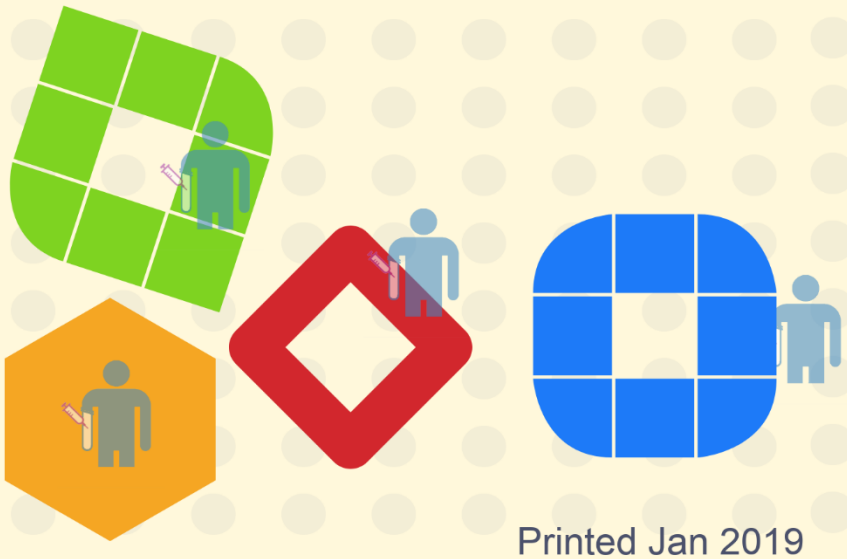
Myanmar Integrated Biological and Behavioural Surveillance Survey
&
Population Size Estimates among People Who Inject Drugs (PWID)

2017-2018

National AIDS Program
Ministry of Health and Sports
Myanmar



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ACRONYMS AND ABBREVIATIONS

AE	Adverse Event
AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal clinic
CCDAC	Central Committee for Drug Abuse Control
DIC	Drop-in Centre
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human Immunodeficiency Virus
IBBS	Integrated Biologic & Behavioural Survey
KII	Key Informant Interviews
KP	Key population
MOHS	Ministry of Health and Sports
NAP	National AIDS Programme
NGO	Non-governmental Organization
NHL	National Health Laboratory
PSE	Population Size Estimation
PWID	People who inject drugs
RDS	Respondent Driven Sampling
RDT	Rapid Diagnostic Test
STI	Sexually Transmitted Infections
SOP	Standard Operating Procedures
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

EXECUTIVE SUMMARY

BACKGROUND

This report presents the results of the 2017-18 Integrated Biological and Behavioural Survey (IBBS), among people who inject drugs (PWID) in selected sites in Myanmar, including a formative assessment and population size estimations. A formative assessment was conducted in September 2017 in each site to inform the implementation of the IBBS. The assessment was conducted to assess the particulars of PWID populations in each setting, to provide information to tailor RDS and PSE methods and logistic approaches to the different PWID population and epidemic context.

SURVEY METHODOLOGY

This survey used respondent driven sampling (RDS) most suitable to reach hidden populations, a type of chain referral sampling which yielded data representative of the network of the populations from which the samples were gathered. Four new sites were added to the 2017-18 IBBS in line with national priorities outlined in the national surveillance plans and based on advice from the Myanmar Strategic Information/ Monitoring and Evaluation Technical Working Group (SI/M&E TWG) on HIV and AIDS, for a total of 13 study sites. Sites were selected for their large PWID population (based on programme reports), large young PWID population, high HIV prevalence, high risk behaviours and proximity to gold or jade mining areas associated with drug use among seasonal workers.

Eligibility criteria included: males or females; 15 years of older; who self-reported drug injection for non-medical purposes in the past one month; having lived in respective township/city of study for at least 6 months; having a valid RDS coupon; having consent to participate in the study; and understanding Myanmar or any local language used in the questionnaire. A total of 6061 respondents participated from October 2017 to January 2018.

This PWID IBBS survey had two components: a questionnaire used to collect behavioral and other data including information on socio-demographics, drug using and sexual behaviors, knowledge of HIV and need for HIV services, information needed for size estimation, and a biological component that involved testing blood specimen to determine prevalence of HIV, hepatitis B and C.

PSE SUMMARY REPORT
PSE REPORT

Following the completion of data collection and analysis, a workshop was convened with a range of stakeholders to develop national and sub-national population size estimates (PSE) for PWID. The first step was to collate all new and existing size estimation data sources for the 13 study sites, including the multiplier data from the 2017-2018 IBBS findings, programmatic mapping results, and monitoring data. Using data triangulation, ranges for population estimates for each data source were developed. During the workshop, the population size estimates for each site were reviewed and assessed in groups by individuals familiar with the townships and the PWID population in those townships. These knowledgeable participants identified outliers, supplied additional information on data quality issues, and recalculated estimates when necessary. Based on the triangulation process, the group developed a final consensus range and population proportions for each study site.

To conduct extrapolation based on the available direct size estimation data from the study sites, participants developed a list of characteristics, or predictor variables, that were determined to be related to the number

or proportion of PWID at the township level. A scoring system for each variable was developed by the group, and scores were applied for each variable to every township. An initial attempt was made to use regression modelling to test the relationship between the proposed criteria and PWID size, based on the existing outcome data (PWID PSE) for 34 townships. Due to the limited number of townships with existing outcome data, it was not possible to use regression modeling to calculate the population size estimates.

Manual categorization through stratified imputation was used to develop national and sub-national PSE. A weighted composite score was calculated, based on the variables that were most predictive of PWID size in bivariate analyses, including in-migration, price of heroin, presence of trafficking, presence of mining, level of drug related law enforcement, and ANC HIV prevalence. Composite scores were divided into 6 strata and assigned a population proportion based on the value of the composite score. Using these scores, national estimates were developed by applying the strata specific population proportions to the number of males over age 15 in each township. Extrapolated values for the 13 IBBS sites were replaced with consensus scores.

Following review of the PSE calculations at the township level, the predictor variables associated with PWID populations and the calculation of the weighted composite score was adjusted to improve accuracy. Townships were categorized into strata based on the updated composite score, based on five variables (ANC HIV prevalence and presence of mining were removed). The township level PSE were recalculated by applying the strata specific population proportions to the number of males over age 15 in each township. As a result, an updated national point estimate of 93,215 (49,677 – 124,287) PWID was produced.

SURVEY RESULTS

With respect to sociodemographic characteristics, more than 98% of PWID were male. Median age by site ranged from 25 to 33 years of age. Overall, a majority of PWID (52%) have never been married, but a substantial range in marital status was observed across survey sites. In all survey sites, most PWID lived with a spouse (30%) or family (56%). Median income ranged from 100,000 to 250,000 kyats. With respect to formal education, a majority of PWID (>50%) had completed secondary school or higher at all sites, except Kutkai, where the highest proportion of PWID only completed primary school or less.

Regarding drug use practices, the median age of initiating injection drug use was several years older than initiating non-injection drug use across survey sites: from 20 years in Waimaw to 30 years in Tamu. Waimaw and Yangon reported the lowest median age for initiation of both non-injection and injection drug use. For duration of injection drug use, overall, approximately one-quarter of PWID had been injecting drugs for one year or less. More than half of PWID in Tamu had been injecting drugs for a year or less. The mean/median years of injection drug use was much higher in Yangon than the other survey sites.

Overall, the survey found that heroin remained the primary drug of injection in all townships. In the month prior to the survey, more than 80% of PWID injected 2-3 times a day or more. Compared with other survey sites, PWID in Kalay reported much less frequent injecting behavior, with more than 65% injecting less than daily. Injecting drugs in public places was most commonly reported in Bamaw (51%), Myitkyina (48%), Waimaw (67%) and Yangon (48%), with considerable increases observed from the 2014 IBBS in these study sites.

Shared needle use varied greatly between survey sites, ranging from 7% in Mandalay to 63% in Bamaw. The proportion of PWID who reported ever having used a previously used needle/syringe decreased from the 2014 IBBS in most survey sites, excluding Bamaw, Tamu, and Yangon. Bamaw observed the largest increase,

from 55% reporting ever having used a previously used needle/syringe in 2014 to 63% in 2017. Ever using a previously used needle/syringe was not significantly associated with age (>=25 years) or income (<150,000 kyats).

NGOs (50%), drug dealers (30%), and pharmacies (17%) were the most frequently reported main source of needles/syringes used, but significant variation was observed across survey sites. In Bamaw, Hpakant, Lashio, Muse, and Myitkyina, more than 60% reported NGOs as their primary source of needles/syringes. In Yangon and Indaw, more than half reported pharmacies as their main source of injecting equipment. In Tamu and Mandalay, drug dealers were the primary source of needles/syringes. Less than 1%, overall, reported health workers, hospitals, or sex partners as their main source of sterile injecting equipment.

Only 16% of PWID reported ever having an overdose, and 7% reported an overdose in the past 12 months. Overall, 17% had received methadone treatment in the last 12 months, but a notable range in recent methadone treatment was observed across survey sites: 53% of PWID in Bamaw and 35% in Kalay had received methadone treatment in the last 12 months, while only 2% of PWID in Waimaw had received methadone treatment.

Across most survey sites, less than 20% of PWID had ever been arrested or detained. Kutkai (22%), Lashio (20%) and Muse 18% reported the highest levels of history of arrest. In most sites, a greater proportion of PWID injecting for more than a year had ever been arrested, compared with PWID injecting for one year or less.

Overall, among the 80% of PWID who have ever had sex, 87% reported having sex with a regular partner in the last 12 months. Across survey sites, having sex with a regular partner ranged from 72% in Hpakant to 97% in Indaw. Those having sex with a paid partner in the past 12 months ranged from 3.6% in Indaw to 30.2% in Hpakant. Less than 10% of PWID had more than one type of sex partner in the past 12 months.

While condom use with a regular partner has increased compared with the 2014 IBBS, reported use has remained particularly low. Among those who have a regular sexual partner, a majority (67%) across survey sites reported never using a condom, and 80% did not use a condom during their last sexual encounter with their regular partner. Conversely, among those who had a paid partner in the past 12 months, 80% reported use a condom during their last sexual encounter with their paid partner.

A majority of PWID (52%) across all survey sites had never been tested for HIV. Among those who reported ever testing for HIV, 49% were tested over one year ago, and approximately two-thirds were tested 6 months ago or longer. Older PWID were more likely than younger PWID to have ever been tested for HIV. Ever using a previously used needle or syringe was associated with a higher proportion of HIV testing in Hpakant, Kutkai, Mandalay, Muse, Tamu, Waimaw, and Yangon.

Overall HIV prevalence among PWID was 35%, with the lowest prevalence in Mandalay (7.6%) and the highest prevalence in Bamaw (61%). Bamaw reported the highest HIV prevalence for both IBBS and HSS across survey sites (61% and 65%, respectively). Six survey sites reported an increase in HIV prevalence from the 2014 IBBS (Bamaw, Kalay, Lashio, Myitkyina, Tamu and Waimaw), while four sites (Kutkai, Mandalay, Muse, and Yangon) reported a reduction. Among PWID reporting never testing for HIV, overall HIV prevalence was notably higher (41%), with a majority testing positive In Bamaw (64%), Hpakant (54%), and Waimaw (54%). PWID injecting for more than one year had an HIV prevalence of 40%, as compared to an

HIV prevalence of 20% among PWID injecting for less than one year. In addition, ever using a previously used needle/syringe was also a significant predictor of HIV across all survey sites

Only 19% of HIV-positive PWID know their HIV status. Among PWID who self-reported as HIV-positive, three-quarters or more of HIV-positive PWID were linked to care in all survey sites, except Kalay and Kutkai; only 50% and 36% of HIV-positive PWID, respectively, had ever visited a healthcare provider for their HIV infection in these two survey sites. Among PWID who self-reported as positive for HIV, overall coverage for ever taking antiretroviral therapy (ART) was 70%. Mandalay reported the highest coverage for ever taking ART (96%) followed by Yangon (89%). Five sites (Kalay, Kutkai, Mohnyin, Muse, and Tamu) reported ART coverage less than 55%. The lowest retention proportion was observed in Myitkyina, where only approximately half of HIV-positive PWID in Myitkyina were retained in care. Among PWID who reported ever taking ART, overall coverage for those currently taking ART was over 95%, with current ART coverage ranging from 86% in Mandalay to 100% at 7 sites. These findings highlight that significant gaps remain in access and adherence to HIV treatment in PWID to achieve 2020 targets.
Overall HCV prevalence was high (56%), with prevalence ranging from 27% in Myitkyina to 85% in Waimaw. A significant range in prevalence of HIV/HCV co-infection was observed across survey sites, ranging from 4% in Mandalay to 54% in Waimaw. As expected, HBV prevalence (7.7%) was significantly lower than HCV prevalence. The highest prevalence was observed in Muse, Kalay and Mohnyin at approximately 10%. HIV/HBV co-infection was also significantly lower than HIV/HCV co-infection, with prevalence ranging from 0.5% in Mandalay to 5.7% in Hpakant.

IMPLICATIONS AND RECOMMENDATIONS

Based on the findings from IBBS PWID 2017 survey, the following implications and recommendations are described.

- **Increase in young PWID population compared to 2014 results**: Review and revise peer outreach models to expand outreach activities to young PWID and bring them for drug treatment to prevent HIV transmission.
- **Geographic differences in drug injecting practices**: Further studies to be conducted to have in-depth information on drug use patterns and trends among young drug users, and common transitions process to injecting practices for all drug users;
- **Having strong peer networks could promote safe injecting practices among PWID (e.g. Tamu and Muse survey sites):** Program should focus on supporting and enhancing capacity of drug users' network to sustain the effective preventive intervention activities among PWID
- **Sharing of needles and syringes:** Develop innovative strategies to improve access to needles and syringes, and ensure utilization of sterile needles and syringes by PWID
- **Low ART Coverage and adherence on ART:** Integrated HIV services should be provided to PWID so that they can be tested and treated for HIV, STI, TB and other co-infection. Defaulter patients tracking and enhanced adherence counselling should be provided to meet the psychosocial needs of PWID and adherence on HIV treatment services.
- **Consistent condom use is considerably low and increase in syphilis positivity rates:** Comprehensive knowledge, education and awareness regarding safe sex practices should be promoted with participation from peers and immediate communities
- **Large variation in utilization of drug treatment services**: Implementing partners to provide further support to drug treatment centers in peer counselling and adherence on methadone
- **Community misconceptions of services to PWID:** Expand advocacy to promote harm reduction literacy and benefits of drug treatment in some townships in Kachin State.

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1. INTRODUCTION AND BACKGROUND

HIV epidemic in Myanmar

Myanmar has a population of 51,486,253 million [1]. HIV prevalence among adults in Myanmar was estimated to be 0.59% (220,000 people) in 2016 [2]. Alarmingly however, a much higher HIV prevalence has been concentrated among key populations groups including people who inject drugs (28.5%), female sex workers (14.6%), and men who have sex with men (11.6%) [3]. Over 70% of new HIV infections in Myanmar in 2017 were estimated to occur among key populations, including clients of female sex workers [4]. Although the use of illicit drugs is no longer illegal in Myanmar, drug possession is still illegal and drug injection, like sex work and sex between men (currently illegal) is highly stigmatized, making key populations hard for services and research to reach.

HIV among People who Inject Drugs

In 2014, 3,275 people who inject drugs were recruited from 2 cities and 8 townships using Respondent-Driven Sampling (RDS). The overall PWID population in Myanmar was estimated to be over 83,000 [3]. Main findings from the 2014 IBBS among PWID can be found in the final IBBS report [5]. The majority of PWID sampled injected drugs daily (>75%) and 16% to 63% (depending on the city) reported injecting with a used needle/syringe. The proportion of PWID tested for HIV and who received test results in the last year was below 20% in seven cities; the highest proportion were in Lashio (41%), Muse (30%) and Mandalay (28%). HIV prevalence varied between 6% in Kalay to over 40% in Waimaw, Bamaw, and Muse. HCV prevalence was 2 to 3 times higher than HIV and ranged from 16% in Kalay to 81% in Waimaw. A considerable number of PWID reported ever injecting with a used needle/syringe in all sites; between 55% and 63% of PWID in three sites reported ever sharing (Bamaw, Waimaw, and Kalay**)**. Among study participants, 25% of PWID in Yangon had received methadone treatment in the previous three months and 42% in Bamaw city.

2. METHODS

2.1. Objectives

This report presents the results of the 2017-18 Integrated Biological and Behavioural Survey (IBBS), among people who inject drugs (PWID) in selected sites in Myanmar, including a formative assessment and population size estimations. The overall objectives of the survey were to:

1. Estimate the prevalence of HIV, hepatitis C and syphilis and associated risk behaviours among PWID in Myanmar in 2017;
2. Estimate the prevalence of hepatitis B (HBV) among PWID in Myanmar;
3. Estimate the population size of PWID in the study cities in 2017, with extrapolation to State/ regional and national levels in Myanmar;
4. Assess HIV-related knowledge and attitudes among PWID in Myanmar in 2017;
5. Estimate HIV incidence among young PWID in 2017;
6. Measure gaps in the HIV continuum of care and treatment (diagnosis, linkage, antiretroviral treatment and viral load suppression) among PWID living with HIV in Myanmar in 2017;
7. Monitor temporal changes in HIV, HCV and HBV prevalence and key behavioural indicators using the previous (2014) IBBS findings;
8. Enhance local capacity to conduct IBBS and population size estimations among PWID and other key populations at risk for HIV in Myanmar.

2.2. Pre-survey formative assessment

Formative research prior to IBBS implementation is essential to inform RDS planning in each site [6]. A formative assessment was conducted in September 2017 in each site to inform the implementation of the IBBS. A training was conducted for the formative assessment teams by central-level technical team

members. The assessment was conducted to assess the particulars of PWID populations in each setting, to provide information to tailor RDS and PSE methods and logistic approaches to the different PWID population and epidemic context. The assessment lasted approximately 2 weeks and included key informant interviews and review of routine data.

Eligibility criteria for key informant interviews

PWID were eligible for the formative assessment if they:

a) were 15 years and older,
b) were current or former drug injectors,
c) had lived in the study area for at least 6 months.

The formative assessment did not exclude former drug injectors, as they may contribute important insights. Local NGOs' managers and health authorities who were working with or providing services to PWID also participated in key informant interviews to inform survey sampling and logistics.

Review of routine data

In addition, routine monitoring service data from health centres and NGOs were assessed for their potential to be used as service multiplier methods for population size estimation. The adequacy and quality of available service count data were reviewed using standard quality control measures (a checklist) to record whether service records are complete, if people included in the logs met the study eligibility criteria and if there was a way to obtain unique head counts (rather than number of visits/services). For the purpose of extrapolation of the PWID population size estimates to other townships not included in the study, different township-level indicators (e.g. number of overdoses) as proxy indicators for drug injection were also verified for availability and quality during this phase.

2.3. Survey sites and staff

The survey was conducted in a house or apartment that was easy for PWID to find, easy to access and affordable to reach. Potential survey participants were invited to come to this venue, called the "RDS Centre". In addition to being easily accessible, RDS centres also needed to be quiet and private to ensure participants' confidentiality, to limit distractions and avoid possible stigma and discrimination.

Each RDS Centre was composed of at least: a site supervisor, an RDS centre manager, two interviewers, one nurse/lab technician, one coupon manager, one data entry clerk and one receptionist. Before the survey data collection started, a week-long training was held for all RDS team members simultaneously, outlining IBBS survey aims, methods and procedures. A session on HIV testing and counselling was conducted during the IBBS/PSE training workshop by the NAP.

2.4. Study population

To participate in the survey, candidates had to meet all the following criteria:

- Being male or female
- Being 15 years or older
- Self-reported drug injection with verification for non-medical purposes in the past one month
- Having lived for at least 6 months in the respective township/city of study
- Having a valid RDS coupon
- Having consented to participate in the study
- Understanding the Myanmar or any local language used in the questionnaire

2.5. Study sites and sample size

Three new sites were added to the 2017-18 IBBS in line with national priorities outlined in the national surveillance plans and based on advice from the Myanmar Strategic Information/ Monitoring and Evaluation Technical Working Group (SI/M&E TWG) on HIV and AIDS. The sites of Hpakant, Mohnyin and Indaw were selected for their large PWID population (based on programme reports), large young PWID population (Mohnyin), high HIV prevalence (Hpakant, Mohnyin), high risk behaviours and proximity to gold or jade mining areas associated with drug use among seasonal workers.

Using 2014 PWID IBBS data, the sample size was calculated to estimate the proportion "ever injected with previously used needles/syringes" with a margin of error of 5% applied to prevalence in each city. Sample sizes were rounded for each site and increased to 200 any site-specific sample size that was below 200.

Table 1. Study sample size for each study site

Study sites	Final Sample Size
Yangon	450
Mandalay	850
Lashio	600
Muse	450
Kutkhai	400
Myitkyina	450
Waimaw	450
Bamaw	350
Kalay	400
Tamu	250
Hpakant	650
Mohnyin	550
Indaw	350
Total	**6,500**

2.6. Recruitment and sampling

The IBBS used RDS, a method selected for its effectiveness in sampling hidden populations that are hard to reach with other sampling methods. RDS has been effectively used in Myanmar and many other countries to recruit members of groups at high risk for HIV.

RDS is a chain referral sampling method that, if applied correctly, produces data representative of the network of the population from which the samples were drawn [7]. Uptake in the survey started with a small number of purposefully selected members of the study population. After participating in the survey, these initial respondents, called "seeds" were each asked to recruit 3 peers (i.e. other eligible survey participants) to take part in the survey. Successfully recruited peers repeated the process of participating and then recruited others until the desired sample size was reached. Participants were provided a primary travel cost compensation for completing the survey process and additional travel cost compensations for recruiting peers who enrol and complete the survey.

Weekly monitoring of recruitment during data collection helped to identify non-productive seeds. Additional seeds were added as needed. Analysis of resulting recruitment chains found convergence to equilibrium as well as low homophily across study sites. Coupons included information on enrolment as well as the address, opening hours and contact details of the local RDS Centre. Coupons were coded in a way that allowed the

linking of recruiters to their recruits. Each coupon was valid for two weeks, during which recruiters were expected to pass their coupon(s) to a peer who will, in turn, enrol in the survey.

2.7. Study procedures

Potential participants reporting to the survey site were screened for eligibility and asked to provide verbal informed consent. They completed the paper-based, interviewer-administered questionnaire, received HIV pre- and post-test counselling and provided a specimen for rapid HIV testing, rapid HCV testing, rapid HBV testing, and rapid Syphilis testing.
Any participant testing positive for HIV had a follow-up confirmatory test at the site and was referred for treatment. All persons presenting to the survey site were offered condoms and risk reduction materials, regardless of participation.

Survey participants returned to the RDS Centre to receive a secondary compensation after the period of coupon validity (two weeks) or earlier, if they were certain that all peers they have recruited have enrolled and completed the survey (making recruiters eligible for secondary compensation). The number of coupon recipients who did not present within the two-week window were enumerated for each site. Non-response rate was then be calculated to assess PWID interest in participating in the survey and was used as an indicator of survey quality.

2.8. Population Size Estimation Methods

During the week of April 2-6, 2018, a workshop was held in Myanmar to review the preliminary results of the 2017 round of IBBS with People who Inject Drugs (PWID) and to update the size of the PWID population. The primary focus of the size estimation activity was to update the national PWID estimates. These estimates are needed to advocate for programmatic support for people who inject drugs, to provide denominators for national and sub-national indicators, and to estimate prevalence and incidence of HIV among PWID. Participants at the workshop included a wide range of stakeholders including organizations implementing programs with PWID, as well as government staff and staff of national and international partners (NGOs, bilateral and multilateral agencies).

Developing national estimates

Developing national size estimates for key populations involves the following main activities:

1. Collate new and existing size estimation data sources in defined areas (e.g. cities and townships).
2. Where multiple primary sources of size estimation data exist in particular areas, triangulate information to reach consensus estimates for those areas (henceforth referred to as direct local area size estimates).
3. Use the direct local area size estimates to develop extrapolated size estimates for areas with no primary sources of size estimation data. (Note – Common approaches for extrapolation include simple or stratified imputation, or regression analysis).
4. Sum direct and extrapolated estimates across all areas of the country to obtain higher level (regional or national) estimates.

Collating new and existing data

The first step was to collate all available PSE data in all locations where such data exist. The main sources included 1) the 2017 IBBS with PWID, 2) programmatic mapping with PWID in 2016/2017, and 3) program monitoring data (prevention reach) in 2017. Other sources such as the rough size estimates from the RDS formative research and the 2014 consensus estimates for PWID were also considered during the triangulation process.

As part of the IBBS, four multiplier estimates plus an estimate based on RDS Successive Sampling were available from each of the 13 survey sites (11 townships in Kachin, Sagaing and N. Shan, plus Yangon and Mandalay). Of the four multipliers, three used service delivery data (number of PWID tested for HIV in the last three months, # of PWID visiting drop-in centres (DIC) in the last three months, and number of PWID receiving methadone (MMT) in the last three months) at specific program sites. A fourth multiplier was based on distribution of a unique object (UO) which was then asked about in the IBBS survey. The ranges for each of the resulting multiplier estimates and the successive sampling (SS) estimate can be seen in columns A through E in Table 2.

Data triangulation to reach consensus on direct local estimates

As part of the consensus process for developing direct local estimates (or ranges of estimates) for each site, the multiplier estimates were scrutinized in the light of other data sources (the 2016-2017 programmatic mapping of PWID in column F, and the prevention reach data in column G). Because of the intrinsic uncertainty of KP size estimates and the limitations of each data source, the goal of triangulation was to produce suitably wide ranges to be inclusive of the likely number of PWID, while acknowledging that the precise number is likely to be unknowable.

Group work organized by region

At the workshop people were asked to work in groups consisting of individuals familiar with the townships in the respective regions to agree on a plausible range of PWID size estimates for each of the townships and cities where the IBBS was done. All the information in columns A through G was provided to the groups along with the data used in the multiplier calculations. It was suggested that the following questions be considered while assessing the different estimates in columns A-E:

- Were there any clear outliers in the group of estimates in columns A-E? And if so, could a plausible explanation be found by scrutinizing the multiplier data sources?
- Did the numbers differ substantially from the consensus ranges developed in 2014 or from the data in columns F and G? If so, could a plausible explanation be found?

To answer these questions the program data used to develop the multiplier estimates was assessed together with local NAP representatives, implementing partners, and PWID network representatives who supplied the data, and in some cases, estimates were recalculated. Examples of situations that required modification of the multiplier data included the following:

- In some cases, multiplier data included people who were not active injectors, and who would not therefore have been eligible for the IBBS, which recruited only people who had injected in the past one month. For example, the program supplied monitoring data on the number of people on methadone in the past three months. However, many methadone users are not active injectors, so the three-month figures had to be reduced to calculate the size estimates based on the MMT multiplier. For the purposes of the exercise it was assumed that 80% of people on methadone are not current injectors, so the figure was reduced by 80%.
- In some cases, there was a mismatch in the program multiplier data with what was asked in the IBBS questionnaire. For example, the questionnaire asked about HIV testing at the DIC centre in the past three months, whereas the program monitoring data included people who had tested at the DIC plus people who were tested through outreach. So, the figures used for the HIV testing multipliers also had to be reduced based on program records.

Table 2. Summary of Direct Size Estimate Ranges from 2017 IBBS, Programmatic Mapping Prevention Reach and 2017 Consensus Ranges for PWID in 13 IBBS sites

	A	B	C	D	E	F	G	H	I
Sites	**HIVC Test**	**Drop-In Centres**	**MMT**	**Unique Object**	**Successive Sampling**	**Programmatic Mapping**	**Prevention Reach**	**2017 Consensus Range**	**Percent of Males Age 15+ Lower/Upper**
Bamaw	1651 - 2345	920 - 1114	326 - 445	1081 - 1612	354 - 577	693	2133	693 - 2133	1.3%, 4.1%
Hpakant	3115 - 3770	3778 - 4345	2975 - 3623	8272 - 9578	657 - 19038	N/A	11533	3778 - 11533	2.3%, 6.2%
Indaw	331 - 671	241 - 335	283 - 387	512 - 1085	356 - 588	N/A	1368	800 - 1824	2.1%, 4.7%
Kalay	412 - 639	350 - 478	117 - 199	611 - 866	358 - 2191	1933	824	770 - 2191	0.7%, 1.9%
Kutkai	2199 - 2759	2221 - 2676	385 - 703	831 - 1169	N/A	1989	4921	1989 - 3452	3.6%, 5.9%
Lashio	1184 - 1534	1873 - 2194	352 - 531	2110 - 2524	407 - 1432	813	2769	1184 - 5400	1.1%, 4.6%
Mandalay	4807 - 5728	5054 - 5751	3735 - 4485	3480 - 4052	856 - 24808	3954	4060	3954 - 7500	0.6%, 1.1%
Mohnyin	1340 - 2113	684 - 855	390 - 561	1389 - 1745	628 - 785	4360	4644	1389 - 4644	2.0%, 5.9%
Muse	2886 - 3503	2565 - 3112	1055 - 1617	1453 - 1790	442 - 4783	1721	2123	1800 - 3112	2.8%, 4.6%
Myitkyina	12155 - 18121	1975 - 2389	2909 - 3763	3270 - 4137	462 - 4954	2787	2673	1975 - 4137	1.8%, 3.4%
Tamu	332 - 615	290 - 394	420 - 780	344 - 529	254 - 2864	N/A	658	344 - 2130	0.9%, 5.7%
Waimaw	1196 - 1730	677 - 818	1376 - 2139	1630 - 2175	454 - 5851	936	2309	936 - 2175	2.3%, 4.8%
Yangon	1554 - 2071	1458 - 1790	452 - 625	1943 - 2484	452 - 684	1656	1219	1458 - 2484	0.07%, 0.12%

- In some townships it was found that the Unique Object had been distributed to remote locations outside the areas of participation for the survey. In that case the size of the Unique Object multiplier was reduced so that it included only people thought to have been in the catchment area covered by the survey.

As a final step in the triangulation process, the groups were asked to consider whether the population proportions (percent of males age 15+ represented by the consensus range) found in column I seemed plausible.

The final consensus ranges and population proportions can be found in columns H and I of Table 2. It should be noted that some groups found it challenging to reach consensus on a range, preferring instead to use a point estimate which they believed to be accurate based on their experience implementing programs in the townships. To standardize the process, it was agreed to use 75% of the upper value as the point estimate. This was consistent with the way the 2014 consensus estimates were derived. However, the ranges were maintained for extrapolation purposes, to reflect the inherent lack of precision in the data.

Extrapolation Procedures

The process of extrapolation based on direct size estimation data from a subset of locations, requires 1) compiling information about characteristics in both locations with and without direct size estimates, and 2) assuming that locations with similar characteristics have similar numbers or proportions of PWID. For example, it might be found that in the group of townships with direct local estimates, those which produce opium and are on drug trafficking routes are likely to have a higher number of drug users than those that don't. Using this information for extrapolation means assuming that opium producing townships located on drug trafficking routes have similar numbers (or proportions) of PWID. Therefore, if one knows the number (or proportion) of PWID in some townships with those characteristics, that information can be used to estimate the number (or proportion) of PWID in townships which share those characteristics.

> Example: According to direct size estimation data, Township X which has a population of 30,000 males over age 15 has 500 PWID. This means that 1.6% of adult males in that township are PWID. Township X is an opium producing township on a drug trafficking route. Township Y has a population of 14,000 males over age 15. It also has high levels of opium production and is on a drug trafficking route. However, township Y does not have direct size estimation data. Using the information from township X, and the characteristics it shares with township Y, the assumption would be that 1.6% of males in township Y are also PWID. Applying this proportion as an extrapolation factor, this translates into 224 PWID in township Y.

Review of extrapolation procedures for 2014

In 2014 national size estimates were done through a stratified imputation process. Townships were placed into "high", "medium" and "low categories or strata, based on consensus about characteristics of townships. The characteristics included in 2014 included drug production, drug trafficking, border presence, level of law enforcement, migration and mining. The process of categorization was subjective, meaning that there was no scoring system for creating high, medium and low strata. Data from townships within each stratum with direct size estimates from the 2014 IBBS were used to develop an "extrapolation factor" for each stratum. The extrapolation factor was the average prevalence of injecting among adult males across the townships with data. The strata specific extrapolation factor was applied to all townships in each strata by multiplying the adult male population in the township by the corresponding extrapolation factor.

Extrapolation procedures for 2017

Brainstorming characteristics for extrapolation

To improve upon the process used in 2014, a more systematic approach to categorization based on criteria related to the size of PWID was attempted. This involved developing a list of characteristics that would potentially be related to the number (or proportion) of PWID at the township level. Through a brainstorming process, workshop participants proposed criteria which were discussed and honed down to produce the list in Table 3. A scoring system was developed for each criterion, and workshop participants worked in groups (based on their level of familiarity with the different regions), to provide values for variables 1-12 for every township. Variables 13-16 were available from the census and variable 17 was available from the National AIDS Program.

