STUDY REPORT ON EFFECTIVENESS AND EFFICACY OF IMPLEMENTATION PROJECT ON BUPRENORPHINE MAINTENANCE TREATMENT FOR OPIOID DEPENDENCE IN MYANMAR

Contact:

Dr. Nanda Myo Aung Wan

Principal Investigator | Program Manager

Drug Dependency Treatment and Research Unit

Contents

LIST OF ABREVIATIONS....2
LIST OF TABLES....3
LIST OF FIGURES....3
EXECUTIVE SUMMARY....4
BACKGROUND....6
STUDY OBJECTIVES....7
METHODOLOGY....8
Study Design....8
Study Setting....8
Sample size....8
Sampling procedure....8
Study Populations....8
Study procedures....10
Training of Staff....10
Data collection tool....11
Data collection procedure....11
Data analysis....11
Data Management....11
ETHICAL CONSIDERATIONS....12
QUANTITATIVE FINDINGS....13
Background Characteristics....13
Drug Use History....14
Current Drug Use Patterns....15
High-Risk Behaviors....15
Addiction scores assessment and BPN initiation dose....16
BPN treatment over one-year follow-up....18
Retention in the BPN program....19
Outcome after one-year follow-up....19
Self-reported illicit drug use during the clinic visits....20
Urine testing results during the clinic visits....21
Self-reported overdose experience....24
Side effects experienced....24
DISSCUSSION....24
Study Outcome discussion....24
PROGRAM RECOMMENDATIONS....26
LIMITATION OF THE STUDY....26
REFERENCES....27

LIST OF ABREVIATIONS

AIS	Agency, Information and Services Activity
BPN	Buprenorphine
BPN-N	Buprenorphine-Naloxone
COWS	Clinical Opiate Withdrawal Scale
CPI	Community Partners International
DDTRU	Drug Dependency Treatment and Research Unit
DSM5	Diagnostic and Statistical Manual of Mental Disorders
DTIC	Drug Treatment Information Card
FGD	Focus Group Discussion
HIV	Human Immunodeficiency Virus
IDI	In-depth Interviews
MO	Medical officers
NGOs	Non-governmental Organizations
OAMT	Opioid Agonist Maintenance Treatment
PEPFAR	President's Emergency Plan for AIDS Relief
RCTS	Randomized control trials
SD	Standard Deviation
TOT	Training of Trainers
UHF	USAID HIV/AIDS Flagship
WHO-ICD	World Health Organization – International Classification of Diseases

LIST OF TABLES

Table 1. Background Information 13

Table 2. Drug Use History 15

Table 3. Drug Addiction Score Assessment 17

Table 4. BPN initiation dose 17

Table 5. BPN outcome after one-year follow-up 20

Table 6. Self-reported illicit drug use during clinic visits 20

LIST OF FIGURES

Figure 1. Algorithm of BPN study 9

Figure 2. Recruitment Flow of BPN study 10

Figure 3. Median BPN doses over one-year follow-up visits by sites 18

Figure 4. BPN retention rate by sites 19

Figure 5. Urine morphine positivity rate during clinic visits 21

Figure 6. Urine amphetamine positivity rate during clinic visits 21

Figure 7. Urine cannabis positivity rate during clinic visits 22

Figure 8. Urine methadone positivity rate during clinic visits 23

Figure 9. Urine methadone positivity rate during clinic visits 23

Figure 10. Side effects experienced after BPN 24

EXECUTIVE SUMMARY

Introduction

Myanmar faces a high burden of opioid dependence, with an estimated 93,000 people who inject drugs most of whom use heroin. Approximately one-third of people who use drugs are living with HIV, underscoring the urgent need for effective harm reduction interventions. While methadone maintenance therapy has been the only available opioid agonist maintenance treatment (OAMT) option in Myanmar, it has limitations including accessibility barriers, long induction periods, and side effects that reduce acceptability and coverage.

Buprenorphine (BPN) is widely recognized as a safe and effective alternative to methadone for opioid agonist maintenance therapy and is endorsed by the World Health Organization as a first-line treatment (WHO, 2009). Compared with methadone, buprenorphine demonstrates superior safety due to its partial agonist profile, resulting in lower risk of respiratory depression and overdose (Mattick et al., 2014; Strain et al., 2011). It offers greater efficiency and flexibility in service delivery through shorter induction periods, alternate-day dosing, and supervised take-home options, thereby reducing the burden of daily attendance (Krook et al., 2002; Carrieri et al., 2006). Buprenorphine also provides improved tolerability and patient acceptability, with fewer drug–drug interactions, less cognitive impairment, and reduced misuse potential compared to methadone (Lintzeris et al., 2006; Soyka et al., 2017). Evidence from Asia and other regions further highlights higher levels of patient preference and treatment satisfaction, citing its milder side-effect profile and better compatibility with daily functioning (Tran et al., 2018; Ambekar et al., 2018). Collectively, these attributes underscore buprenorphine's superior efficacy, efficiency, and patient-centeredness, making it a strong option for scaling up treatment in resource-limited and conflict-affected settings such as Myanmar.

Methodology

This study adopted a prospective observational design in quantitative approach. Quantitative data were collected from 220 participants (52 in Yangon, 32 in Mandalay, 136 in Myitkyina) through structured questionnaires and Drug Treatment Information Cards (DTICs). Participants were recruited using convenience sampling for quantitative and assessed based on established criteria for opioid dependence Data analysis was conducted using Stata 14 for

quantitative data. The study adhered to ethical standards, with informed consent obtained and confidentiality maintained.

Findings

The mean age of participants was 35 years, with most being male (97.3%). Heroin was the predominant drug used (94.5%), with injecting as the main route of administration (71.8%). Risk behaviors were common, including needle sharing (23.2%) and history of overdose (10.4%). Baseline assessments showed moderate to severe opioid dependence, with most participants initiated on BPN at 4–6 mg.

At the study endpoint, 27.7% remained active in treatment, 7.3% had transitioned to methadone, and 61.8% were lost to follow-up, with small numbers completing treatment (1.8%) or recorded as deceased (1.4%). Retention declined from 57.3% at three months to 28.2% at twelve months, with Yangon performing somewhat better than the other sites. Self-reported heroin use was nearly universal at baseline (99.6%) but dropped sharply following treatment initiation, with only 1.6% reporting ongoing use at twelve months. Urine testing coverage increased markedly after baseline and remained high, peaking at 90.4% at month six. Morphine positivity showed the most consistent decline, from 84.6% at baseline to 2.5% at twelve months. Other substances, including cannabis and diazepam, also decreased to complete absence by the end of follow-up, while amphetamine use declined from 24.6% to 5.0% with a minor fluctuation at month nine. Methadone was rarely detected throughout. Collectively, these findings demonstrate that buprenorphine treatment was associated with meaningful reductions in opioid and poly-drug use, with moderate retention under challenging operational and security conditions.

Overall, the study demonstrated that buprenorphine maintenance treatment is feasible, acceptable, and effective in Myanmar. While retention challenges remain, BPN offers distinct advantages over methadone, making it a vital option for scaling up OAMT and strengthening HIV prevention efforts among people who use drugs.

BACKGROUND

It has been estimated that there are about 93,000 people who inject drugs (people who use drugs) in Myanmar, almost all of whom inject heroin[1]. Heroin dependence is known to be a devastating, chronic disorder with adverse consequences in almost all the areas of lives of affected patients. One of the major consequences of injecting drug use is enhanced vulnerability to blood borne viral infections like HIV. In Myanmar, a sizeable proportion of people who use drugs (about 34.9%) are living with HIV[2].

In response to the rising epidemic of HIV associated with drug use, Myanmar has initiated comprehensive programs aimed at preventing HIV transmission among people who use drugs. Among these, Needle Syringe Programs and provision of Opioid Substitution Therapy (OAMT) using Methadone are especially important. As of 2019, about 20000 people who use drugs are covered through methadone[3]. It is apparent that despite best attempts, coverage of OAMT for people who use drugs remains inadequate in Myanmar.

