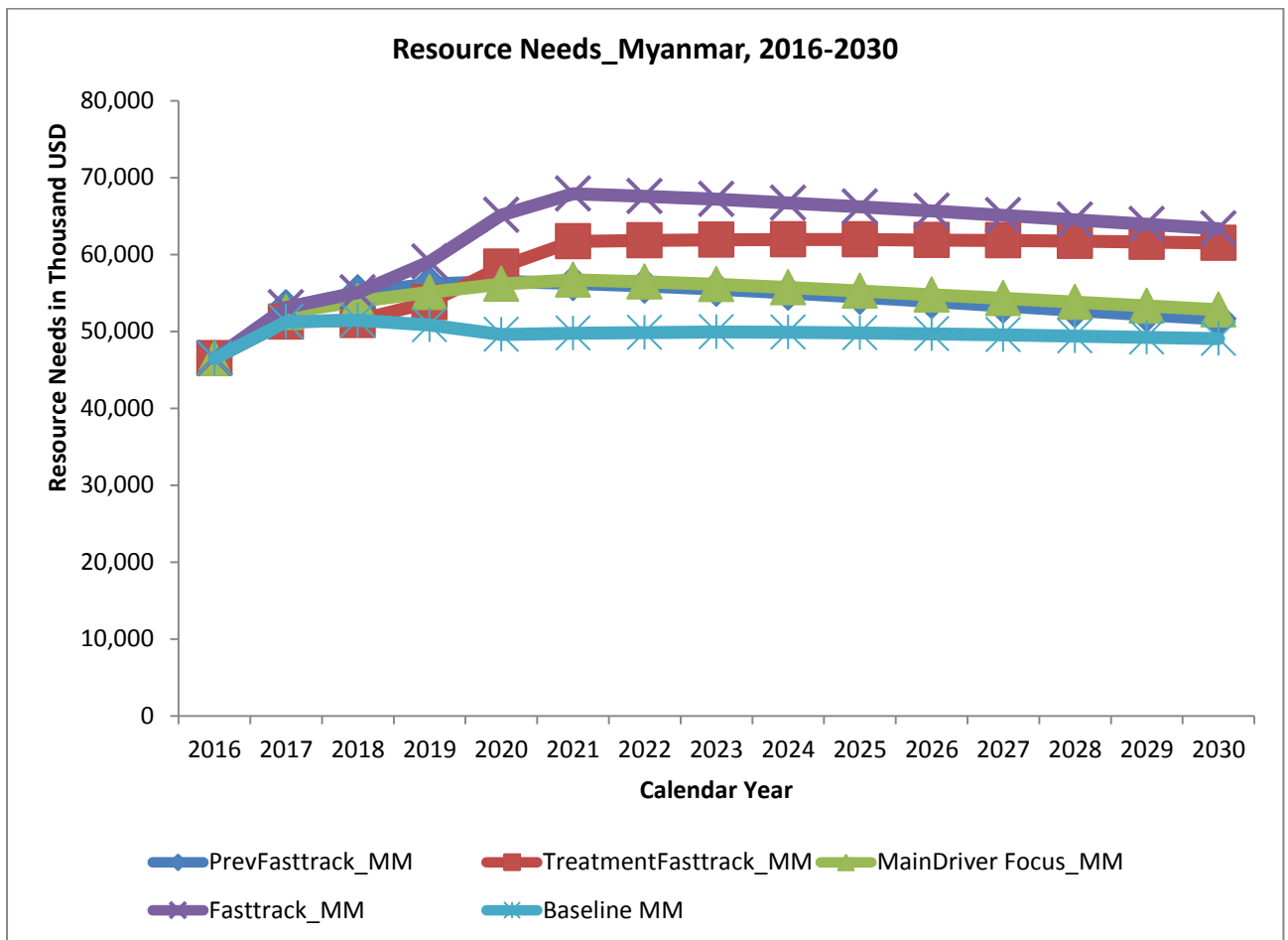

Figure 23: Resource Needs by different scenarios (2016-2030)

In Yangon Region the Fast Track (FT) scenario is cheaper than treatment only scenario; while in the long run prevention only FT and Main driver focus FT are cheaper than the baseline *(Figure 24)*.

In Mandalay Region, the cheapest option is baseline however treatment only FT, prevention only FT and Main driver focus FT cost roughly the same. The treatment only FT is slightly cheaper than prevention only and main driver focus.

Kachin State and Shan (North) State have the same cost trends; treatment only is nearly as expensive as Fast Track. The cheapest scenario remains the baseline followed by prevention only FT and main driver focus FT. However, we can see that costs are increasing in the long run rather than decreasing because of increasing number of PLHIV due to the low effectiveness of PWID prevention and expansion of ART coverage.

In Sagaing Region and Remaining Regions and States FT scenario is the most expensive and the cheapest is Baseline scenario. In the long run, both regions groups show that main driver focus is the second cheapest, after baseline, followed by prevention only and treatment only. Sagaing Region cost are also increasing as in Kachin State and Shan (North) State in the long run. (see Figure 24)

Resource Needs _Yangon, 2016-2030

Main Driver – FSW, MSM

Legend:
- PrevFastTrack_Yangon
- TreatmentFastTrack_Yangon
- FSWMSM FastTrack_Yangon
- FastTrack_Yangon
- Baseline_Yangon

Resource Needs _Mandalay, 2016-2030

Main Driver – FSW, MSM, PWID

Legend:
- PrevFastTrack_Mandalay
- TreatmentFastTrack_Mandalay
- KP_Focus_Mandalay
- FastTrack_Mandalay
- Baseline_Mandalay

Figure 24: Resource needs by different scenarios at State and Regional level (2016-2030)

Resource Needs_Kachin (2016-2030)

Main Driver – PWID

Legend:
- PrevFastTrack_Kachin
- TreatmentFastTrack_Kachin
- IDUFocus_Kachin
- FastTrack_Kachin
- Baseline_Kachin

Resource Needs_Shan (N) (2016-2030)