Table 3. List of Characteristics to be used for 2017 Extrapolation

	Variable	Score
1.	Ease of availability of heroin	Zero to five with zero being the least and 5 being the most
2.	Level of law enforcement	1 – weakest enforcement 2 – medium enforcement 3 – strongest enforcement
3.	Level of peace and stability	White –Peaceful Brown – Travel with security Black – Unstable/Restricted
4.	Presence of mines (e.g. jade and other Gems)	Yes/No
5.	Presence of Drug trafficking	Yes/No
6.	In-Migration for economic reasons	Yes/No
7.	In-Migration related to education	Yes/No
8.	Drug production / Poppy cultivation	Yes/No
9.	Price of heroin	Low: < 1000 kyat/shot Med: 1001-4999 kyat/shot High: > 5000 kyat/shot
10.	Use of drugs for cultural or traditional purposes	Yes/No
11.	Township categorization from 2014	Low/Medium/High
12.	Presence of international border	Yes/No
13.	Proportion of young people in the population	From Census
14.	Average years of education among males over age 25	From Census
15.	Proportion of adults employed	From Census
16.	Population size (projected to 2017)	From Census
17.	Prevalence of HIV among ANC women	From MOH

Use of regression modeling

An initial attempt was made to use regression modelling to test the relationship between the proposed criteria and the PWID sizes at the township level. This involved developing a regression equation using the identified characteristics for which data had been gathered as independent variables and the size of the PWID population in townships which had direct size estimates as the outcome variable. In addition to the 13 IBBS sites, ten additional townships with programmatic mapping data that could be used as outcome data were included in the model. This was based on the assumption that because the programmatic mapping figures were close to the IBBS data (in the townships which had both types of data), that they could be

considered as a proxy for PWID size in the other ten townships. Given the small number of townships with outcome data, it was important to include as many townships as possible. Although the IBBS covered 34 townships in Yangon and 7 townships in Mandalay), each city was considered as a single site.

Using linear regression, the subset of predictors that appeared most related to PWID size in both bivariate and multivariable models included:

- Number of males above age 15
- ANC positivity rates
- Ease of availability of heroin
- Price of heroin
- 2014 township categorization
- Presence of mines
- In-migration related to economic factors
- Level of drug law enforcement

Using a few of the best fitting models with multiple predictors, multiple imputation of size estimates to townships with no outcome data was attempted. However, these attempts resulted in many negative values. This likely reflects the imprecision of the data and the lack of sensitivity of the independent variables to distinguish between townships with higher and lower numbers of PWID.

Manual categorization through stratified imputation

Given the unsuccessful attempt at regression, stratified imputation was considered as the next best option for developing national estimates. The following sections described the composite score developed during the workshop as well as an alternative approach to deal with inaccuracies at the local level.

Composite score developed during workshop

Rather than develop categories based on scores assigned through a subjective process, an attempt to develop a weighted composite score was made. A group of variables, which were most predictive of PWID sizes in bivariate analyses, were used to develop a composite score. These variables included in-migration related to economy, price of heroin, presence of trafficking, presence of mining, level of drug related law enforcement and ANC HIV prevalence).

Multiple steps were undertaken to produce the score including:

1. Recoding variable to obtain all positive coefficients
2. Recoding variables to make them ordinal with standardized interval ranges as follows:
   - Variables with several categories (e.g. availability of heroin which went from 0-5) were left as they were
   - Variables with fewer categories (e.g. level of drug related law enforcement) were recoded to range from 0 to 5 with equal intervals (e.g. 1.5, 3.5, 5)
   - Variables with only yes/no values were coded as “0” (for no) and “5” (for yes)
3. Multiplying the values by the bivariate regression coefficients to develop a composite score for each township.

Townships were then categorized into strata based on the value of the composite score:

- Composite scores ranged from 1-10, but those in the bottom half (1-4) were collapsed into one group and the remaining were organized into five additional groups.

- Population proportions for each strata
  1. 0.092% (score 0-5)
  2. 0.266% (score 6)
  3. 0.754% (score 7)
  4. 1.31% (score 8)
  5. 3.56% (score 9)
  6. 5.21% (score 10)

Using these scores, national estimates were developed by applying the strata specific population proportions to the number of males over age 15 in each township. Extrapolated values for the 13 IBBS sites were replaced with consensus scores. These values were then summed to produce the following estimates:

	Point Estimate	Lower Bound	Upper Bound
Absolute number	**92,798**	**49,455**	**123,731**

While this approach produced a reasonable national range and population proportion, there were concerns that the estimates were not accurate at the local level, as there were townships with very low estimates while others had very high estimates.

Updated composite score and PSE

Following the workshop, the PSE calculations for each township level were reviewed for accuracy. Additional modifications were undertaken to refine the weighted composite score and subsequent PSE, including:

1. ANC positivity rates and in-migration were dropped from the list of predictors, as both are thought to be predictors of sexual transmission not presence of PWID
2. The final composite score was developed based on 5 variables: ease of availability of heroin, in-migration related to economy, price of heroin, presence of drug trafficking, and level of drug related law enforcement
3. The process for using correlational coefficient estimates to develop a composite score that was done during the workshop was repeated with the subset of predictors. However, the total composite score was recalculated:
   a. The final standardized weighted score for each predictor was calculated based on the correlational coefficient of each predictor, with the weighted score for each predictor summing to 10
      i. Ease of availability of heroin: 4.81131
      ii. Level of drug related law enforcement: 2.799734
      iii. Presence of drug trafficking: 1.508565
      iv. In-migration related to the economy: 0.564962
      v. Price of heroin: 0.285609
   b. Recoding variables to make them ordinal with standardized interval ranges as follows:
      i. Ease of availability of heroin: 0, 1, 2, 3, 4, 10
      ii. Level of drug related law enforcement: 2, 4, 6
      iii. Presence of drug trafficking: 0, 4

iv. In-migration related to the economy: 0, 3
v. Price of heroin: 0, 1, 3, 6

c. Each individual variable score was multiplied by the final standardized weight and the total weighted score for each variable was combined to create a composite score

Townships were then categorized into strata based on the value of the composite score:

- Based on the updated weights and methods for creating a composite score, composite scores ranged from 0 – 75, though actual scores ranged from 6 – 69.
- Population proportions for each score were determined based on the scores for specific sites with understood population proportions (either from the IBBS site consensus estimates or PSE data from the programmatic mapping exercise)

Using these scores, national estimates were developed by applying the strata specific population proportions to the number of males over age 15 in 2017 each township. Extrapolated values for the 13 IBBS sites were replaced with consensus scores. These values were then summed to produce the following estimates:

	Point Estimate	Lower Bound	Upper Bound
Absolute number	**93,215**	**49,677**	**124,287**

2.9. Data management

RDS data was entered on an ongoing basis during the survey at each RDS Centre. A data entry screen developed in CSPro 6.3 and mirroring the questionnaire was used. The data entry screen had controls to prevent erroneous data entries and omission in skip patterns. The data entry screen was designed to reduce the burden of data cleaning. Site managers and site Supervisors conducted regular checks and supervised data entry in each site. Data entry clerks sent RDS data files to central NAP daily for verification and monitoring of the coupon management and to examine whether RDS sampling is proceeding according to plan. All databases and forms were linked by the unique Participant ID.

2.10. Data analysis

Data in each database were verified and cleaned and then imported into RDS Analyst (Version 7.1, www.respondentdrivensampling.org) to create Gile's SS weights with estimated PWID population size in each study site and RDS-II weights for data analysis. Both weights are similarly based on the probabilities of inclusion in the sample that are based on reported social network sizes of participants, and were used for population prevalence estimation, while the former needs estimated population size and the later treats the sampling process as a random walk through the network of the targeted population (RDS user's manual, 2017). In this study the final estimation of PWID population sizes in each study site used for Gile's SS weight calculation were achieved using multiple reliable methods. The 13 data sets including weight variables were saved and imported into SAS respectively and then merged together for data analysis. Proc surveyfreq procedure was used to calculate all population proportions and confidence intervals with Gile's SS weight adjustment and network cluster effects (Sensitivity analysis with RDS-II weights adjustment indicates the differences are minimal). All results presented in this report are population proportion (instead of sample proportion) unless indicated otherwise.

2.11. Ethical considerations

Ethical considerations were duly taken to protect study participants since they constitute a socially marginalized and highly stigmatized population. This study protocol was approved by the Myanmar MOHS-IRB, the CDC Associate Director of Science, the University of California, San Francisco Institutional Review Board, and the Columbia University Medical Center Institutional Review Board.

Every effort was made to protect participant privacy and confidentiality. To safeguard confidentiality, each participant was assigned a unique study ID, which was the only identifier on data collection forms and specimens. All study files, when not in use during interview or as previously described, were kept in the locked file cabinet in the study site office. Following data collection completion, the files were transferred and stored in a locked file cabinet at the NAP office. All computer files were only be identifiable by participants' code number. Participants' names were never be used and test results were not shared with authorities.

3. SURVEY FINDINGS

3.1. Network Characteristics

Overall, three to 11 seeds were used to recruit the full sample, with a median of seven seeds per survey site. All seeds were male, with a total of 88 seeds used in analysis. In 9/13 sites, recruitment from a single seed resulted in half or more of the total sample. Two-thirds (66%) were associated with an NGO and 38% were on methadone treatment.

Table 4. Recruitment pattern and number of waves

RDS Center	# of seeds	# of seeds' networks =<5 participants	Maximum # of waves	Notes
Bamaw	4	0	25	1 seed's network has more than 75% of all participants in site
Hpakant	9	5	25	1 seed's network has more than 50% of all participants in site
Indaw	4	0	26	
Kalay	7	6	21	1 seed's network has more than 50% of all participants in site
Kutkai	7	0	14	
Lashio	8	2	28	1 seed's network has more than 50% of all participants in site
Mandalay	7	0	15	1 seed's network has more than 50% of all participants in site
Mohnyin	4	2	23	1 seed's network has more than 60% of all participants in site
Muse	6	2	19	1 seed's network has more than 75% of all participants in site
Myitkyina	6	2	18	
Tamu	3	0	14	1 seed's network has 2/3 of all participants in site
Waimaw	7	0	18	1 seed's network has 60% of all participants in site
Yangon	7	4	18	Recruitment extended to January 2018 due to geographic size/ transportation challenges to reach required sample size
Total	79	23	28	

Table 5. Recruitment pattern and number of waves

Sites	Total coupon distributed	# Total return	# Non-eligible and refuse to participate	# of participants	Male	Female	Sample size	% fulfilled sample size
Bamaw	1039	363	9	354	353	1	350	101%
Hpakant	1792	689	32	657	645	12	650	101%
Indaw	1043	359	3	356	354	2	350	102%
Kalay	635	232	23	209	207	2	400	52%
Kutkai	1150	412	5	407	405	2	400	102%
Lashio	1793	607	3	604	598	5	600	101%
Mandalay	2442	883	27	856	839	17	850	101%
Mohnyin	1612	564	10	554	554	0	550	101%
Muse	1297	447	5	442	432	9	450	98%
Myitkyina	1354	476	14	462	456	5	450	103%
Tamu	732	258	4	254	243	11	250	102%
Waimaw	1349	455	1	454	451	3	450	101%
Yangon	1317	452	0	452	434	18	450	100%
Total	**17555**	**6197**	**136**	**6061**	**5971**	**87**	**6200**	**98%**

3.2. Socio-demographics

Gender

Overall, more than 98% of PWID were male; 100% of PWID in Mohnyin were male, while 4 other sites (Bamaw, Indaw, Kalay, and Lashio) reported greater than 99% of PWID male.

Age

The overall median age was 30 years old (range: 16-74). The median age of PWID by site ranged from 25 to 33 years of age. Mohnyin, Mandalay, and Waimaw had a significantly higher proportion of PWID under the age of 25. Compared with the 2014 IBBS, a notable reduction in the proportion of PWID under the age of 25 was observed in Lashio and Myitkyina, while a significant increase was observed in Yangon.

Figure 1. Median age of PWID

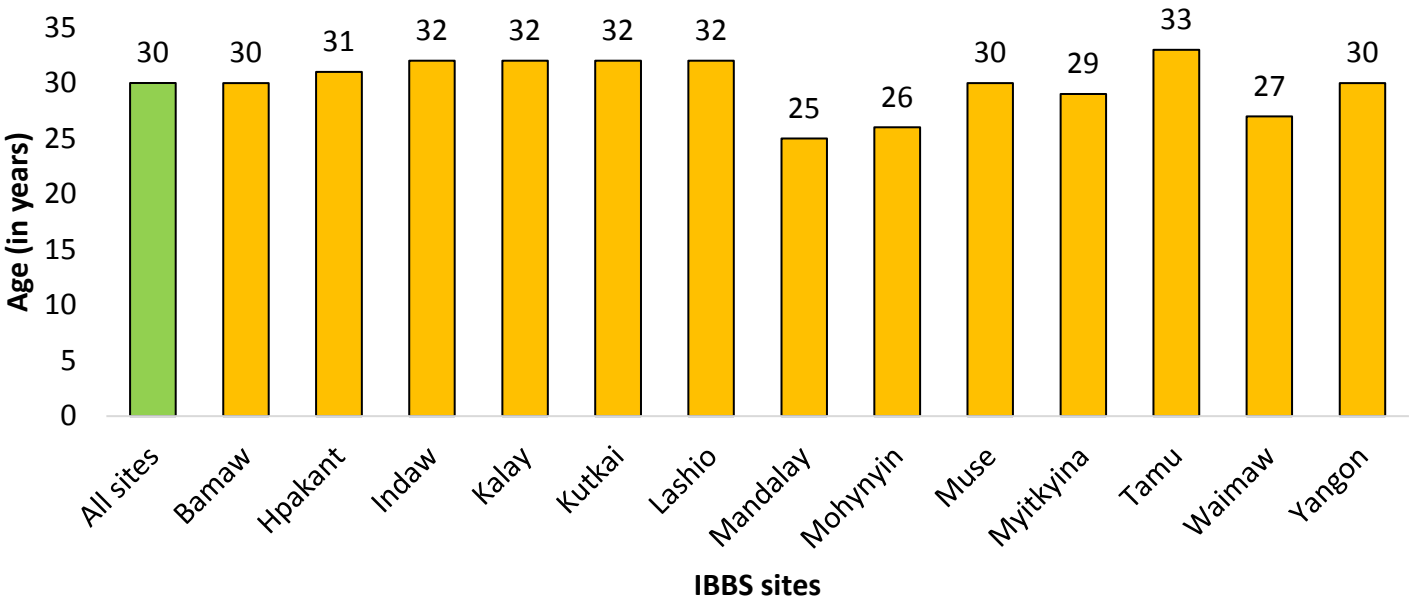


Figure 2. Age Distribution of PWID

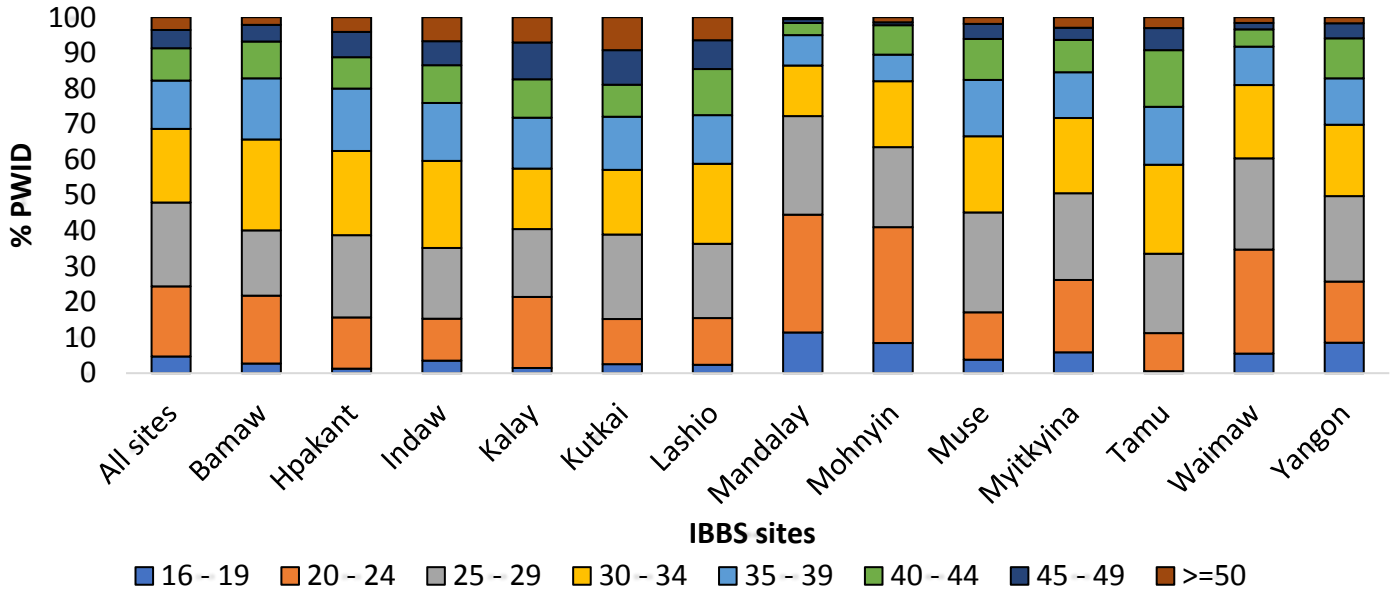
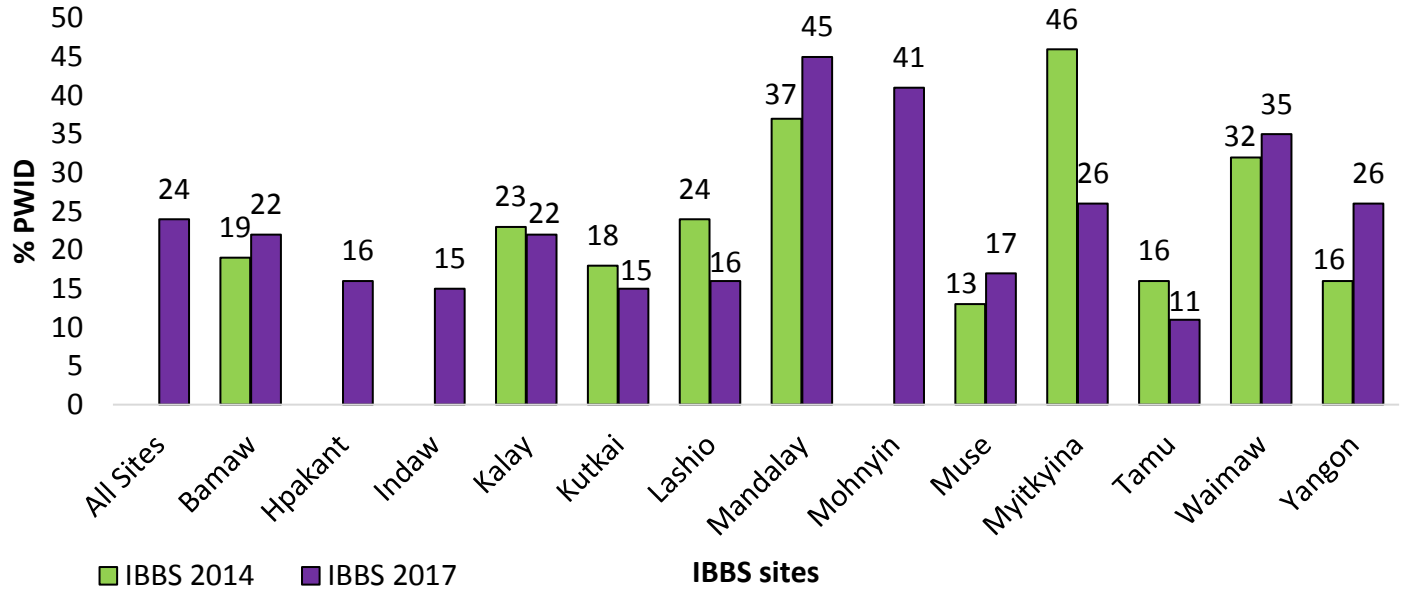


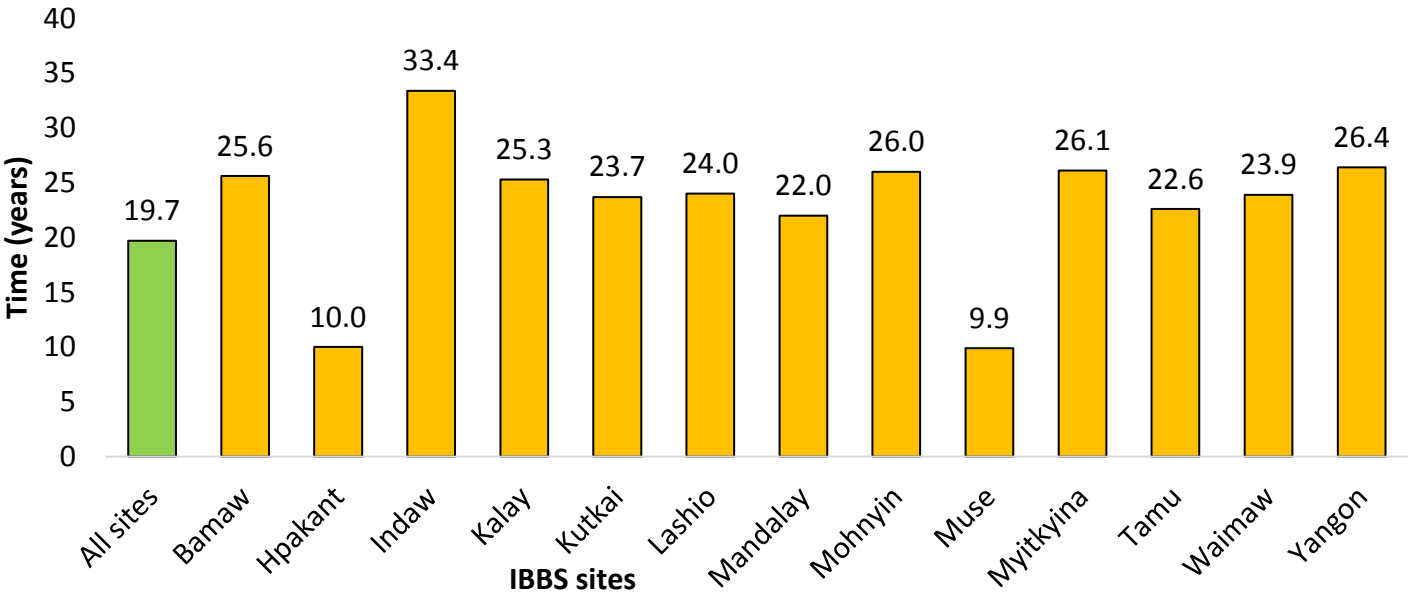
Figure 3. Percent of male PWID < 25 years old, 2014 and 2017



Residency in township

The overall median length of township residency was 22 years and the mean length of residency was 19.7 years, with a range from 6 months to 74 years; all sites had a mean length of residence greater than 20 years, except Hpakant and Muse, where median length of residence was 10.0 and 9.9 years, respectively.

Figure 4. Mean length of time (years) PWID have lived in the township



Marital status and household composition

Overall, a majority of PWID (52.1%) have never been married, but a substantial range in marital status was observed across survey sites; the proportion of PWID who were currently married ranged from 20.5% in Muse to 63.4% in Kalay. Marital status was associated with age; as expected, a greater proportion of PWID 25 years and older were married, compared with PWID less than 25 years of age.

Figure 5. Marital status distribution of PWID

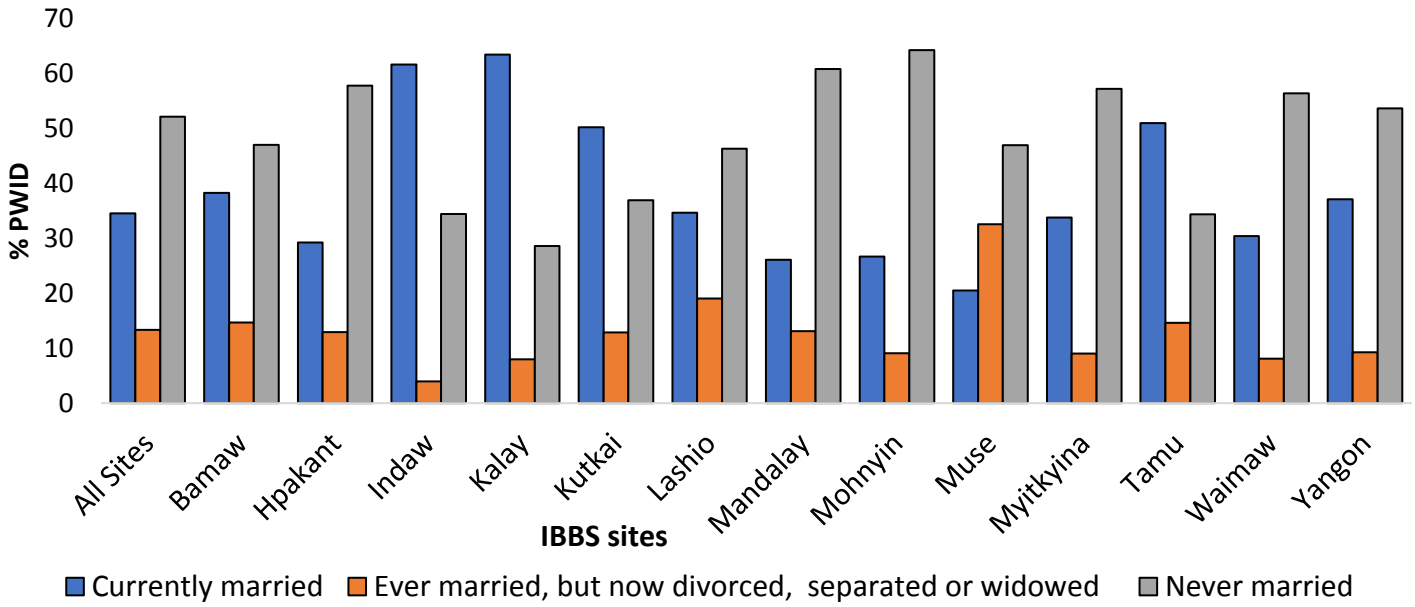
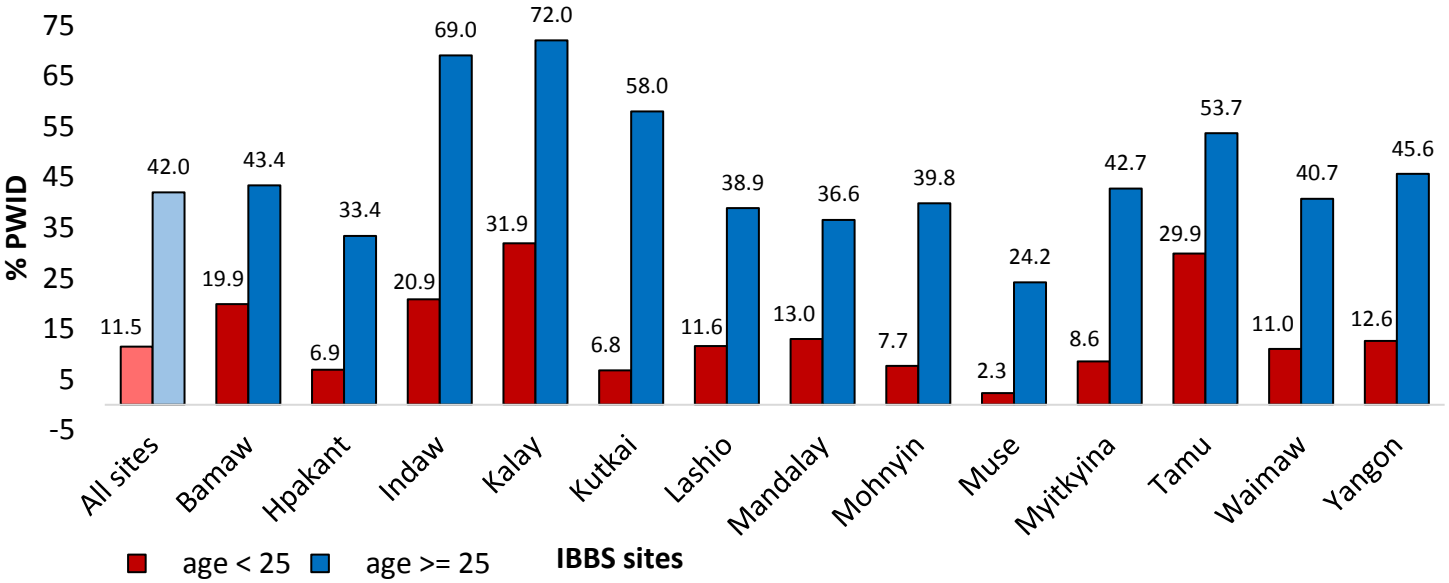


Figure 6. Percent of PWID currently married, by age group*



**Denominator: those <25 and >=25, respectively*

Table 6. Household composition among PWID

	% of PWID who lives with:				
	Spouse/ partner	Other sex partner	Family	Friends	Alone
All sites	29.7	0.4	55.9	13.2	9.4
Bamaw	34.6	1.0	68.1	1.8	5.4
Hpakant	20.9		27.0	34.3	18.7
Indaw	59.4	0.6	63.3	0.9	1.2
Kalay	58.5	0.4	43.2	5.7	1.4
Kutkai	46.4	0.0	62.9	4.6	7.2
Lashio	33.2	0.2	67.5	0.8	5.9
Mandalay	26.5	0.9	76.5	4.3	7.7
Mohnyin	13.5	0.1	87.1	2.1	5.3
Muse	16.2		23.2	39.0	26.2
Myitkyina	29.5	1.4	58.1	12.0	3.9
Tamu	43.5	0.7	40.4	15.6	4.2
Waimaw	28.8	0.1	71.8	2.1	1.8
Yangon	35.5	0.3	65.8	3.7	5.0

In all survey sites, most PWID lived with a spouse (30%) or family (56%). In Muse and Mohnyin, however, less than 20% of PWID lived with a spouse. In Muse—a town on the border with China characterized by a large volume of migration—most PWID lived with friends or alone (55%). Overall, less than 1% of PWID reported living with a sex partner who was not their spouse.

Table 7. Household composition among PWID <25 years old

	% of PWID who live with:				
	Spouse/ partner	Other sex partner	Family	Friends	Alone
All sites	10.5	0.5	78.9	11.0	4.9
Bamaw	19.2		88.4	2.4	0.3
Hpakant	4.0		54.1	30.2	12.1
Indaw	18.1		92.3		
Kalay	26.9		71.3	5.9	1.9
Kutkai	5.5		85.3	9.1	9.2
Lashio	14.2		86.9	1.5	0.8
Mandalay	14.8	1.3	84.2	4.7	6.4
Mohnyin	2.7		96.7	1.4	1.4
Muse	8.7		41.3	51.8	5.8
Myitkyina	6.1		75.5	18.5	3.4
Tamu	19.5	6.3	59.1	19.3	3.6
Waimaw	11.2		86.8	3.8	
Yangon	12.6		80.9	5.0	4.9

Among PWID less than 25 years of age, fewer PWID in all survey sites lived with a spouse (11%), compared with PWID 25 years and older. A majority of PWID less than 25 years across survey sites lived with family,

except for Muse. In Muse, most PWID (52%) lived with friends. Less than 0.5% of PWID less than 25 years of age across survey sites reported living with a sex partner who was not their spouse.

Socio-economic status

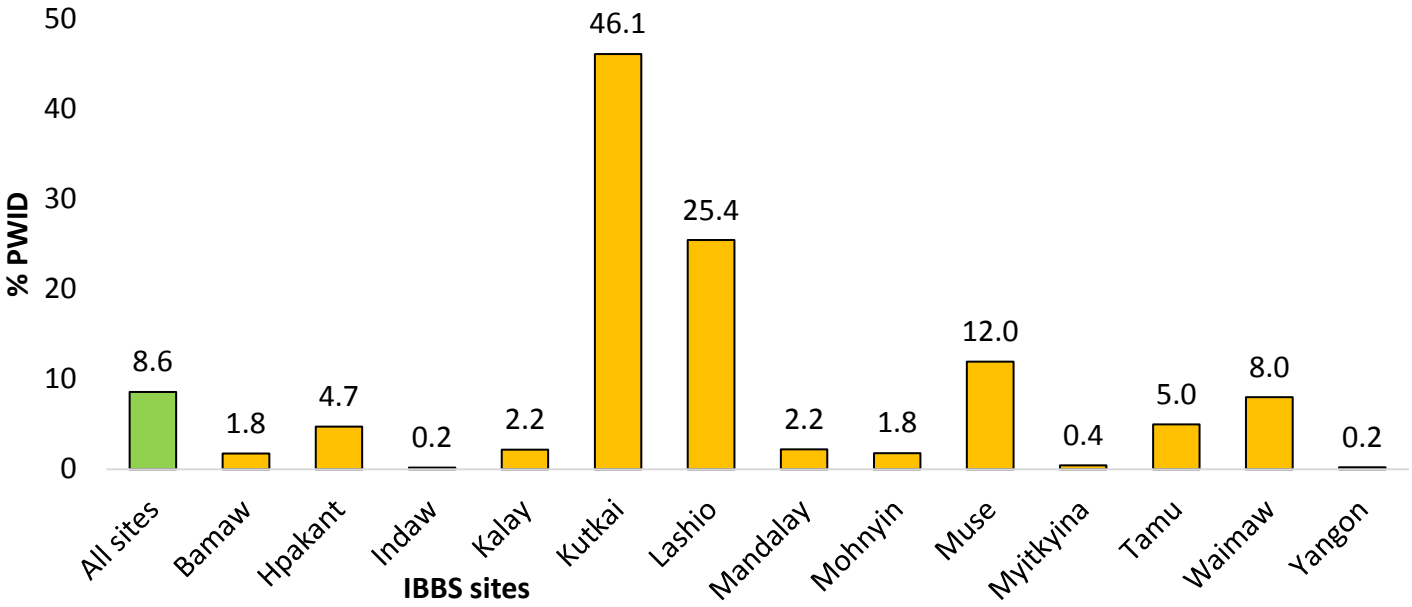
PWID reported their monthly level of income in kyats. Mean and median values varied significantly by site. The highest mean and median monthly income were reported in Yangon, with 276,231 and 250,000 respectively. Median income was significantly lower than mean income across survey sites, indicating a skewed distribution of income. The site with the lowest income among PWID was Kutkai. In Kutkai, 65% of PWID reported monthly income less than 150,000 kyats.