At present, only one option (methadone) is available for OAMT in Myanmar. Some of the reasons cited for low coverage of OAMT methadone include long distance to travel, long induction period, difficulty in accessing take-home dose, and limited availability of satellite dispensary models[4]. Buprenorphine as OAMT comes across as a very promising option in this regard since some of these challenges associated with Methadone treatment can be addressed by using buprenorphine. Buprenorphine in general has a better safety profile than methadone, requires short induction period, and allows patients to be stabilized on the maintenance dose in 3 – 4 days. With the use of the combination formulation of Buprenorphine-Naloxone (BPN-N), the risk of diversion and overdose is minimized enhancing the possibility of take-home dispensing. A large number of Randomized Controlled Trials (RCTS), review papers and meta-analyses are available showing effectiveness of buprenorphine[5]. A systemic review reported that buprenorphine, buprenorphine-naloxone, and methadone are similarly efficacious for the treatment of opioid-dependent patients. Buprenorphine-naloxone has less potential for abuse and diversion. The adverse-effect profiles for buprenorphine, buprenorphine-naloxone, and methadone are similar[6]. The experience of using buprenorphine and the evidence-base is not only limited to the developed countries. There is adequate amount of clinical, research and program experience about OAMT with buprenorphine from the developing countries as well. In the neighbouring country, India, Buprenorphine is the major treatment option used for the treatment of opioid dependence as well as for HIV prevention for more than two decades[7]. The effectiveness as well as feasibility of Buprenorphine treatment has been demonstrated in India in the community-based settings (NGOs) as well as the Government hospital settings. According Avert 2019, it is stated that "However, because the scale of drug use in Myanmar is particularly extensive, existing harm reduction services are failing to meet the escalating demand by people who inject drugs. In particular, OAMT sites need to scaled up. Currently only around 50 OAMT sites are in operation, reaching around 17% of people who inject drugs. Satellite dispensary models are limited in Myanmar[9]."

Since, HIV among people who use drugs continues to be a significant public health concern in Myanmar, newer strategies are clearly required to address it. Though, large scale OAMT program using Methadone have been instituted, due to inherent challenges with methadone, the coverage remains inadequate. Hence provision of OAMT with buprenorphine in Myanmar will be immensely helpful in:

- Improving the coverage (by initiating buprenorphine OAMT programs in locations where methadone program does not exist / have inadequate number of clients / have inadequate coverage).
- Providing another option of treatment to those people who use drugs clients who have not found methadone effective or suitable for some reason (such as unsatisfactory subjective experiences or side effects).
- Providing user-centred clinical decision support and to increase the rates of BPN initiation at drop-in centers[10]

The major potential benefit of adding buprenorphine as an option would be the rapid scaleup which will be possible owing to the unique characteristics of buprenorphine. Due to better safety profile of buprenorphine-naloxone combination, the concerns with diversion and misuse would be minimized and it would be possible to provide 'take-home' treatment to a larger number of people who use drugs clients. This would result in improvement in retention in treatment, thereby minimizing the risk of HIV associated with injecting / sharing.

In view of this, it has been decided to implement buprenorphine-based OAMT as a pilot project under the instruction and guidance technical support from DDTRU with the leading role and with the funding support from the USAID HIV/AIDS Flagship (UHF) Project under the President's Emergency Plan for AIDS Relief (PEPFAR) and continue with the AIS project from 2022 to 2025 period through Community Partners International (CPI) to the implementing partners such as Medical Action Myanmar and Asia Harm Reduction Network.

Sustainable issue of BPN

Demonstration project is planned to be initially implemented to understand and gather evidence of how BPN can be further scaled up in Myanmar, taking into consideration the local situation and contextual factors. This document describes the full report of this demonstration project.

STUDY OBJECTIVES

The main objectives of the study were as follows.

1) To recruit the patients for receiving buprenorphine maintenance treatment in Yangon, Mandalay and Myitkyina
2) To initiate buprenorphine maintenance treatment in Yangon, Mandalay and Myitkyina Drug treatment centres

3) To document the effectiveness and feasibility of implementation of buprenorphine maintenance treatment for opioid-dependent patient with the overall goal to enhance the OAMT coverage in Myanmar

METHODOLOGY

Study Design

The study applied a prospective observational design using quantitative approach. The primary data for the quantitative component were collected through questionnaire forms, while routine DTIS data from Drug Dependency Treatment and Research Unit (DDTRU) were also utilized to provide a more complete picture.

Study Setting

The project was implemented at three sites:

(a) Yangon Mental Health Hospital
(b) Myitkyina Drug Treatment Hospital, Kachin and
(c) Mandalay Drug Treatment Hospital.

These Major Drug Treatment Centers have already implemented Methadone Maintenance Therapy. All three centers have assigned specialists for drug treatment. Additionally, the partner organizations are working in these cities.

Sample size

A total of 220 participants were recruited for the quantitative component, comprising 52 clients from Yangon, 32 from Mandalay, and 136 from Myitkyina, respectively.

Sampling procedure

Participants for the quantitative component were recruited using convenience sampling. Those who were willing to initiate treatment and attended the clinic were assessed for eligibility based on predefined suitability criteria.

Study Populations

As this was not a study with an experimental design, all participants were those who have been selected for receiving buprenorphine maintenance treatment at the participating clinics. The criteria for eligibility of buprenorphine were based on the criteria currently being applied in Methadone Maintenance Therapy[8]:

A. Inclusion Criteria for buprenorphine maintenance treatment:

a. Age 18 years or more
b. Diagnosed as Opioid Dependence Syndrome as per the WHO-ICD 11 criteria
c. Willing to follow the clinic guidelines and regular follow-up

B. Exclusion Criteria:

a. Currently received Methadone Maintenance Therapy
b. Pregnant or lactating women and women of child-bearing potential unwilling to use effective contraception
c. Serious mental illness
d. Medical Emergency conditions or significant medical problems

Algorithm of BPN Study

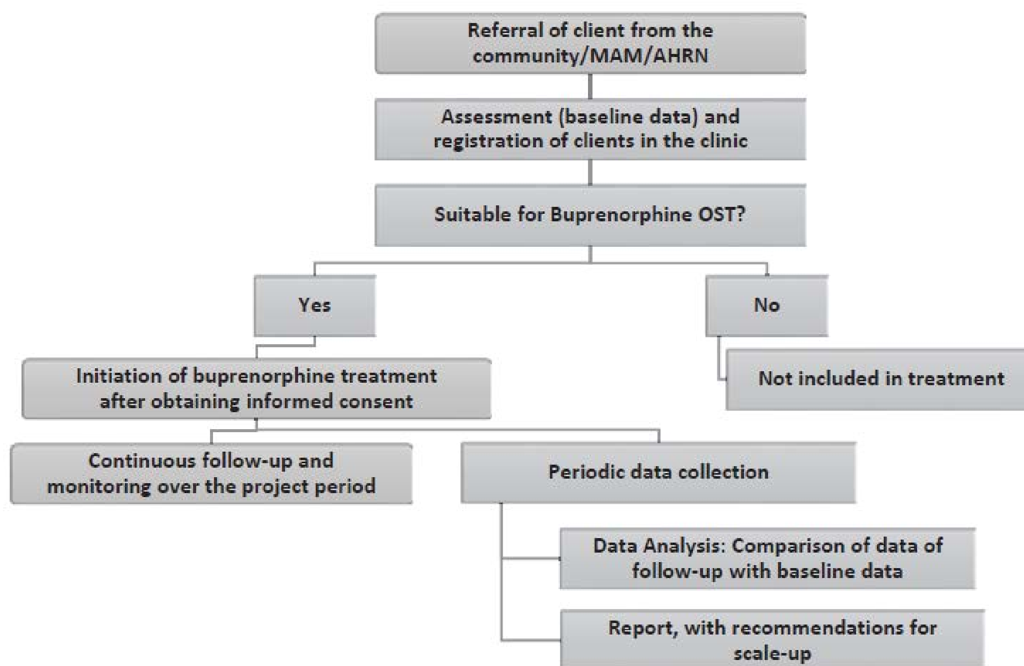

Figure 1. Algorithm of BPN study

Criteria for drop out /loss to follow up in the study

As stated earlier, this was an observation study design. Thus, the criteria for entry or exit from treatment were based upon real life clinical situations. For eligibility to receive treatment, no patient who had started treatment was ever considered to have permanently dropped out. Even if a patient missed treatment for a few days, weeks, or months, they were allowed to resume treatment upon returning to the clinic and expressing willingness to continue. Treatment was not denied solely on account of irregular attendance.

Loss to follow up - any client who did not attend the clinic within two weeks of the scheduled appointment was treated as loss to follow-up for that particular month. If the client returned to the clinic later than 2 weeks of the scheduled date, their data were considered for the next month.

Dropped out - if the clients did not present to the clinic throughout the study period, or were lost to follow-up for more than three months from the scheduled appointment, they were considered to have dropped out.

Study procedures

Counselling and recruitment process

Counselling for initiation of buprenorphine maintenance treatment was conducted by trained counsellors, focusing on the risks and benefits of treatment. Informed consent was obtained prior to enrolment, and participants were allowed to withdraw from the study at any time based on their individual consent. Adherence counselling and information on buprenorphine maintenance were provided to clients by nurse counsellors before and throughout the study.