Main Driver – PWID

Legend:
- PreventionFastTrack_ShanN
- TreatmentFastTrack_ShanN
- IDU Focus_ShanN
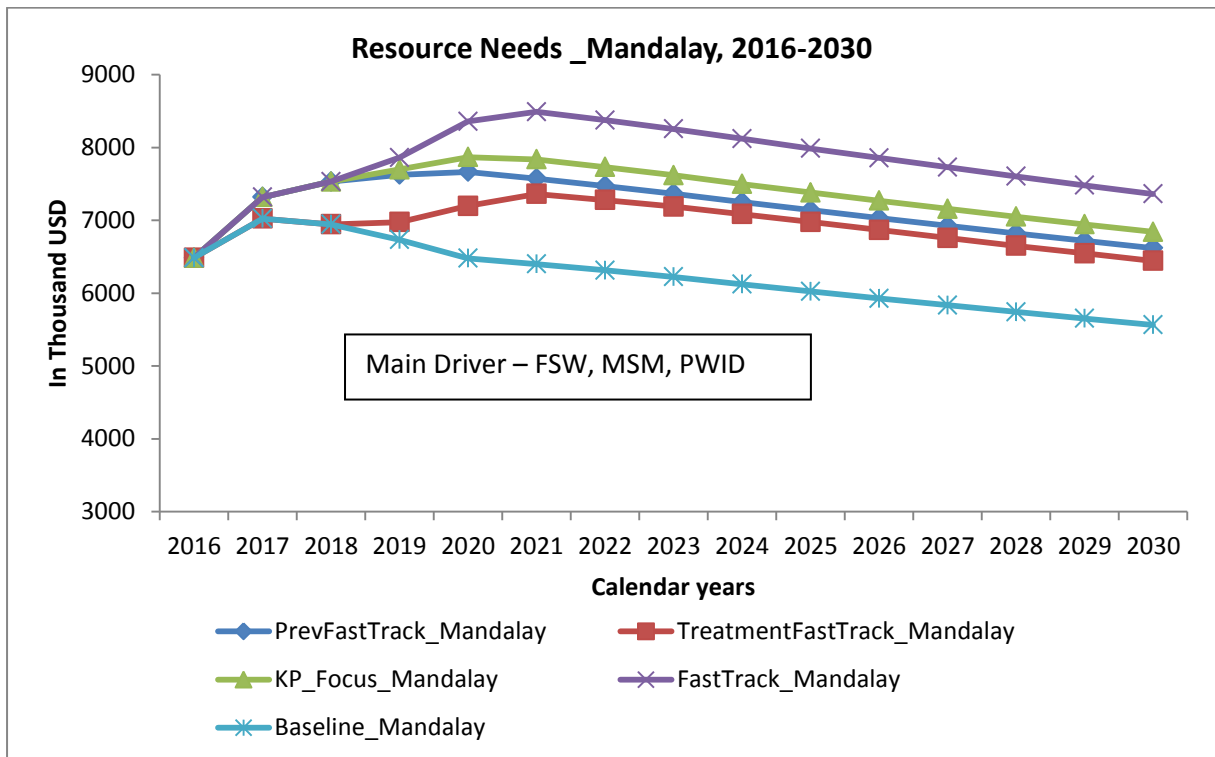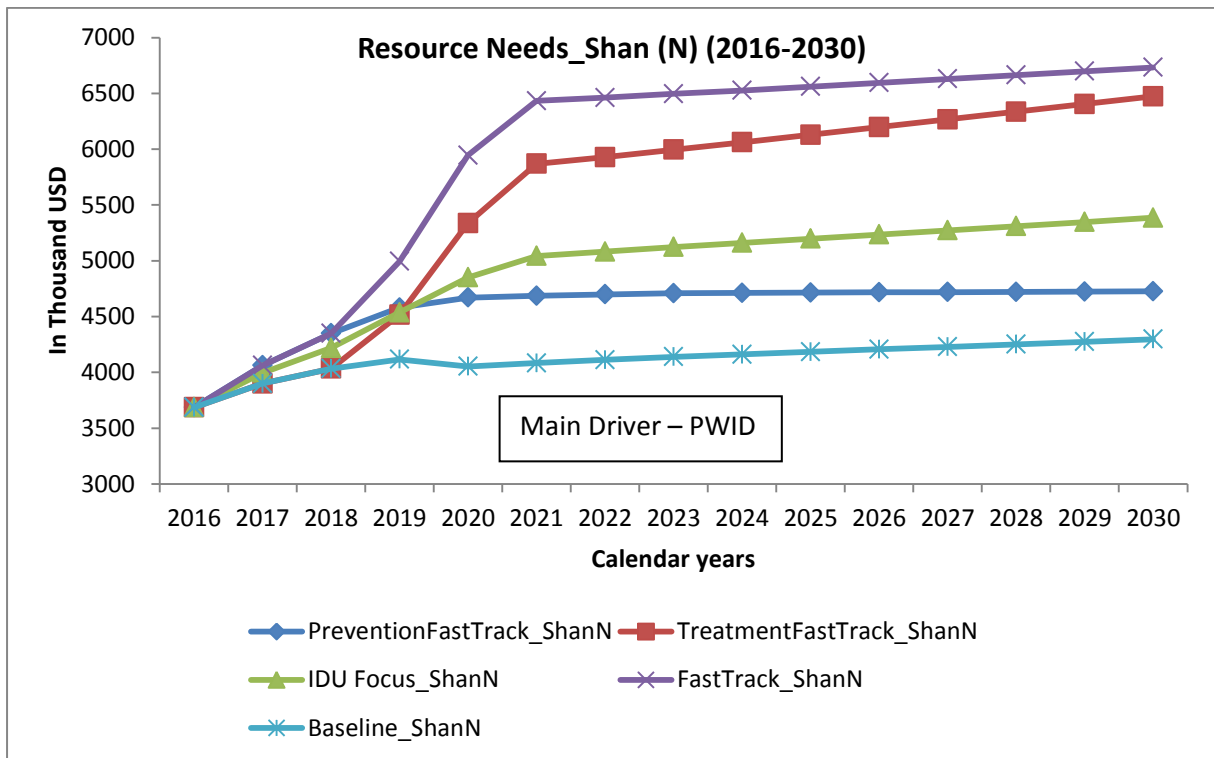- FastTrack_ShanN
- Baseline_ShanN

Figure 24: Resource needs by different scenarios at State and Regional level (2016-2030)

Resource Needs _Sagaing (2016-2030)

Main Driver – PWID

Legend:
- PrevFastTrack_Sagaing
- TreatmentFastTrack_Sagaing
- IDU Focus_Sagaing
- FastTrack_Sagaing
- Baseline_Sagaing

Resource Needs_Remaining states and regions (2016-2030)

Main Driver – FSW, MSM

Legend:
- PrevFastTrack_Remaining
- TreatmentFastTrack_Remaining
- FSWMSM Focus_Remaining
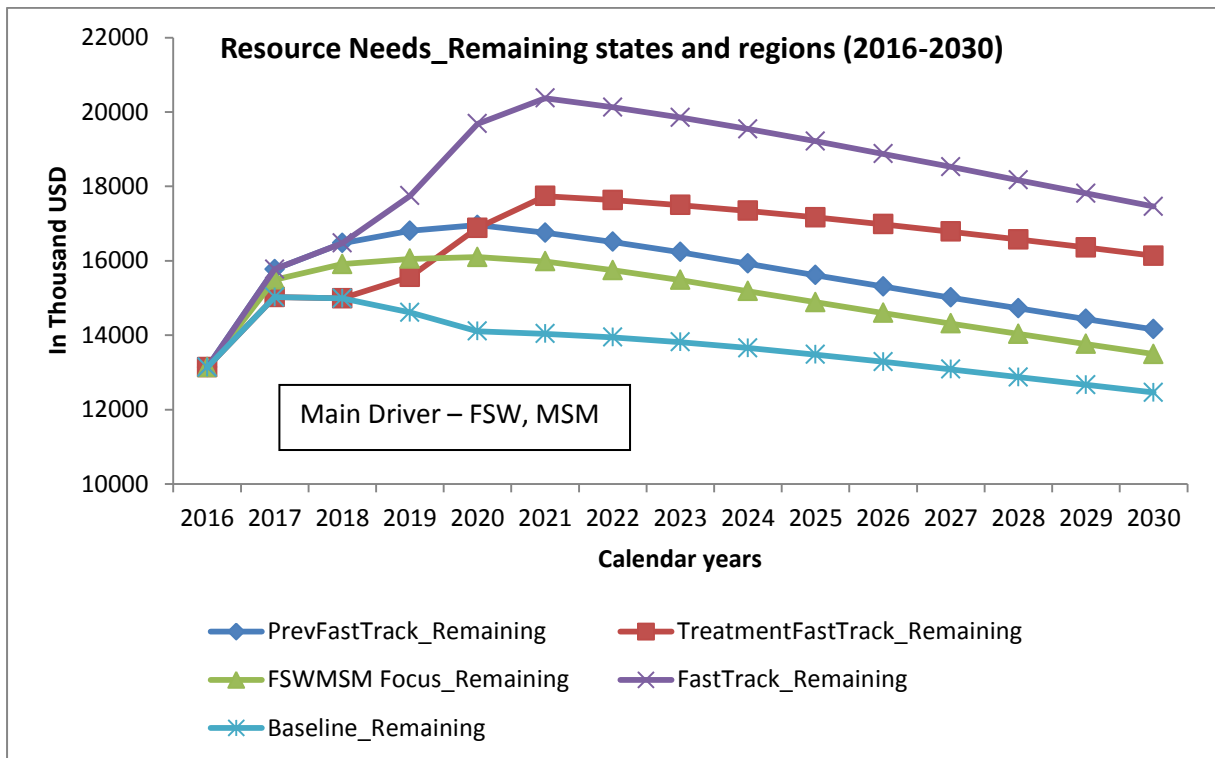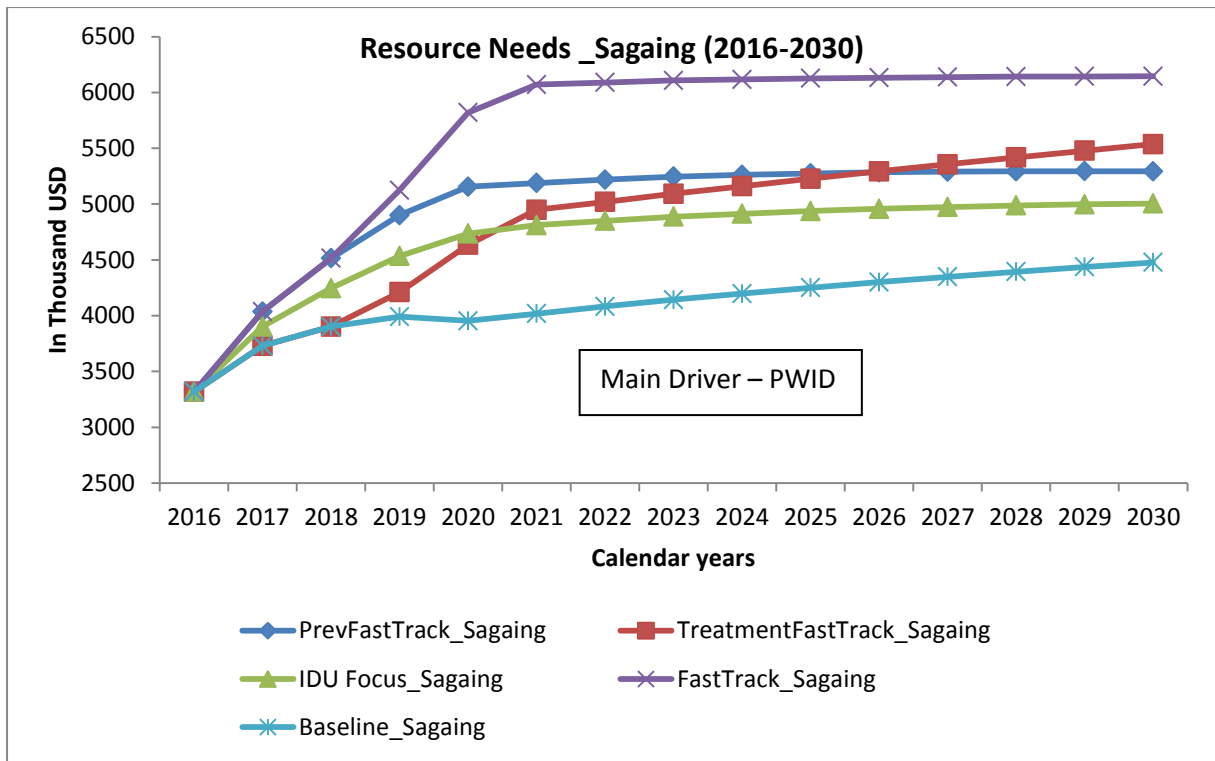- FastTrack_Remaining
- Baseline_Remaining

