

# What are the factors associated with HIV testing among male injecting and non-injecting drug users in Lashio, Myanmar: a cross-sectional study

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## ABSTRACT

**Objectives:** HIV testing is an effective intervention for reducing HIV risk and providing information on HIV status. However, uptake of HIV testing is a major challenge within the drug-using population due to the stigma and discrimination associated with their illegal drug use behaviours. This study thus aimed to identify factors associated with HIV testing among injecting drug users (IDUs) and non-injecting drug users (NIDUs) in Lashio, Myanmar.

**Design:** A cross-sectional study was conducted from January 2010 to February 2010.

**Setting:** This study was carried out in Lashio city, Northern Shan State, Myanmar.

**Participants:** In total, 158 male IDUs and 210 male NIDUs were recruited using a respondent-driven sampling method.

**Primary outcome measures:** Proportion of both drug users who were ever tested for HIV and factors associated with HIV testing.

**Results:** Approximately 77% of IDUs and 46% of NIDUs were ever tested for HIV. The multivariate analysis revealed that having ever received drug treatment was positively associated with HIV testing among both IDUs (adjusted OR (AOR) 13.07; 95% CI 3.38 to 50.53) and NIDUs (AOR 3.58; 95% CI 1.38 to 9.24). IDUs who were married (AOR 0.24; 95% CI 0.06 to 0.94) and who injected at least twice daily (AOR 0.30; 95% CI 0.09 to 0.97) were less likely to undergo HIV testing. Among NIDUs, those who belonged to Shan (AOR 0.30; 95% CI 0.11 to 0.84) or Kachin (AOR 0.30; 95% CI 0.10 to 0.87) ethnicities were less likely to test for HIV.

**Conclusions:** IDUs and NIDUs who have received drug treatment are more likely to test for HIV. Integrating HIV testing into drug treatment programmes alongside general expansion of HIV testing services may be effective in increasing HIV testing uptake among both IDUs and NIDUs in the Northern Shan State of Myanmar.

## INTRODUCTION

Myanmar is one of the countries hardest hit by the HIV epidemic in South-East Asia.

## ARTICLE SUMMARY

### Article focus

- To identify factors associated with HIV testing among injecting drug users (IDUs) and non-injecting drug users (NIDUs) in Lashio, Myanmar.

### Key messages

- IDUs were more likely than NIDUs to have been tested for HIV.
- HIV testing rates were especially low among both IDUs and NIDUs engaging in risk behaviours.
- IDUs and NIDUs would benefit from integrating HIV testing services into drug treatment services.

### Strengths and limitations of this study

- The first look at HIV testing that covered both IDUs and NIDUs.
- Respondent-driven sampling was used to recruit participants.
- HIV testing was self-reported by drug users.
- Results may not be generalised to drug users in other cities of Myanmar.

According to the Joint United Nations Programme on AIDS (UNAIDS), approximately 240 000 people were living with HIV/AIDS at the end of 2011, and HIV prevalence was 0.5% within Myanmar's adult population.<sup>1</sup> Injecting drug use is a primary mode of HIV transmission in the country. The estimated number of drug users in 2008 was 300 000–400 000, of whom 90 000–150 000 were injecting drug users (IDUs).<sup>2 3</sup> HIV prevalence among IDUs was 21.9% in 2011.<sup>1</sup> To tackle this problem, Myanmar has actively promoted condom use, improved the management of sexually transmitted infections (STIs), and made access to HIV testing and counselling services more widespread.

HIV testing is a highly cost-effective intervention for reduction of HIV risk and transmission.<sup>4</sup> Early discovery of HIV infection in individuals is essential to provide HIV-related

care and treatment, and to prevent further spread of the disease to others. In addition, HIV testing and counselling can increase knowledge of HIV/AIDS, reduce risky sexual and drug use behaviours, and prevent other STIs.<sup>5–9</sup> It is therefore important to encourage IDUs and non-injecting drug users (NIDUs) to be tested for HIV infection.

In Myanmar, both the government and international non-governmental organisations (INGOs) have been providing a variety of HIV testing services including referrals and pretest and post-test counselling.<sup>10</sup> By the end of 2006, 289 service delivery points were providing HIV testing services in Myanmar—53% implemented through the government sector, and 47% through INGOs.<sup>11</sup> However, HIV testing uptake has been a major challenge within the drug using populations. Owing to the varying levels of stigma and discrimination associated with drug use and its illegality, access to mainstream public health services is often limited in the drug using population.<sup>12</sup> In Myanmar, drug treatment, including methadone maintenance treatment (MMT), is provided through government-run medical facilities, and HIV testing is not a compulsory service in the treatment.

Despite the critical importance of these population subgroups to HIV prevention and treatment efforts, only limited information is available on the characteristics of both IDUs and NIDUs undergoing HIV testing in Myanmar. Therefore, the purpose of this study was to identify the characteristics of IDUs and NIDUs undergoing HIV testing, and to identify factors associated with testing uptake in Lashio Township, Northern Shan State, Myanmar.