Psychiatrists from the Drug Treatment Centers were responsible for initiating buprenorphine maintenance treatment. INGO partners conducted community awareness activities using various communication channels, including social media platforms, to increase knowledge of buprenorphine treatment. Peer outreach workers from existing prevention partners and selected peers from community networks were trained to support client recruitment for buprenorphine maintenance treatment. INGO partners also followed up with eligible clients and monitored service uptake, adherence, and retention.

Recruitment Flow of BPN Study

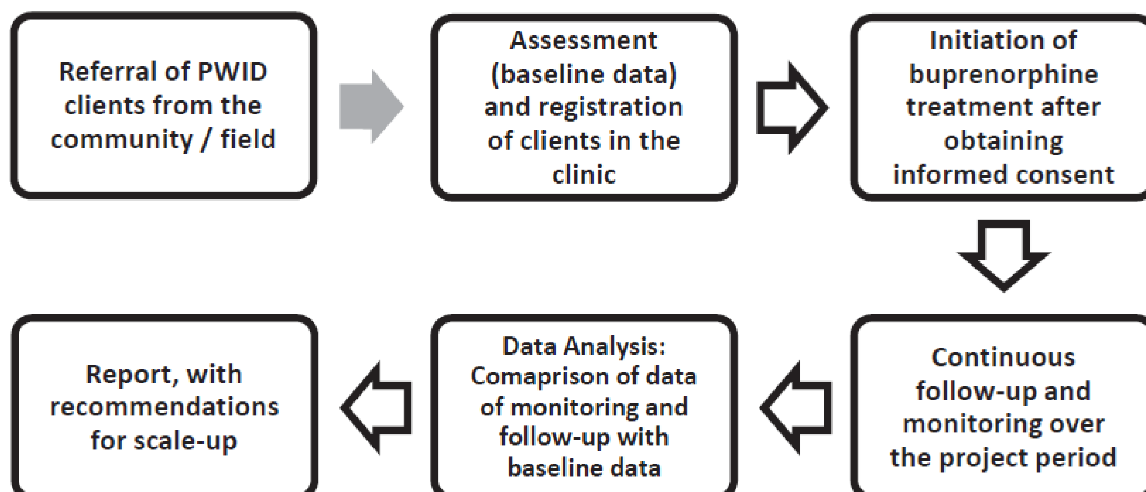

Figure 2. Recruitment Flow of BPN study

Training of Staff

Initially, a Training-of-Trainer (TOT) training was conducted for the consultants at the national level, followed by cascade training for implementing partners. The clinical staffs (medical doctors, nurses, counsellors, and outreach workers) recruited at each of the implementation sites were trained by the consultants in all the aspects of delivery of buprenorphine after the development of standard treatment guidelines. The training also included record

maintenance and data management procedures at the clinics. Those trainings were conducted by the consultants at the start of the project and CPI provided refresher trainings after project initiation.

Data collection tool

The data collection tool used in this study was the Drug Treatment Information Card (DTIC), developed for record maintenance during buprenorphine treatment and following the same structure as used in Methadone Maintenance Therapy. The DTIC captured participants' socio-demographic characteristics, substance use history, details of injecting drug use, risk behaviors, diagnosis of opioid dependence, types of treatment received, and treatment outcomes.

Data collection procedure

Data collection for the study commenced after finalization of the protocol and clearance by the Institutional Review Board of the health authorities of Myanmar. Once service delivery began following staff training, medical officers at each site recorded clinical information using the Drug Treatment Information Cards (DTICs). Records maintained at the OAMT Clinics (client files) were collected and entered into digital formats using REDCap. Assessment and dispensing of buprenorphine maintenance treatment were conducted in accordance with the clinical guidelines for BPN-based treatment of opioid dependence.

Data analysis

Quantitative data were cleaned and analysed using Stata 14 (© StataCorp, College Station, TX). Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as mean (standard deviation, SD) or median (interquartile range, IQR), as appropriate. Participants who continued follow-up at the end of each assessment month were considered retained in the study, and retention rates were calculated accordingly. Mean adherence rates were also calculated for participants retained at the end of the assessment month.

Data Management

All questionnaire forms were stored in a locked cabinet at the drug treatment centers and arranged serially according to registration numbers. All collected data were converted into electronic format and stored securely on password-protected computers, accessible only to key study personnel and members of the research team. All data were kept confidential and anonymized using study-specific unique identifiers. Only de-identified data were shared with other teams, if requested, and all analyses were conducted using these de-identified datasets.

ETHICAL CONSIDERATIONS

The study commenced after receiving clearance from Institutional Review Board. Potential participants were enrolled into OAMT only after providing written informed consent. Confidentiality and privacy were maintained throughout data collection, and the patients' personal details were not revealed to anyone, except the research team.

SHIFTING FROM BUPRENORPHINE TO METHADONE

Shifting from buprenorphine to methadone was considered for clients who were not benefiting from buprenorphine, who experienced serious or intolerable side effects, or who requested a change to another treatment. Before the switch, clients were informed about the differences between buprenorphine and methadone and were advised that mild withdrawal symptoms might occur during the transition.

There were no fixed guidelines for switching from buprenorphine to methadone. Treating doctors monitored clients closely for signs of opioid overdose during the switching period. One approach involved reducing the buprenorphine dose to the minimum sufficient for withdrawal control in a day, typically not exceeding 8 mg/day. Once the buprenorphine dose reached 8 mg/day or less, further doses were withheld until the client experienced mild withdrawal symptoms; objective signs were not required, but pupils should not be constricted. When withdrawal symptoms appeared, the first dose of methadone was administered, usually 15–20 mg on the first day, and continued for the next 2–3 days. Subsequent methadone dose adjustments were made according to standard methadone treatment guidelines.

QUANTITATIVE FINDINGS

Background Characteristics

A total of 220 participants were included in this study, comprising 52 (23.6%) from Yangon, 32 (14.5%) from Mandalay, and 136 (61.8%) from Myitkyina. The mean age of the respondents was 35.4 years (SD = 10.1), ranging from 17 to 74 years. The mean ages across sites were similar, with Yangon at 33.3 years, Mandalay at 33.8 years, and Myitkyina at 36.5 years. The vast majority of the participants were male (97.3%), with only six females enrolled in total.

In terms of ethnicity, notable geographic differences were observed. Most participants from Yangon (92.3%) and Mandalay (81.3%) were of Bamar, whereas in Myitkyina, the majority were Kachin (60.3%) followed by Bamar (33.1%). Smaller proportions belonged to other groups such as Shan, Chin, and Rakhine. Employment patterns also varied by sites. In Yangon, unemployment was highest (40.4%), while in Mandalay, most participants were engaged in full-time employment (71.9%). In contrast, the majority in Myitkyina were working part-time (76.5%).

Education levels ranged widely, although most participants had at least completed high school (42.7%). Yangon participants had higher representation among university graduates and post-graduates (50%), while those from Myitkyina more often reported middle (28.7%) or high school (42.6%) education. Marital status also showed variation across study sites. Overall, 57.7% were married, 35.0% were single, and a smaller proportion were divorced/separated (6.4%) or widowed (0.9%). In Yangon, almost equal proportions were single (48.1%) and married (46.1%), whereas married participants were more common in Mandalay (53.1%) and especially in Myitkyina (63.2%).

Most participants were recruited from the regions where the study was conducted. Nearly all from Yangon were Yangon residents (98.1%), those in Mandalay were predominantly from Mandalay (90.6%), and all participants from Myitkyina were Kachin state residents.