Table 8. Monthly income (kyats) distribution

	Mean (kyats)	Median (kyats)	%<150,000 (kyats)	*95% CI*
All sites	196029	150000	35.3	(33.4-37.2)
Bamaw	178757	150000	34.6	(27.1-42.1)
Hpakant	170272	150000	48.5	(43.3-53.8)
Indaw	216996	150000	18.5	(12.9-24.0)
Kalay	215823	150000	31.3	(23.2-39.4)
Kutkai	133031	100000	65.0	(58.3-71.7)
Lashio	187851	150000	31.6	(26.2-36.9)
Mandalay	211095	200000	22.9	(19.0-26.9)
Mohnyin	188120	150000	34.2	(29.1-39.3)
Muse	208329	200000	18.7	(13.0-24.4)
Myitkyina	270654	200000	33.9	(27.6-40.2)
Tamu	192634	150000	34.9	(26.9-43.0)
Waimaw	143809	130000	50.5	(44.2-56.9)
Yangon	276231	250000	5.2	(3.2-7.2)

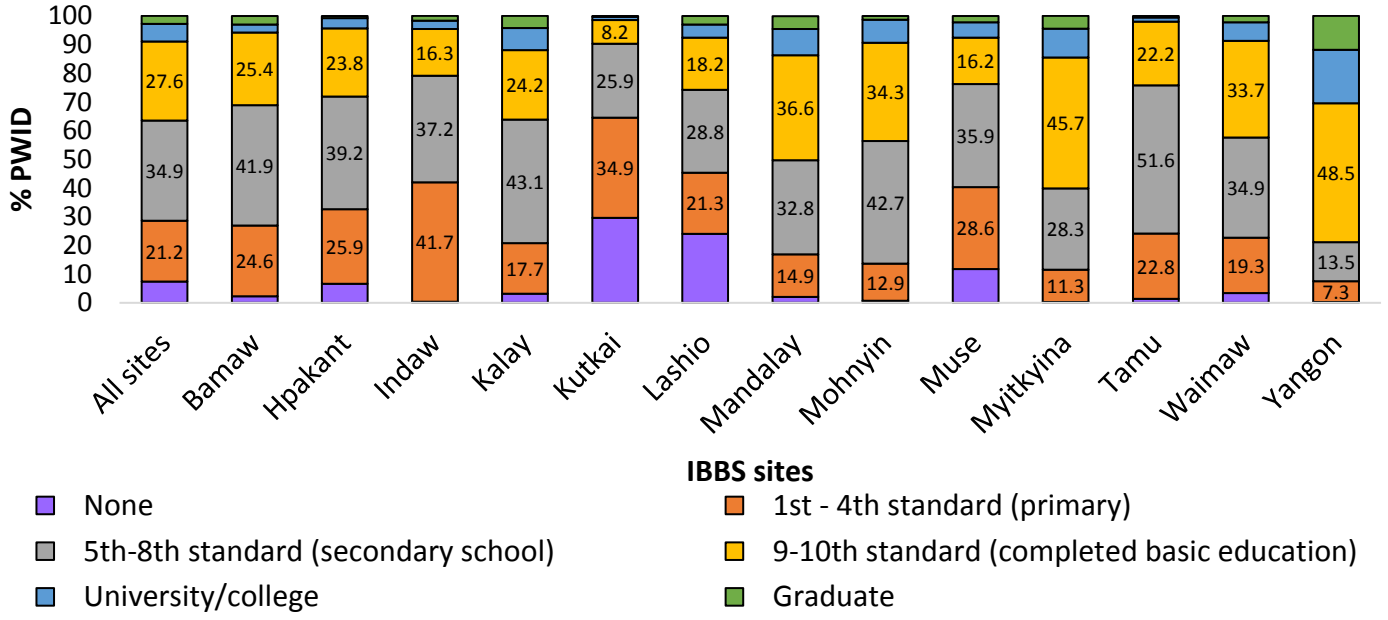
PWID were also asked their literacy level in Myanmar or other local languages. Overall, less than 10% of PWID could not read or write, but substantial variation was observed across survey sites. Only 0.2% of PWID in Yangon could not read or write, while nearly half of PWID (46%) could not read or write in Kutkai. These literacy patterns align with formal education patterns observed across survey sites.

Figure 7. Percent of PWID who do not read or write



With respect to formal education, a majority of PWID (>50%) had completed secondary school or higher at all sites, except Kutkai, where the highest proportion of PWID only completed primary school or less. Conversely, Yangon reported the highest proportion of PWID who completed secondary school or higher (93%).

Figure 8. Highest grade in school

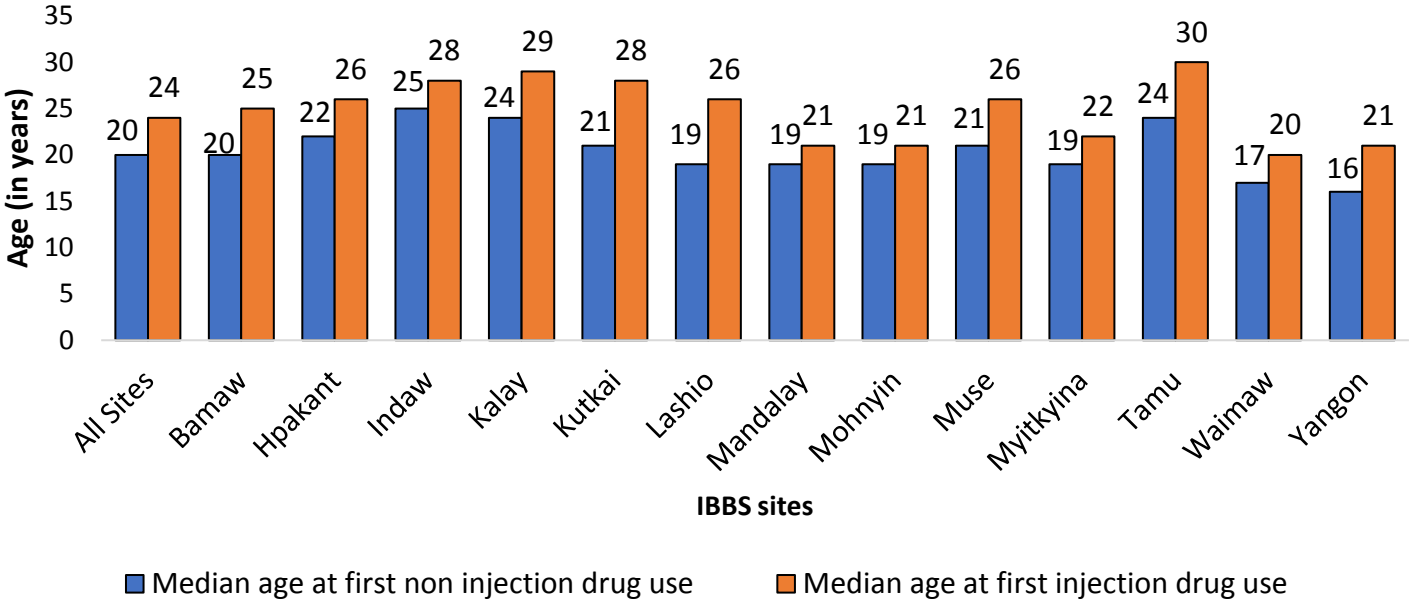


3.3. Drug Use Practices

Initiation of drug use

The median age of non-injection drug use initiation ranged from 16 years in Yangon to 25 years in Indaw. The median age of initiating injection drug use was several years older than initiating non-injection drug use: from 20 years in Waimaw to 30 years in Tamu. Waimaw and Yangon reported the lowest median age for initiation of both non-injection and injection drug use.

Figure 9. Median age at first drug use, injection and non-injection



Duration of drug use

To estimate the duration of drug use, the age when first injecting drugs or using drugs by ingestion, inhalation, or smoking was subtracted from the PWID's current age. Across sites, PWID reported an average duration of 4 years of non-injection drug use before first injection drug use, ranging from 1.8 years in Mandalay to over 7 years in Kutkai. In Mandalay, Mohnyin, and Myitkyina, progression to injecting drugs occurred after less than 3 years of non-injection drug use. In Yangon, Lashio, and Kutkai PWID reported an average duration of illicit drug use (non-injection + injection) of over ten years.

The mean/median years of injection drug use was much higher in Yangon than the other survey sites. Overall, approximately one-quarter of PWID had been injecting drugs for one year or less. More than half of PWID in Tamu had been injecting drugs for a year or less.

Figure 10. Years of non-injection drug use before injecting

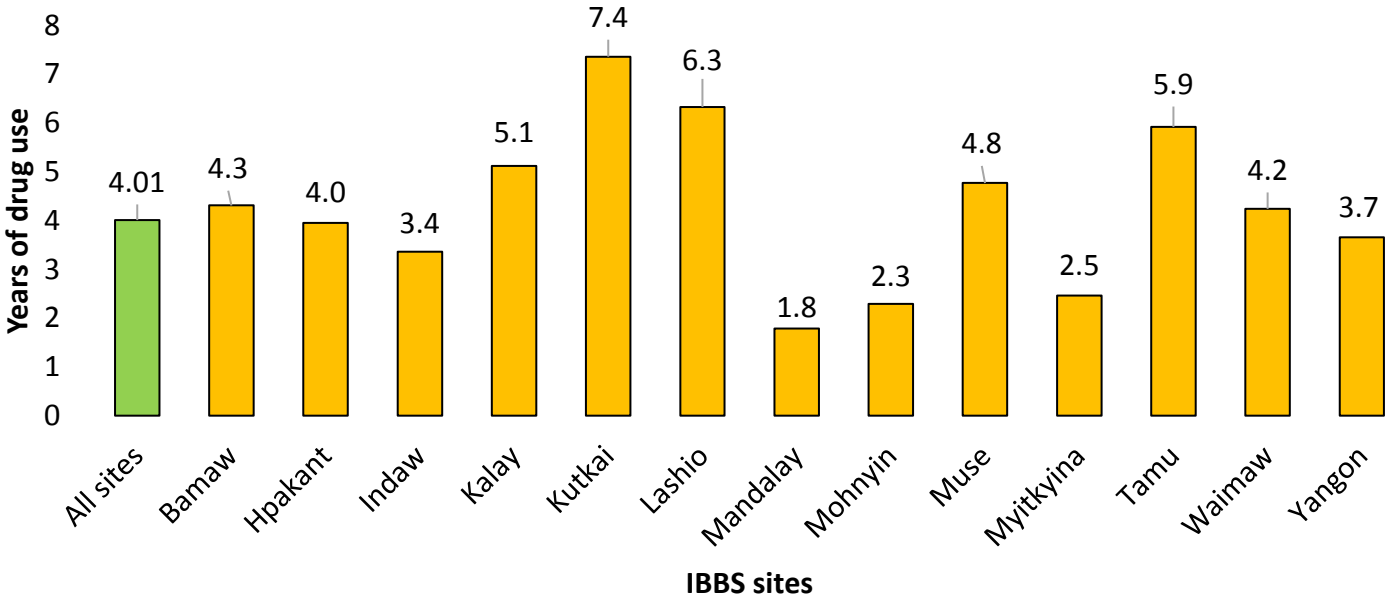


Table 9. Duration of injecting drugs among PWID

	Mean (years)	Median (years)	% injecting <= 1 year	*95% CI*
All sites	4.8	3	26.0	(24.3, 27.7)
Bamaw	5.1	4	20.9	(14.9-27.0)
Hpakant	5.2	4	22.3	(17.7-27.0)
Indaw	4.0	2	34.6	(28.2, 41.1)
Kalay	3.1	2	41.6	(33.3, 49.8)
Kutkai	3.6	2	38.5	(32.0-45.0)
Lashio	5.9	4	19.6	(15.3, 24.0)
Mandalay	4.0	3	25.4	(21.3, 29.4)
Mohnyin	4.3	3	27.6	(23.0, 32.2)
Muse	3.7	2	37.3	(31.2, 43.5)
Myitkyina	6.6	5	15.6	(10.7, 20.5)
Tamu	2.3	1	54.8	(46.8, 62.8)
Waimaw	5.4	4	10.8	(7.2, 14.4)
Yangon	8.0	5	14.5	(9.5, 19.5)

**31 participants were excluded because of missing data on age of first injection.*

Types of illicit drugs used

Overall, more than 99% of PWID reported heroin as their primary drug of injection in the last 12 months. When asked what drugs were used through non-injecting modes in the last 12 months, most PWID reported heroin, amphetamines, and opium use. More than two-thirds of PWID reported using heroin (65.5%), more than half reported using amphetamines (51.1%), and approximately one-third reported using opium (35.6%). Heroin use through non-injection modes in the last 12 months varied across survey sites. The highest levels of use were reported in Mandalay and Mohnyin. In these sites, more than 90% of PWID reported heroin use

through non-injection modes in the last 12 months. The lowest levels of heroin use through non-injection modes were observed in Bamaw and Yangon, with only approximately one-quarter of PWID reporting use in the last 12 months. Bamaw and Yangon reported the highest amphetamine use in the last 12 months across survey sites (72%). Reported opium use varied significantly across survey sites, ranging from 15% in Mandalay to 86% in Waimaw.

The use of combination drugs for non-injection use, e.g. 'formula,' or 'swe,' was low across survey sites, ranging from no reported use (0%) in Kalay, Kutkai, and Tamu to 7% in Mandalay.

Frequency of use of alcohol in the last month was relatively moderate across survey sites. Approximately half reported no alcohol consumption in the last month. The highest proportion of daily alcohol use was observed in Kalay, where approximately one-third reported daily alcohol use. While Kalay also reported the highest proportion of daily alcohol use in the last month in the 2014 IBBS, the proportion of PWID reporting daily alcohol use significantly decreased from 64% in 2014 to 31% in 2017.

Injection frequency

Risk of HIV infection is also strongly related to frequency of injection. In the month prior to the survey, more than 80% injected 2-3 times a day or more. Compared with other survey sites, PWID in Kalay reported much less frequent injecting behavior. More than 65% reported injecting less than daily. While the proportion of PWID injecting more than once per day was not significantly different from 2014 IBBS results across most survey sites, Kalay and Yangon observed a significant decline.

Figure 11. Injection frequency in the last month among PWID

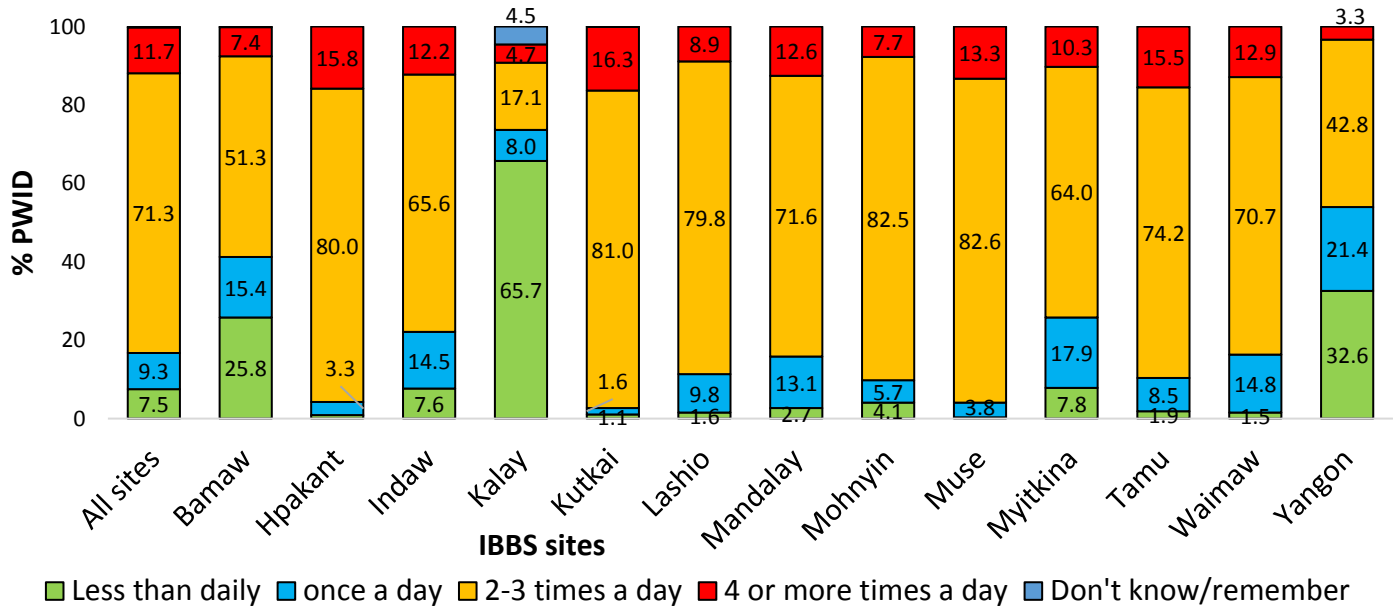
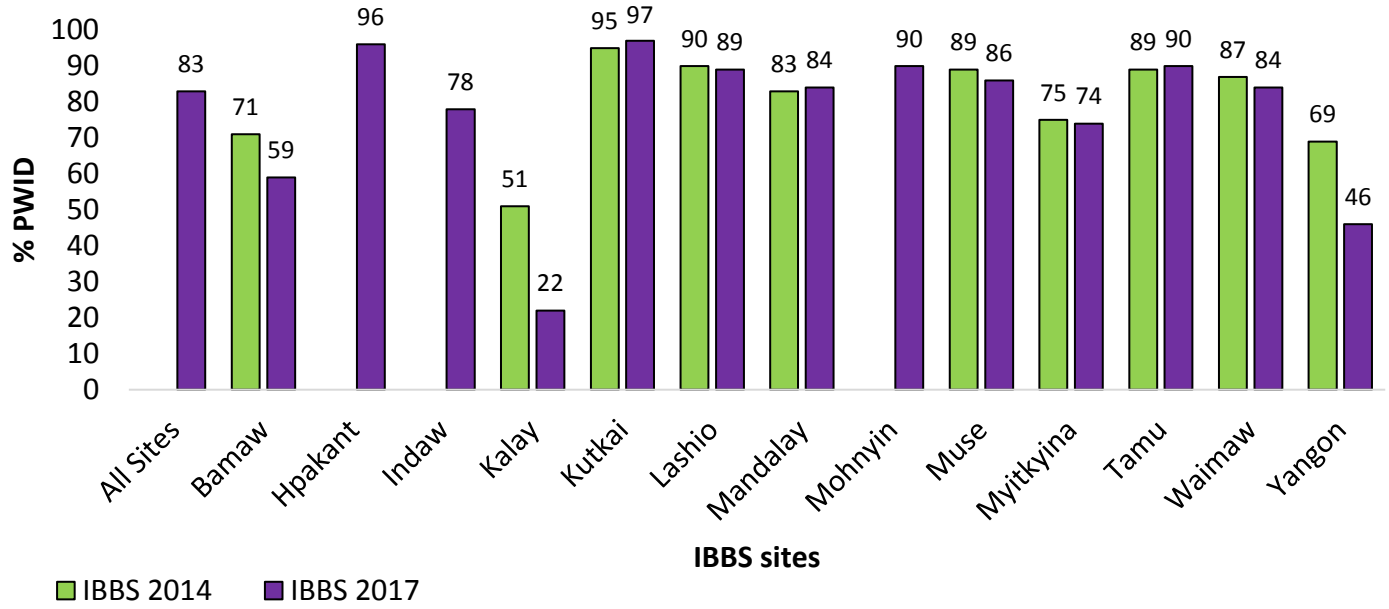


Figure 12. Percentage of PWID injecting more than once per day, 2014 and 2017



Injecting venues

Injecting drugs in public places was most commonly reported in Bamaw (51%), Myitkyina (48%), Waimaw (67%) and Yangon (48%), with considerable increases observed from the 2014 IBBS in Bamaw, Waimaw, and Yangon (from 5%, 4%, and 23%, respectively).

Figure 13. Percentage of PWID who inject in public places

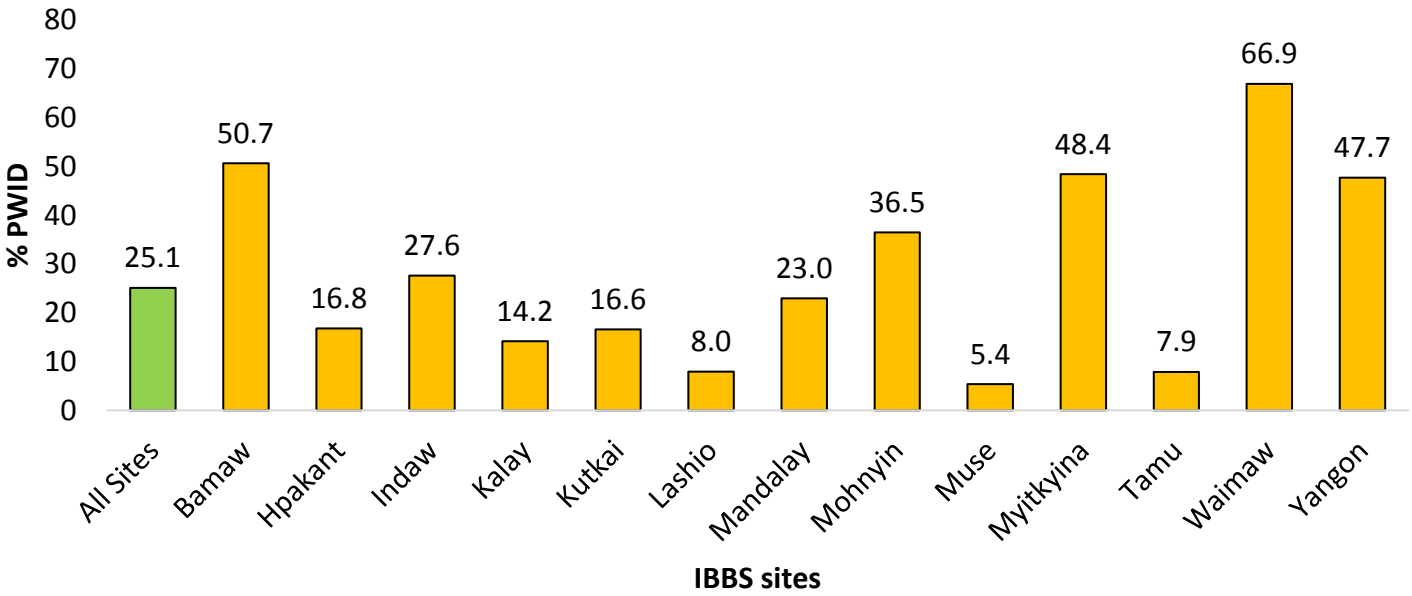
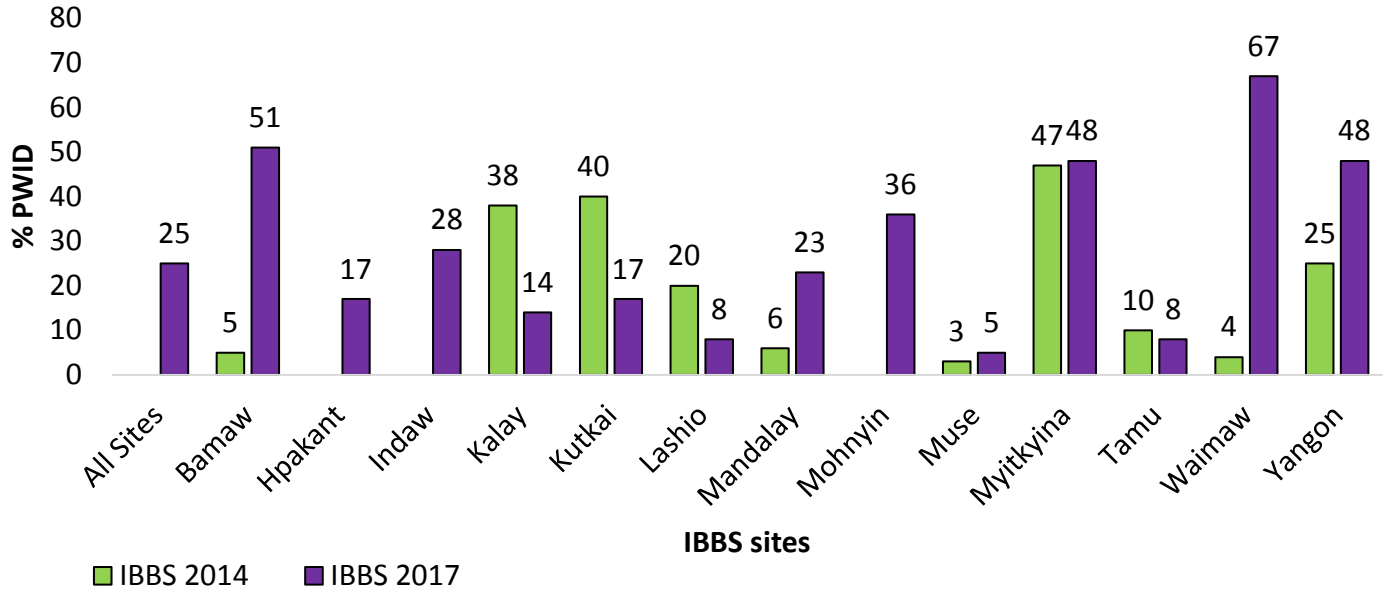


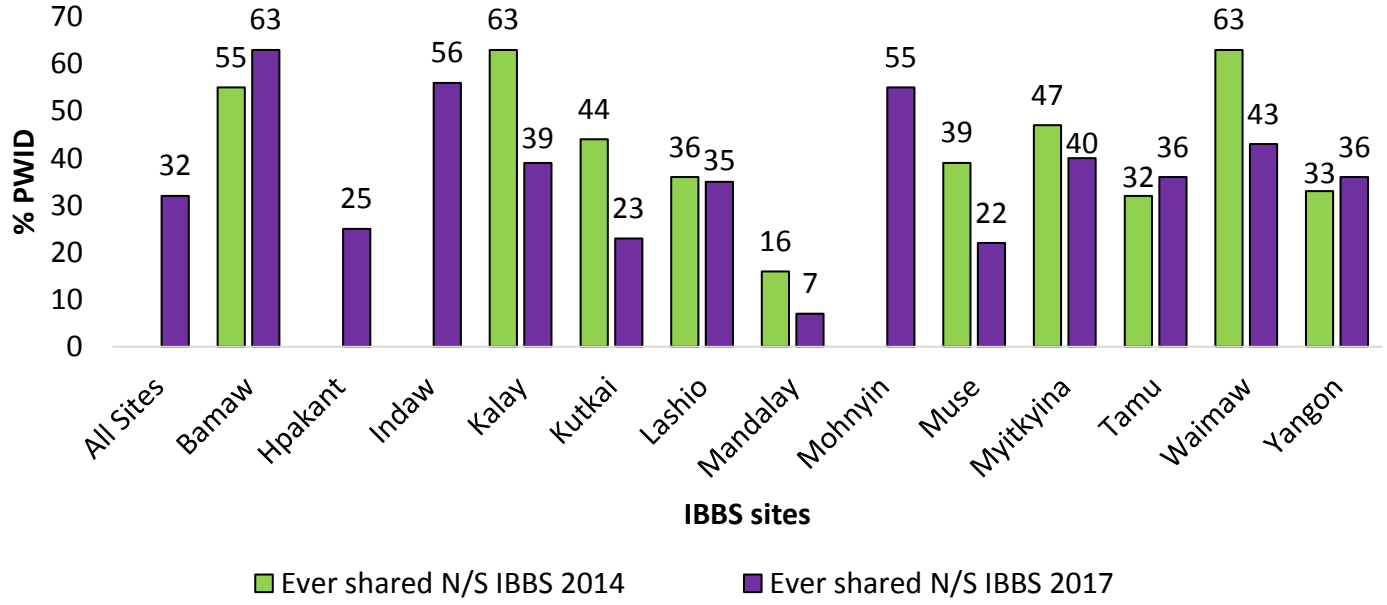
Figure 14. Percentage of PWID who inject in public places, 2014 and 2017



Sharing behaviours

Less than one-third of PWID reported ever having used a previously used needle/syringe. Shared needle use varied greatly between survey sites, ranging from 7% in Mandalay to 63% in Bamaw. The proportion of PWID who reported ever having used a previously used needle/syringe decreased from the 2014 IBBS in most survey sites, excluding Bamaw, Tamu, and Yangon. Bamaw observed the largest increase, from 55% reporting ever having used a previously used needle/syringe in 2014 to 63% in 2017.

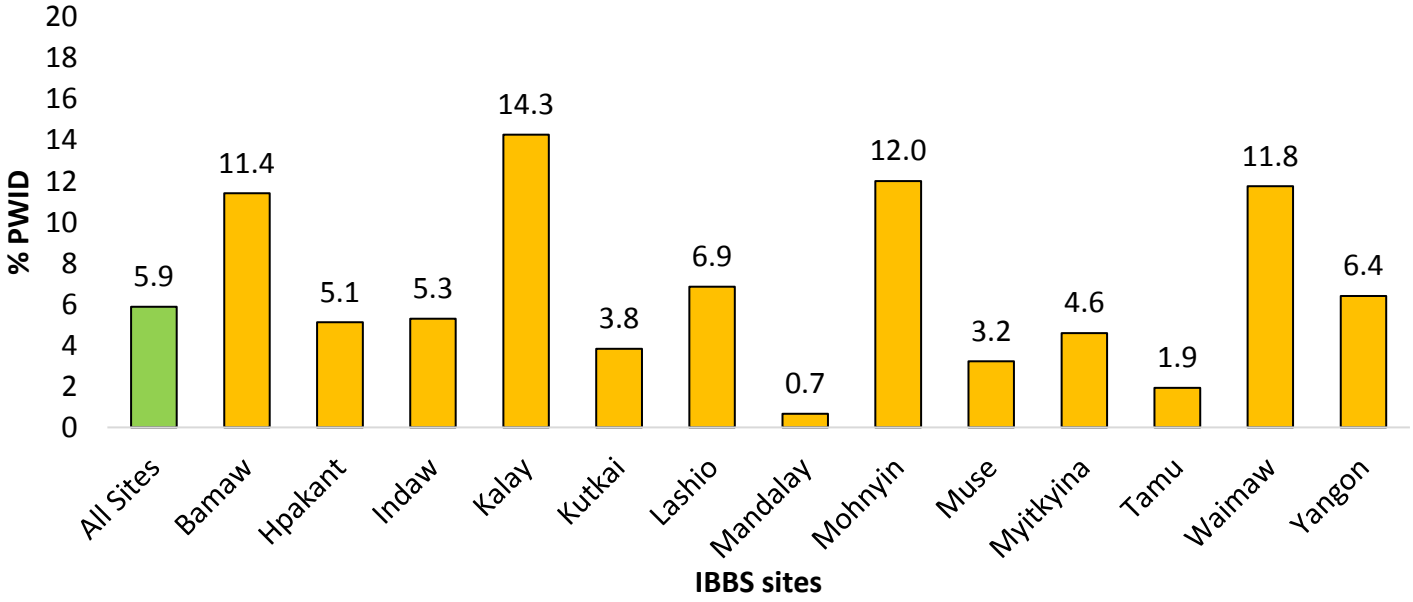
Figure 15. Percentage of PWID who have ever used a needle or syringe previously used by someone else



The survey questionnaire asked PWID to describe recent sharing behaviours in greater specificity. The proportion who reported using a previously used needle/syringe at last injection was significantly less than ever use. Only 5.9% of PWID overall reported shared needle use at last injection, ranging from 0.7% in

Mandalay to 14.3% in Kalay. Frequency of using a previously used needle/syringe at last injection who had ever reused injecting equipment was also low across most survey sites. Overall, among those reporting they had ever used a previously used needle, more than half (63%) reported they did not use a previously used needle/syringe in the last month. Indaw, Kalay, and Mohnyin reported the highest frequency of any previously-used needle use (including occasionally, about half of the time, most times, and always/every time) in the last month across survey sites (64%, 57%, and 72%, respectively).