Figure 24: Resource needs by different scenarios at State and Regional level (2016-2030)

II.3.2. Number of new HIV infections by scenarios, 2016-2030

At national level *(Figure 25)*, the most effective impact yielding scenario is the FT but the Main driver focus yields almost the same impact as the FT scenario for a lesser cost. Treatment only scenario will not reduce new infections to the same levels than Prevention and Main driver focus, highlighting the fact that treatment only is not as effective in controlling the epidemic. A combination of prevention and treatment approaches is required to end AIDS. A focused FT approach is additionally cheaper than FT for all.
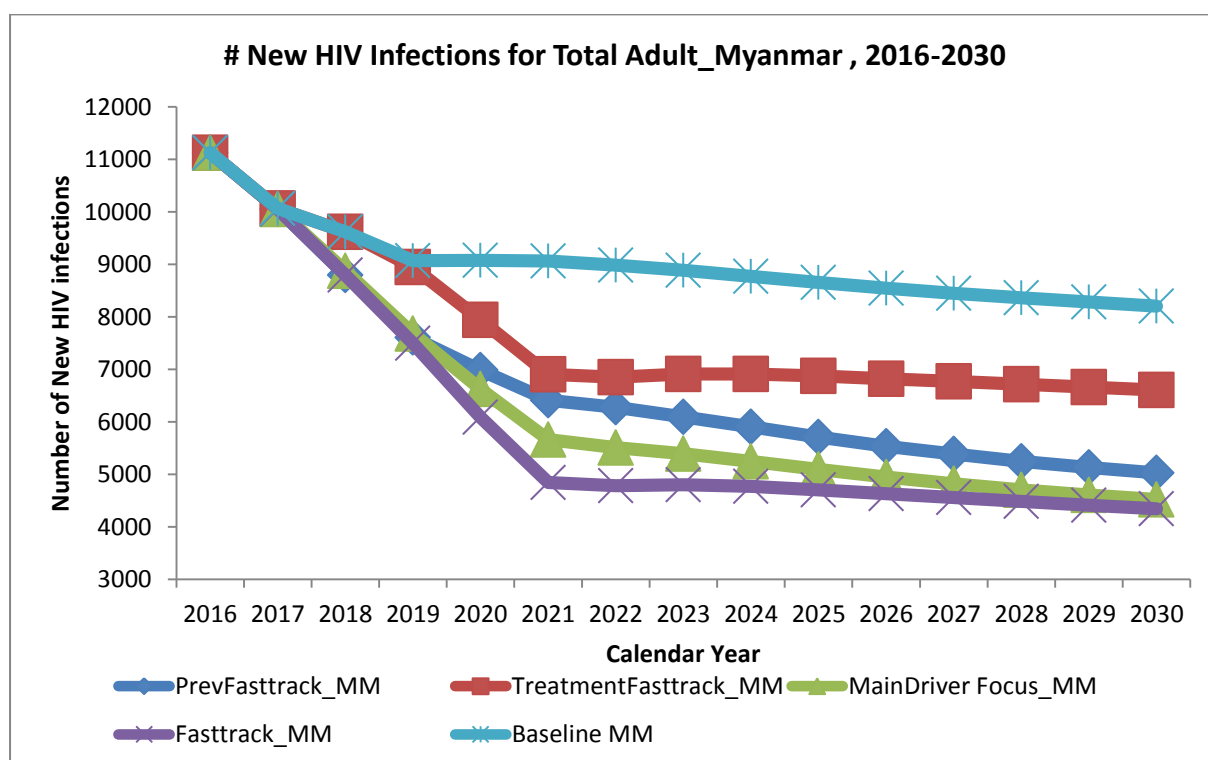

Figure 25: Estimated number of new HIV infections by different scenarios (2016-2030)