Table 1. Background Information

	Yangon N=52 n (%)	Mandalay N=32 n (%)	Myitkyina N=136 n (%)	Total N=220 n (%)
Age				
Mean (SD) (years)	33.3 (8.8)	33.8 (10.4)	36.5 (10.4)	35.4 (10.1)
Range (years)	18-63	17 – 57	17 – 74	17-74
Gender				
Male	49 (94.2)	32 (100)	133 (97.8)	214 (97.3)
Female	3 (5.7)	0 (0)	3 (2.2)	6 (2.7)
Race				

Kachin	0 (0)	2 (6.3)	82 (60.3)	84 (38.2)
Kayin	1 (1.9)	1 (3.1)	0 (0)	2 (0.9)
Chin	1 (1.9)	0(0)	0(0)	1(0.5)
Bamar	48 (92.3)	26 (81.3)	45 (33.1)	119 (54.1)
Rakhine	0 (0)	0 (0)	1 (0.7)	1 (0.5)
Shan	1 (1.9)	2 (6.3)	2 (1.5)	5 (2.3)
Others	1 (1.9)	1 (3.1)	6 (4.4)	8 (3.6)
Occupation				
Full time	17 (32.7)	23 (71.9)	17 (12.5)	57 (25.9)
Part-time	14 (26.9)	5 (15.6)	104 (76.5)	123 (55.9)
Unemployment	21 (40.4)	4 (12.5)	15 (11.0)	40 (18.2)
Education				
Illiterate	0 (0)	0 (0)	2 (1.5)	2 (0.9)
Primary	0 (0)	0 (0)	18 (13.2)	18 (8.2)
Middle	1 (1.9)	8 (25.0)	39 (28.7)	48 (21.8)
High	25 (48.1)	11 (34.4)	58 (42.6)	94 (42.7)
University	10 (19.2)	8 (25.0)	14 (10.3)	32 (14.6)
Graduated	16 (30.8)	5 (15.6)	5 (3.7)	26 (11.8)
Marital Status				
Single	25 (48.1)	10 (31.3)	42 (30.9)	77 (35.0)
Married	24 (46.1)	17 (53.1)	86 (63.2)	127 (57.7)
Widowed	0 (0)	1 (3.1)	1 (0.7)	2 (0.9)
Divorce/ Separated	3 (5.8)	4 (12.5)	7 (5.2)	14 (6.4)
States or Regions				
Ayarwaddy	1 (1.9)	0 (0)	0 (0)	1 (0.5)
Kachin	0 (0)	0 (0)	136 (100)	136 (61.8)
Mandalay	0 (0)	29 (90.6)	0 (0)	29 (13.2)
Sagaing	0 (0)	1 (3.1)	0 (0)	1 (0.5)
Shan (South)	0 (0)	2 (6.3)	0 (0)	2 (0.9)
Yangon	51 (98.1)	0 (0)	0 (0)	51 (23.2)

Drug Use History

The mean age at first drug use was 25.3 years (SD = 9), with Yangon participants initiating slightly earlier (mean 22.8 years) compared to those in Mandalay (24.7 years) and Myitkyina (26.4 years). The mean duration of drug use across all sites was 10 years, ranging from 1 to 34 years. Yangon participants reported the shortest average duration (8.2 years), whereas those in Myitkyina reported the longest (10.8 years).

Poly-drug use was common overall (57.7%), but the proportion varied widely across sites, being most prevalent in Yangon (94.2%), moderate in Mandalay (68.8%), and less common in Myitkyina (41.2%). Nearly all participants (99.6%) reported using illicit drugs within the last six months.

Current Drug Use Patterns

Heroin was the predominant drug used across all sites, reported by 94.5% of participants overall, with little variation between Yangon (96.1%), Mandalay (90.6%), and Myitkyina (95.6%). Opium use was reported by a small proportion (4.1%), particularly in Mandalay and Myitkyina. Use of methamphetamine pills (0.9%) and morphine/tramadol (0.5%) was rare.

The most common route of administration was injecting, reported by 71.8% overall. Yangon participants reported the highest proportion of injection use (80.8%), followed by Myitkyina (71.3%) and Mandalay (59.4%). Smoking (19.1%), snorting (6.4%), and swallowing (2.7%) were less frequently reported. Most participants reported using drugs several times daily, with 59.5% using two to three times daily and 34.6% using more than three times daily. Yangon had the highest proportion of very frequent users (>3 times daily, 69.2%), while the majority in Myitkyina used two to three times daily (70.6%).

The timing of the last drug use also reflected high levels of ongoing use. A majority of participants (81.4%) reported drug use within the last 24 hours, with the highest proportion in Myitkyina (93.4%), followed by Yangon (69.2%) and Mandalay (50%). Smaller numbers reported last use within the past 2–3 days (11.8%) or within the past week (5.4%).

High-Risk Behaviors

Risk behaviors related to drug use were evident among participants. Overall, 23.2% reported ever sharing needles or syringes, with similar proportions across sites (25% in Yangon, 15.6% in Mandalay, and 24.3% in Myitkyina). A history of overdose was reported by 10.4% of participants, with the highest rate in Myitkyina (13.2%) compared to 6.3% in Mandalay and 5.8% in Yangon.

Table 2. Drug Use History

	Yangon N=52 n (%)	Mandalay N=32 n (%)	Myitkyina N=136 n (%)	Total N=220 n (%)
Age of first drug use				
Mean (SD) (years)	22.8 (7.9)	24.7 (7.6)	26.4 (9.6)	25.3 (9)
Range (years)	13 - 61	14 - 54	10 – 51	10 - 61
Duration of drug use				
Mean (SD) (years)	8.2 (6.8)	9.4 (8.1)	10.8 (7.4)	10 (7.4)
Range (years)	1 - 30	1 – 31	1 – 34	1– 34
Poly drug users	49 (94.2)	22 (68.8)	56 (41.2)	127 (57.7)
Using illicit drugs in last 6 months	52 (100)	31 (96.9)	136 (100)	219 (99.6)
Currently using illicit drugs (Major)				
Heroin	50 (96.1)	29 (90.6)	130 (95.6)	207 (94.5)
Opium	0 (0)	2 (6.3)	6 (4.4)	9 (4.1)

Meth (Pills)	1 (1.9)	1 (3.1)	0 (0)	2 (0.9)
Morphine/Tramadol	1 (1.9)	0 (0)	0(0)	1 (0.5)
Most recent route of administration				
Swallowing	1 (1.9)	1 (3.1)	4 (2.9)	6 (2.7)
Smoking	0 (0)	12 (37.5)	30 (22.1)	42 (19.1)
Snorting	9 (17.3)	0 (0)	5 (3.7)	14 (6.4)
Injecting	42 (80.8)	19 (59.4)	97 (71.3)	158 (71.8)
Frequency of drug use				
No use during 30 days	0 (0)	1 (3.1)	0 (0)	1 (0.5)
2or 3 times per week	0 (0)	0 (0)	6 (4.4)	6 (2.7)
Once daily	2 (3.9)	1 (3.1)	3 (2.2)	6 (2.7)
2 or 3 times daily	14 (26.9)	21 (65.6)	96 (70.6)	131 (59.5)
>3 times daily	36 (69.2)	9 (28.1)	31 (22.8)	76 (34.6)
Last time using drugs				
Within 24 hours	36 (69.2)	16 (50.0)	127 (93.4)	179 (81.4)
2-3 days	11 (21.2)	8 (25.0)	7 (5.2)	26 (11.8)
1 week ago	5 (9.6)	6 (18.8)	1 (0.7)	12 (5.4)
1 month ago	0 (0)	1 (3.1)	1 (0.7)	2 (0.9)
2-5 months ago	0 (0)	1 (3.1)	0 (0)	1 (0.5)
Ever shared needles and syringes	13 (25.0)	5 (15.6)	33 (24.3)	51 (23.2)
Ever overdosed	3 (5.8)	2 (6.3)	18 (13.2)	23 (10.4)

Addiction scores assessment and BPN initiation dose

Assessment of opioid use disorder severity using DSM-5 criteria showed relatively high mean scores across all sites, with an overall mean of 8.5 (SD = 2.7). The mean DSM-5 score was lowest in Yangon at 7.6 (SD = 1.7), moderate in Mandalay at 8.4 (SD = 1.1), and highest in Myitkyina at 8.9 (SD = 3.2). The range of scores was widest in Myitkyina (0–11), indicating greater variation in disorder severity among participants, while Yangon and Mandalay showed narrower distributions (1–11 and 5–10, respectively).

Clinical Opiate Withdrawal Scale (COWS) scores also varied across sites, with an overall mean of 10.1 (SD = 5.0), corresponding to mild withdrawal severity. Yangon participants had a mean score of 11 (SD = 3.9), Mandalay 11.8 (SD = 3.1), and Myitkyina 9.6 (SD = 5.4). The widest range was again observed in Myitkyina (2–34), suggesting some participants were experiencing more severe withdrawal symptoms compared to Yangon (3–19) and Mandalay (8–17). Overall, these results indicate that most participants across all sites presented with moderate opioid use disorder severity and mild to moderate withdrawal symptoms at baseline, with Myitkyina showing the greatest variability in both measures.