Figure 16. Percentage of PWID who used a needle or syringe previously used by someone else at last injection in the last month



Reported use of sterile injecting equipment at last injection increased across most survey sites, compared with the 2014 IBBS, except for Yangon. Yangon reported the lowest use of sterile injecting equipment at last injection, with a significant decrease observed from 90% in 2014 to 63%. Sterile injecting equipment distributed to all survey sites in 2017 was also the lowest in Yangon. Most sterile equipment was distributed to Hpakant. Ever using a previously used needle/syringe was not significantly associated with age (>=25 years) or income (<150,000 kyats).

Figure 17. **Percentage of PWID reported using sterile injecting equipment at last injection**

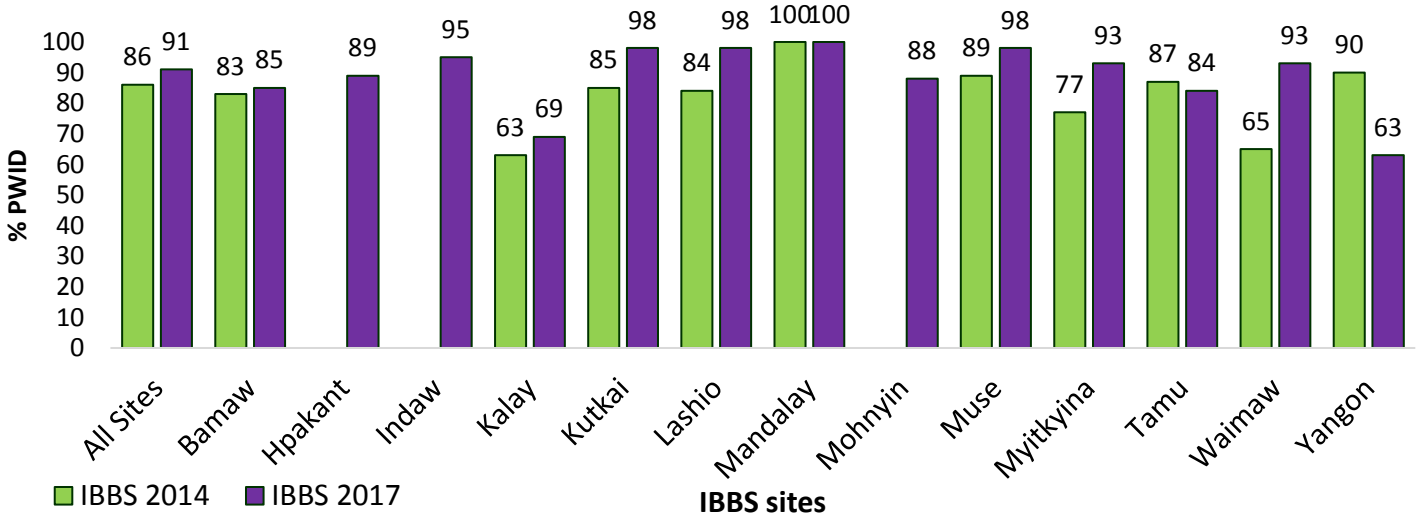


Table 10. Sterile injecting equipment distributed to PWID in 2017

Site	Number distributed
Bamaw	517,505
Hpakant	8,129,312
Kalay	158,674
Kutkai	163,734
Lashio	1,774,876
Mandalay	3,948,548
Mohnyin	2,807,279
Muse	889,088
Myitkyina	1,655,595
Tamu	337,115
Waimaw	1,184,820
Yangon	156,290

Figure 18. Percent ever used previously used needles/syringes among PWID by duration of injecting drugs

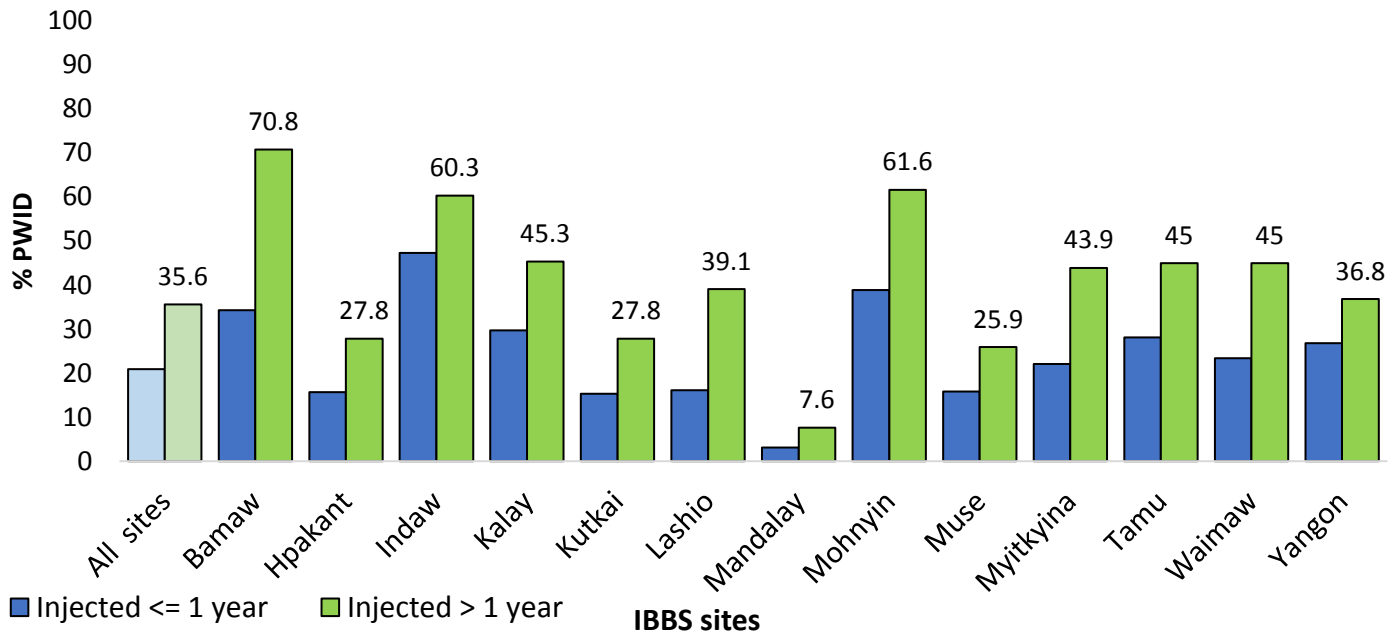
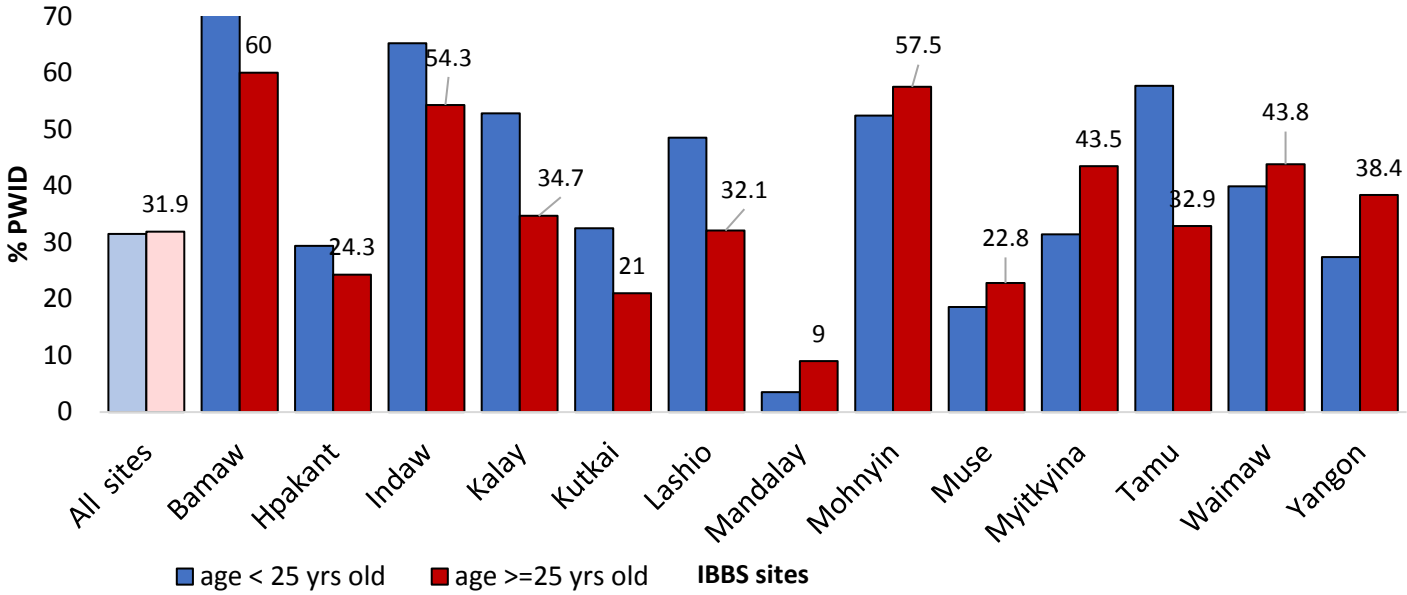


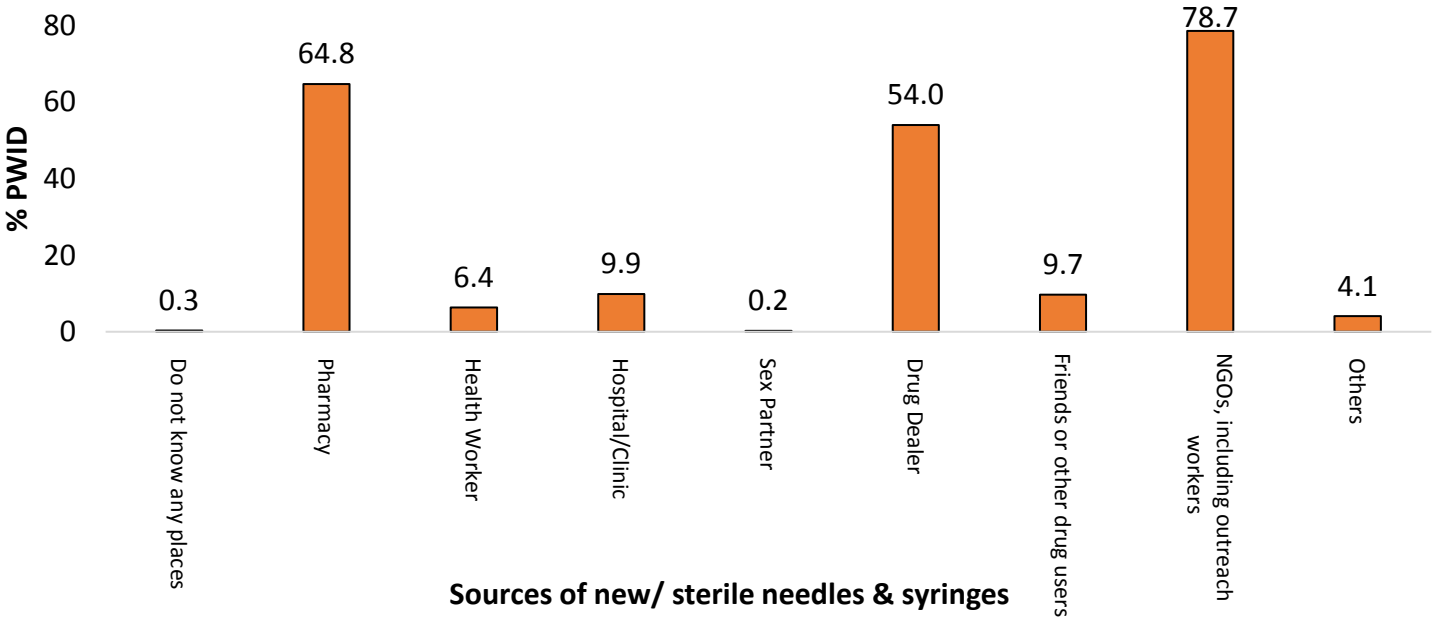
Figure 19. Percent ever used previously used needles/syringes among PWID by age group



Source of needles/syringes

PWID were asked to name places they knew where needles/syringes were available. Pharmacies (65%), NGOs (79%), and Drug dealers (54%) were the most commonly reported known sources of clean needles.

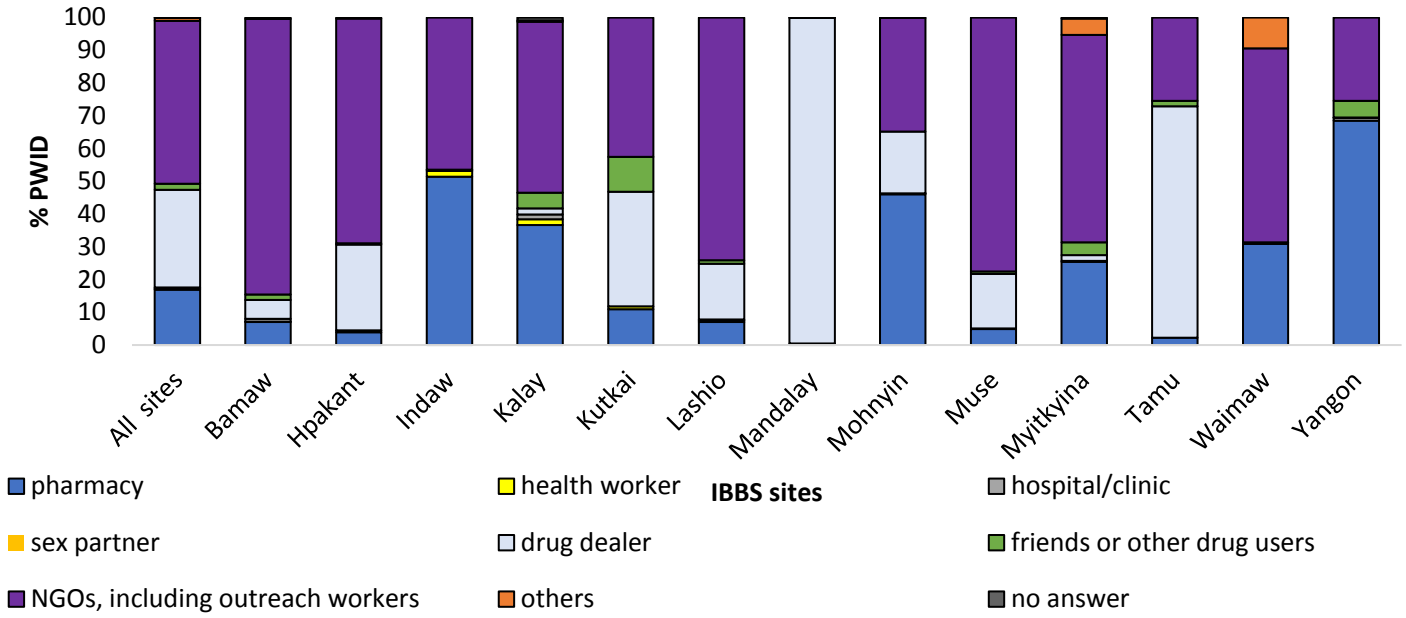
Figure 20. Places PWID reported knowing as a source of needles/syringes



NGOs (50%), drug dealers (30%), and pharmacies (17%) were also the most frequently reported main source of needles/syringes used, but significant variation was observed across survey sites. NGOs were reported as the primary source of needles/syringes used by over 60% of PWID in Bamaw (84%), Hpakant (69%), Lashio (74%), Muse (78%), and Myitkyina (63%). In Yangon and Indaw, more than half reported pharmacies as their main source of injecting equipment. In Tamu and Mandalay, drug dealers were the primary source of needles/syringes. In Mandalay, 99% reported drug dealers as the dominant source of clean needles. Less

than 1%, overall, reported health workers, hospitals, or sex partners as their main source of sterile injecting equipment.

Figure 21. Main source of needles/syringes (in past month) among PWID

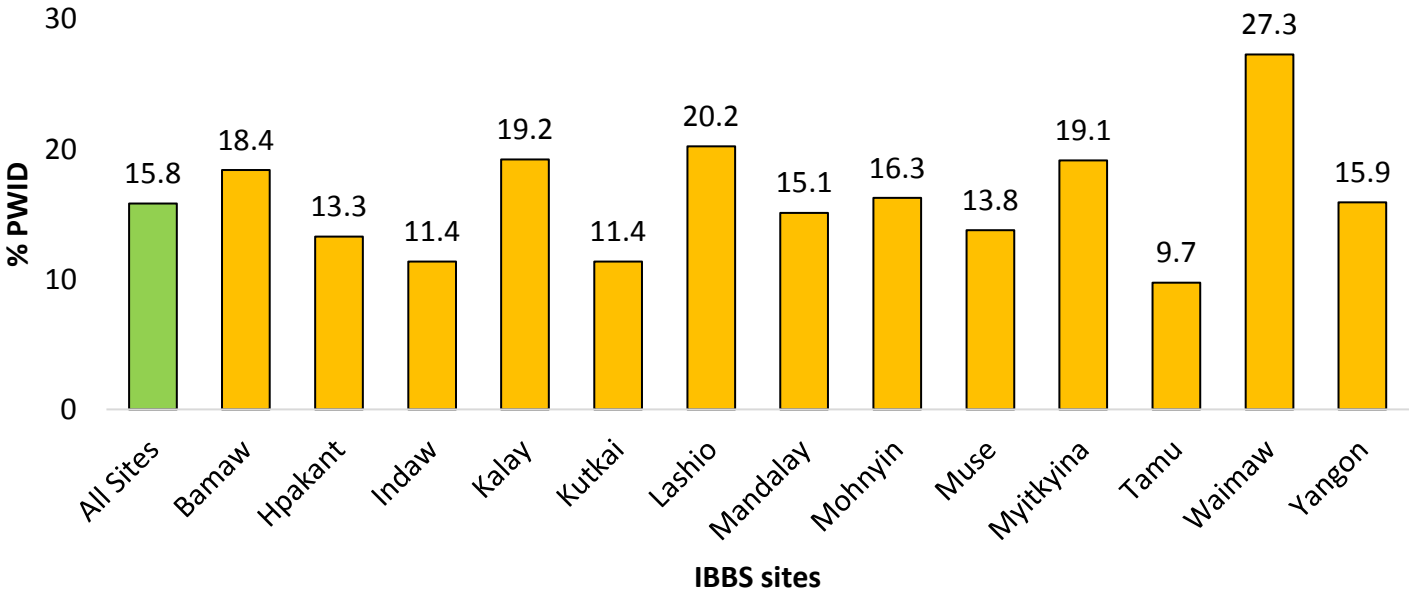


With respect to differences in main source of needles/syringes by duration of injection drug use (injecting =< 1 year) and age group, no notable differences were observed in reported primary sources of sterile injecting equipment.

Overdose

Overall, a low percentage of PWID ever had an overdose (16%). Waimaw (27%), Lashio (20%), Myitkyina (19%), and Kalay (19%) had the highest percentage of ever overdose across survey sites. Only 7% of PWID reported having an overdose in the past 12 months, although 74% of PWID reported witnessing someone else overdosing in the past 12 months.

Figure 22. Percentage of PWID who ever had an overdose



History of drug treatment and methadone

PWID were also asked about any drug treatment ever received, including current treatment, intended to modify, reduce, or stop drug use. Only about one-third of PWID reported ever receiving any drug treatment. The highest percentage of PWID ever receiving treatment was observed in Kalay (69%), Mandalay (60%), and Bamaw (58%). Among PWID who ever received treatment, "maintenance with methadone" was the most common type of treatment received (53%). Counseling was less commonly reported, overall, as a type of treatment received. Among types of counseling received—including "inpatient," "outpatient, and "community/peer counseling"—inpatient counseling (35%) was the most frequently reported. Only 2% of PWID who ever received any treatment reported "community/peer counseling" as a type of treatment.

Figure 23. Percentage of PWID who have ever received drug treatment intended to modify, reduce or stop drug use

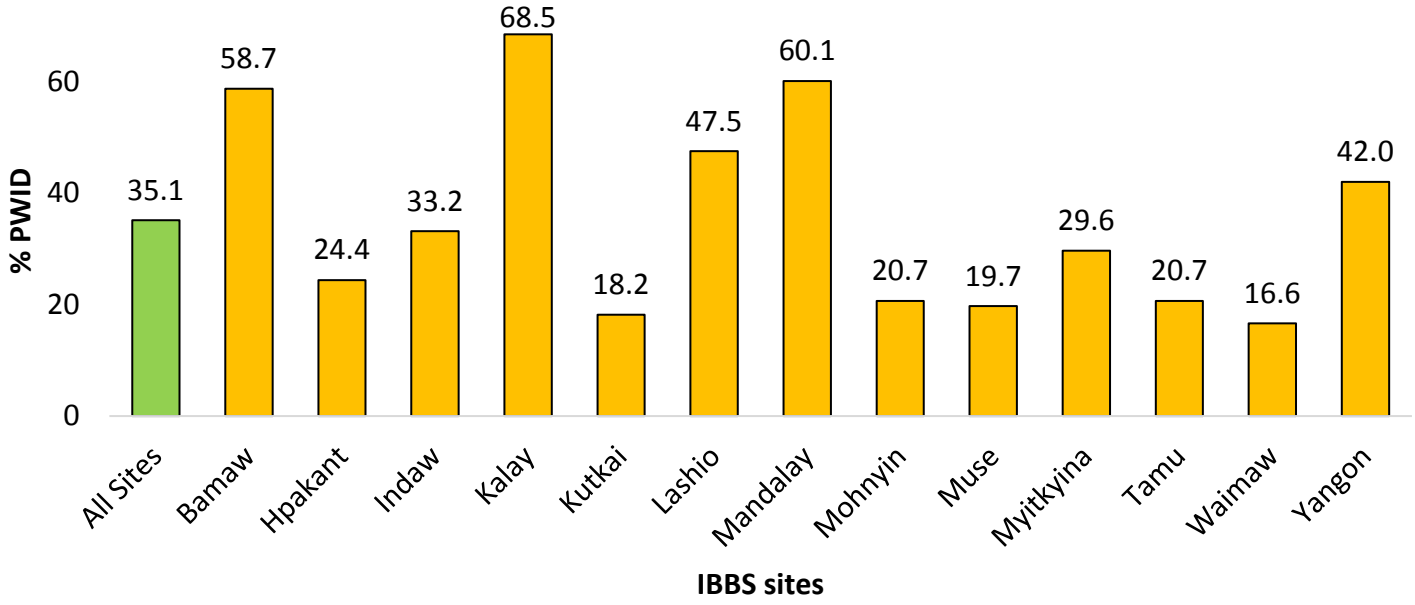


Figure 24. Type of drug treatment ever received

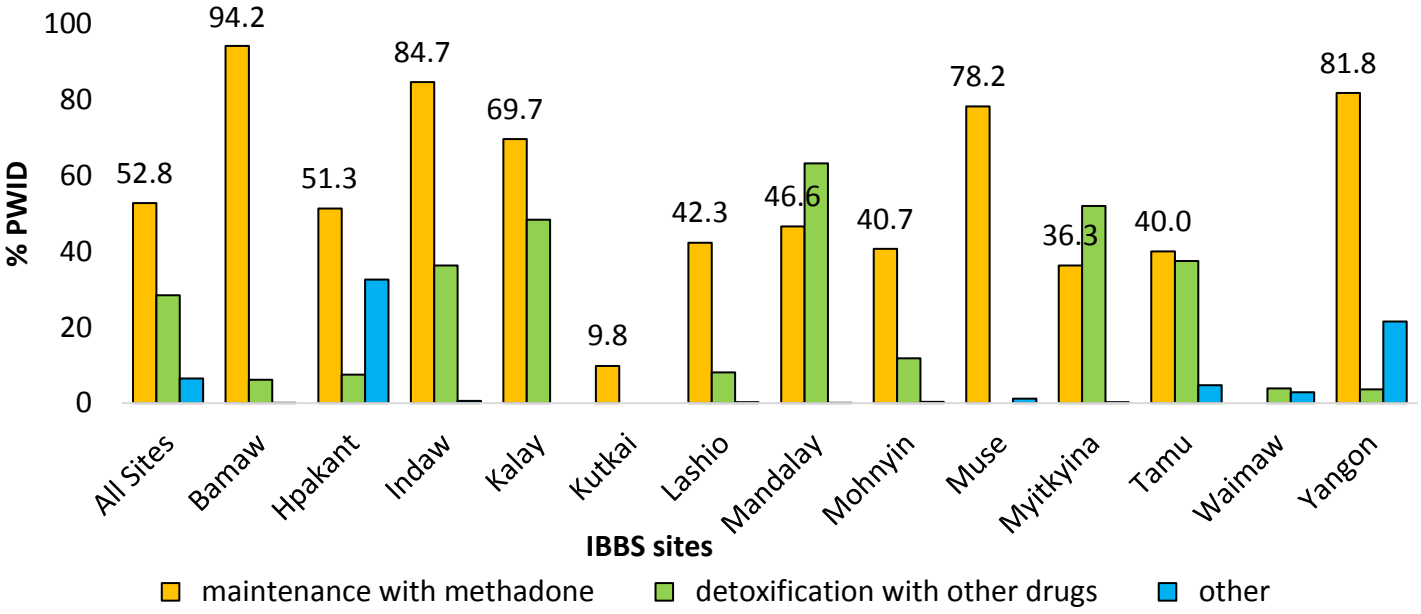
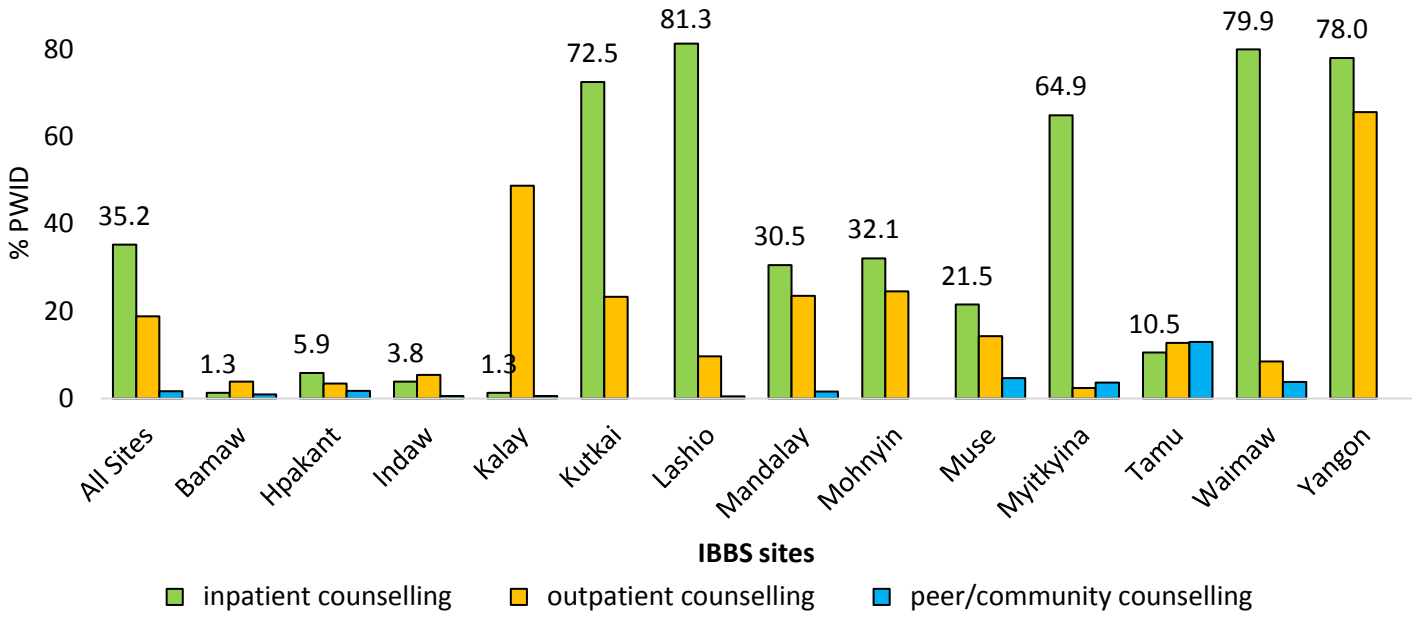


Figure 25. Type of counselling drug treatment ever received



PWID were also asked about methadone treatment in the last 12 months. While only 17% had received methadone treatment in the last 12 months, a notable range in recent methadone treatment was observed across survey sites. Approximately half of PWID in Bamaw and over one-third in Kalay had received methadone treatment in the last 12 months, while only 2% of PWID in Waimaw had received methadone treatment. Compared with the 2014 IBBS, reported drug treatment increased across survey sites. As expected, the percentage of PWID currently receiving any treatment was significantly lower than ever treatment. While only 14% of PWID, overall, reported they were currently receiving treatment to modify, reduce, or stop drug use, a significant range in current drug treatment was observed across survey sites. Bamaw (49%) and Kalay (38%) had the highest percentage of PWID receiving current treatment, while less than 1% of PWID in Waimaw reported current treatment.

Figure 26. Percentage of PWID who received methadone treatment in the past 12 months

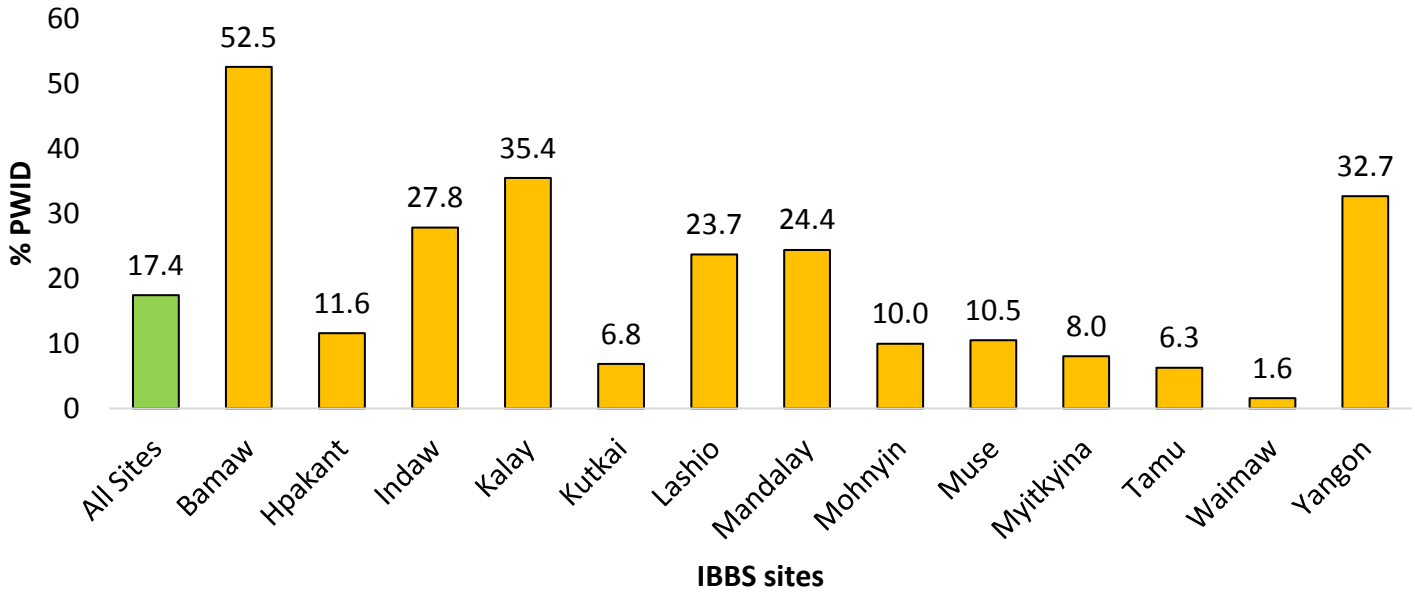
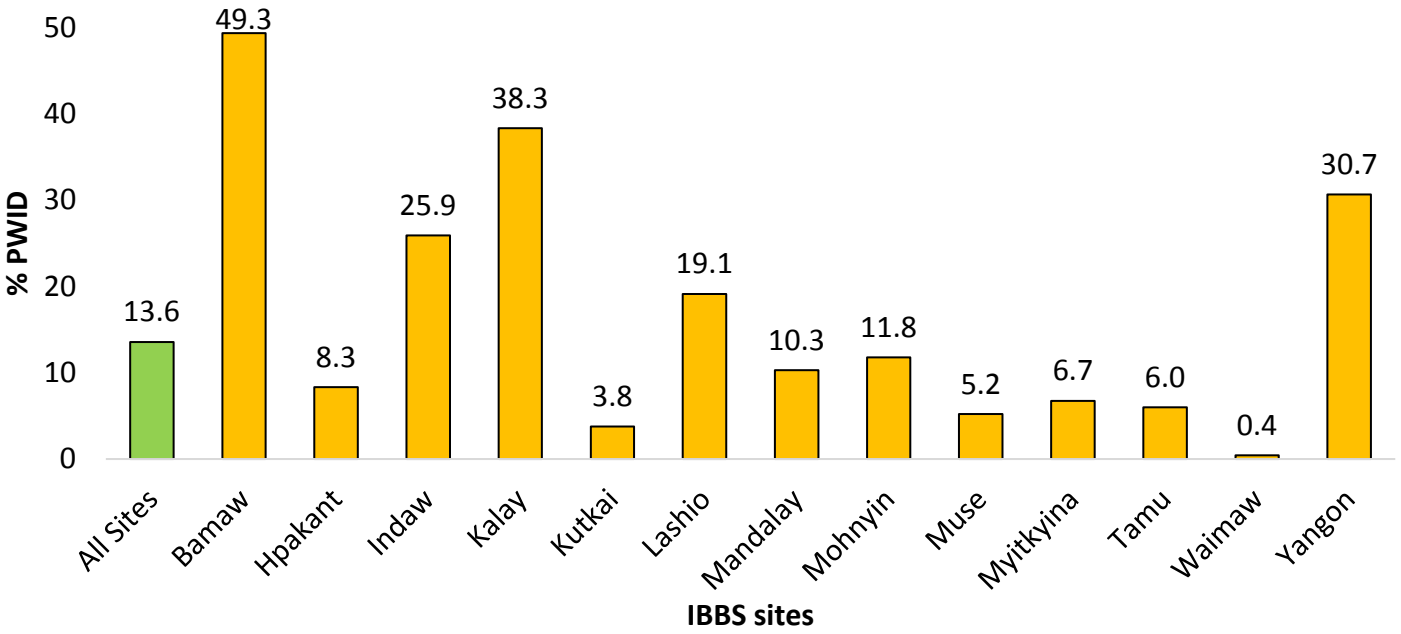


Figure 27. Percentage of PWID currently receiving any treatment intended to modify, reduce or stop drug use



History of arrest/detainment

PWID were asked whether they had ever been arrested or detained and if yes, whether they had ever been arrested or detained for drugs. Across all sites, less than 20% of PWID had ever been arrested or detained and only 10% reported ever being arrested or detained specifically for using drugs. Kutkai (22%), Lashio (20%), and Muse (18%) reported the highest levels of history of arrest for using drugs. These findings differ slightly from the 2014 IBBS, where the highest percentages of arrest or detainment were observed in Muse and Yangon.