For all regions the Main driver focus has nearly the same effect in the reduction of new infections than the FT scenario, followed by prevention only except for Kachin State and Shan (North) State. In Kachin State and Shan (North) State, although the prevention coverage for PWID is already high the effectiveness of the current prevention program seems limited. This makes the prevention effect from treatment more salient for bringing down the new infections.
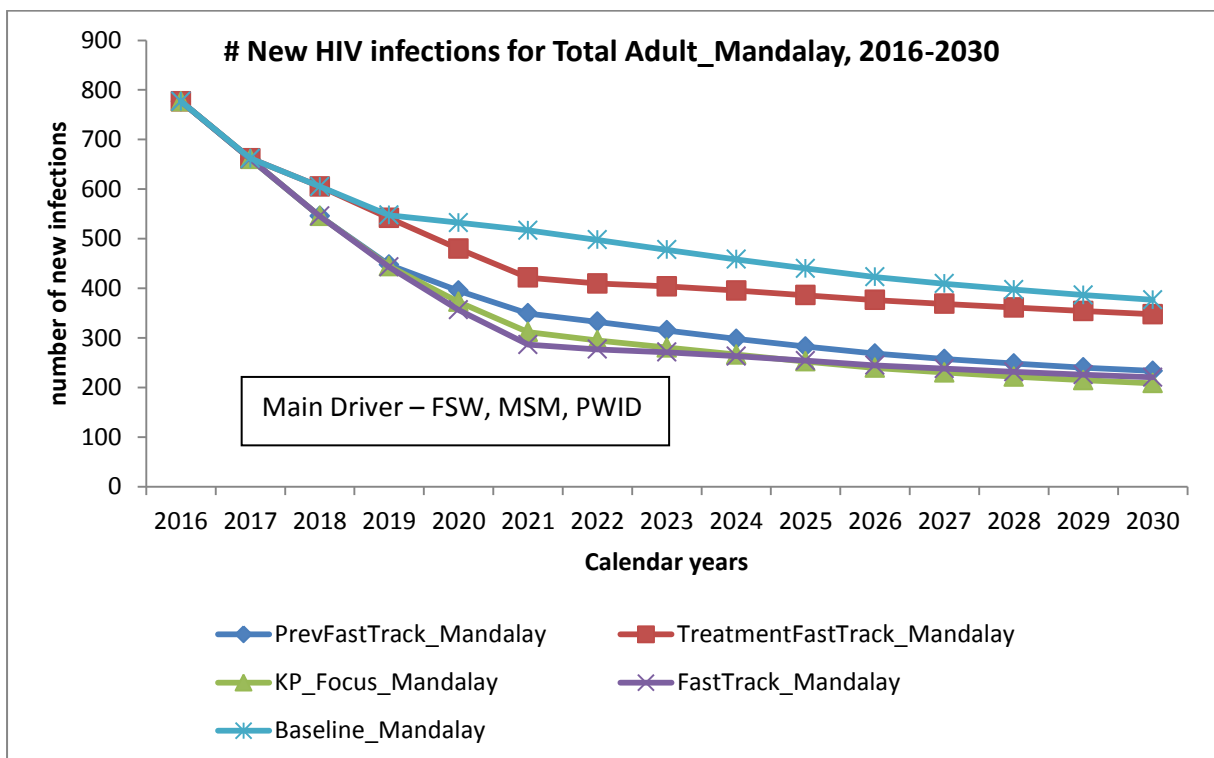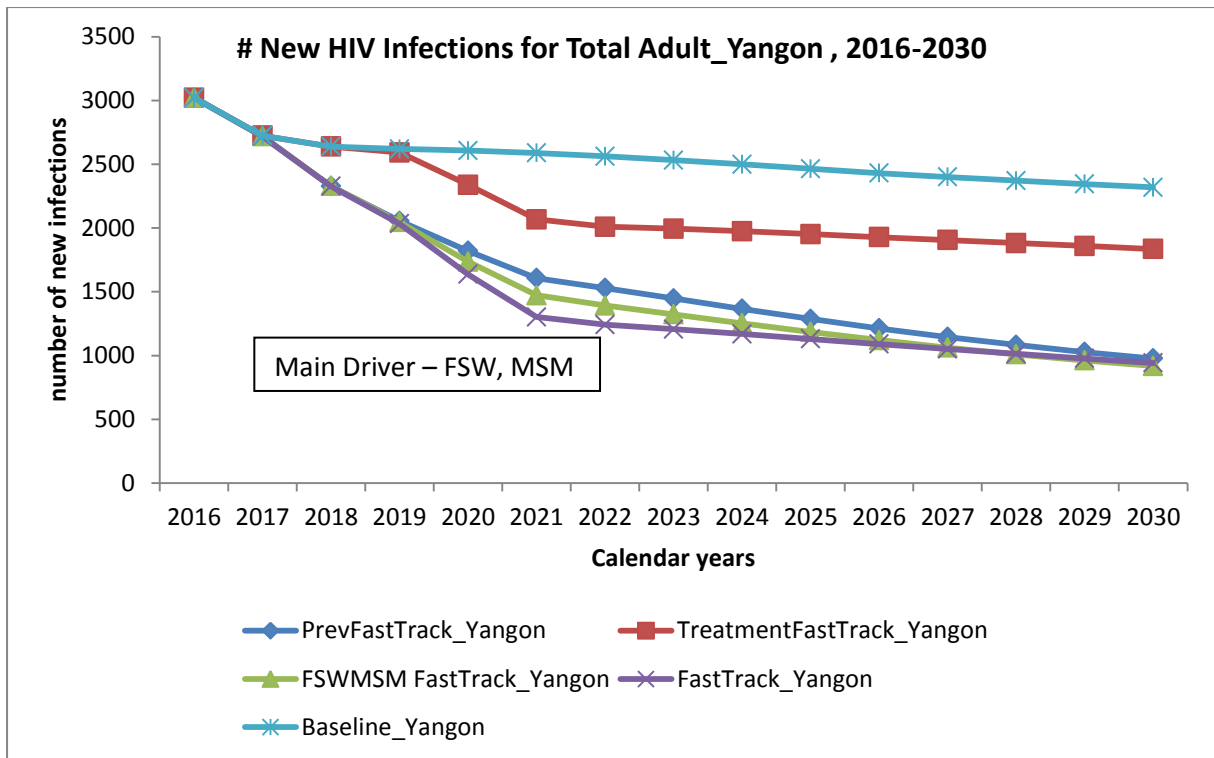
Figure 26: Estimated number of new HIV infections by different scenarios at State and Regional level (2016-2030)

 # New HIV infections for Total Adult_Kachin , 2016-2030

Main Driver – PWID

- PrevFastTrack_Kachin
- TreatmentFastTrack_Kachin
- IDUFocus_Kachin
- FastTrack_Kachin
- Baseline_Kachin

 # New HIV infections for Total Adult_Shan (N), 2016-2030

Main Driver – PWID

- PreventionFastTrack_ShanN
- TreatmentFastTrack_ShanN
- IDU Focus_ShanN
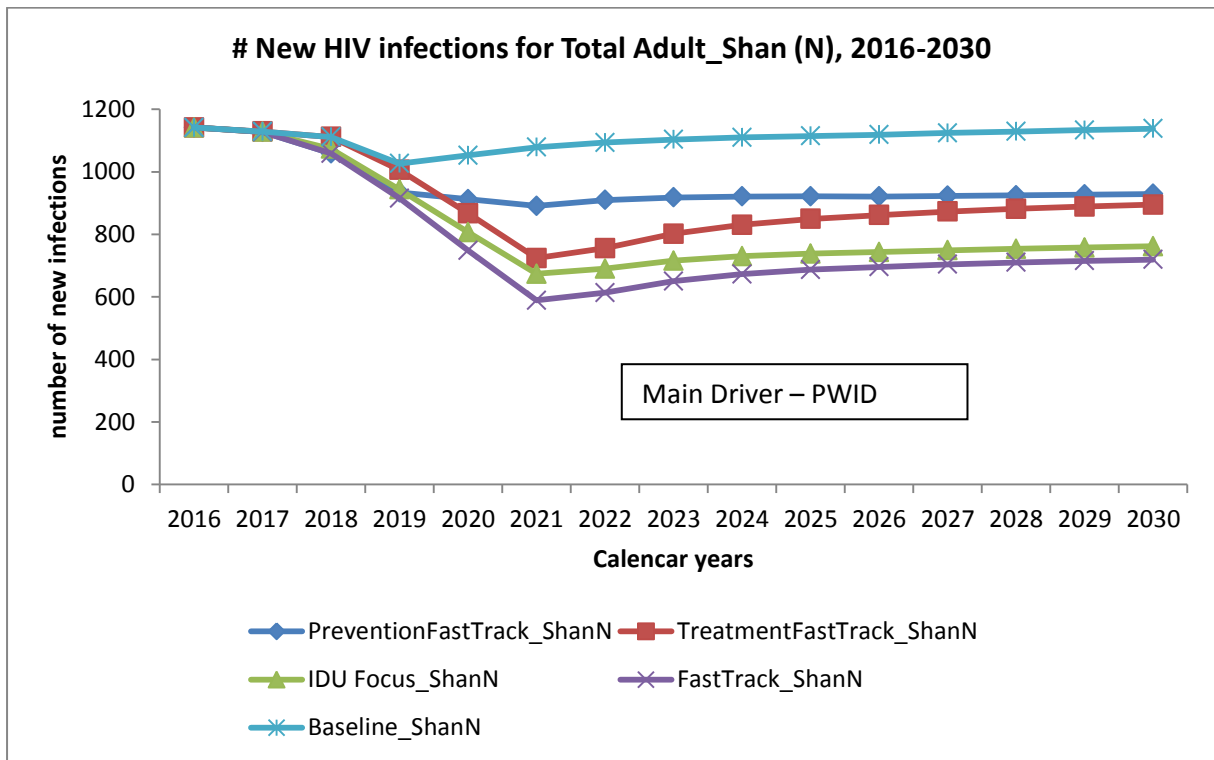- FastTrack_ShanN
- Baseline_ShanN

Figure 26: Estimated number of new HIV infections by different scenarios at State and Regional level (2016-2030)

#New HIv infections for Total Adult_Sagaing, 2016-2030

Main Driver – PWID

Legend:
- PrevFastTrack_Sagaing
- TreatmentFastTrack_Sagaing
- IDU Focus_Sagaing
- FastTrack_Sagaing
- Baseline_Sagaing