Table 3. Drug Addiction Score Assessment

	Yangon n (%)	Mandalay n (%)	Myitkyina n (%)	Total n (%)
DSM5 score	N=52	N=30	N=136	N=218
Mean (SD)	7.6 (1.7)	8.4 (1.1)	8.9 (3.2)	8.5 (2.7)
Range	1 – 11	5 – 10	0 - 11	0 – 11
COWS score	N=52	N=11	N=135	N=198
Mean (SD)	11 (3.9)	11.8 (3.1)	9.6 (5.4)	10.1 (5.0)
Range	3 - 19	8 - 17	2 - 34	2 - 34

The majority of participants across all sites were initiated on BPN at a dose of 4 mg, accounting for 63.2% overall. This was most common in Yangon (82.7%) and Mandalay (65.6%), while just over half of participants in Myitkyina (55.1%) began treatment at this dose. A smaller proportion, 31.4% overall, were initiated at 6 mg, with the highest proportion observed in Myitkyina (44.9%) compared to Yangon (9.6%) and Mandalay (9.4%). Initiation at the lowest dose of 2 mg occurred in 4.5% of participants, mostly in Yangon (7.7%) and Mandalay (18.7%), while none in Myitkyina started at this dose. Only two participants (0.9%), both from Mandalay, were initiated at 8 mg. These findings suggest site-level differences in induction practices, with Yangon and Mandalay favoring lower starting doses, whereas Myitkyina more commonly initiated patients at 6 mg.

Table 4. BPN initiation dose

Initiation dose	Yangon N=52 n (%)	Mandalay N=32 n (%)	Myitkyina N=136 n (%)	Total N=220 n (%)
2 mg	4 (7.7)	6 (18.7)	0 (0)	10 (4.5)
4 mg	43 (82.7)	21 (65.6)	75 (55.1)	139 (63.2)
6 mg	5 (9.6)	3 (9.4)	61 (44.9)	61 (31.4)
8 mg	0 (0)	2 (6.3)	0 (0)	2 (0.9)

BPN treatment over one-year follow-up

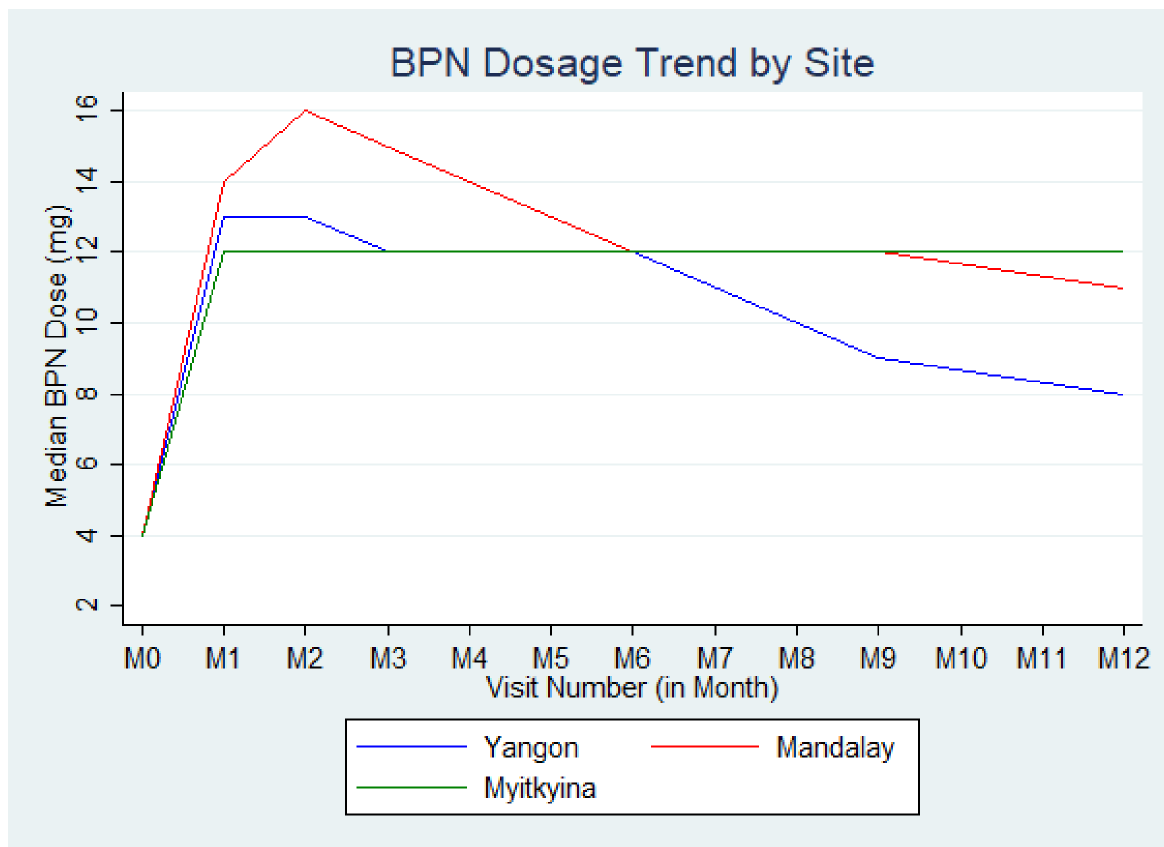

Figure 3. Median BPN doses over one-year follow-up visits by sites

The trend of buprenorphine dosing varied across the three study sites over the 12-month follow-up period. All sites showed a rapid escalation in median dose during the first two months, with Yangon and Myitkyina stabilizing at around 12 mg, while Mandalay peaked higher at approximately 16 mg by Month 2. Thereafter, the patterns diverged. In Yangon, doses gradually declined from Month 3 onward, reaching about 8 mg by Month 12, reflecting a tapering approach once patients stabilized. In contrast, Myitkyina maintained a steady median dose of 12 mg throughout the year, suggesting a strategy of long-term maintenance rather than reduction. Mandalay showed a gradual decline after the initial peak but remained consistently higher than the other sites, ending at around 11 mg by Month 12. These differences highlight site-specific variations in clinical practice and patient management, with Mandalay favoring higher induction and maintenance doses, Yangon applying progressive tapering, and Myitkyina sustaining a stable maintenance regimen.

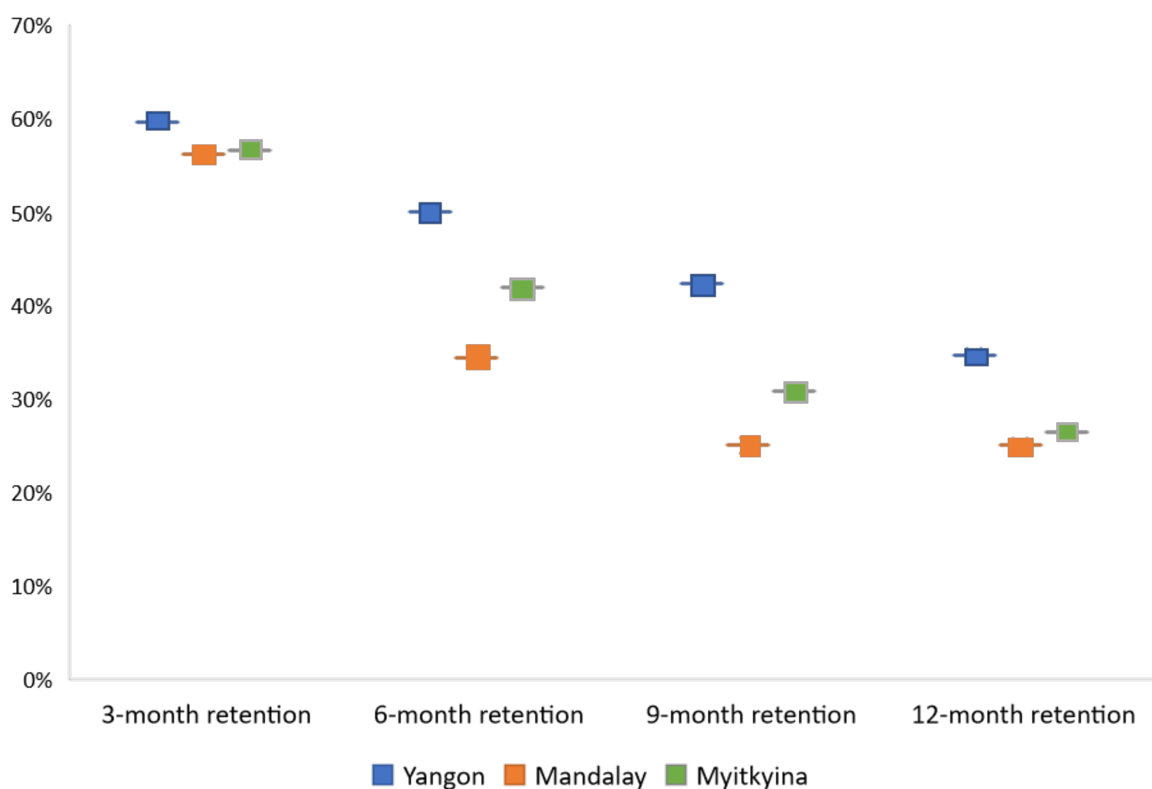

Figure 4. BPN retention rate by sites

Retention rates on buprenorphine treatment declined progressively over time across all sites. At three months, overall retention was 57.3%, with similar levels observed in Yangon (59.6%), Mandalay (56.3%), and Myitkyina (56.6%). By six months, retention fell to 42.7% overall, with Yangon maintaining the highest proportion (50.0%), followed by Myitkyina (41.9%) and Mandalay (34.4%). At nine months, retention dropped further to 32.7% overall, with Yangon again highest (42.3%), compared to Myitkyina (30.9%) and Mandalay (25.0%). By twelve months, only 28.2% of participants overall remained in treatment, with Yangon showing the best long-term retention (34.6%), followed by Myitkyina (26.5%) and Mandalay (25.0%). These findings highlight significant attrition over time, with Yangon demonstrating relatively stronger retention compared to the other sites.