Figure 28. Percentage of PWID ever arrested or detained for using drugs

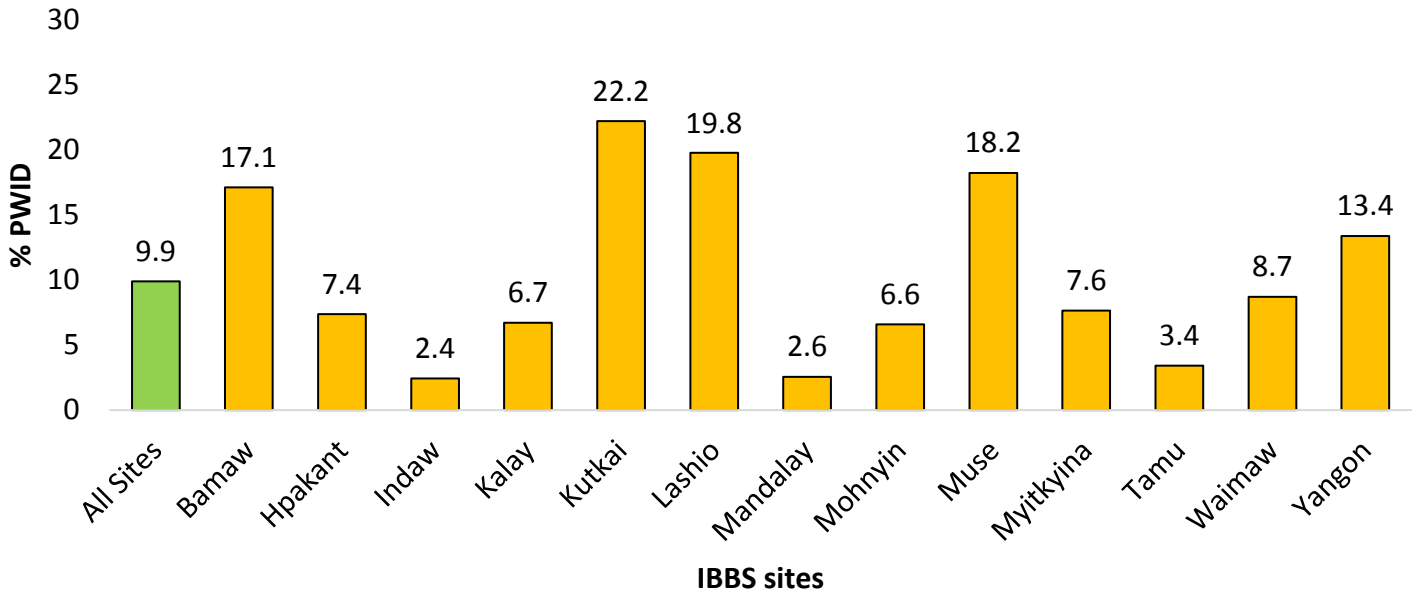
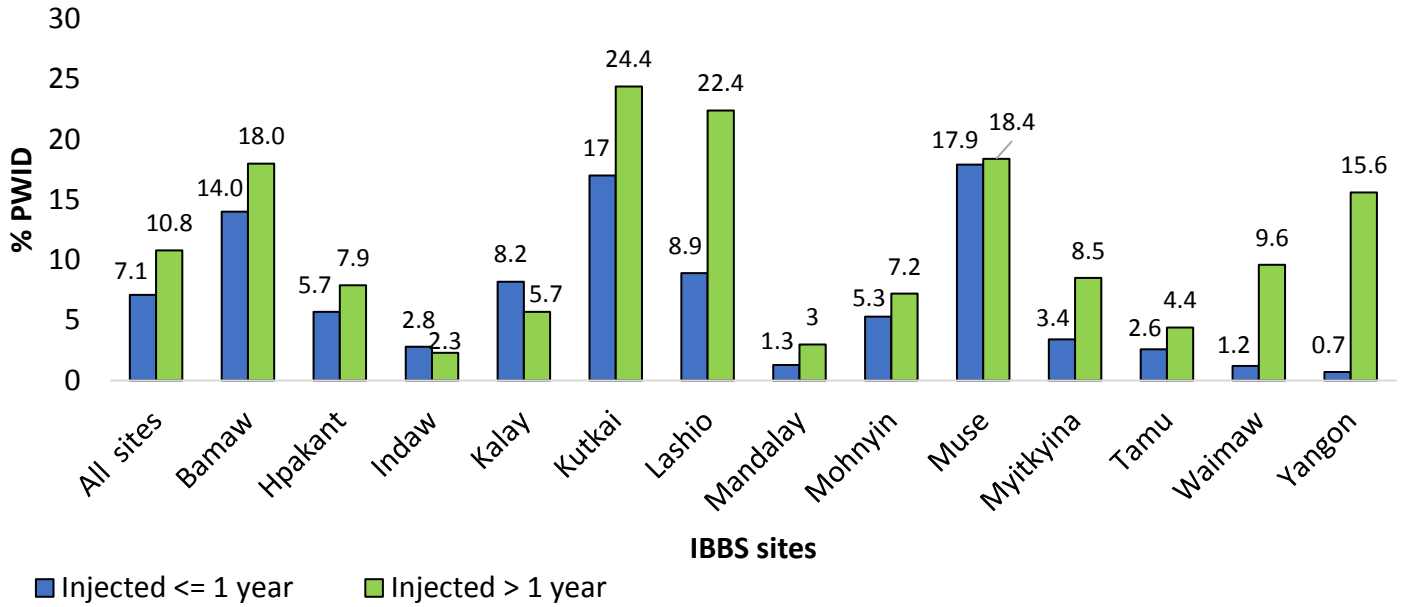


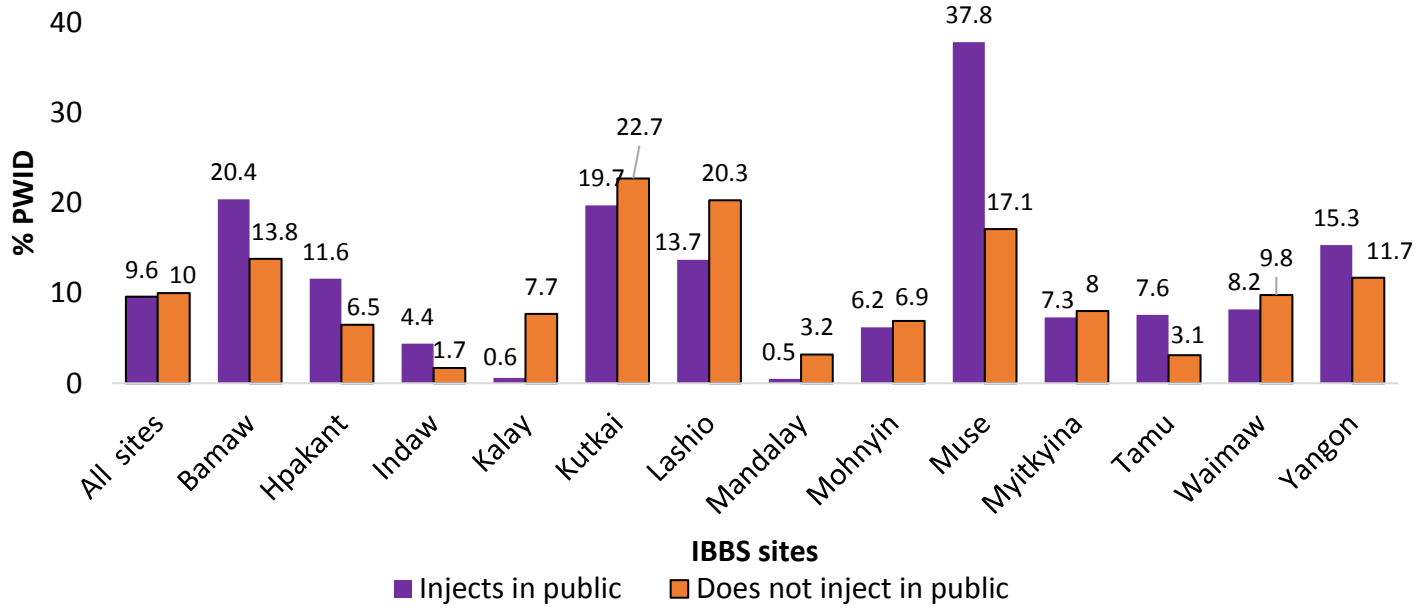
Figure 29. Percent of PWID ever arrested for drugs by duration of injection

In most sites, a greater proportion of PWID injecting for more than a year had ever been arrested for drugs,



compared with PWID injecting for one year or less. The largest differences in arrest were observed in Waimaw and Yangon, where only approximately one percent of PWID injecting one year or less had ever been arrested, compared with 10 and 16 percent, respectively, who had been injecting for more than one year. No differences in arrest by whether they inject in public vs. private places were observed across most survey sites, except for Muse. In Muse, nearly 40 percent of PWID who inject in public had ever been arrested, compared with less than 10 percent of PWID who did not inject in public places.

Figure 30. Percent of PWID ever arrested by whether injects in public places

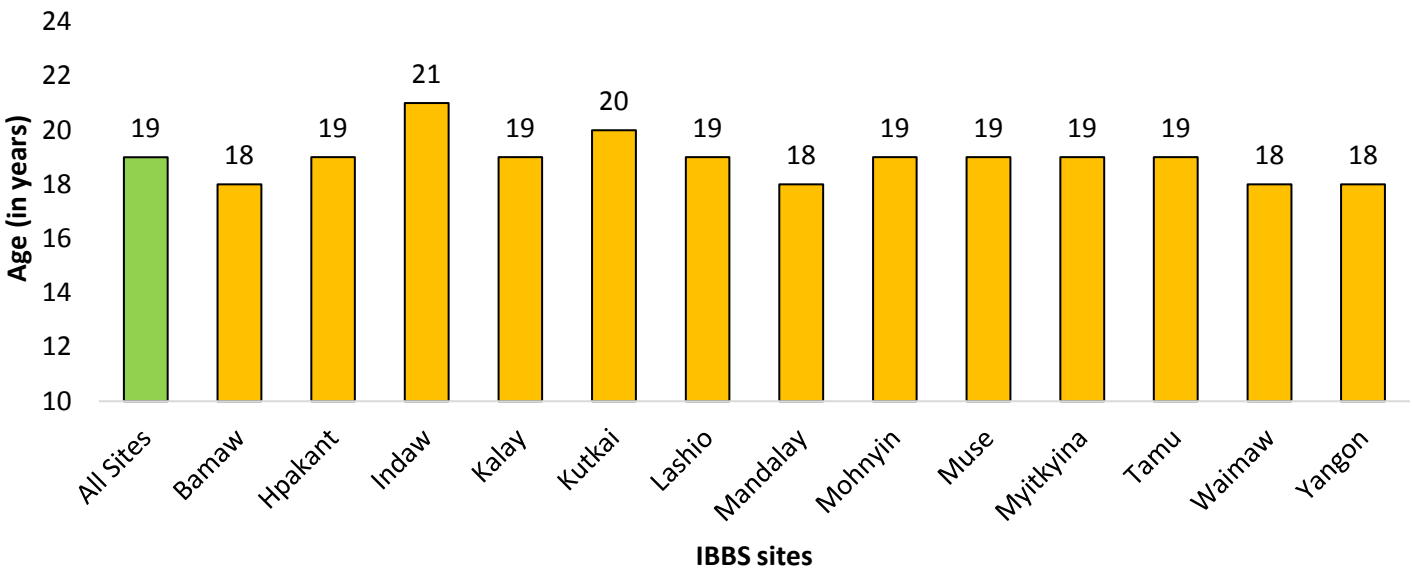


3.4. Sexual Relationships and Practices

First Sexual Intercourse

The majority of PWID (>80%) had ever had sex. Among PWID who have ever had sexual intercourse, the median age of first sexual intercourse was 19 years (range: 7-46) and the mean was 20 years. Bamaw, Mandalay, Waimaw and Yangon reported the lowest median age of first sexual intercourse.

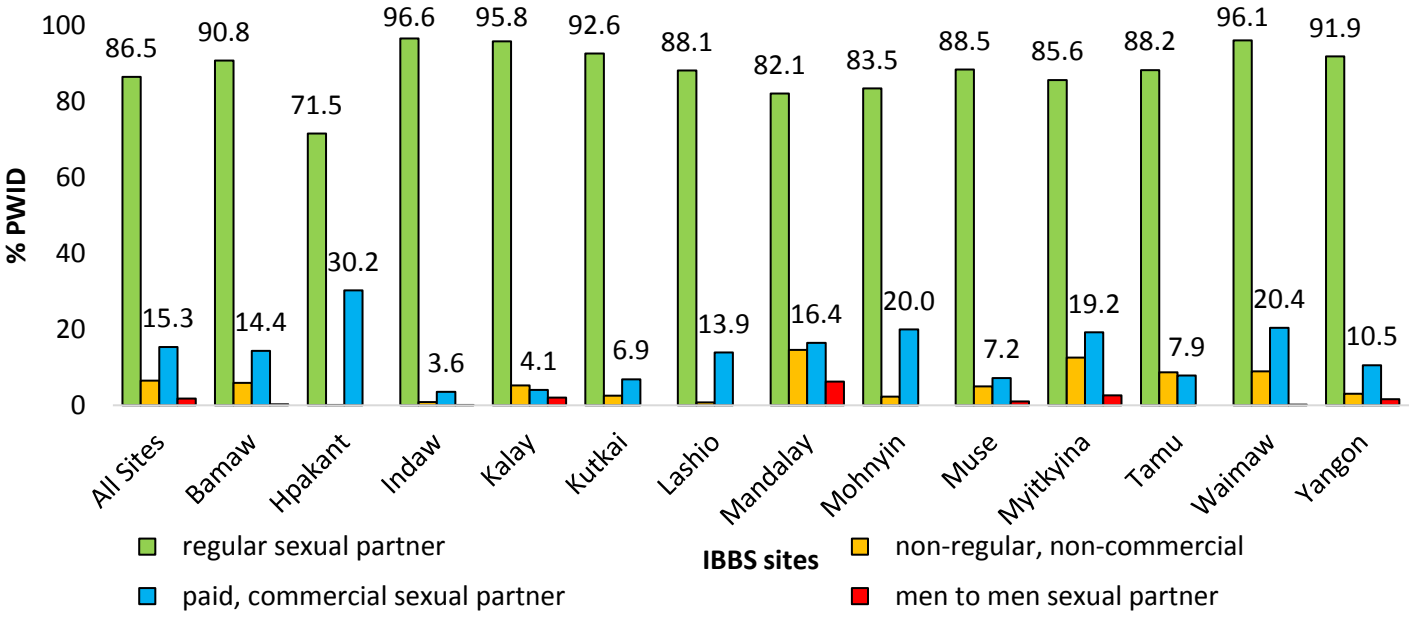
Figure 31. Median age of first sexual intercourse, among PWID who ever had sexual intercourse



Types of sexual partners

Among all PWID, 37% reported that they did not have a sexual partner in the last 12 months. Among those with a sexual partner in the last 12 months, 87% of PWID reported having sex with a regular partner. Across survey sites, having sex with a regular partner ranged from 72% in Hpakant to 97% in Indaw. Those having sex with a paid partner in the past 12 months ranged from 3.6% in Indaw to 30.2% Hpakant.

Figure 32. Type of sexual partner in the last 12 months, among PWID who had sexual intercourse in the last 12 months



Across survey sites, less than 10% of PWID had more than one type of sex partner in the past 12 months. Waimaw reported the highest proportion of PWID with multiple sex partners. Approximately 10% of PWID had a regular and commercial partner, and 5% had a regular and casual partner.

Table 11. Percent of PWID with multiple types of recent sexual partners

	Had regular and commercial partner (%)	*95% CI*	Had regular and casual partner (%)	*95% CI*
Bamaw	4.0	(1.9, 6.2)	2.0	(0.4, 3.7)
Hpakant	0.4	(0, 1.1)	0.0	
Indaw	0.6	(0, 1.4)	0.0	
Kalay	1.9	(0, 4.1)	2.2	(0, 4.4)
Kutkai	0.2	(0, 0.5)	0.3	(0, 0.8)
Lashio	0.9	(0, 2.3)	0.2	(0, 0.5)
Mandalay	4.2	(2.6, 5.9)	3.5	(1.9, 5.2)
Mohnyin	2.0	(0.2, 3.9)	0.4	(0, 1.0)
Muse	0.1	(0,0.2)	0.0	
Myitkyina	5.7	(2.6, 8.8)	5.3	(1.8, 8.8)
Tamu	0.4	(0,0.9)	1.2	(0, 2.8)
Waimaw	9.6	(6.2, 12.9)	4.7	(2.8, 6.7)
Yangon	2.4	(0.8, 4.0)	0.4	(0, 0.9)
All sites	2.2	(1.7, 2.7)	1.4	(1, 1.9)

Among those with a regular sex partner, the proportion of PWID under age 25 who had sex with a regular partner in the last month was not substantially different than the proportion of older PWID across most sites, except for Indaw and Kutkai. In Indaw, 68% of those aged 25 and older had sex with a regular sex partner in the past 12 months, compared with only 20% among those under age 25. In Kutkai, only 12% of PWID under age 25 had sex with a regular partner in the past 12 months, compared with 44% of those aged 25 and older. No notable age-related differences were found with respect to the proportion of injectors with a commercial sex partner in the past 12 months or a casual sex partner in the past month.

Table 12. Percent of male PWID having sex with different types of partners by age group

Age group	BAM	HPA	IND	KAL	KUT	LAS	MAN	MOH	MUS	MYI	TAM	WAI	YGN	ALL
% who had sex with regular partner in the past 12 months (among all PWID)														
< 25	46.7	9.0	20.1	65.8	12	25.4	47.6	26.9	18.2	54.6	37.0	59.0	45.1	36.1
>=25	51.3	18.5	67.5	79.2	43.7	38.5	54.2	43.6	23.8	57	53.0	53.8	56.9	42.0
% who had sex with paid/commercial sexual partner in the past 12 months (among all PWID)														
< 25	7.2	5.8	4.5	7.5	1.8	5.3	9.3	7.1	0.6	14.8	12.2	9.7	6.4	7.7
>=25	8.2	7.4	1.8	2.1	3.1	5.9	11.1	10.0	2.1	11.9	3.6	12.9	6.1	7.0
% who had sex with a casual partner in the past 1 month (among all PWID)														
< 25	2.5	0.0	0.8	4.8	4.6	0.2	8.8	1.7	4.6	11.5	24.3	3.4	1.6	4.9
>=25	3.5	0.0	0.5	4.0	0.4	0.3	9.3	0.6	0.6	7.1	2.6	6.1	1.8	2.4

No notable differences between new and long-term injectors with respect to having sex with different types of partners were observed across most survey sites.

Table 13. Percent of PWID having sex with different types of partners by duration of injection

Injection Duration	BAM	HPA	IND	KAL	KUT	LAS	MAN	MOH	MUS	MYI	TAM	WAI	YGN	ALL
% who had sex with regular partner in the past 12 months (among all PWID)														
<= 1 year	56.6	19.3	50.8	77.0	45.1	40.7	48.9	41.2	19.2	65.0	53.8	56.2	71.1	43.2
>1 year	48.8	16.3	65.4	76.4	36.4	35.5	51.9	35.2	24.8	54.6	47.8	55.4	51.1	39.6
% who had sex with paid/commercial sexual partner in the past 12 months (among all PWID)														
<= 1 year	5.1	6.5	2.9	2.5	0.2	1.0	11.1	9.2	0.2	11.1	5.7	7.8	5.6	5.6
>1 year	8.7	7.2	1.9	3.8	4.7	7.0	10.1	8.8	2.9	13.0	3.2	12.4	9.7	7.8
% who had sex with a casual partner in the past 1 month (among all PWID)														
<= 1 year	5.9	0.1	0.2	2.3	0.0	0.0	11.5	2.0	0.4	14.3	6.4	7.9	0.0	3.5
>1 year	2.6	0.0	0.7	4.7	1.8	0.4	8.3	0.7	1.8	7.2	3.3	5.3	2.1	2.9

**Denominator: all participants. 31 participants did not report age at first injection and were excluded from injection duration analyses.*

Condom use

To assess overall condom use, those who ever had sex and those who had sex in the last month were asked whether they used a condom at last sexual encounter. Among PWID who ever had sex, reported condom use at last sexual encounter was low overall (37%). Condom use ranged from 18% in Kutkai to 44% in Yangon and 45% in Hpakant. While reported condom use has increased across survey sites, compared with the 2014 IBBS, overall condom use remains low; a majority of PWID (63%) reported no condom use at last sexual encounter.

Figure 33. Condom used when last time had sex, among PWID who have ever had sexual intercourse

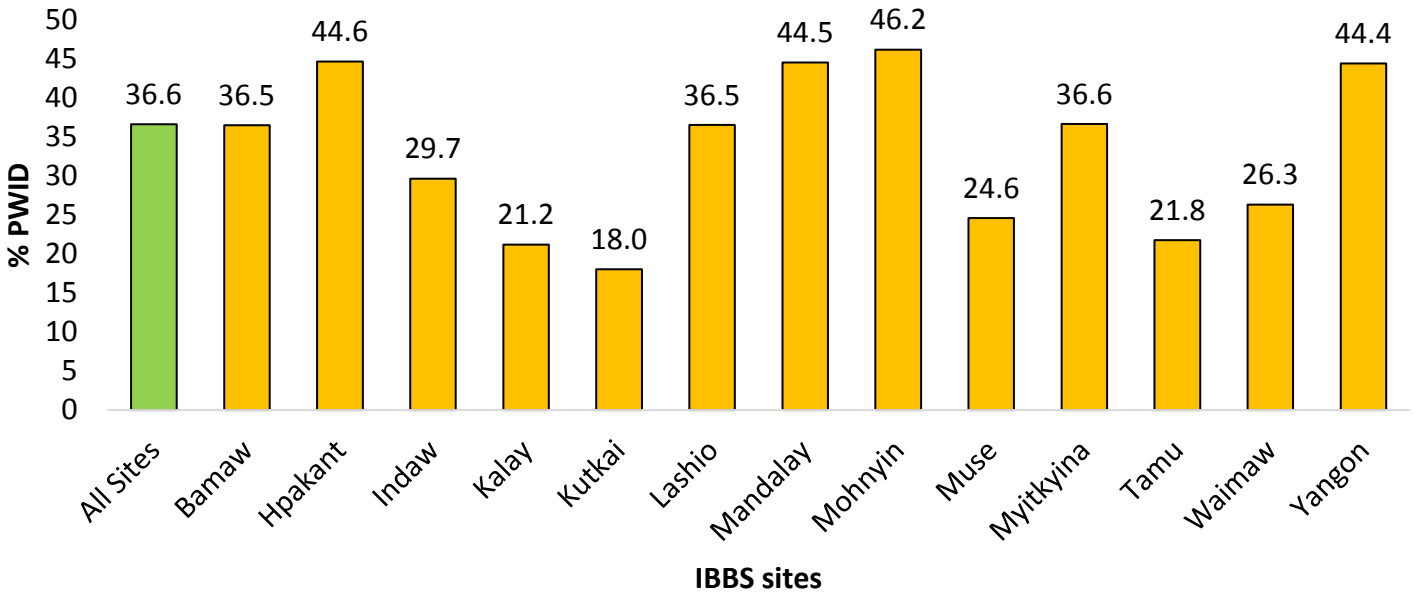
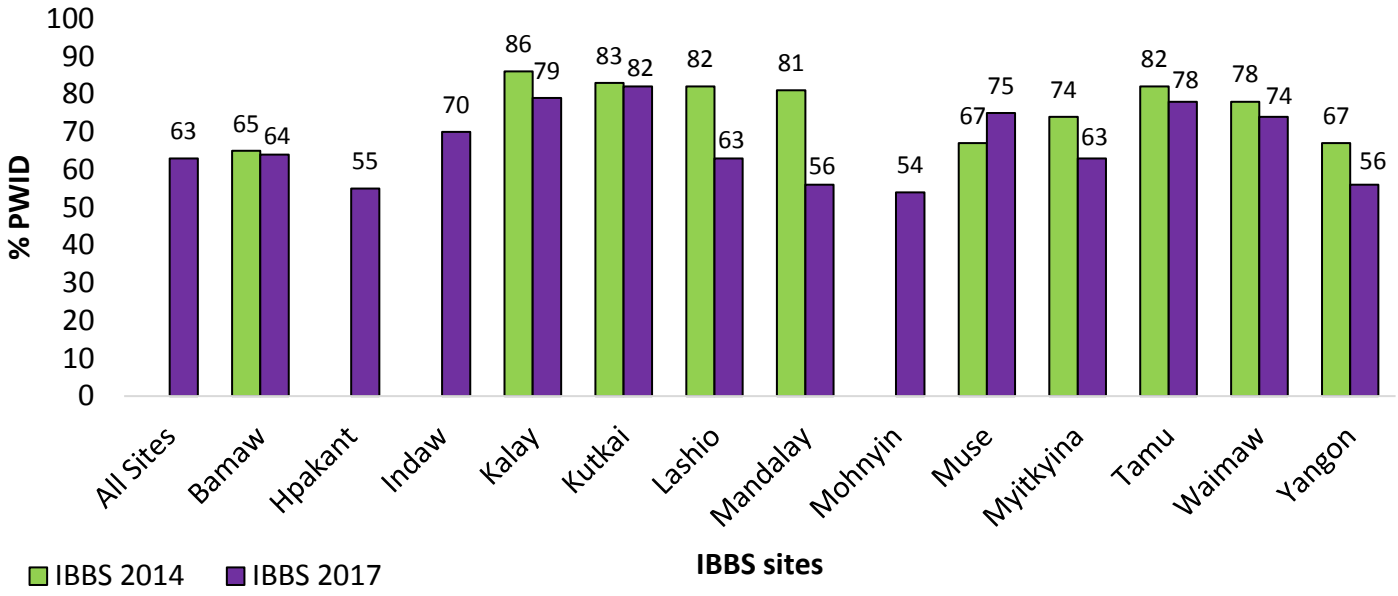


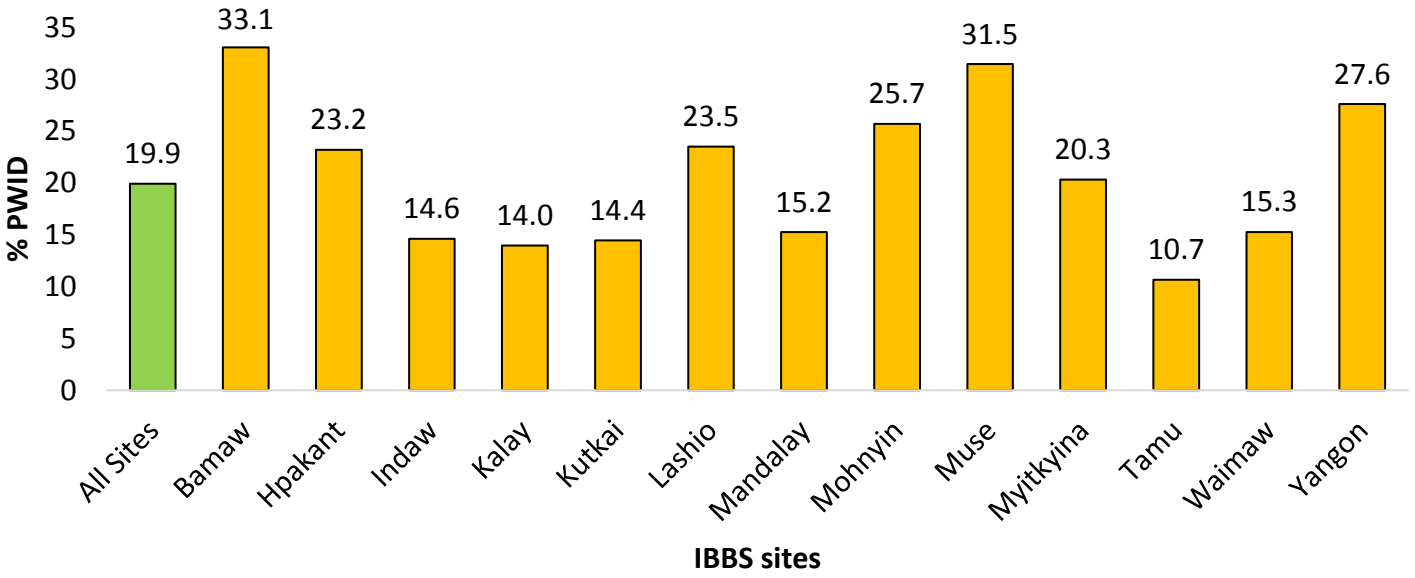
Figure 34. Percentage of PWID who did not use condom the last time had sex, among PWID who have ever had sexual intercourse



PWID who reported ever having sex were also asked whether they used a condom at the last sexual encounter with any partner type. PWID who had sexual intercourse in the last month reported lower condom use at last sexual encounter (21%) as compared with PWID who ever had sex (37%). This means that PWID who had sexual intercourse more recently were less likely to have used a condom than PWID who had sexual intercourse more than a month ago. Only 21% of PWID reported condom use, with lowest reported use in Tamu (8%) and highest use in Lashio (38%).

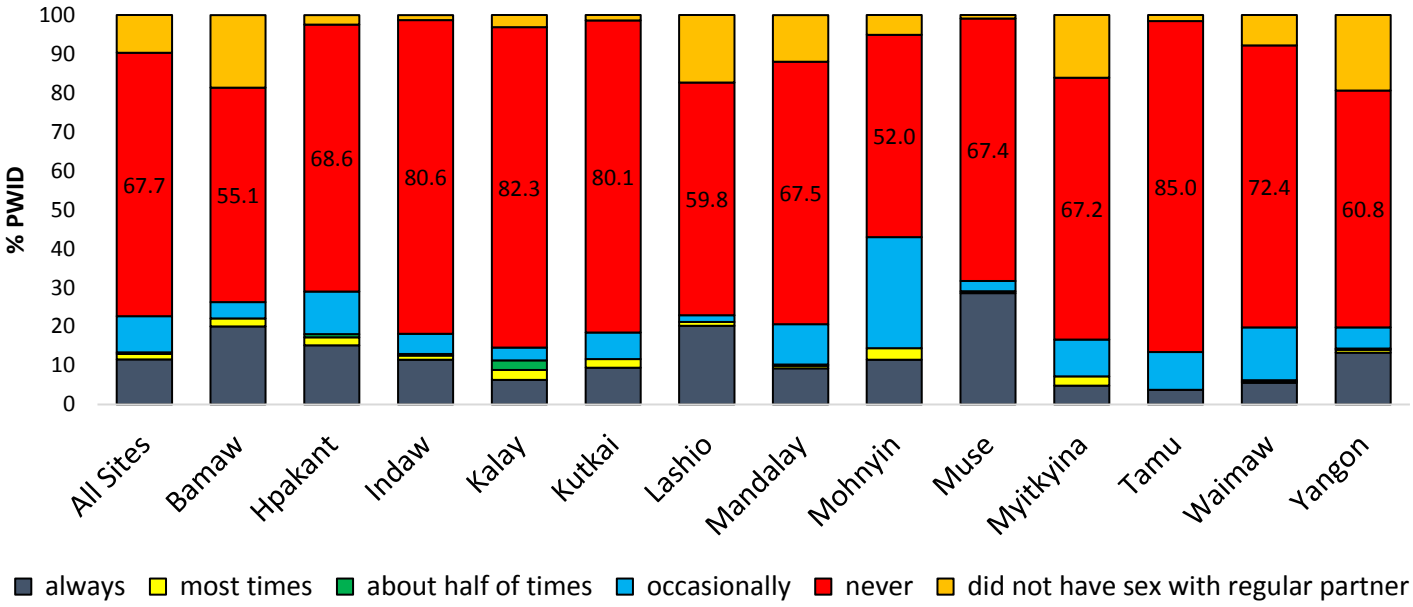
While condom use with a regular partner has increased compared with the 2014 IBBS, reported use has remained particularly low. Among PWID who had sexual intercourse in the past 12 months with a regular partner, only 20% reported condom use during last sex. Bamaw and Muse reported the highest proportion of condom use at last sex, with approximately one-third of PWID reporting use.