 # New HIV infections for Total Aduts_Remaining, 2016-2030

Main Driver – FSW, MSM

Legend:
- PrevFastTrack_Remaining
- TreatmentFastTrack_Remaining
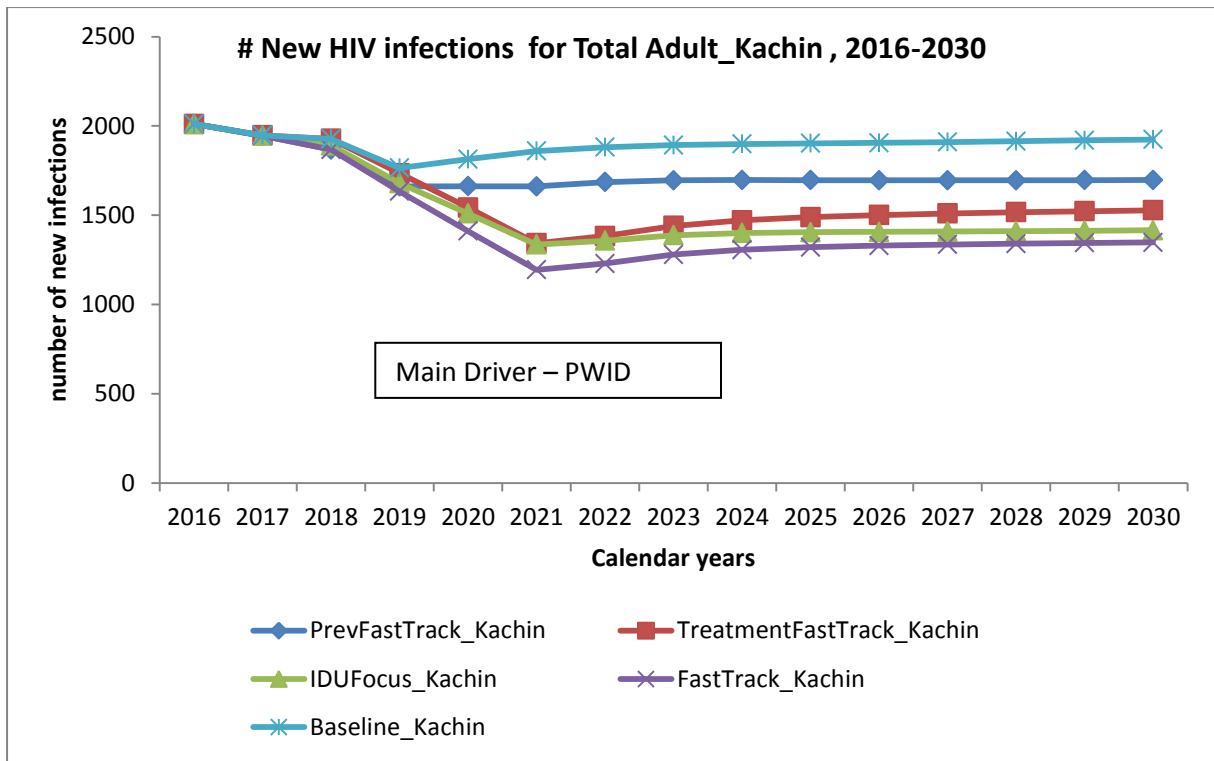- FSWMSM Focus_Remaining
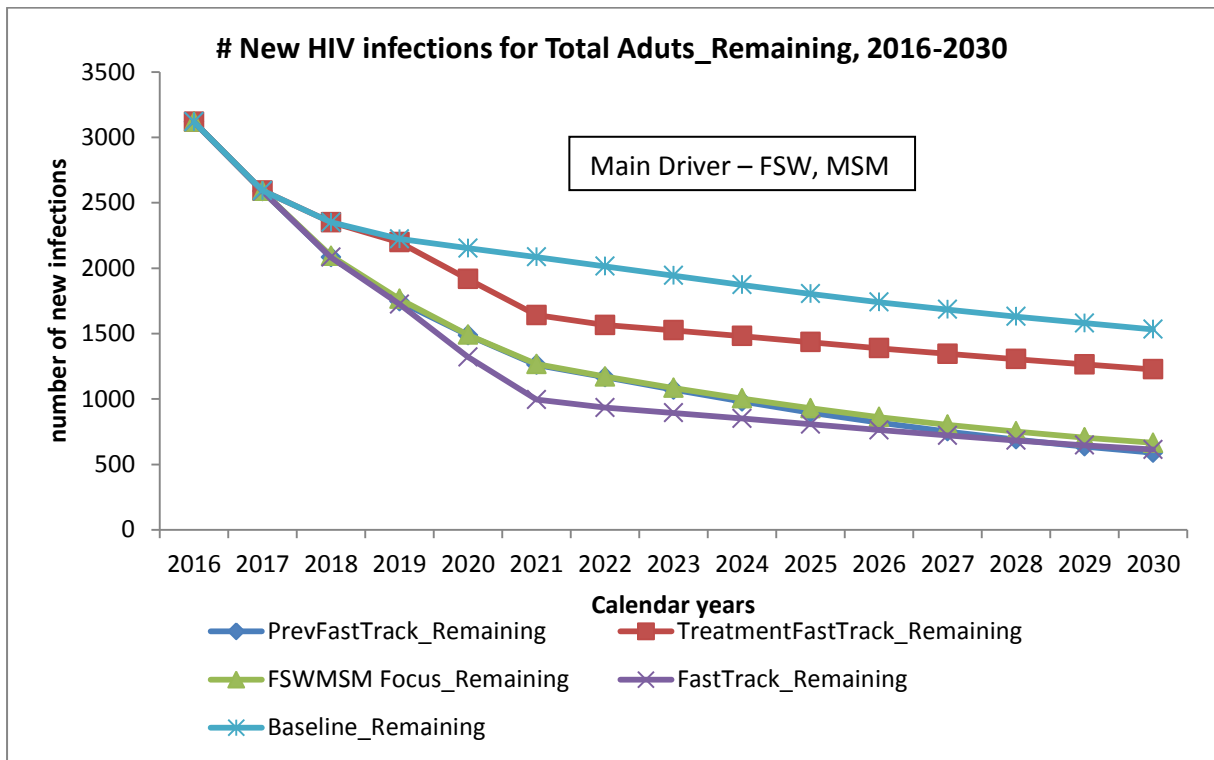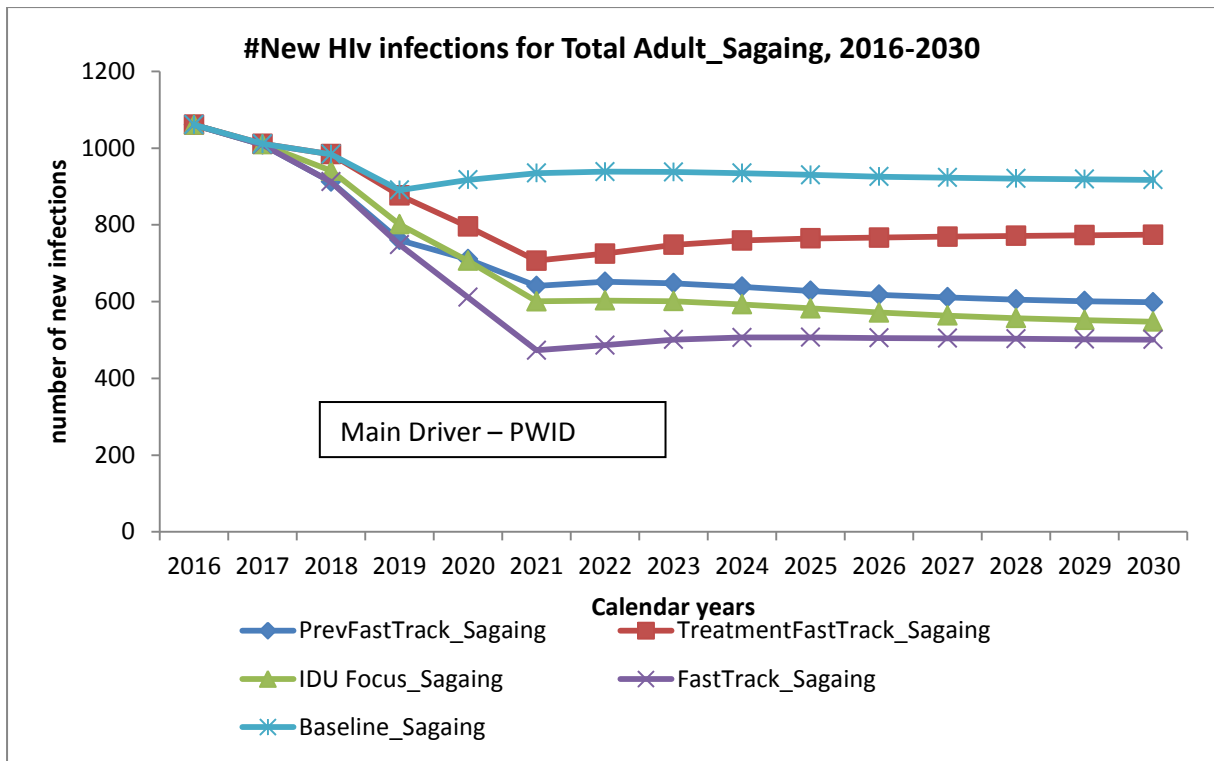- FastTrack_Remaining
- Baseline_Remaining

Figure 26: Estimated number of new HIV infections by different scenarios at State and Regional level (2016-2030)