Outcome after one-year follow-up

Overall, only four (1.8%) completed treatment, and 61 (27.7%) were still active at one year. Sixteen (7.3%) shifted to methadone, while the majority—136 (61.8%)—dropped out or were lost to follow-up. Three deaths (1.4%) were also recorded. In Yangon, among 52 participants, 19 (36.5%) remained active after one year, while 22 (42.3%) dropped out. Eleven clients (21.1%) shifted to methadone, but none completed treatment or died. In Mandalay, retention was lowest, with only eight participants (25.0%) active. The majority, 23 (71.9%), dropped out, while just one client (3.1%) moved to methadone. No completions or deaths were

reported. In Myitkyina, four clients (2.9%) successfully completed treatment. Thirty-four (25.0%) remained active, but most—91 participants (66.9%)—dropped out. Four (2.9%) shifted to methadone, and three (2.2%) died during follow-up. Overall, outcomes reveal serious challenges in maintaining clients in long-term buprenorphine treatment, with more than 60% attrition across all sites.

Table 5. BPN outcome after one-year follow-up

Outcome	Yangon N=52 n (%)	Mandalay N=32 n (%)	Myitkyina N=136 n (%)	Total N=220 n (%)
Completed	0 (0)	0 (0)	4 (2.9)	4 (1.8)
Active	19 (36.5)	8 (25.0)	34 (25.0)	61 (27.7)
Move to MMT	11 (21.1)	1 (3.1)	4 (2.9)	16 (7.3)
Loss to follow-up (or) drop-out	22 (42.3)	23 (71.9)	91 (66.9)	136 (61.8)
Expired	0 (0)	0 (0)	3 (2.2)	3 (1.4)

Self-reported illicit drug use during the clinic visits

At baseline, nearly all participants (99.6%) reported illicit drug use, with only one participant (0.4%) denying use as he was on Methdone. By month 1, the proportion reporting ongoing use fell sharply to 22.9%, while 64.0% denied use and 13.1% did not report. At month 2, illicit use decreased further to 16.4%, with 70.0% reporting no use and 13.6% not reporting. By month 3, only 12.7% admitted to use, while 63.5% reported abstinence and 23.8% gave no response. At month 6, the proportion using illicit drugs dropped to 7.5% and 55.3% denied use, though 37.2% did not report. By month 9, reported use was down to 2.8% while 31.9% denied use and 65.3% did not report. At month 12, only 1.6% admitted to illicit use, while 29% denied use and 69.4% failed to report.

Overall, the trend shows a sharp reduction in self-reported illicit drug use from over 99% use at baseline to very low levels by 12 months, suggesting positive treatment effects.

Table 6. Self-reported illicit drug use during clinic visits

Illicit drug use	Baseline N=220 n (%)	Month 1 N=175 n (%)	Month 2 N=140 n (%)	Month 3 N=126 n (%)	Month 6 N=94 n (%)	Month 9 N=72 n (%)	Month 12 N=62 n (%)
Yes	219 (99.6)	40 (22.9)	23 (16.4)	16 (12.7)	7 (7.5)	2 (2.8)	1 (1.6)
No	1 (0.4)	112 (64.0)	98 (70.0)	80 (63.5)	52 (55.3)	23 (31.9)	18 (29.0)
Not reported	0 (0)	23 (13.1)	19 (13.6)	30 (23.8)	35 (37.2)	47 (65.3)	43 (69.4)

Urine testing results during the clinic visits

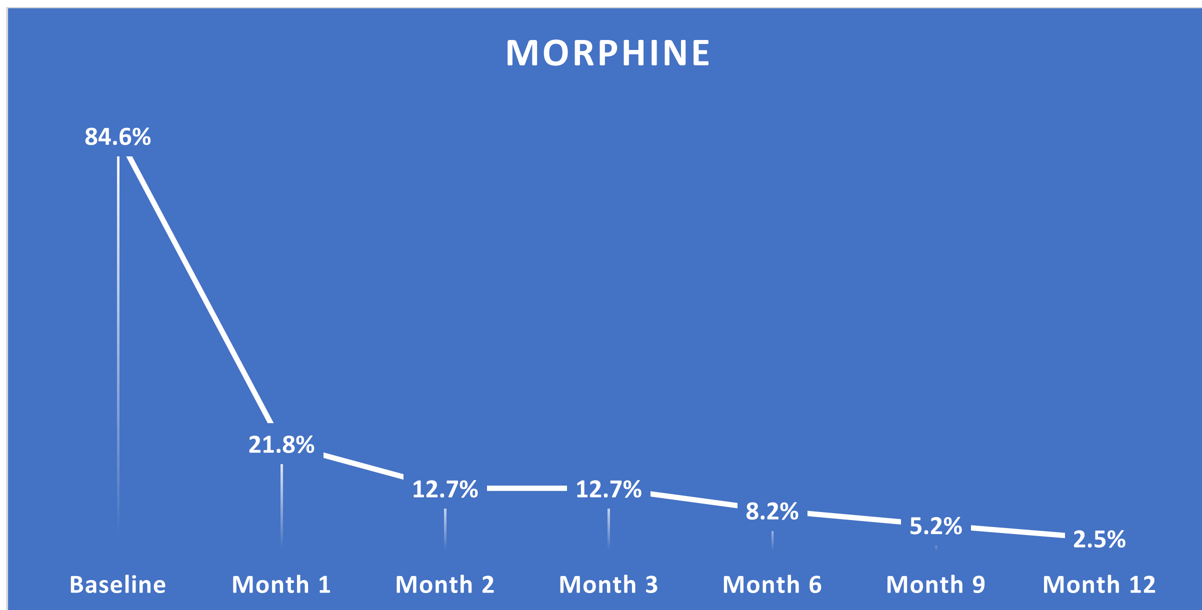

Figure 5. Urine morphine positivity rate during clinic visits

Urine Morphine

At baseline, morphine was detected in the vast majority of those tested i.e. 84.6%, confirming heroin as the primary drug of use among participants. A sharp decline followed after treatment initiation, with positivity falling to 21.8% at month 1 and further to around 12.7% by months 2 and 3. By month 6, morphine detection had dropped to 8.2%, declining further to 5.2% at month 9 and reaching just 2.5% at month 12. This represents the clearest and most sustained downward trend across all substances.