Figure 35. Condom use at most recent sex with regular partner, among PWID who had sexual intercourse with regular partner in past 12 months



In addition, among those who had sex with a regular partner in the past 12 months, reported frequency of condom use in the last month was also low; a majority (68%) across survey sites reported never using a condom. Mohnyin, Muse, and Hpakant reported the highest proportion of any condom use (including "always," "most times," "half of times," and "occasionally").

Figure 36. Frequency of condom use in the last month with a regular partner, among PWID who had a regular partner

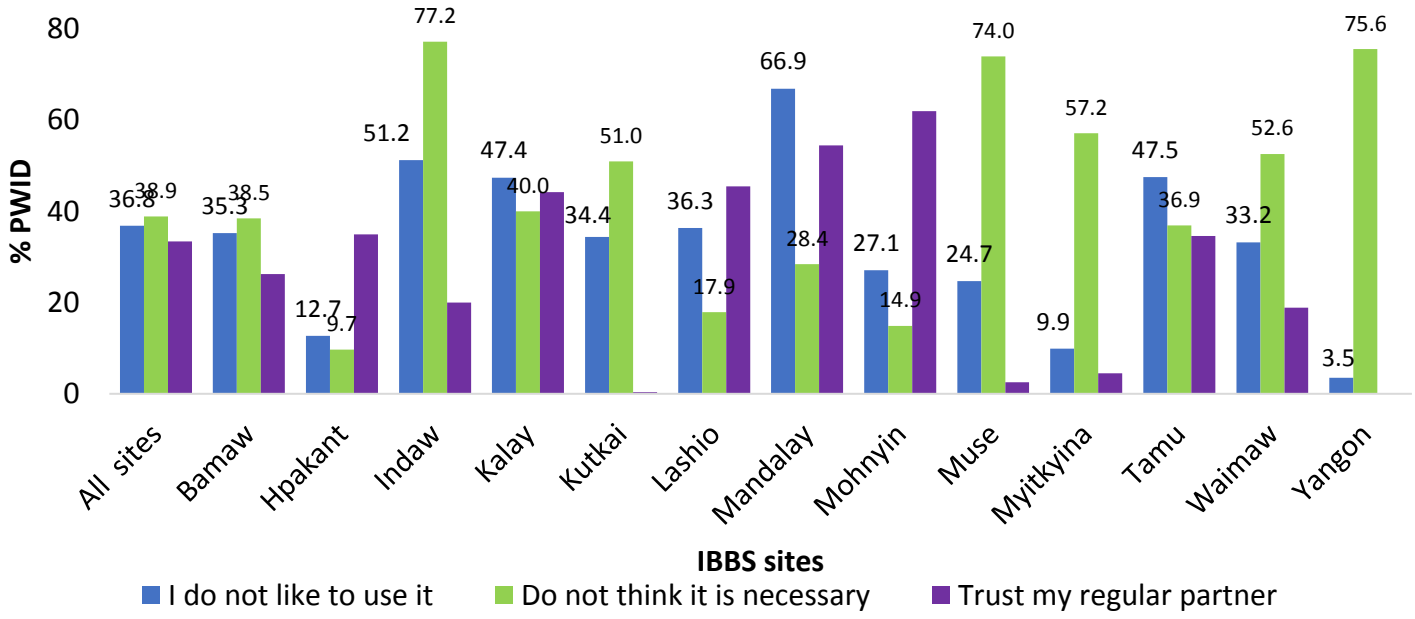


PWID having sex with their regular partner in the last month and who did not always use condoms were asked for their reasons for not using a condom. "I do not like to use it," "I do not think it is necessary," and "I trust my regular partner" were the most commonly reported responses (37%, 39%, and 33%, respectively). In Yangon and Indaw, three-quarters or more cited condoms "not necessary" as a reason for inconsistent use, and more than two-thirds of respondents in Mandalay cited "do not like to use." Cost, availability, and under the influence of alcohol/drugs were the least frequently cited reasons across most survey sites. While few cited "under the influence of alcohol/drugs" as a reason across most survey sites (<10%), approximately one-third of PWID in Mandalay cited this factor as a barrier to use. Frequency of condom use with commercial partners was more common than with regular partners.

Among those who had sex with a paid partner in the past 12 months, 80% reported that they used a condom during the most recent sexual encounter. In addition, a majority reported that they either had "no sex with commercial sex partner in the last month" (48%) or "always" using a condom during sex with a paid partner in the last month (40%). Kalay reported the lowest frequency of condom use with a commercial partner across survey sites, with only approximately one-third of PWID reporting "always" using condoms in the last month. Among PWID who did have sex with a commercial sex partner in the past month, 76% of PWID "always" used a condom during sex with a paid partner.

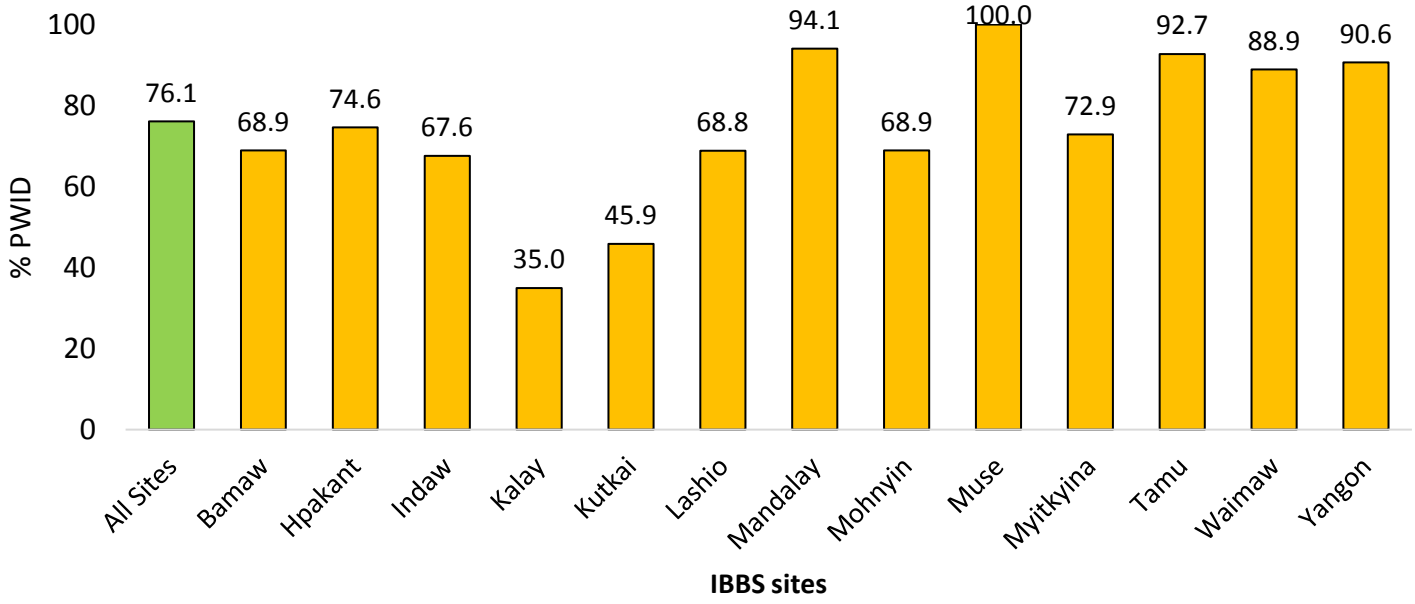
Overall, "not easily available," "partner does not like it," and "under the influence of alcohol/drugs" were the most frequently cited reasons for not using condoms with commercial sex partners. Significant variability in cited reasons was observed across survey sites, however. In Kalay—where the lowest frequency of "always" use was reported—most PWID (81%) cited "do not like to use it" as the reason for not using condoms with commercial partners. When comparing partner types, 65% of PWID who had a casual partner reported condom use the last time they had sex, as compared to 80% of PWID who had a commercial sex partner.

Figure 37. Reasons given by PWID respondents for not always using condoms with regular sex partner



**Multiple responses allowed.*

Figure 38. Percent of PWID always using condoms with commercial sex partners, among PWID who had sexual intercourse with a commercial sex partner in the past month



Sources of condoms

In all sites, three-quarters or more knew places to obtain condoms. The most common sources of condoms known by PWID were pharmacies (64%) and drop-in centers (DIC) (60%). However, similar to 2014 IBBS findings, few people in Lashio (21%) mentioned pharmacies, and less than 10% of PWID in Kalay mentioned DICs.

Figure 39. Percent of PWID respondents who know a place or person from which to obtain condoms

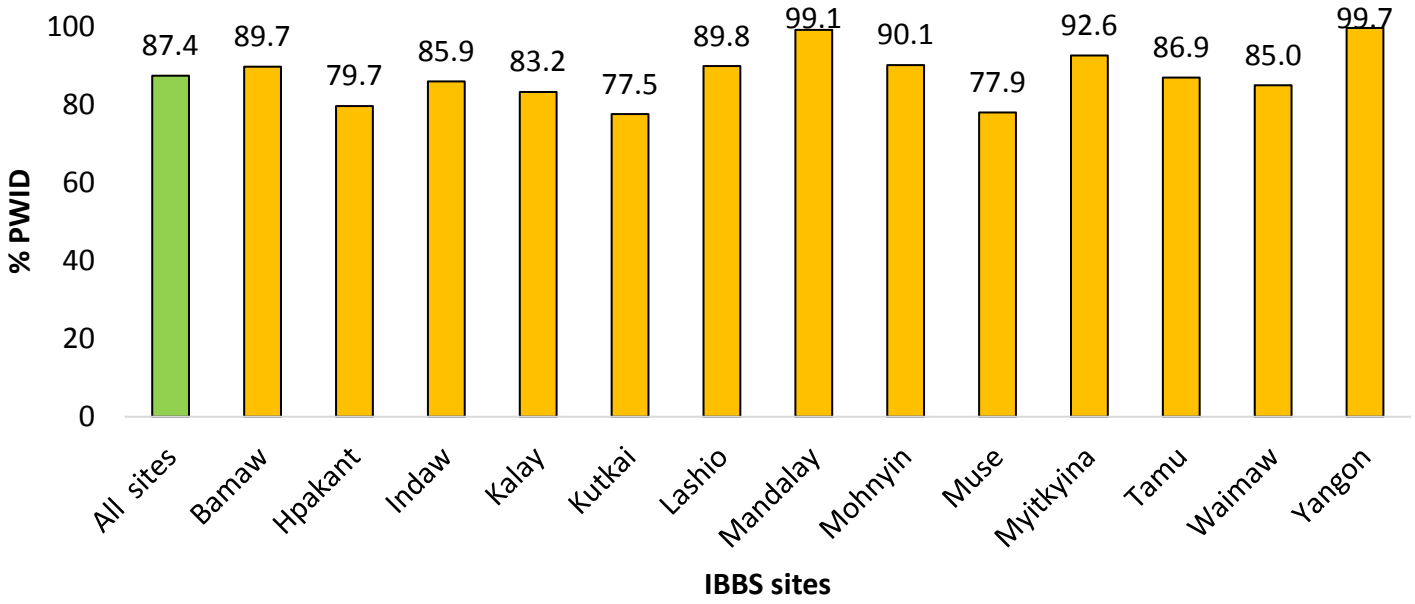
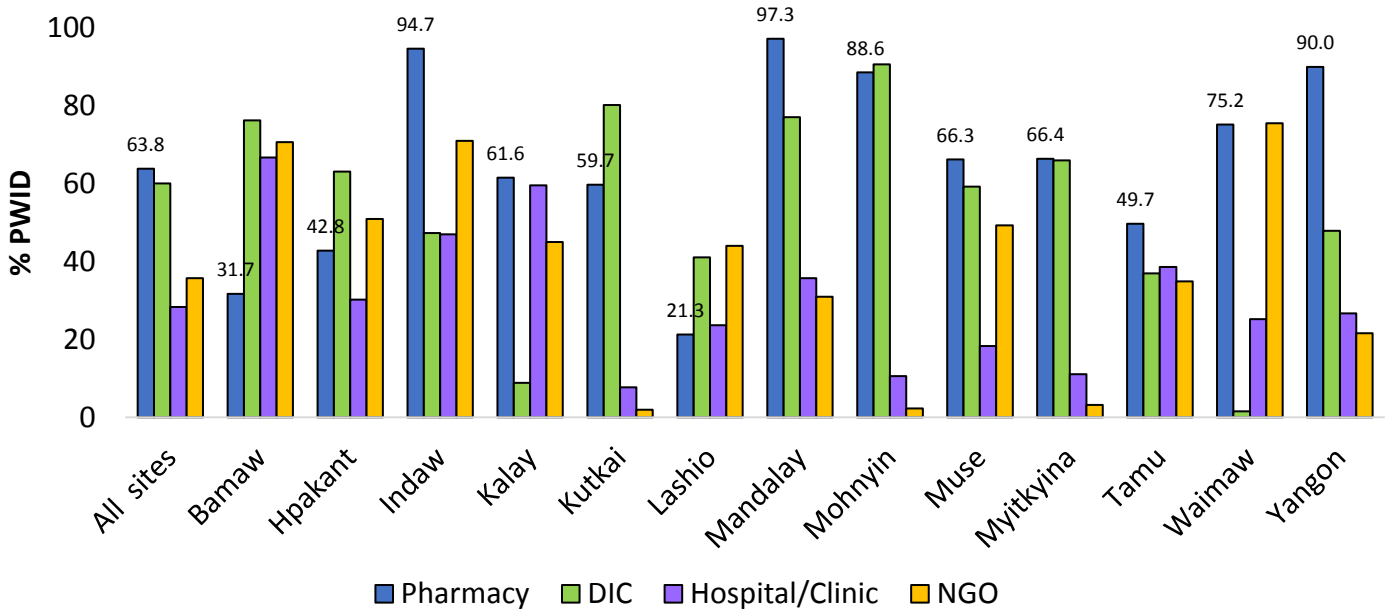


Figure 40. Sources of condoms known by PWID respondents



**Multiple responses allowed. Denominator: All respondents*

Sexually Transmitted Disease (STD) symptoms

A majority of PWID across most survey sites (79%) had heard of diseases that can be transmitted through sexual intercourse. In Kutkai, however, only 42% reported awareness of STDs. Levels of awareness were highest among PWID in Mandalay (95%) and Yangon (96%). A greater proportion of PWID could describe STD symptoms in men, compared with STD symptoms in women. More than half (55%), overall, said they did not know symptoms of STDs in women. The highest proportion who did not know symptoms in women were observed in Lashio (78%) and Mandalay (74%). Similar to the 2014 IBBS findings, foul smelling discharge and genital ulcers were the most common symptoms named. Only 30% could not describe any STD symptoms

in men, ranging from 11% in Hpakant and Yangon to 56% in Kutkai. The most common symptoms known by men were discharge from penis and genital/anal ulcers.
In addition to awareness of the symptoms of STDs, less than 3% reported urethral discharge or genital ulcers in the past 12 months.

Figure 41. Percent of PWID respondents aware of STDs

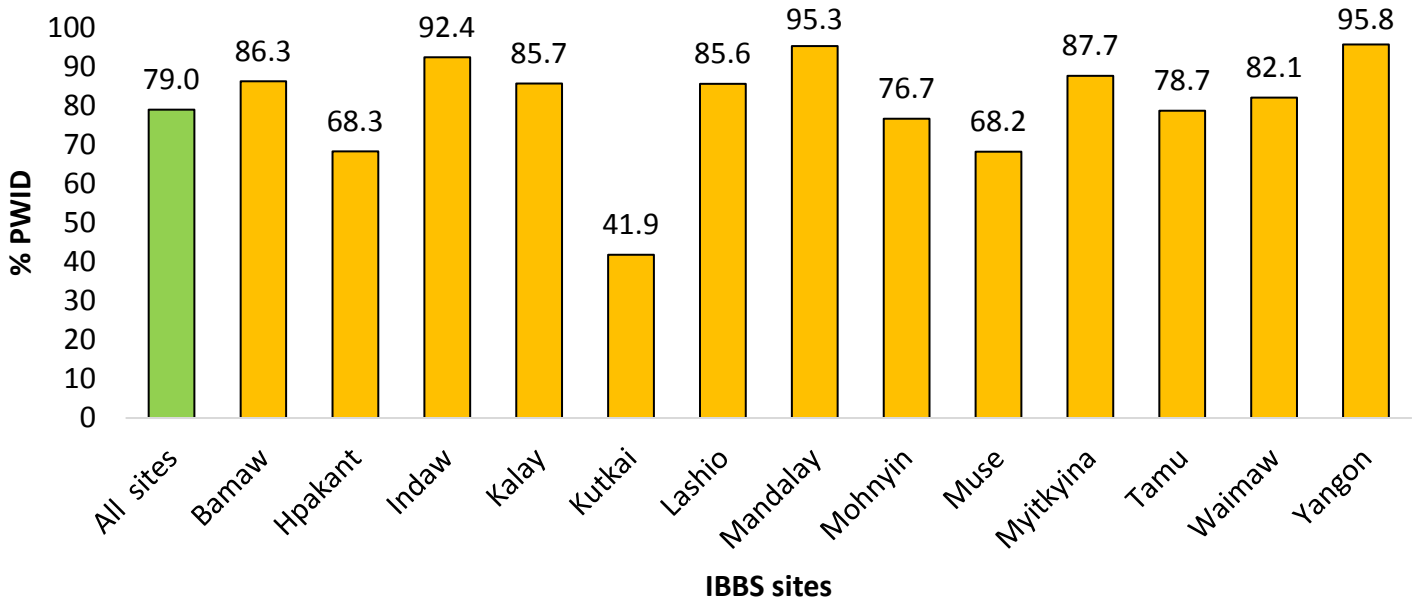
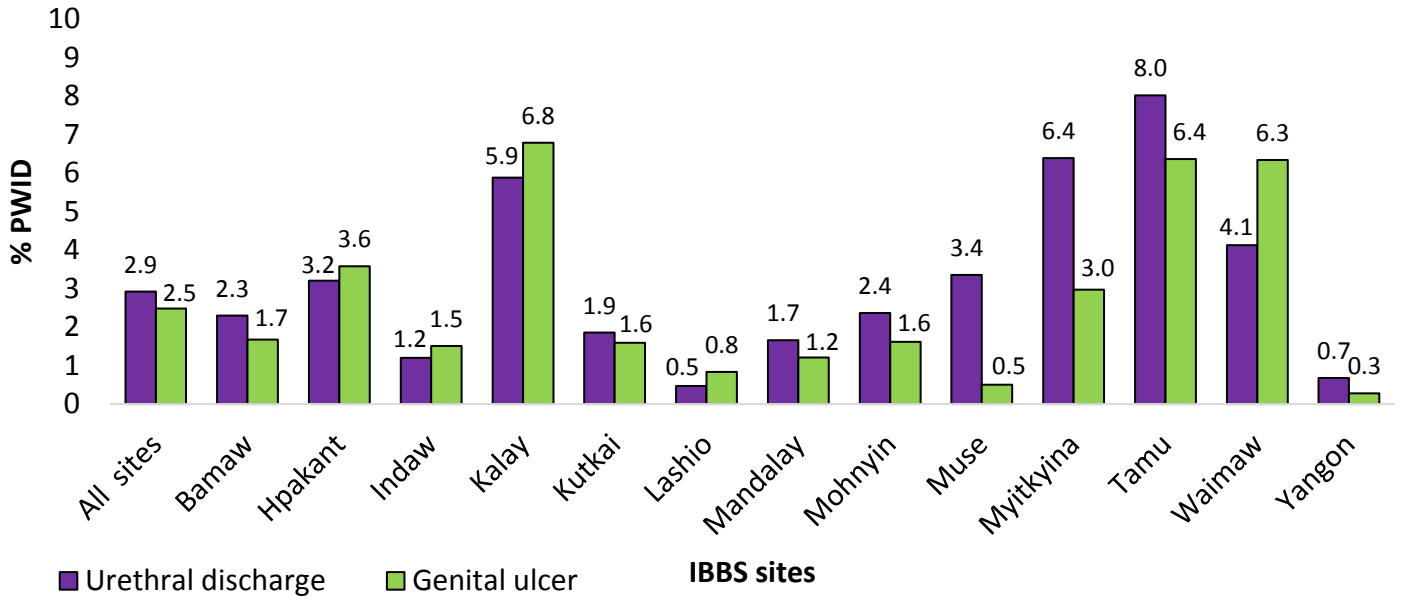


Figure 42. Percent of PWID respondents with symptoms of STDs in past 12 months

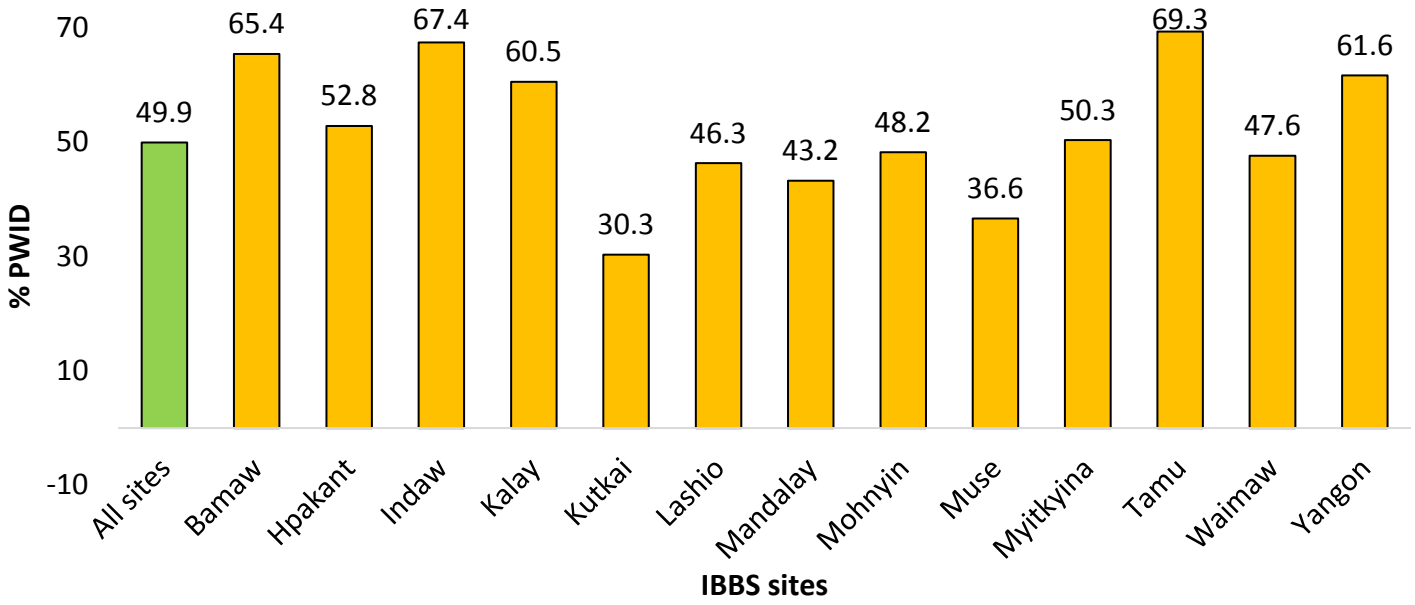


3.5. Knowledge and Service Utilization

Awareness of HIV and AIDS

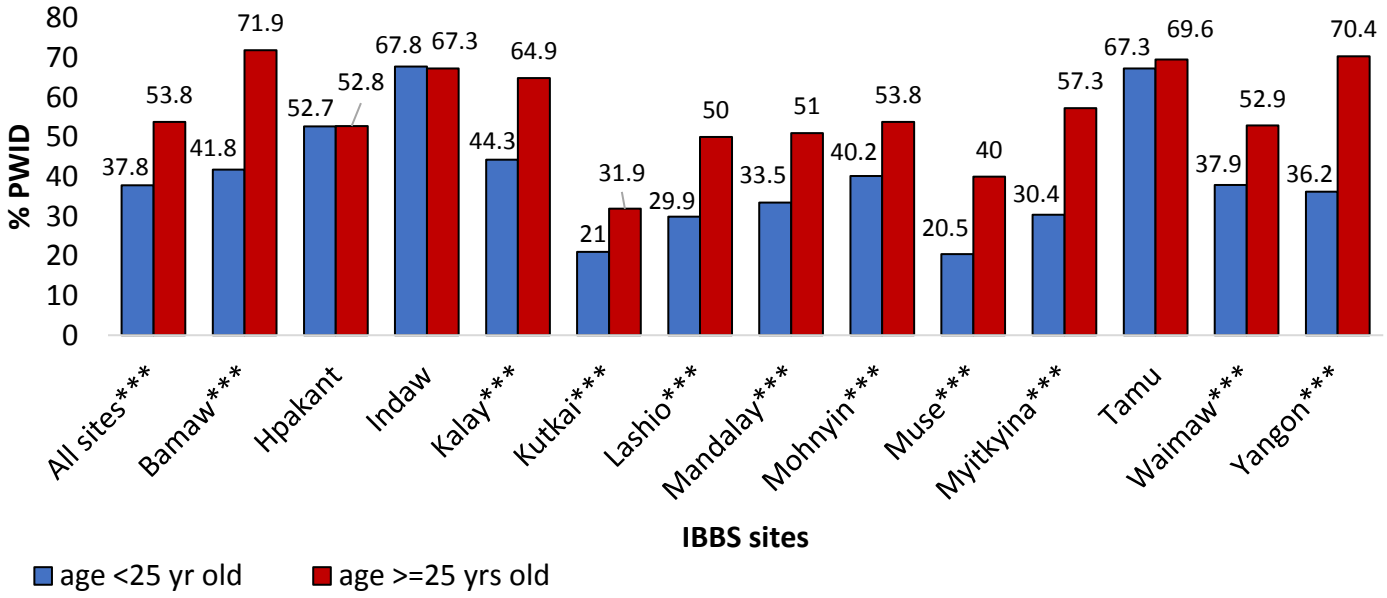
Half of PWID know someone who is infected with HIV or who has died of AIDS. This percentage was highest among PWID in Tamu (69%) and lowest in Kutkai (30%).

Figure 43. Percentage of PWID who know someone infected with HIV or who has died of AIDS



Across most survey sites—except Hpakant, Indaw, and Tamu—significantly fewer PWID under age 25 knew someone infected with HIV compared to those 25 years and older (p<0.0001). Similar to the 2014 IBBS findings, the largest difference was observed in Bamaw. While 42% of PWID under 25 years old in Bamaw under 25 years knew someone with HIV, 72% of PWID over 25 years old knew someone with HIV. In Hpakant, Indaw, and Tamu, no significant differences were observed between age groups. In these survey sites, over 50% of all PWID reported knowing someone infected with HIV.

Figure 44. Percent of PWID who know someone infected with HIV or who has died of AIDS by age group

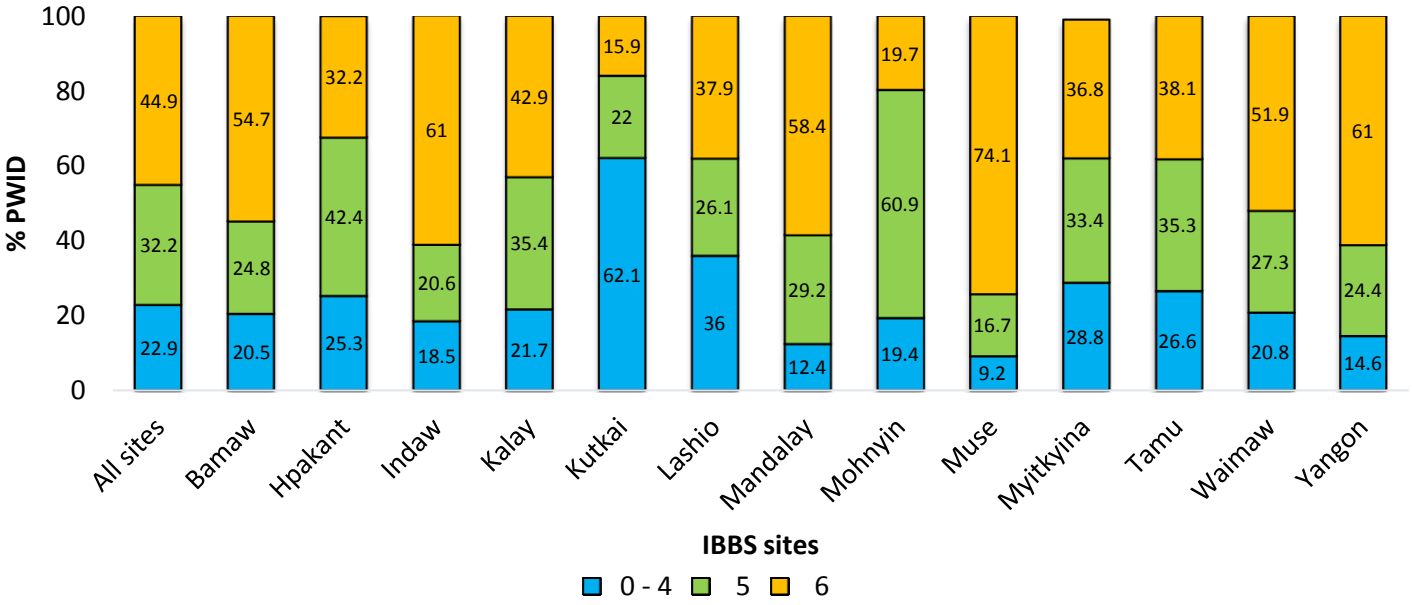


Significance of chi-square statistic: ***p<0.0001

Knowledge of HIV prevention and modes of transmission

Standard questions on knowledge of HIV prevention and modes of transmission were asked to assess comprehensive knowledge[1]. Wide variability in comprehensive knowledge was observed across survey sites; comprehensive knowledge was highest in Yangon, Muse and Indaw (>60% reporting correct answer to all 6 knowledge questions), and lowest in Kutkai and Lashio.

Figure 45. Proportion PWID who gave correct answers to HIV knowledge questions



HIV testing behavior

A majority of PWID (52.2%) across all survey sites had never been tested for HIV. The proportion of PWID ever tested for HIV in Mohnyin and Myitkyina were lowest among all survey sites (28% and 24%, respectively), while Bamaw, Kalay, Lashio, Mandalay, and Yangon had the highest proportion of PWID ever tested (>60% at each site).

Among those who reported ever testing for HIV, 49% were tested over one year ago, and approximately two-thirds were tested 6 months ago or longer. Recent testing (within the last 3 months) was low across all survey sites. Muse (35%), Kutkai (30%), and Kalay (29%) reporting the highest percentage of recent testing.

The reported recency of testing was not significantly different among PWID reporting a negative result at last testing, with a majority (45%) reporting last time tested as more than one year ago. Muse (40%) and Kutkai (30%) reported the highest percentage of recent testing (within the last 3 months) among PWID reporting a negative result at last test.