II.3.3. Number of HIV deaths by scenarios, 2016-2030

Fast track and treatment scenarios have the same effect on the reduction of HIV deaths at national level. However, in the long run that effect is mitigated due to the fact that we keep the target at 81%, which implies no new people on ART and therefore no reduction in deaths. Main driver Focus, prevention only and baseline are not very efficient in reducing deaths however Main driver focus is better at reducing deaths than the two other scenarios.
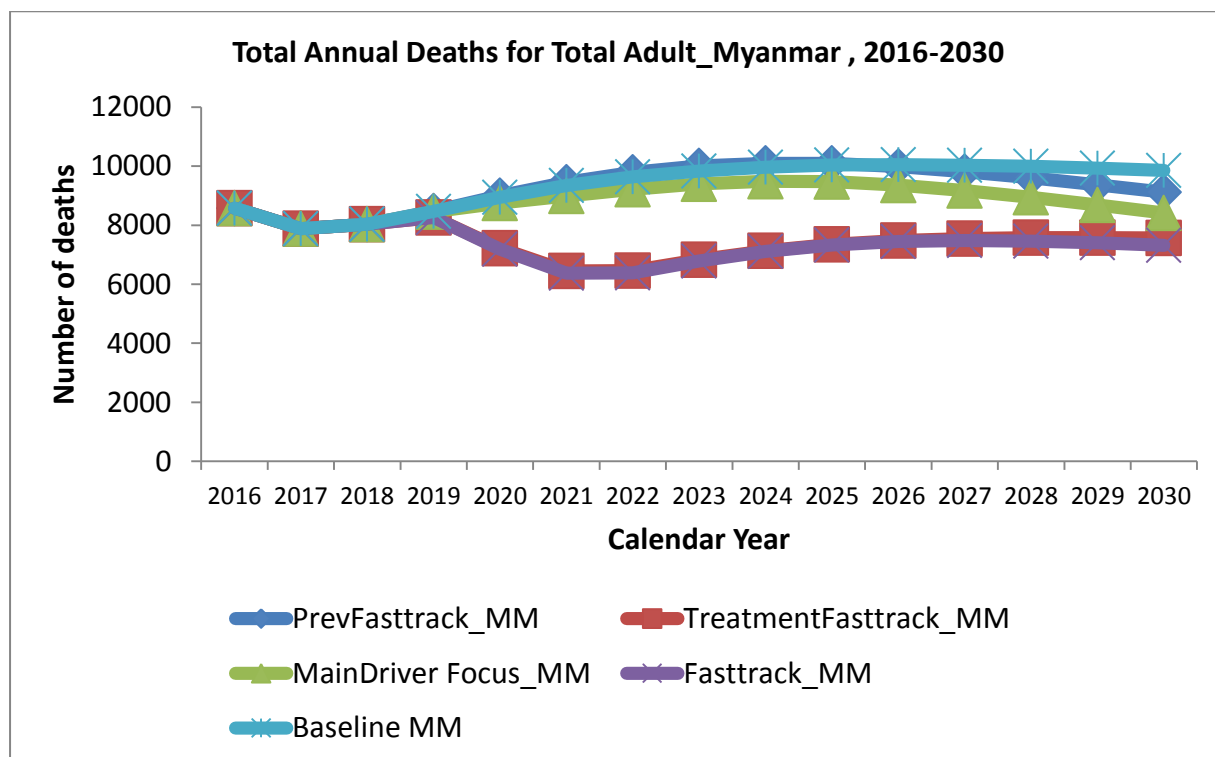

Figure 27: Estimated number of HIV deaths by different scenarios (2016-2030)

In all regions FT and treatment only are the scenarios which best reduce the number of deaths, followed by the Main driver focus. *(Figure 28)*

Total Annual Deaths for Total Adult_Yangon, 2016-2030

Main Driver – FSW, MSM

Legend:
- PrevFastTrack_Yangon
- TreatmentFastTrack_Yangon
- FSWMSM FastTrack_Yangon
- FastTrack_Yangon
- Baseline_Yangon

Total Annual Deaths for Total Adult_Mandalay, 2016-2030

Main Driver – FSW, MSM, PWID

Legend:
- PrevFastTrack_Mandalay
- TreatmentFastTrack_Mandalay
- KP_Focus_Mandalay
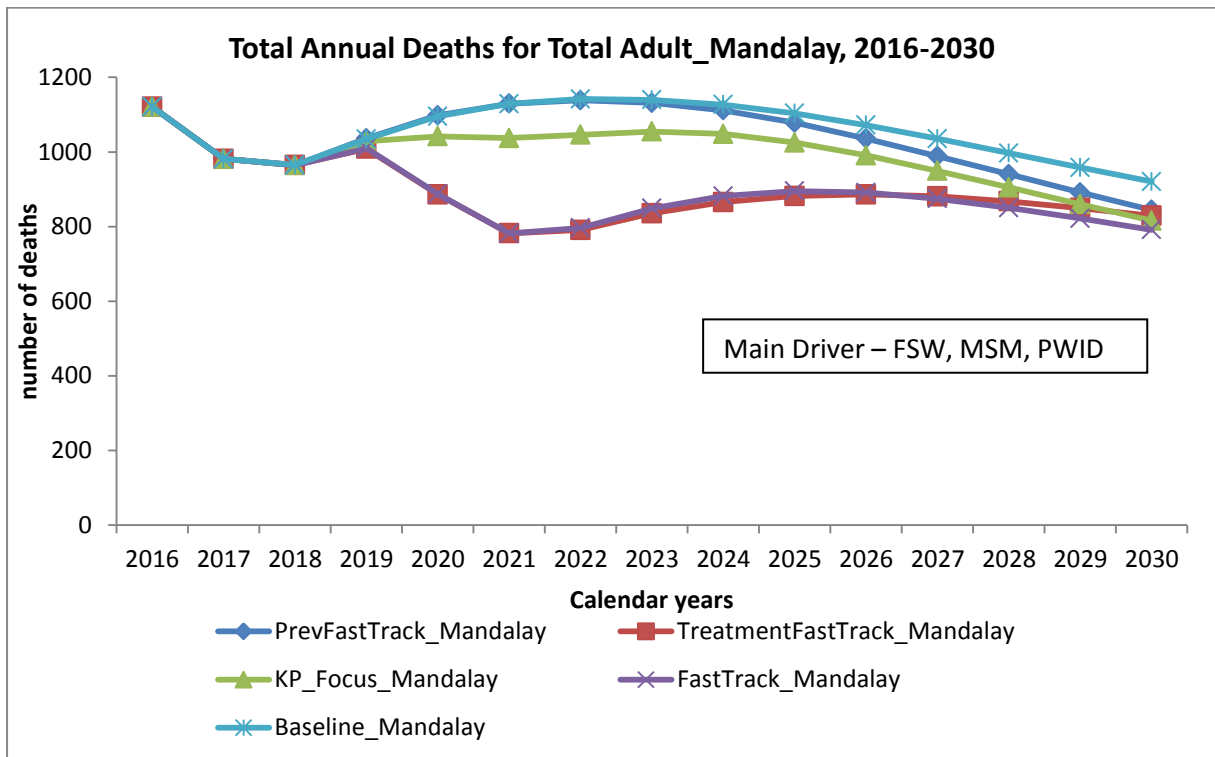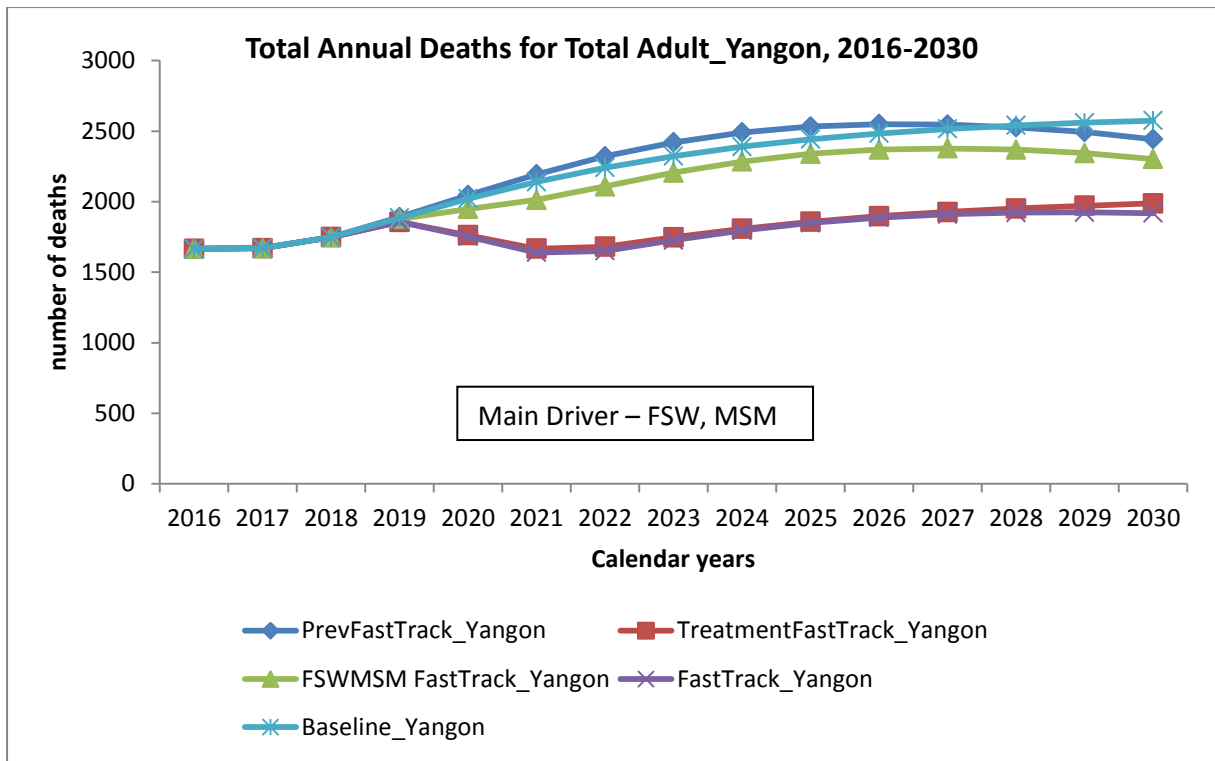- FastTrack_Mandalay
- Baseline_Mandalay