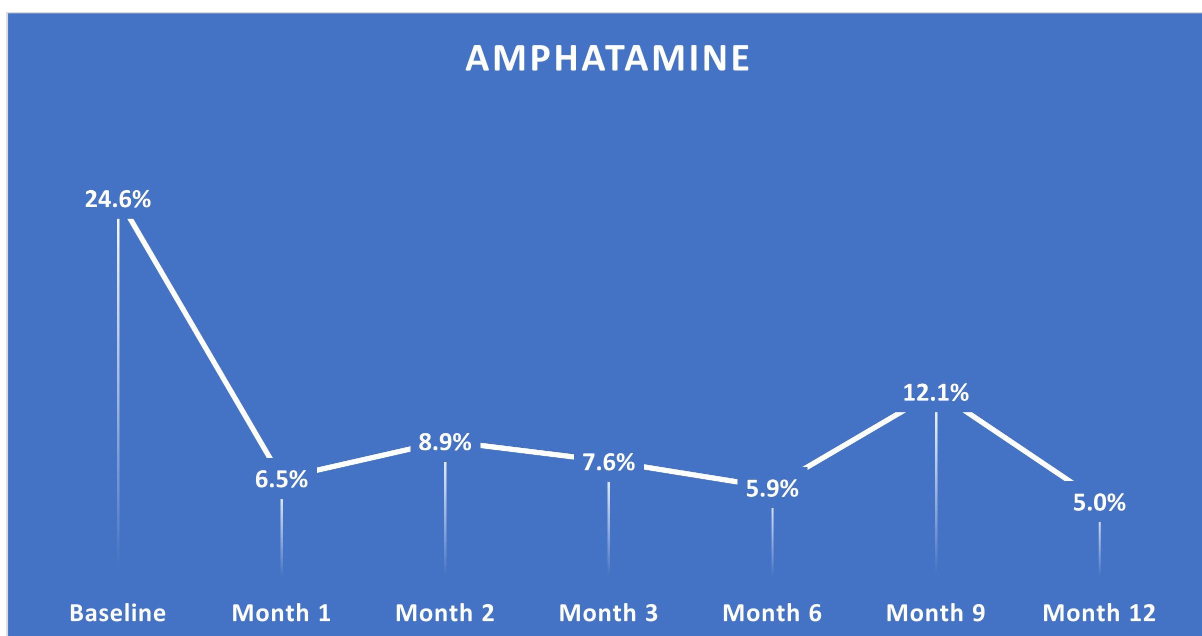

Figure 6. Urine amphetamine positivity rate during clinic visits

Urine Amphetamine

Amphetamine was detected in 24.6% of tested participants at baseline. Positivity fell steeply to 6.5% at month 1, and remained between 6–9% during months 2 to 6. Interestingly, at month 9, positivity rose to 12.1%, suggesting intermittent or relapsing use of the drug. By month 12, the rate had decreased again to 5.0%. Overall, amphetamine use declined from baseline but did not show as consistent a downward trend as morphine.

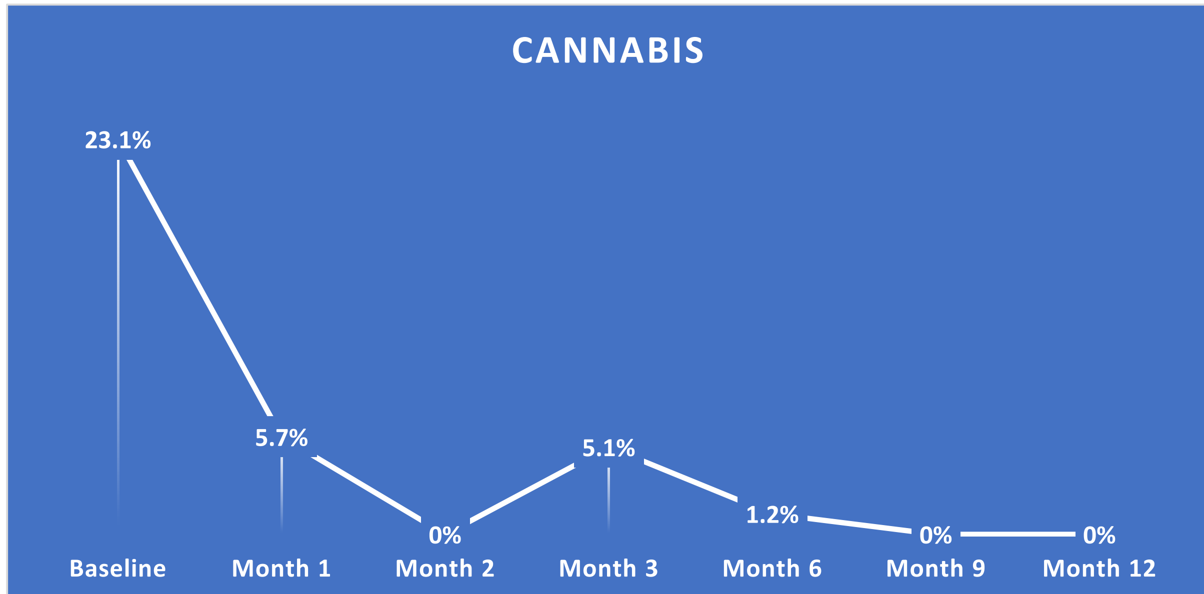

Figure 7. Urine cannabis positivity rate during clinic visits

Urine Cannabis

Cannabis use was present in 23.1% of tested participants at baseline. This decreased to 5.7% at month 1 and disappeared completely by month 2. Small fluctuations occurred with positivity at 5.1% in month 3 and 1.2% in month 6, but cannabis was absent again by months 9 and 12. The overall trend indicates a marked and sustained reduction, with complete disappearance in later follow-ups.

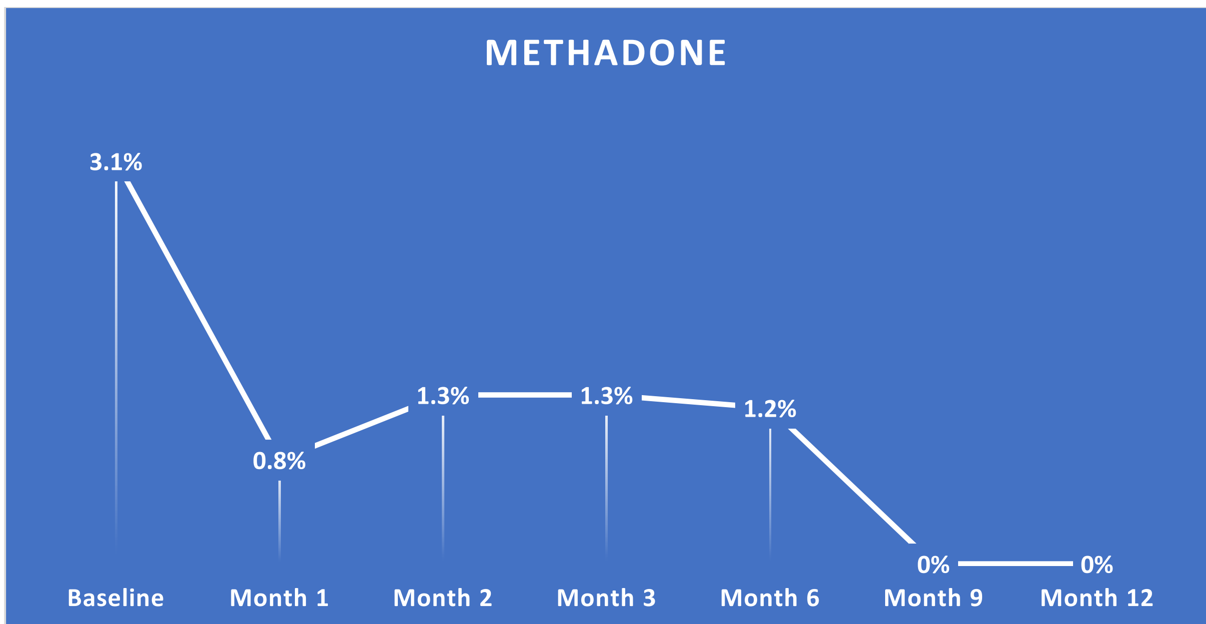

Figure 8. Urine methadone positivity rate during clinic visits

Urine Methadone

Methadone was rarely detected, beginning with 3.1% at baseline, then falling to ≤1.3% in months 1–6. No methadone was detected from month 9 onward. This indicates very limited concurrent or crossover use throughout the study.