[1] The six knowledge questions include, knowing about the protective factors of using condoms at every sex, having a mutually monogamous partner, knowing that HIV cannot be transmitted by mosquitoes or sharing food with an infected person, knowing that HIV can be transmitted through shared needle use, and that an HIV positive person can look healthy

Figure 46. Percent of PWID who had ever been tested for HIV

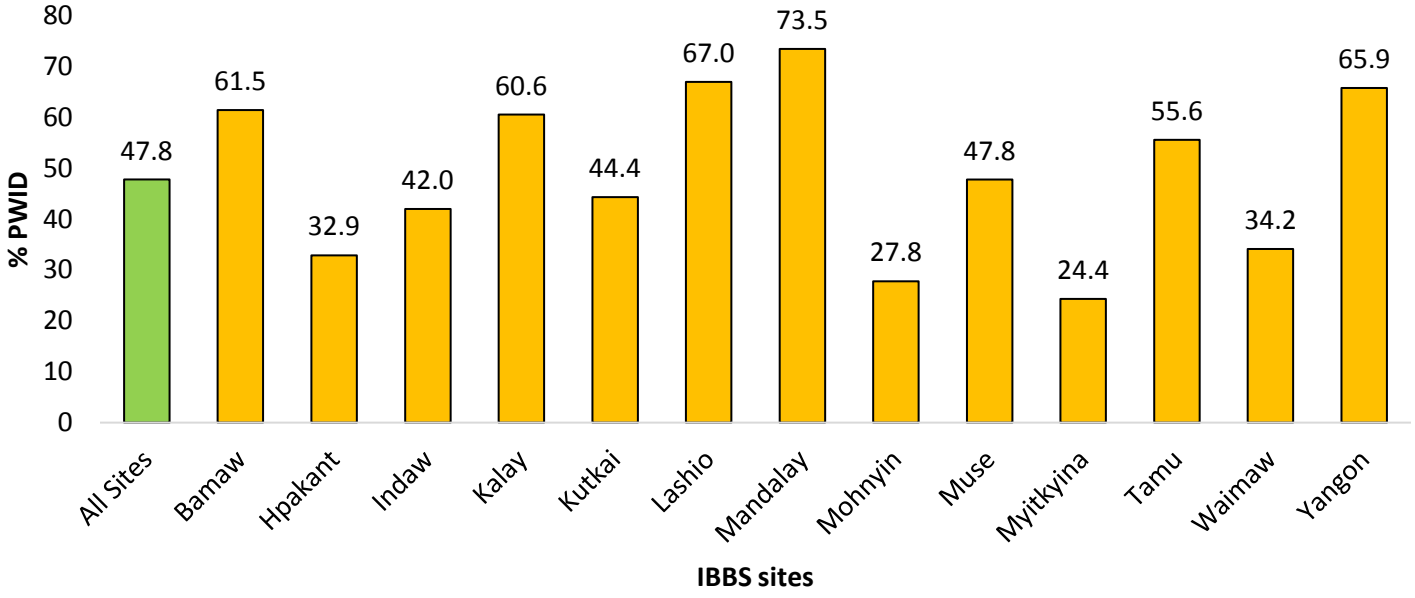
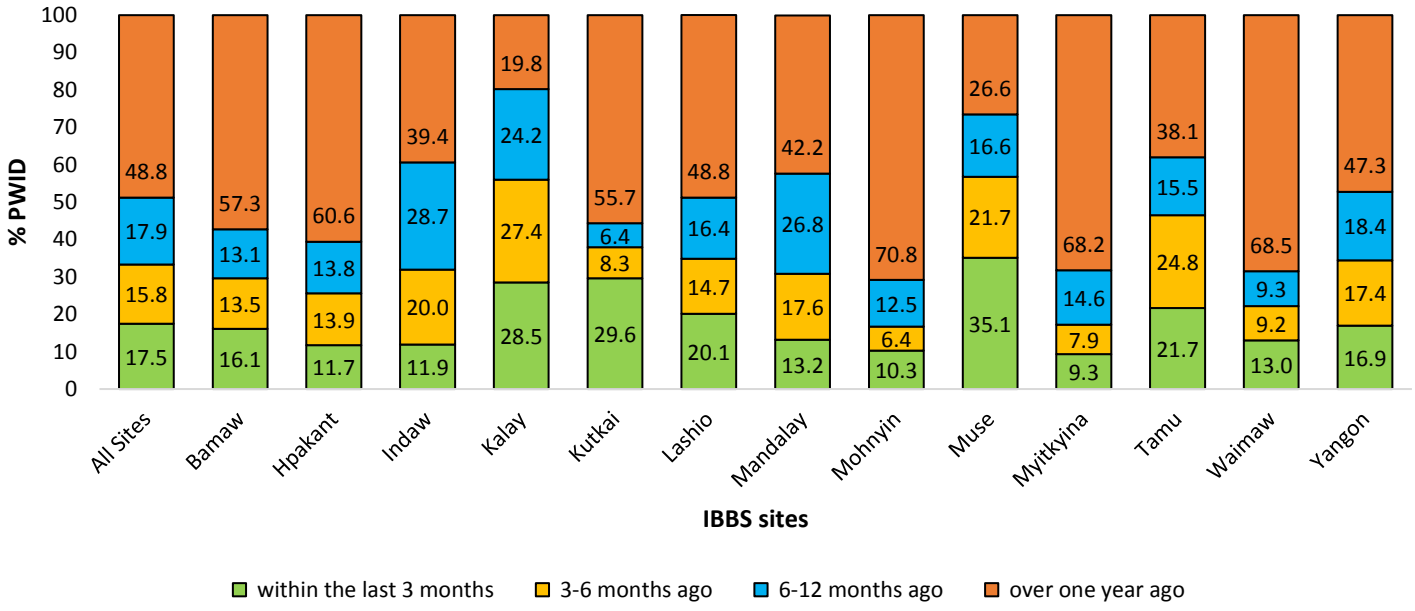


Figure 47. Last time tested for HIV



Overall, 14% of PWID ever tested reported a positive result at last testing. Bamaw (34%), Lashio (25%), and Waimaw (25%) reported the highest percentage of positive test results, while Kalay (3%) and Tamu (3%) reported the lowest. As compared to the number of PWID who are HIV-positive in Kalay (14%) and Tamu (23%), the low percentage of PWID with known HIV status at these sites is notable. These findings are further explored in Section 3.6.

Figure 48. Last time tested for HIV, among those with an HIV negative test result on their last test

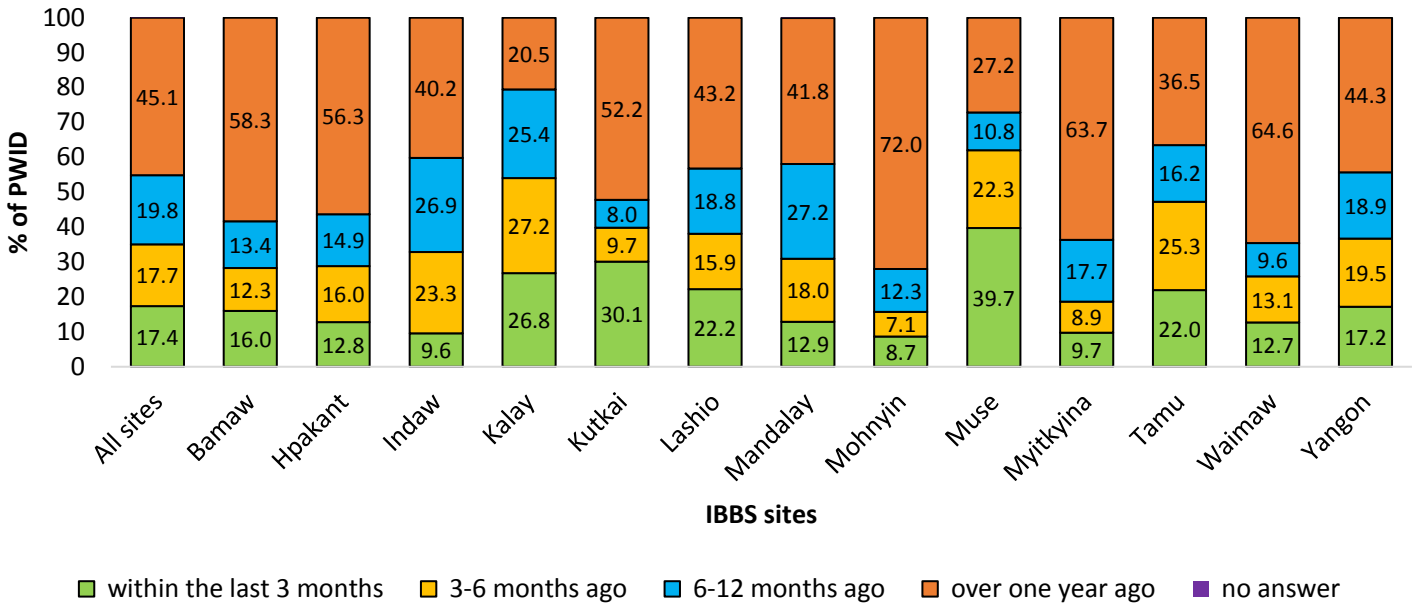
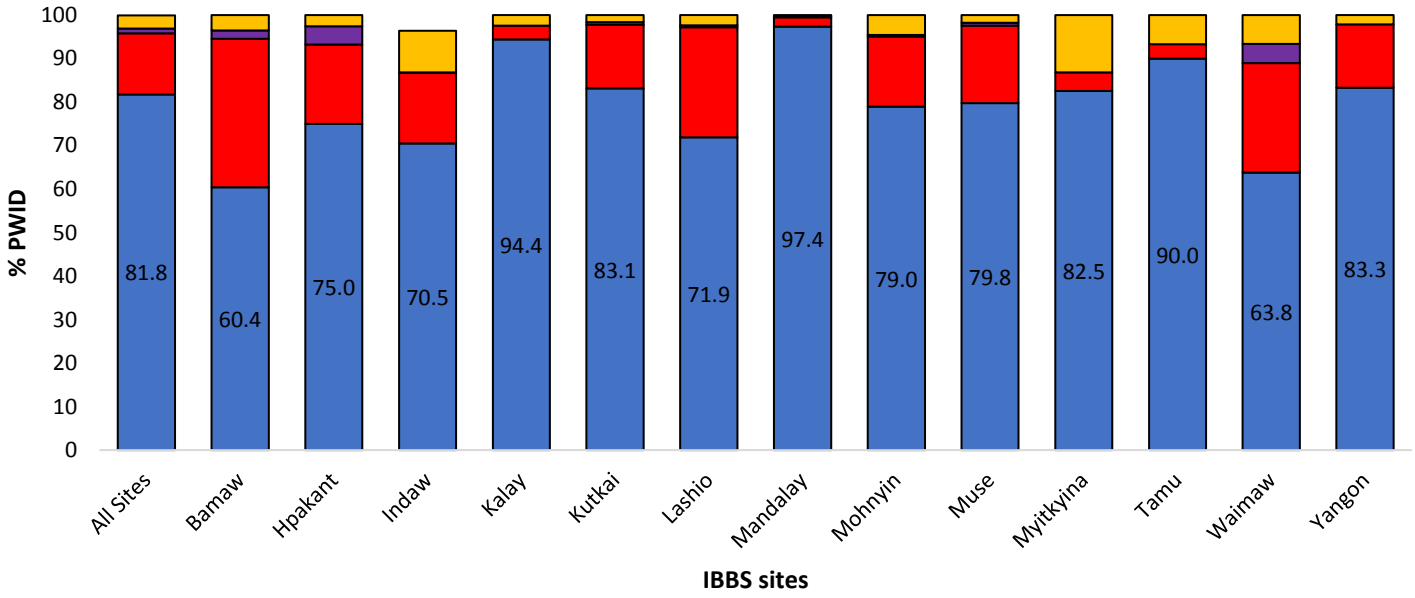


Figure 49. Reported result of last HIV test, among PWID ever tested



Characteristics of people getting tested

Across all survey sites, PWID 25 years and older were more likely to have ever been tested. This difference was statically significant in all survey sites, except Kalay. The most notable testing difference was observed in Yangon, where only one-third of PWID less than 25 years had ever been tested, compared with more than three-quarters of PWID 25 years and older. Longer-term injectors were also significantly more likely ($p<0.05$) to have been tested across all survey sites, except Bamaw and Mohnyin.

In all survey sites but Kalay, a significantly higher proportion of PWID who knew someone infected with HIV and who had comprehensive knowledge about HIV prevention and modes of transmission (all 6 HIV

questions correct) were ever tested for HIV. Ever using a previously used needle or syringe was associated with a higher proportion of HIV testing in Hpakant, Kutkai, Mandalay, Muse, Tamu, Waimaw, and Yangon.

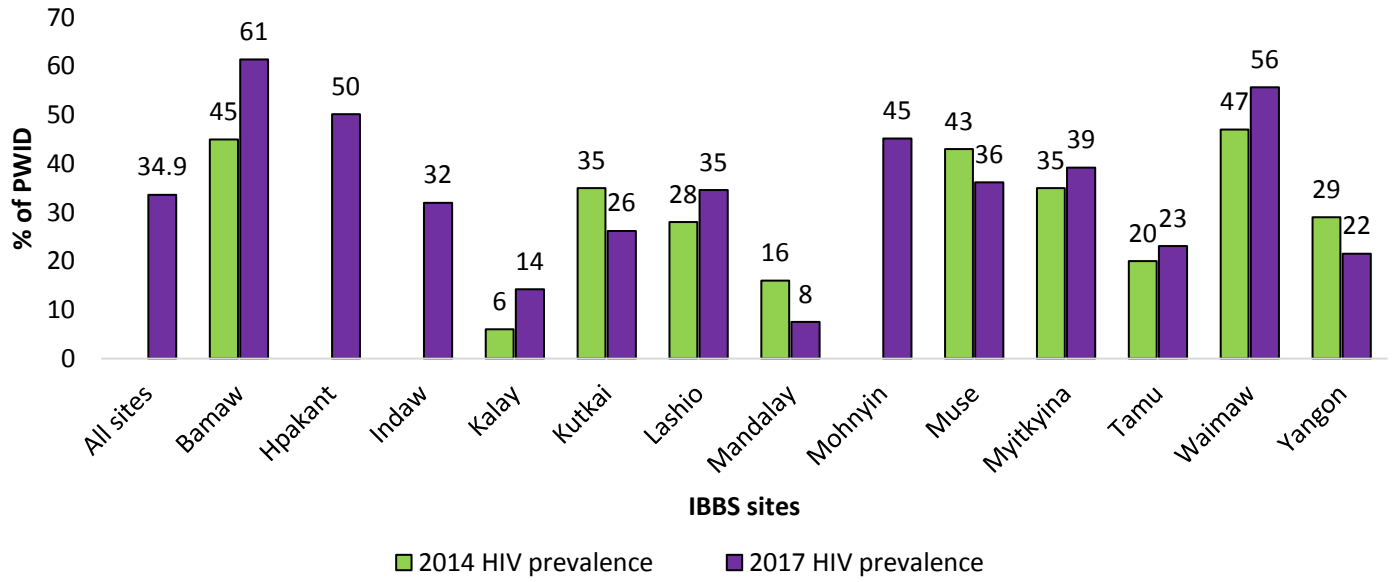
Similar to 2014 IBBS findings, accessing various types of PWID services was also a significant predictor of HIV testing in all survey sites ($p<0.05$). PWID who ever had drug treatment, received methadone treatment (both ever and in the last 3 months), and visited a DIC in the last 3 months were significantly more likely to report ever being tested in all survey sites.

3.6. HIV Prevalence and Correlates of Infection

Overall HIV prevalence

Overall HIV prevalence among PWID was 34.9%, with the lowest prevalence in Mandalay (7.6%) and the highest prevalence in Bamaw (61%). Six survey sites reported an increase in HIV prevalence from the 2014 IBBS (Bamaw, Kalay, Lashio, Myitkyina, Tamu and Waimaw), while four sites (Kutkai, Mandalay, Muse, and Yangon) reported a reduction. No significant differences in HIV prevalence were observed among PWID less than 25 years of age, compared with all.

Figure 50. HIV Prevalence in 2014 vs 2017



Among PWID reporting never testing for HIV, overall HIV prevalence was notably higher (41%), with a majority testing positive in Bamaw (64%), Hpakant (54%), and Waimaw (54%). Among PWID who reported a negative result at last testing, overall HIV prevalence was significantly lower (16%), compared with PWID who reported never testing. Across all survey sites, HIV prevalence varied widely among PWID reporting negative result at last testing, ranging from 2% in Mandalay to 40% in Waimaw.

Figure 51. Percentage tested as HIV+, among those reporting never had HIV testing

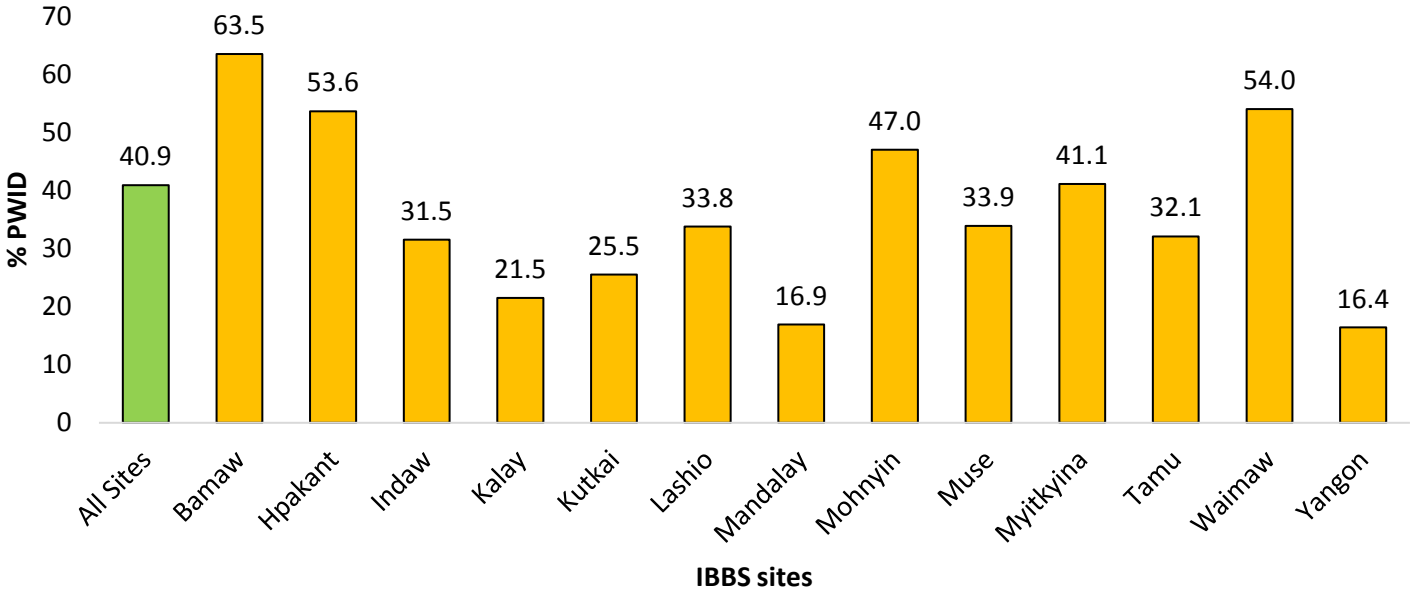
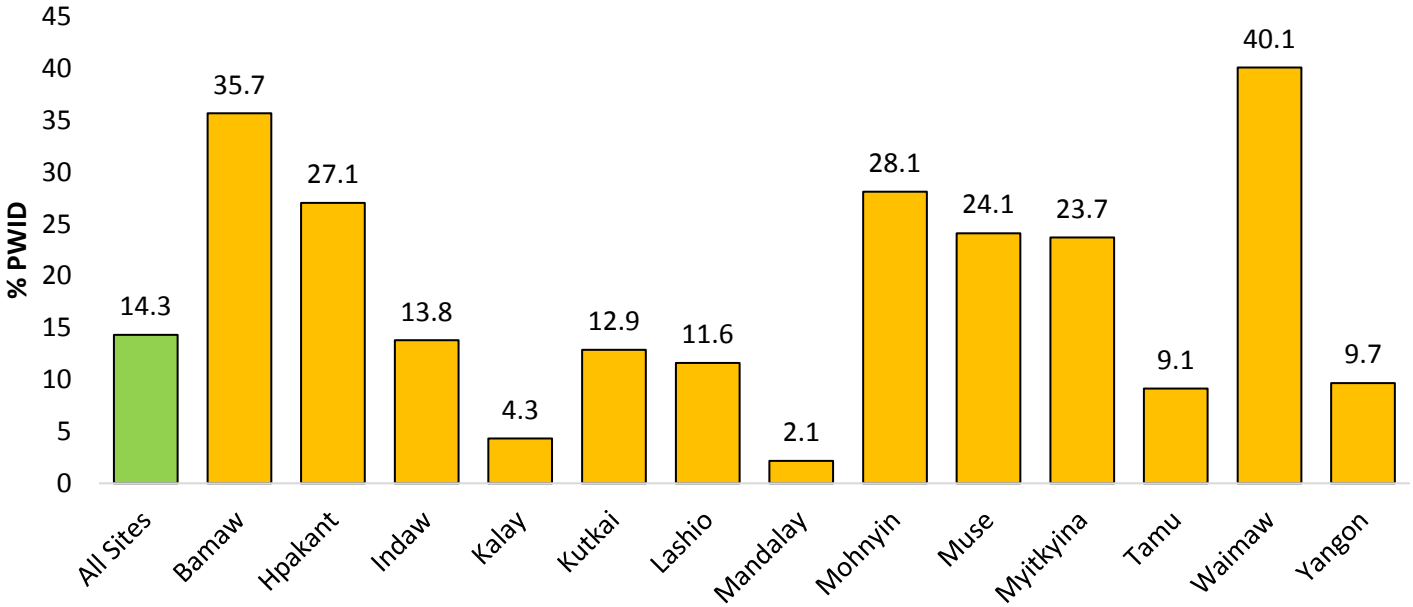


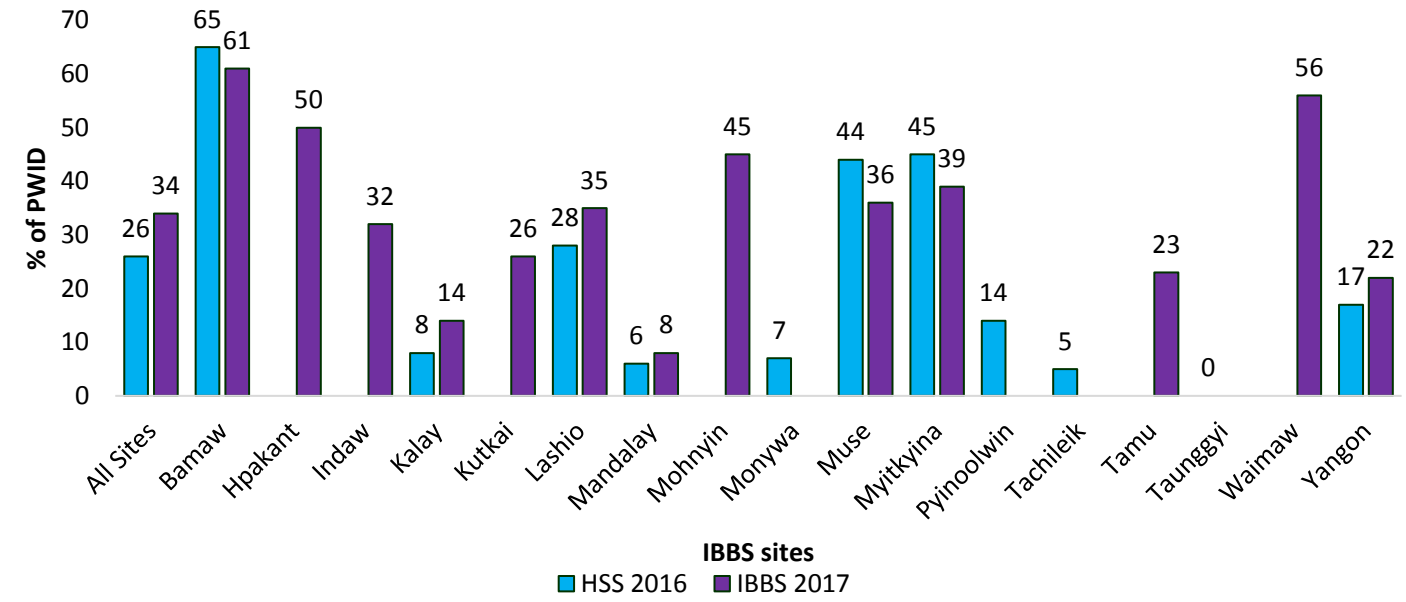
Figure 52. Percentage tested as HIV+, among those reporting HIV-neg test results on last HIV test



Seven survey sites also had data from HIV sentinel surveillance activity. The sampling methodology for HIV sentinel surveillance is very different than that used for the IBBS.[2] Overall HIV prevalence was significantly higher in the 2017 IBBS (34%), compared with 2016 HSS (26.1%). In all sites with both sources of HIV prevalence data, the most recent HSS results were lower than the IBBS results in Kalay, Lashio, and Yangon. In Mandalay, the point estimate results from HSS and IBBS were almost the same. Bamaw reported the highest HIV prevalence for both IBBS and HSS across survey sites (61% and 65%, respectively).

[2] HSS and IBBS differ significantly in sampling methodology, resulting in differences in the target population of PWID who are represented in each survey type.

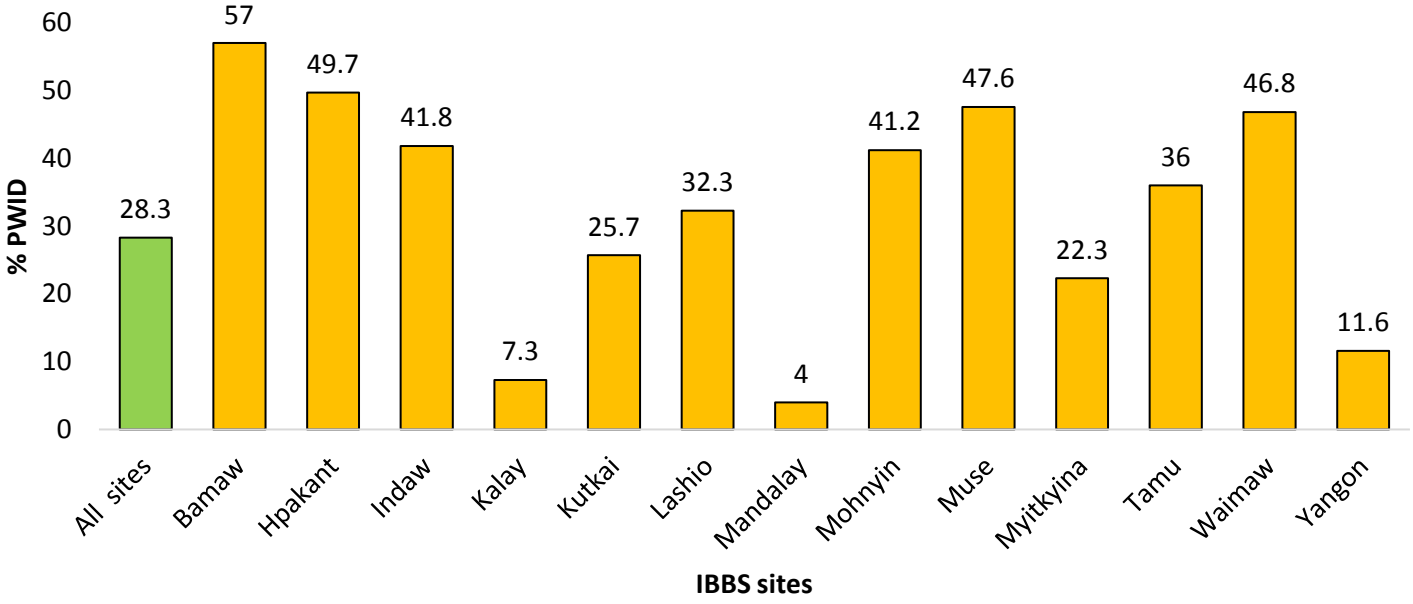
Figure 53. HIV Prevalence among PWID-IBBS and HSS results



HIV prevalence and demographic variables

Overall, younger injectors were less likely to be HIV positive compared to those 25 years and older. The opposite pattern was observed, however, in Indaw, Muse, and Tamu. In these survey sites, a greater proportion of PWID less than 25 years of age were HIV-positive. Differences observed between age groups were statistically significant ($p<0.05$) in all survey sites, except Bamaw, Kalay, and Lashio.

Figure 54. HIV Prevalence among PWID less than 25 years of age

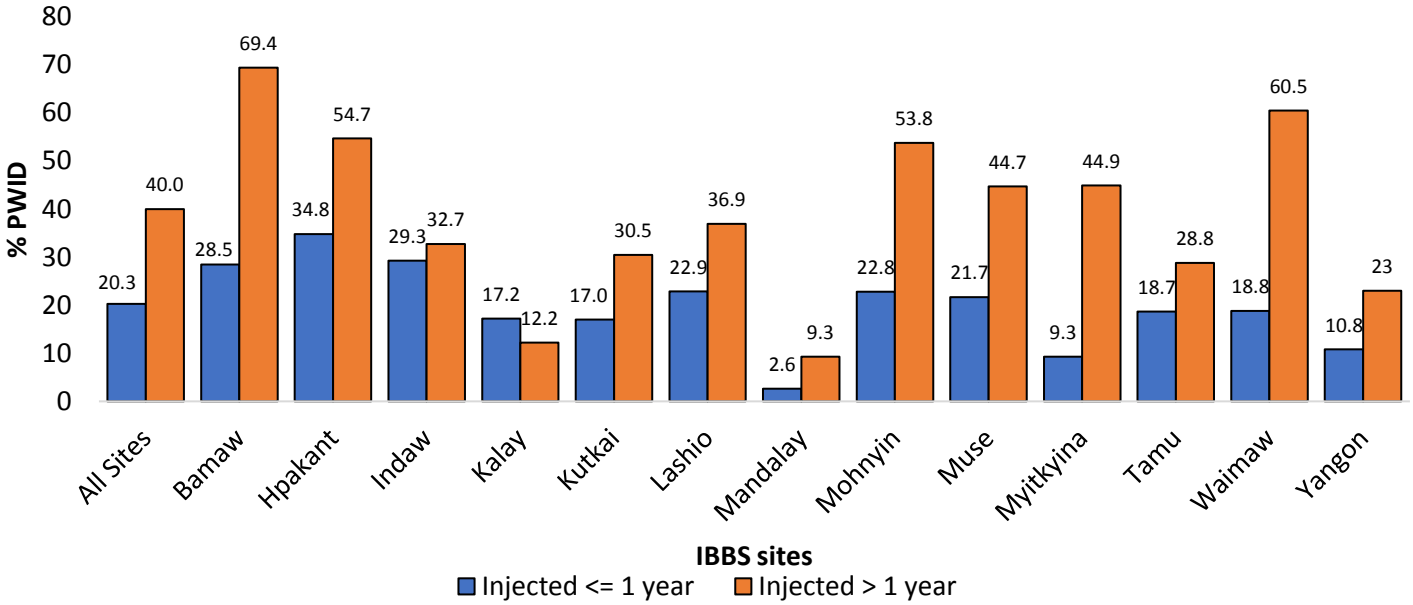


Highest educational attainment was significantly associated with the lowest HIV prevalence, overall and across most survey sites, except in Hpakant, Indaw, Muse, Tamu, and Myitkyina. Except in Kalay, being divorced, separated, or widowed was associated with higher HIV prevalence compared to those who were currently married or never married. Observed differences by marital status were statistically significant in all survey sites.

Correlation between HIV prevalence and injecting behaviours

As expected, PWID who had been injecting for more than a year were much more likely to be HIV positive compared with PWID who had been injecting for a year or less. Overall, HIV prevalence among individuals who had been injecting for more than one year was twice the HIV prevalence among new injectors (<= 1 year). The largest difference in HIV prevalence was observed in Waimaw. In this survey site, less than 20% of PWID injecting for one year or less were HIV positive, compared with more than 60% of PWID injecting for one year or more. Ever using a previously used needle/syringe was also a significant predictor of HIV across all survey sites ($p<0.05$).

Figure 55. HIV prevalence by duration of injection drug use



HIV Treatment

Among PWID who self-reported as positive for HIV, overall coverage for ever taking antiretroviral therapy (ART) was 70%. Although Bamaw reported the highest percentage of PWID who self-reported as positive for HIV, Mandalay reported the highest coverage for ever taking ART (96%), followed by Yangon (89%), Indaw (83%), and Hpakant (83%). Five sites (Kalay, Kutkai, Mohnyin, Muse, and Tamu) reported ART coverage less than 55%.

Among PWID who reported ever taking ART, overall coverage for those currently taking ART was over 95%, with current ART coverage ranging from 86% in Mandalay to 100% at 7 sites.