Figure 28: Estimated number of HIV deaths by different scenarios at State and Regional level (2016-2030)

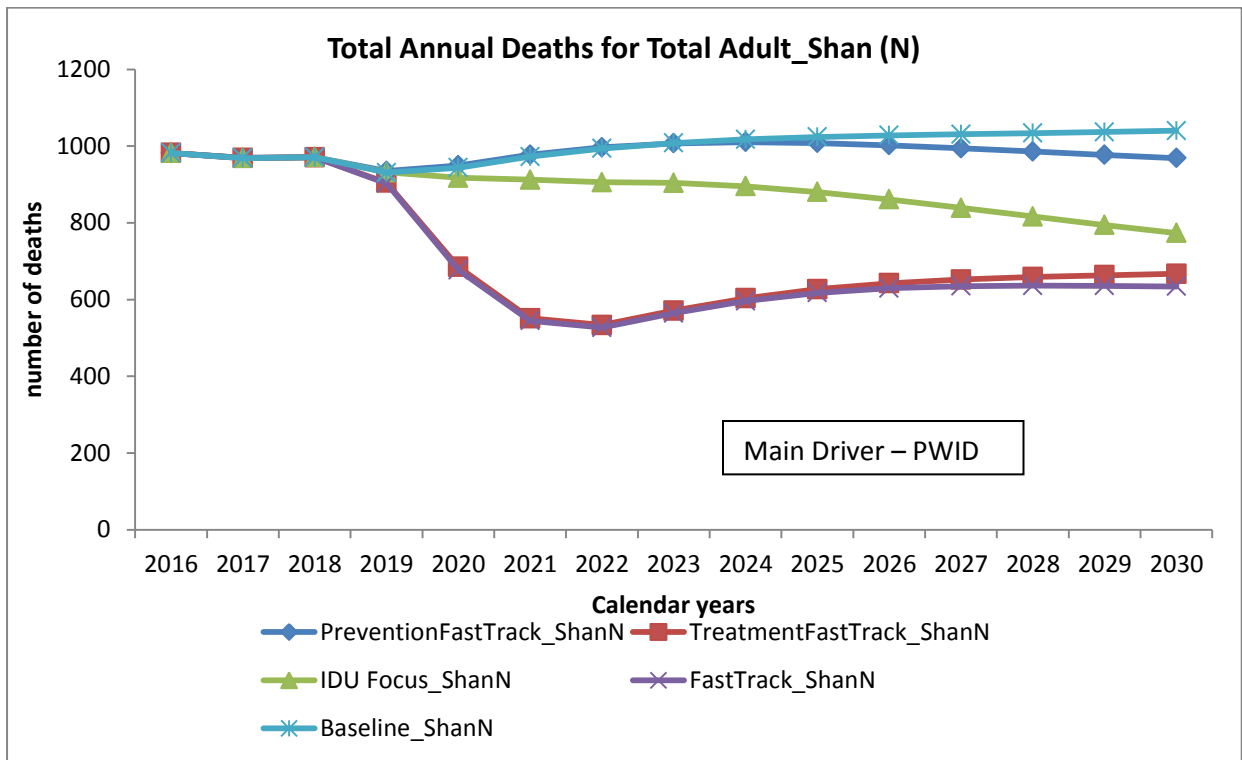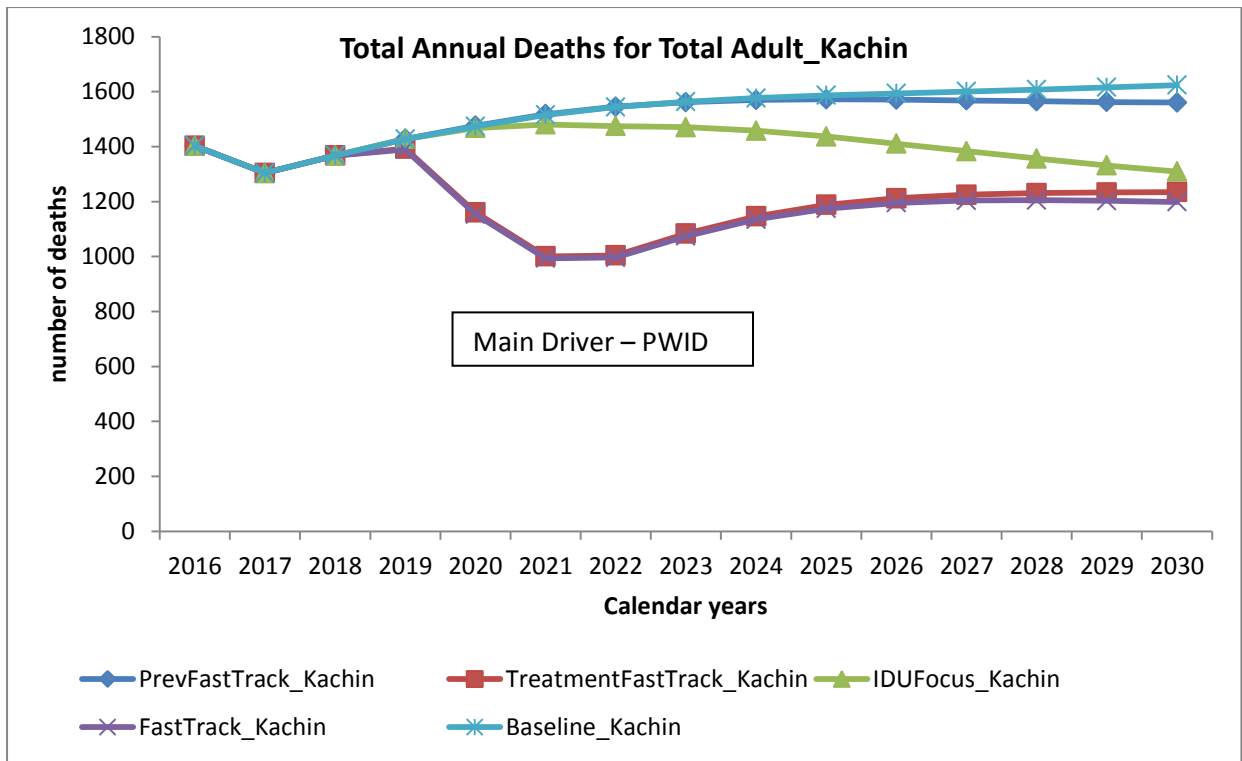Figure 28: Estimated number of HIV deaths by different scenarios at State and Regional level (2016-2030)
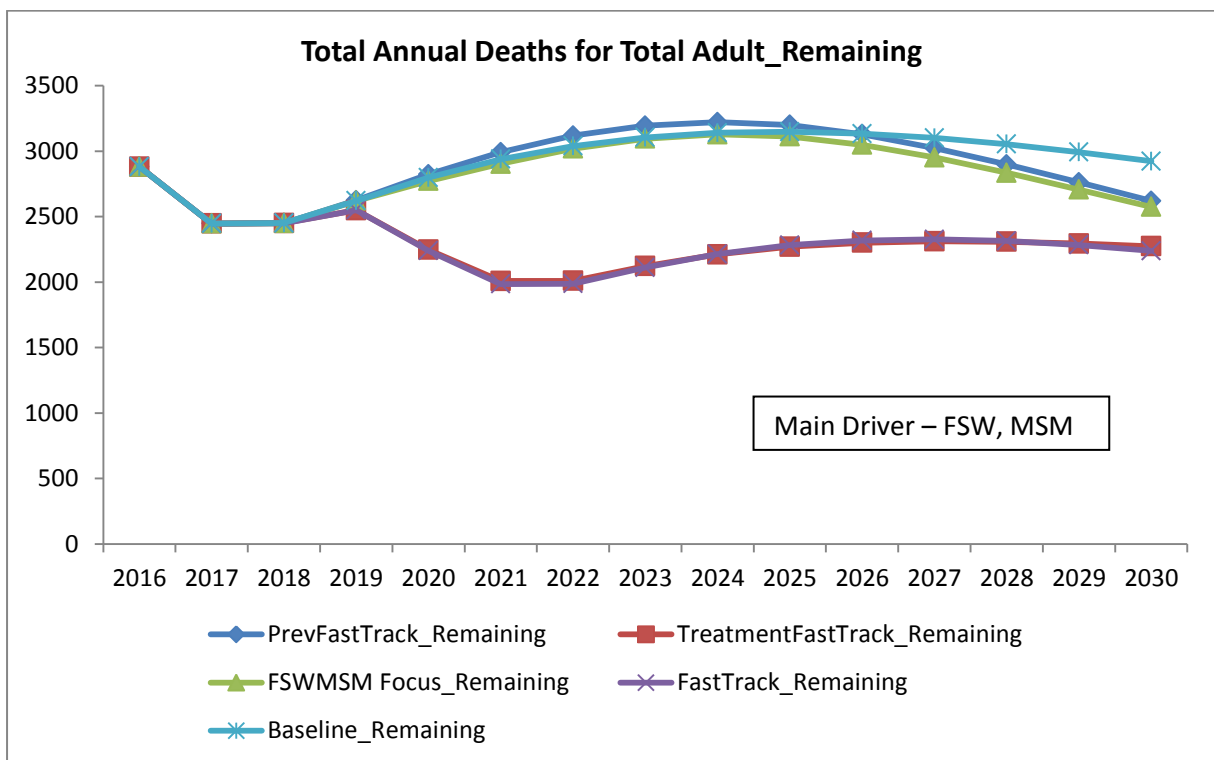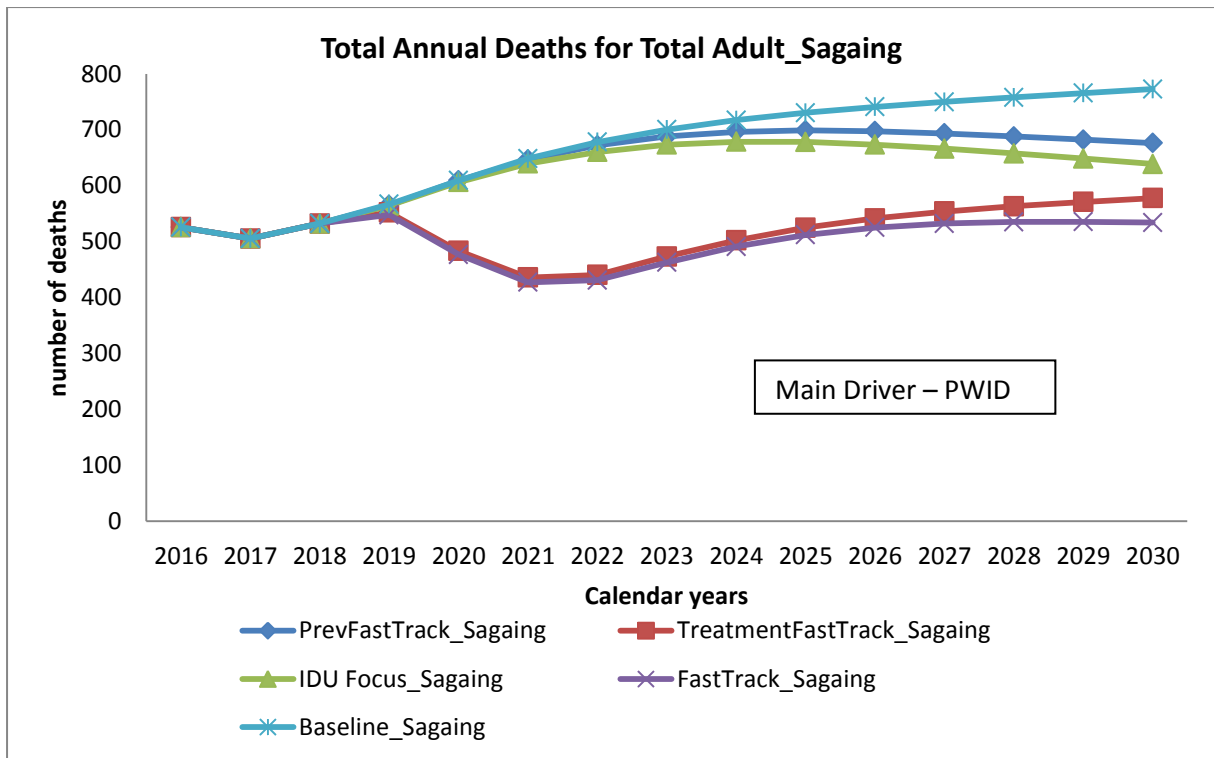
Figure 28: Estimated number of HIV deaths by different scenarios at State and Regional level (2016-2030)