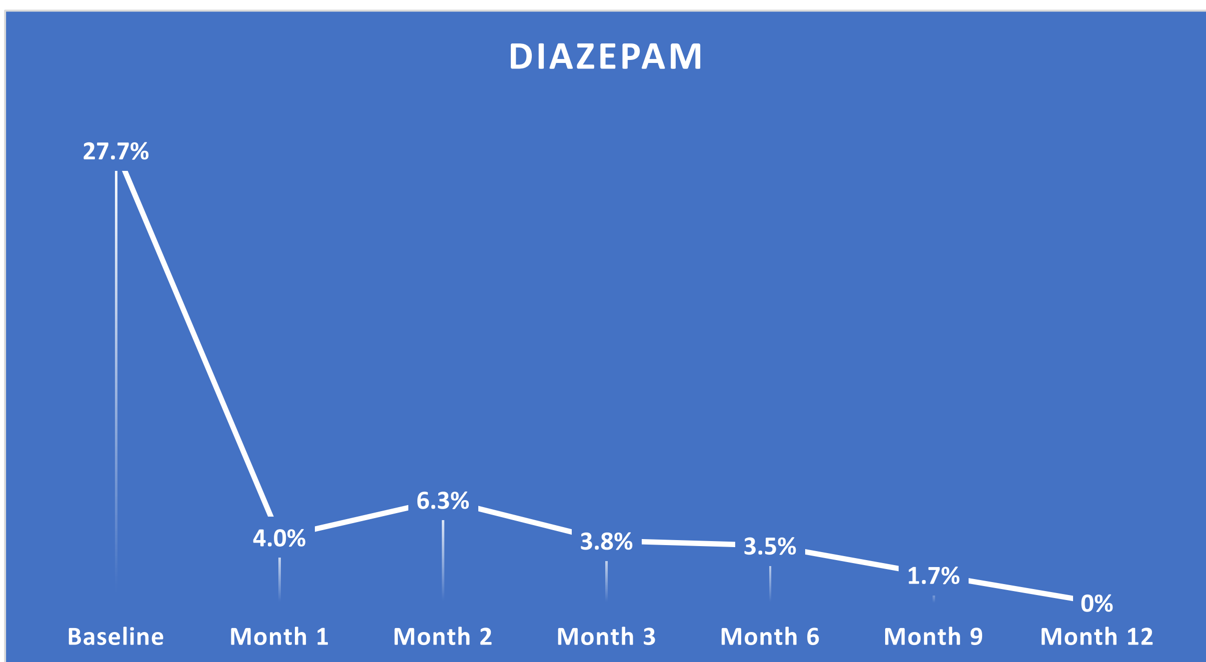

Figure 9. Urine methadone positivity rate during clinic visits

Urine Diazepam

At baseline, diazepam was found in 27.7% of participants, making it the second most common drug after morphine. A sharp drop occurred by month 1 (4.0%), with low levels detected sporadically in subsequent months (6.3% in month 2, 3.8% in month 3, 3.5% in month 6, and

1.7% in month 9). By month 12, no participants tested positive for diazepam. This shows a clear downward trend and eventual disappearance of benzodiazepine use in the cohort.

Self-reported overdose experience

There was 10% of participants who reported of experiencing overdose at least once in their lives, however, all of them reported they did not experience overdose in between the follow-up visits.

Side effects experienced

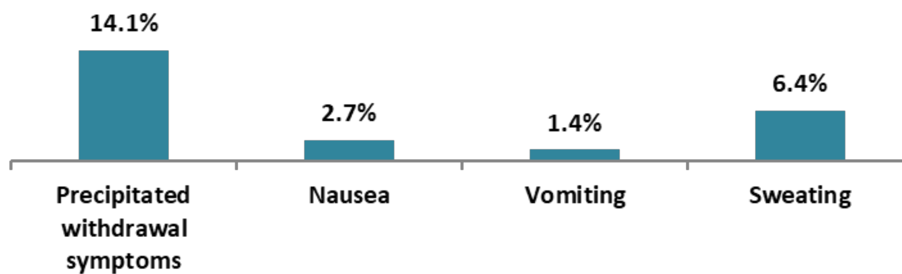

Figure 10. Side effects experienced after BPN

Some participants reported of having side effects after BPN. Only 14.1% experienced precipitated withdrawal symptoms, 2.7% experienced nausea, 1.4% experienced vomiting, and 6.4% experienced sweating. The findings reflects that BPN is well tolerated by the most of the participants.

DISSCUSSION

Study Outcome discussion

This study provides important evidence on the feasibility and outcomes of buprenorphine (BPN) maintenance treatment in Myanmar. Despite being implemented in challenging contexts, the findings demonstrate encouraging improvements in treatment retention and substantial reductions in both opioid and non-opioid substance use. When interpreted alongside international data, the results reinforce the role of buprenorphine as an effective and adaptable intervention for opioid dependence.

Retention in BPN treatment was moderate but consistent with international experiences. More than half of the participants (57.3%) remained in treatment at three months, while nearly one-third (28.2%) were still active at 12 months. Although attrition was evident, the proportion retained mirrors global systematic reviews reporting 12-month BPN retention

between 20–40% in low- and middle-income countries (Feelemyer et al., 2014). Encouragingly, retention rates in Yangon (34.6%) were higher than in Mandalay and Myitkyina, suggesting that site-specific adaptations in service delivery may improve outcomes. Mortality was very low (1.4%), which is consistent with evidence that opioid agonist treatment reduces the risk of death compared with untreated opioid dependence (Sordo et al., 2017). These results affirm that meaningful engagement in care is achievable, even in resource-constrained and conflict-affected contexts.

The self-reported data demonstrated dramatic reductions in illicit opioid use over time. At baseline, almost all participants (99.6%) reported active use, yet within the first month this had dropped to 22.9%. By 12 months, only 1.6% of participants reported ongoing illicit use. These improvements are highly consistent with international findings. In India, Rao et al. (2012) observed similar sharp declines in heroin use during the first months of BPN treatment. In Vietnam, Tran et al. (2018) reported substantial reductions in heroin consumption among buprenorphine patients compared to baseline levels. While increasing non-response rates in later months limit interpretation, the overall pattern indicates that participants who remained in treatment experienced meaningful benefits, echoing results from long-term cohort studies showing sustained reductions in self-reported opioid use among BPN patients (Hser et al., 2014).

The urine drug testing provides objective confirmation of these positive trends. Morphine positivity fell from 84.6% at baseline to only 2.5% at 12 months, demonstrating a steep and sustained reduction in heroin use. Comparable declines have been reported globally: in India, Balhara and Jain (2012) found heroin positivity in urine as low as 5.6% among patients on BPN, while large U.S. datasets confirm that buprenorphine adherence is associated with markedly lower opioid-positive tests (Saloner et al., 2021).

Importantly, the benefits extended beyond opioids. Cannabis, detected in 23.1% of samples at baseline, declined steadily and disappeared completely by the end of follow-up. Diazepam positivity, initially 27.7%, also decreased to zero by 12 months, eliminating a high-risk pattern of opioid–benzodiazepine co-use that is strongly associated with overdose (Jones et al., 2012). Methadone detection was rare throughout the study, reflecting minimal crossover with other opioid substitution therapy.

Amphetamine use presented a more complex pattern, declining from 24.6% at baseline to 5.0% at 12 months, though with a temporary rise at month 9 (12.1%). This is consistent with global evidence that stimulant use may persist despite engagement in opioid agonist therapy, as substitution therapy does not directly target stimulant dependence. De Crescenzo et al. (2018) and Shrestha et al. (2020) emphasize that psychosocial and behavioral interventions are often required in parallel to address stimulant use. Nevertheless, the overall downward trend in amphetamine positivity in this study suggests that stabilization on BPN may indirectly reduce stimulant consumption for some clients.

Taken together, the findings illustrate that buprenorphine treatment in Myanmar achieved meaningful improvements across key outcomes. Retention rates were within expected ranges globally, mortality was low, and both self-reported and urine tests for drug use decreased substantially. The reductions were not limited to heroin but extended to cannabis, benzodiazepines, and even stimulants, underscoring the broader stabilizing effect of BPN. These results add to a growing body of global evidence that buprenorphine maintenance

therapy is an effective, safe, and adaptable option in diverse health system contexts, including resource-limited and conflict-affected settings.

PROGRAM RECOMMENDATIONS

1. **Scale-up and integration**: Expand BPN services beyond pilot sites and integrate into existing harm reduction and HIV services to increase coverage among people who use drugs.
2. **Decentralized and flexible delivery**: Establish community-based dispensing sites and consider mobile units or pharmacy-based models to address distance and accessibility barriers.
3. **Take-home dosing**: Introduce structured, supervised take-home BPN doses for stable clients to enhance retention and reduce clinic burden, drawing on regional experiences.
4. **Transition from Methadone**: Develop guidelines for clients wishing to switch between methadone and buprenorphine, ensuring safe and client-centered transitions.
5. **Peer involvement**: Strengthen peer educator roles in adherence support, counseling, and advocacy to address stigma and increase demand.
6. **Capacity building**: Train health care workers on BPN protocols, managing side effects, and supporting client choice to ensure quality service delivery.
7. **Monitoring and evaluation**: Establish good data systems to monitor retention, adherence, and outcomes, enabling continuous program improvement and evidence generation. There is still a crucial need in recording of some data such as self-reported illicit drug use in between visits, regular urine testing and recording of urine testing results.

LIMITATION OF THE STUDY

The implementation of buprenorphine treatment was carried out within the existing opioid agonist maintenance therapy (OAMT) infrastructure and under significant operational and security constraints. The reliance on clinic-based initiation, and in some cases hospitalization, reduced the practicality of service delivery, particularly for clients with competing livelihood and mobility challenges. In addition, site-level variations in service organization and delivery may have influenced observed outcomes, making it difficult to attribute results exclusively to the pharmacological effectiveness of buprenorphine. Furthermore, the heavy workload of medical officers and program staff contributed to gaps in data recording and occasional missed urine testing during follow-up visits. These limitations may have led to an underestimation of buprenorphine's true effectiveness in this setting.

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