Figure 56. Ever taken antiretroviral therapy to treat HIV infection

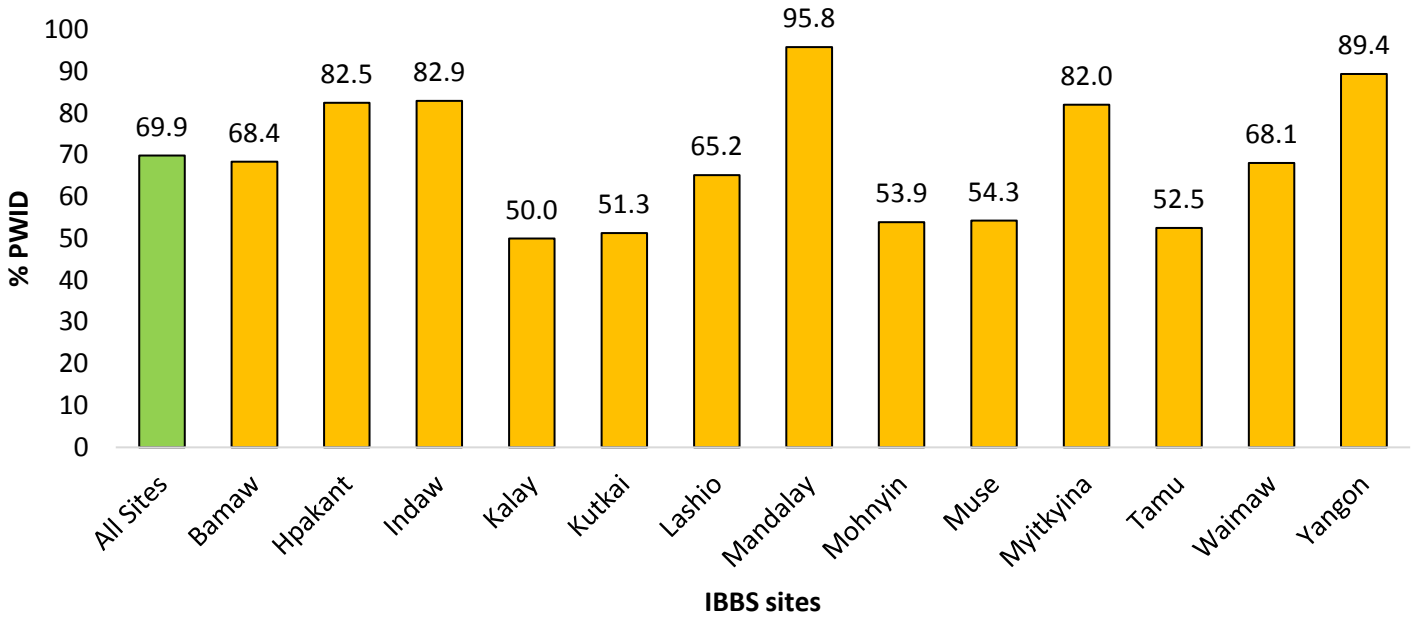
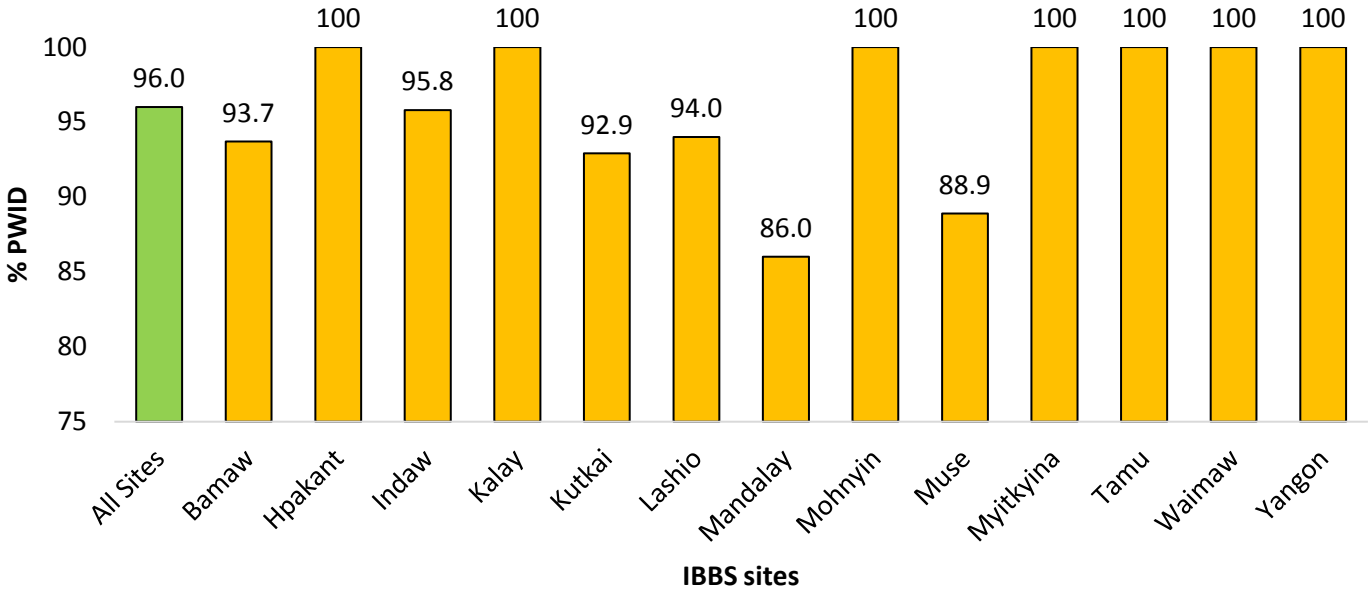


Figure 57. Percentage of PWID currently taking ART, among PWID who have ever taken ART



HIV treatment cascade

To assess progress towards the 90-90-90 targets among PWID— knowing one's status, receiving antiretroviral therapy, and achieving viral suppression through treatment adherence—PWID who self-reported as HIV-positive were asked questions about care and treatment. Less than 20% of HIV-positive PWID were aware of their HIV status. Knowledge of HIV status was lowest in Myitkyina (2%), Tamu (8%) and Mohnyin (10%). Knowledge of HIV status was highest in Lashio (48%) and Yangon (45%).

To assess linkage to care, PWID were asked if they had ever visited a healthcare provider for their infection. Among PWID who self-reported as HIV-positive, three-quarters or more of HIV-positive PWID were linked to

care in all survey sites, except Kalay and Kutkai; only 50% and 36% of HIV-positive PWID, respectively, had ever visited a healthcare provider for their HIV infection in these two survey sites. Highest linkage to care was observed in Mandalay, where more than 95% of HIV-positive PWID had ever visited a healthcare provider for their HIV infection.

Retention in care was notably higher than linkage to care. To assess retention in care, PWID who had ever visited a healthcare provider for their HIV infection were also asked if they had a visited a provider in the last 12 months. Overall, more than 90% of HIV-positive PWID linked to care were retained in care. In Mandalay and Kalay, 100% of HIV-positive PWID linked to care had seen a provider in the last 12 months. The lowest retention proportion was observed in Myitkyina, where only approximately half of HIV-positive PWID in Myitkyina were retained in care. Viral suppression (% with undetectable viral load) was not examined, as a significant proportion of PWID did not have known values; in the survey, PWID self-reported the result of their most recent viral load in the last 12 months, and more than 60% of PWID reported they did not know or could not remember the test result. These findings highlight that significant gaps remain in access and adherence to HIV treatment in PWID to achieve 2020 targets.

Table 14. HIV treatment cascade among PWID

	% HIV+ with known status[a]	% HIV+ linked to care[b]	% retained in care[c]
Bamaw	34.5	78.0	92.8
Hpakant	11.5	91.0	89.6
Indaw	21.1	74.1	85.0
Kalay	13.5	50.0	100
Kutkai	24.8	35.8	87.0
Lashio	48.3	76.3	90.5
Mandalay	20.3	95.8	100
Mohnyin	9.8	65.5	91.6
Muse	23.5	73.5	98.3
Myitkyina	2.4	89.8	50.5
Tamu	7.8	91.9	44.9
Waimaw	15.1	75.4	93.3
Yangon	44.7	90.1	100
All Sites	18.9	77.4	91.1

[a] *denominator: tested positive for HIV*
[b] *denominator: number with known HIV-positive status*
[c] *denominator: number ever visited a health facility for HIV infection*

Hepatitis C testing behavior

The overall percentage of PWID reporting ever testing for hepatitis C (HCV) was only 39%, with a notable range in testing observed across all survey sites; Myitkyina reported the lowest percentage of PWID ever tested (19%), while Yangon reported the highest (60%). Only Mandalay and Yangon reported >50% of PWID who had ever been tested for HCV. Reported frequency of HCV testing was also low, with most PWID (47%) reporting last test as more than a year ago. Recent HCV testing (within the last 6 months) varied widely across survey sites, from only 10% in Mohnyin to 50% in Kutkai and Muse.

Figure 58. Ever tested for hepatitis C

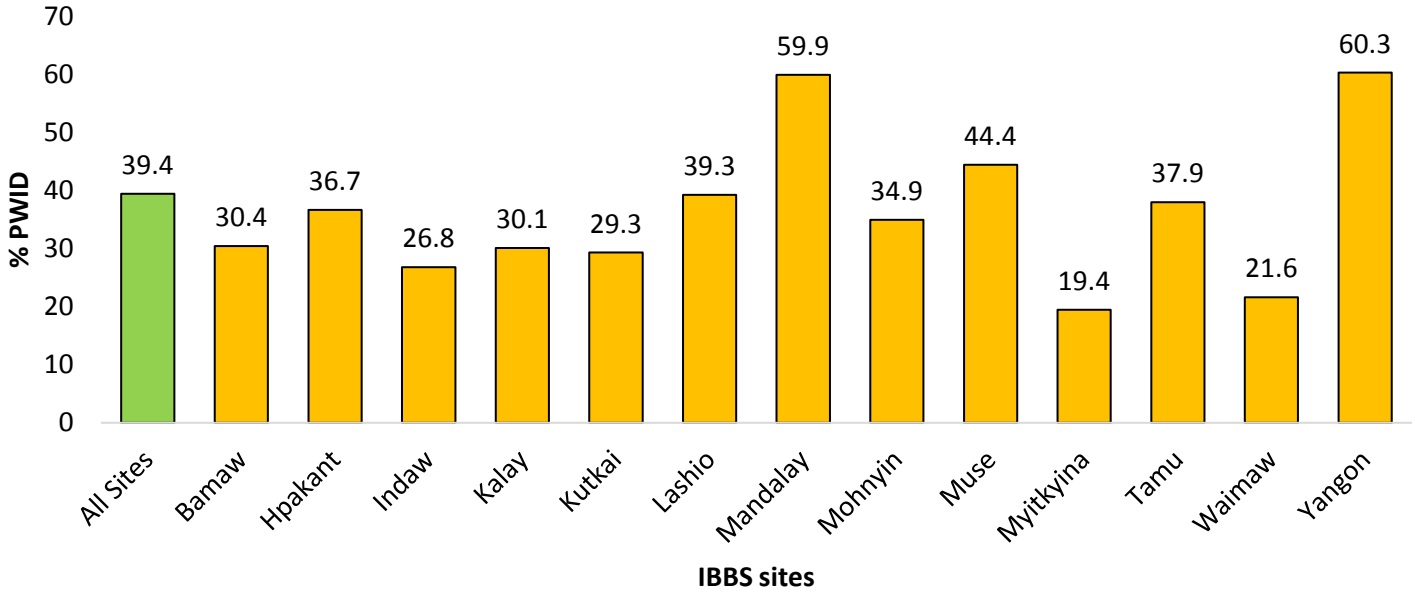
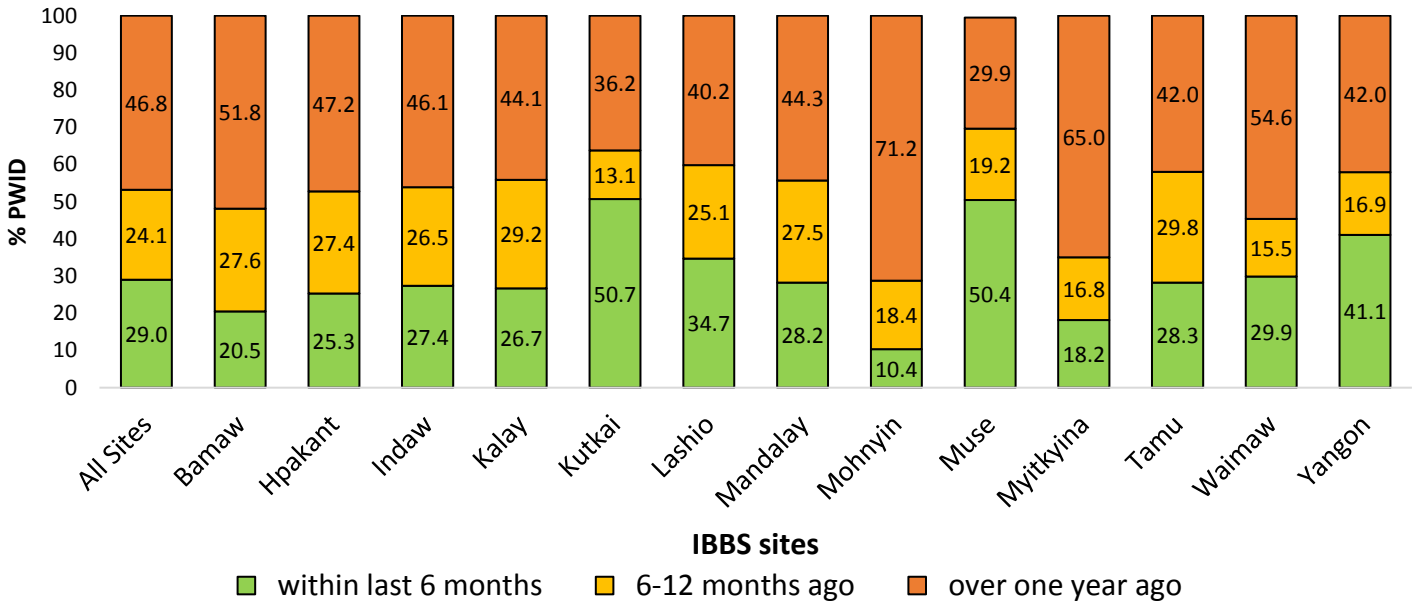


Figure 59. Last time tested for hepatitis C

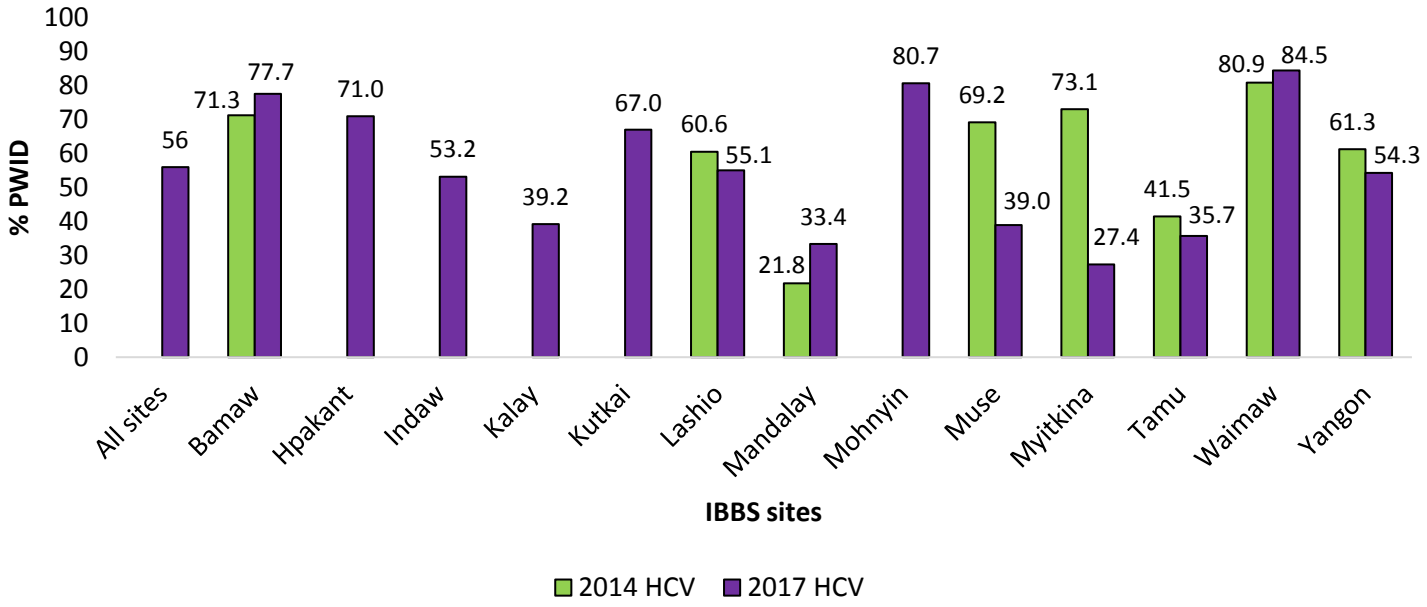


Hepatitis C and HIV co-infection prevalence

Overall HCV prevalence was high (56%), with prevalence ranging from 27% in Myitkyina to 85% in Waimaw. A significant range in prevalence of HIV/HCV co-infection was observed across survey sites, ranging from 4% in Mandalay to 55% in Bamaw.

Prevalence decreased across all survey sites from the 2014 IBBS, except Bamaw, Mandalay, and Waimaw. Co-infection prevalence also significantly increased in Bamaw and Waimaw, from 40% at each site to 55% and 54%, respectively.

Figure 60. HCV Prevalence, 2014 and 2017 IBBS



Hepatitis B and HIV co-infection prevalence

As expected, HBV prevalence was significantly lower than HCV prevalence at 7.7%. The highest prevalence was observed in Muse, Mohnyin, and Kalay. HIV/HBV co-infection was also significantly lower than HIV/HCV co-infection, with prevalence ranging from 0.5% in Mandalay to 5.7% in Hpakant.

Figure 61. Percent of PWID with positive Hepatitis B results, 2014 and 2017

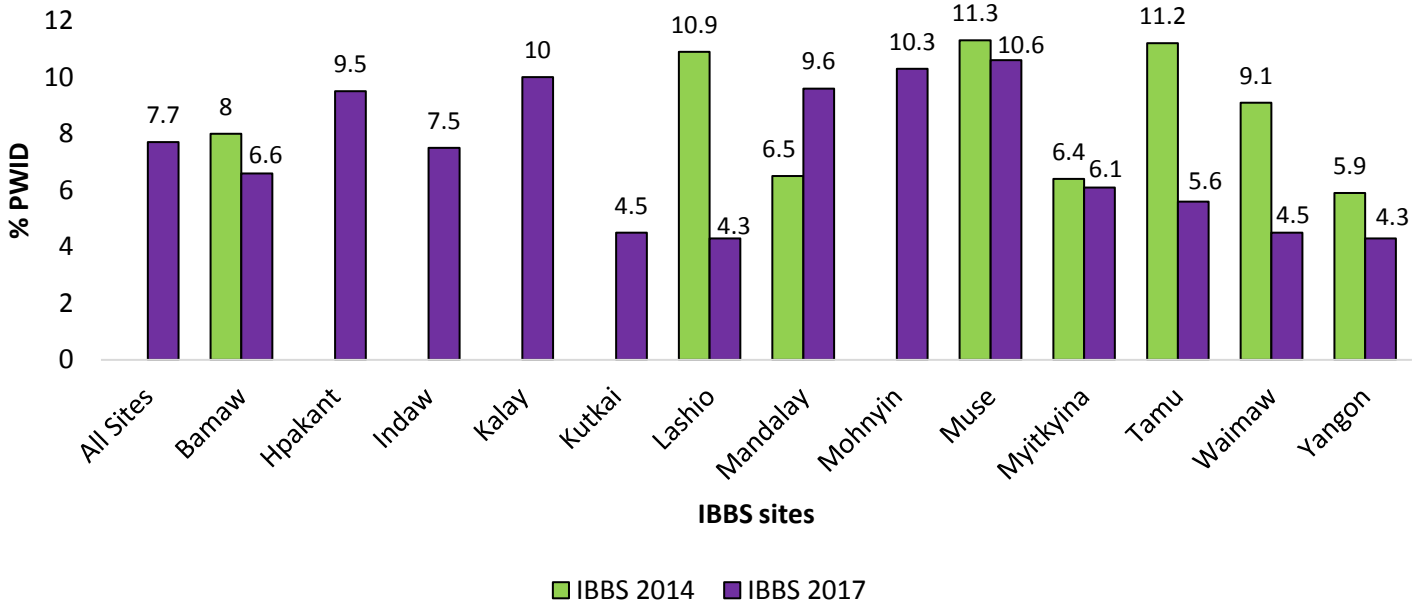


Figure 62. Percent of PWID with HIV/HCV co-infection, 2014 and 2017

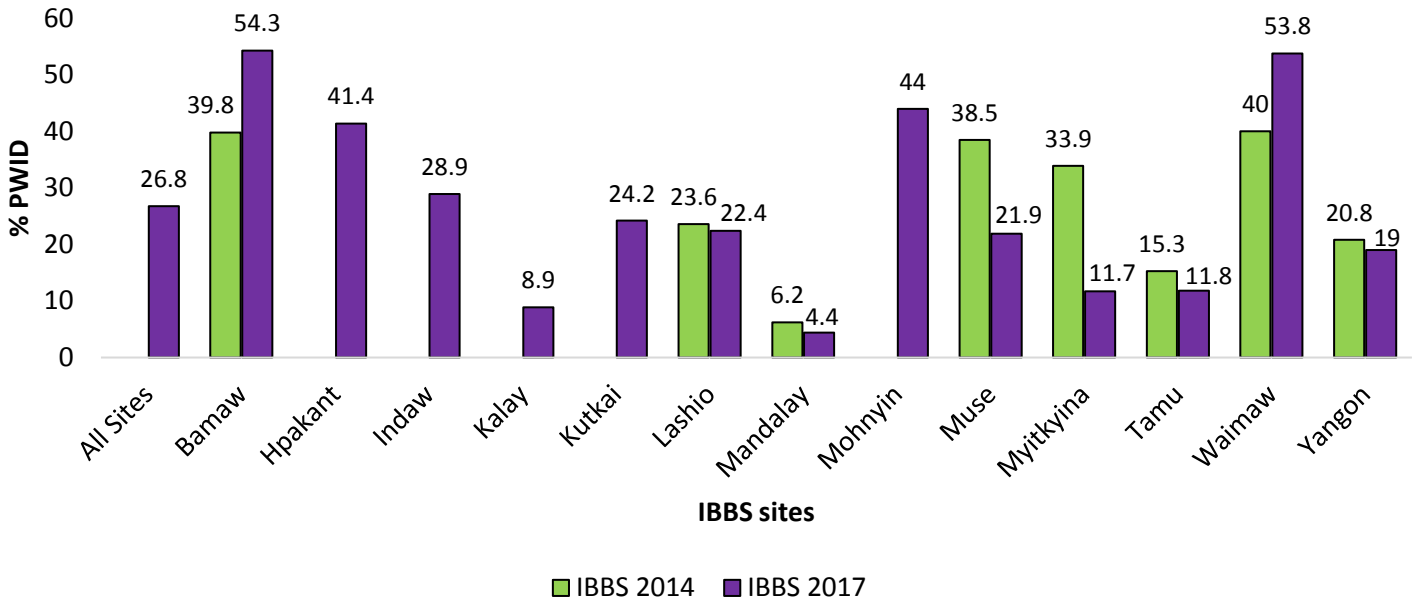
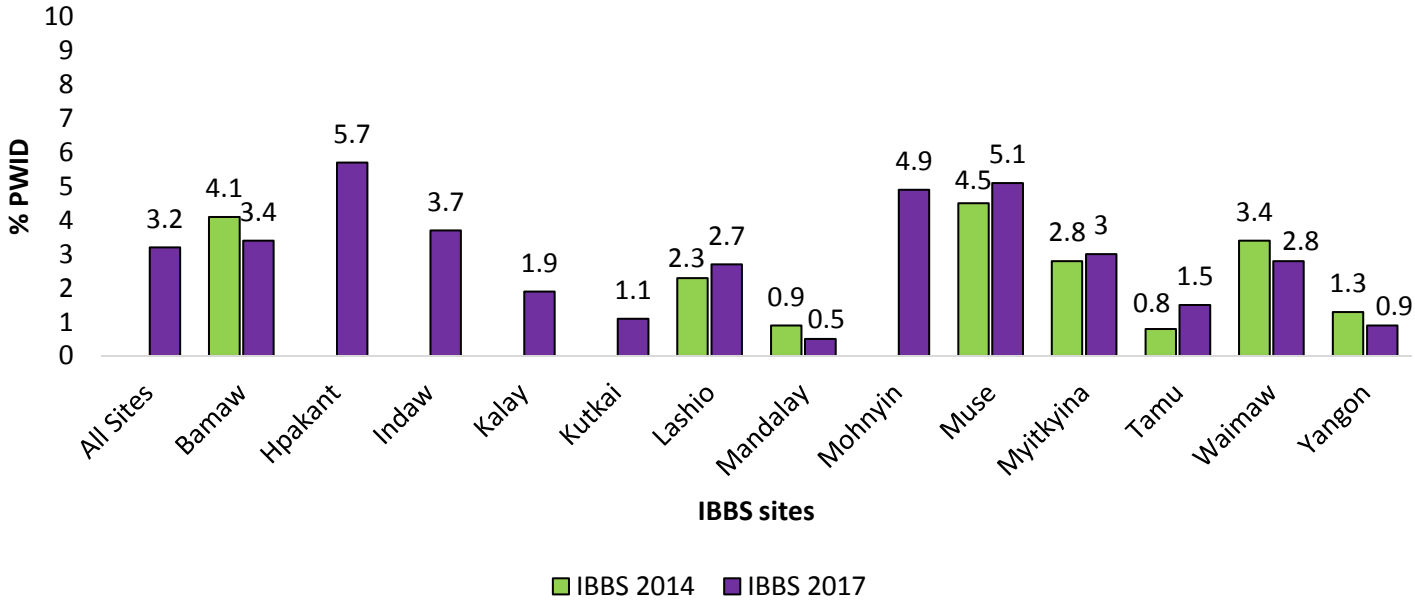


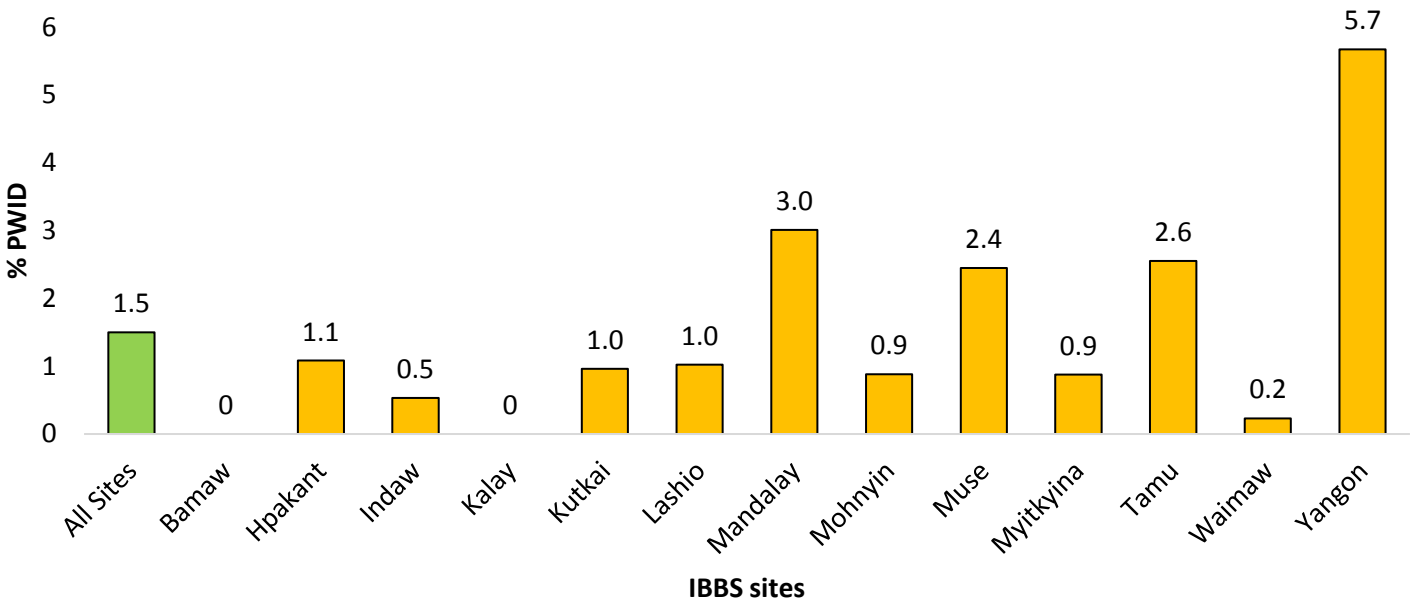
Figure 63. Percent of PWID with HIV/HBV co-infection, 2014 and 2017



Syphilis

Yangon had the highest % of PWID who tested positive for syphilis (5.7%)

Figure 64. Percent of PWID with positive Syphilis test results



4. IMPLICATIONS AND RECOMMENDATIONS

Based on the findings from IBBS PWID 2017 survey, the following implications and recommendations are described.

- **Increased in young PWID population compared to 2014 results**: Review and revise peer outreach models to expand outreach activities to young PWID and bring them for drug treatment to prevent HIV transmission. In particular, models for youth engagement in urban areas should be considered, as there was a significant increase in the young PWID population in Yangon
- **Identify successful models for peer outreach:** Compared with the 2014 IBBS, there was a notable reduction in the proportion of PWID under the age of 25 in Lashio and Myitkyina. Lessons learned from peer outreach and youth engagement in these areas should be examined and considered for adaptation to similar contexts.
- **Majority of PWID respondents are male**: Given overall small numbers of female PWID, compared with males, the survey recruited few female PWID through RDS sampling—similar to 2014 IBBS. Additional studies are needed to adequately characterize levels of risk and access to services among female PWID in a representative way. Additional methods are also needed to engage hard to reach female PWID
- **Geographic differences in drug injecting practices**: Further studies to be conducted to have in-depth information on drug use patterns and trends among young drug users, and common transitions process to injecting practices for all drug users;
- **Sociodemographic differences in HIV prevalence**: Associations found between income level, education, and knowledge of HIV prevention methods and HIV prevalence highlight the need to incorporate a multi-sectorial approach to current HIV prevention strategies among PWID

- **Having strong peer networks could promote safe injecting practices among PWID (e.g., Tamu and Muse survey sites):** Program should focus on supporting and enhancing capacity of drug users' network to sustain the effective preventive intervention activities among PWID
- **Sharing of needles and syringes:** Ever using a previously used needle/syringe was a significant predictor of HIV across all survey sites. Develop innovative strategies to distribute and ensure utilization of sterile needles and syringes. In particular, intensive strategies should focus on areas such as Bamaw, where sharing of needles and syringes is high (63%) and has seen the sharpest increase in needle sharing since 2014.
- **Low access to methadone treatment:** Further studies are needed to better characterize issues of access and to inform development of alternate strategies to create demand for methadone treatment
- **Low utilization and frequency of HIV testing:** With less than half of PWID ever testing for HIV, and only 19% knowing their HIV-positive status, there is a critical need to expand testing coverage among PWID. Incorporate additional testing strategies, including self-testing methods, to improve testing coverage among PWID
- **Early testing of PWID and targeted prevention strategies for PWID in the first year of injection drug use:** HIV prevalence among PWID who had been injecting for less than a year was 20%, as compared to an HIV prevalence of 40% among PWID who had been injecting for more than a year. Identifying and reaching PWID in the first year of injection drug use with HIV testing services and effective HIV prevention education may establish routine testing behaviors and safe injecting practices among new injectors
- **Expanding HIV testing beyond those who have previously accessed services:** Ever using a previously used needle or syringe was associated with a higher proportion of HIV testing in 7 townships. Additionally, accessing various types of PWID services was also a significant predictor of HIV testing in all survey sites. Further analysis is needed to better understand and harness previous exposure to education on risk factors and access of services to expand HIV testing coverage to harder to reach populations
- **Improving linkage to care:** Among PWID who self-reported as HIV-positive, three-quarters or more of HIV-positive PWID were linked to care in all survey sites, except Kalay (50%) and Kutkai (36%); strategies for ensuring immediate linkage to care and ART initiation in these areas should be explored
- **Low ART coverage and adherence on ART:** Findings highlight that significant gaps remain in access and adherence to HIV treatment in PWID to achieve 2020 targets Integrated HIV services should be provided to PWID so that they can be tested and treated for HIV, STI, TB and other co-infection. Defaulter patients tracking and enhanced adherence counselling should be provided to meet the psychosocial needs of PWID and adherence on HIV treatment services. In particular, retention strategies in areas such as Myitkyina, where only approximately half of HIV-positive PWID were retained in care, are needed.
- **Analysis of areas with low ART coverage:** Five sites (Kalay, Kutkai, Mohnyin, Muse, and Tamu) reported ART coverage less than 55%. Further exploration is needed into the factors associated with poor HIV service utilization in these areas, including availability of staff, human resources for health, accessibility of services and services quality
- **Intensive dedication of resources to expand HIV prevention, testing, and care and treatment services in high prevalence areas:** Bamaw reported the highest HIV prevalence for both IBBS and HSS

across survey sites (61% and 65%, respectively). At almost twice the national prevalence among PWID, it is critical to infuse additional prevention and HIV care and treatment services into the region

- **Consistent condom use is considerably low and increase in syphilis positivity rates:** Comprehensive knowledge, education and awareness regarding safe sex practices should be promoted with participation from peers and immediate communities
- **Addressing hepatitis C among PWID:** Scale up of targeted outreach prevention activities for safe injecting and coordinate with National Hepatitis C Programme for confirmatory testing, referral and treatment
- **Overall increased in HIV prevalence**: Invest in implementation of combined effective preventive strategies focusing on behavior change, and treatment services to reduce prevalence in Kachin, Sagaing, North Shan.
- **Conduct further analysis** to develop township specific profile that would provide comprehensive information on implementation gaps, demographic situation on drug use behaviors, needles sharing practices, access to preventive and treatment services.

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6. ANNEXES

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