CONCLUSIONS

The findings from these sub national estimates suggest that:

- Overall, at national level, the HIV epidemic is estimated to be declining slowly. However, sub-national models reveal the real picture of the HIV epidemic in several regions and states, which previously were assumed to have the same trend as the national one.

- These results are essential for the preparation of sub-national strategies and plans allowing States and Regions to develop a more tailored approach to their local HIV epidemic.

- Addressing the epidemic among PWID effectively in Kachin State, Shan (North) State, Sagaing region will impact significantly on new infections among PWID (three states & regions contributed 90% of new infections).

- Addressing the epidemic among MSM in Yangon on its own will impact significantly on the number of new HIV infections among MSM (60% of new infections among MSM are attributed to Yangon).

- Addressing the epidemic among FSW and clients in Yangon and Mandalay will impact significantly on the number of new HIV infections among FSW and clients (50% of new infections among FSW and clients are attributed to Yangon and Mandalay).

- The Main-driver Fast Track scenario seems to be the most cost-effective scenario and should be the priority scenario for all States and Regions modelled, given limited resources.

- Overall scenarios underline the fact that HIV Prevention is still very important and should be highlighted in HIV programming. Additionally, prevention programs should not only focus on reaching Key Populations for testing but should also be focused on behavior change

- There is a need to combine prevention and treatment in particular in Kachin and Shan (North) States. In these States, the Prevention only Fast Track scenario does not bring down effectively the number of new HIV infections since the PWID prevention coverage is already high. To reduce the new infections significantly, the quality of prevention should improve dramatically, and these States should fast track treatment.

- Yangon Region epidemic calls for special consideration and the HIV epidemic is not controlled.

- Sagaing Region is experiencing an early HIV epidemic and has potential to develop a bigger IDU driven epidemic in coming years. The HIV epidemic should be closely monitored to assess future trends.

NEXT STEPS

- Disseminate the sub-national results to advocate States and Regional policy-makers and stake-holders the specific needs of each State and Region.
- Develop policy, planning, resource analysis and information systems at state and regional level to support the generation of tailored strategies and actions-plans to address the local HIV epidemic needs. Reallocate resource as needed.
- Explore the reasons behind the apparent effectiveness of the HIV response in Mandalay where the epidemic seems to have been controlled across all modes of transmission and apply the lessons learned to other States and Regions.
- Analyze further the HIV epidemic differences within the Remaining States and Regions.
- Assess the coverage, effectiveness and impact of prevention efforts among PWID and their spouses or partners and their linkages to ART and other services in Kachin and Shan (North) State.
- Study barriers to treatment in Shan (North) State especially among PWID and their partners.