## METHODS

### Study design and area

A cross-sectional study was conducted in Lashio city in the Northern Shan State of Myanmar, which was located close to the Chinese border. Data were collected between January 2010 and February 2010. Lashio is one of the townships in Myanmar recommended as a priority focus for HIV interventions due to the high HIV prevalence among IDUs—48.5% in 2007.<sup>13</sup> Information on HIV prevalence among NIDUs, meanwhile, is not available in Myanmar.

### Study participants

In this study, IDUs were defined as individuals having visible signs of injection, as confirmed by medical personnel in a private setting, and/or those who had injected drugs in the last 6 months. NIDUs were defined as those with no history of injecting drug use and those who had used drugs by a non-injecting route in the last 6 months. Study participants were recruited using the following criteria: (1) male IDU or male NIDU, (2) aged 18 years or older, (3) had used drugs in the last 6 months, (4) exhibiting no withdrawal symptoms and

not under the influence of drugs at the time of interview, and (5) able to speak the Myanmar language.

A total of 176 IDUs and 217 NIDUs were ultimately enrolled in the study. Of them, 18 IDUs and 7 NIDUs were excluded from analysis because of incomplete responses. The remaining participants, 158 IDUs and 210 NIDUs, were included in the data analysis.

### Sampling method

A respondent-driven sampling method was used to recruit participants as an approach generally regarded as effective for reaching hidden populations.<sup>14</sup> The method uses dual incentives and a structured coupon disbursement process of ‘peer referral’ to reduce typical flaws and biases inherent in sampling of hidden populations. The first-round respondents, also known as ‘seeds’, were recruited from the pool of service-recipients at a local drop-in centre (DIC). From three seeds (two IDUs and one NIDU), a total of 174 IDUs and 216 NIDUs (not including seeds) were recruited who met the study criteria. The recruitment process did not distinguish between IDUs and NIDUs. Both IDUs and NIDUs were allowed to recruit any friends who used drugs by either means of administration. Distribution of coupons was terminated when the target sample size was attained. The successfully recruited participant was then provided with three coupons with serial numbers and instructions were given for passing those coupons to peers who were currently using drugs. Coupons were given a 2-week expiration date. The second respondent was also recruited in the same way.

All respondents recruited in this manner received an information, education and communication (IEC) pack that included two condoms with gel packs along with an incentive of 2000 Kyats (US\$ 2.5) as compensation for their time and travel. The respondents were eligible to receive a secondary incentive if recruits referred through them showed up at study sites to participate within the expiration period designated on their recruitment coupons. The secondary incentive was 500 Kyats (US\$0.5) per recruitment.

### Measures

The dependent variable was if the respondent had ever tested for HIV. Specific HIV testing behaviour-related variables included ever having undergone an HIV test, HIV testing frequency, date of last HIV testing and site of last HIV testing. The independent variables were sociodemographic characteristics, drug use, sexual history, HIV testing behaviours and health service utilisation behaviours.<sup>13 15</sup> Assessed sociodemographic variables included age (IDUs ≤29-year-old vs >29-year-old and NIDUs ≤25-year-old vs >25-year-old), marital status (single vs married vs divorced/widowed), race/ethnicity (Burma vs Shan vs Kachin vs Other), educational background (primary/no formal education vs secondary education vs high school or above), employment

(non-regular job vs regular job) and Lashio residence status (migrant vs resident).

Variables on drug use and sexual behaviours included type of illicit drug use, route of administration for drug use, frequency of injecting drug use, unsafe injecting practice (receptive or distributive syringe sharing; yes vs no), poly drug use (yes vs no), disclosure of sexual orientation (heterosexual vs bisexual/homosexual), having more than one partner (yes vs no) and history of female sex worker visit (yes vs no). Variables regarding health services utilisation included ever undergoing drug rehabilitation treatment (yes vs no), ever registered as a drug user (yes vs no) and ever convicted for drug-related crimes (yes vs no). All variables were measured for the last 6 months, unless otherwise stated.

The contents of the study questionnaire were adapted from several different studies previously conducted in Myanmar. The sociodemographic characteristics, drug use behaviour and health service utilisation-related questions were adapted from the rapid assessment and response on drug use and from the HIV Survey of the Asian Harm Reduction Network, Myanmar.<sup>15</sup> Sexual behaviour and HIV testing behaviour-related questions were adapted from the Behavioral Surveillance Survey (BSS) Questionnaire of the Ministry of Health, Myanmar.<sup>13</sup> Pretesting of the full questionnaire used in this study was carried out prior to data collection in Lashio with 20 IDUs and 20 NIDUs.

### Data collection

After obtaining written informed consent from each participant, the lead researcher and six trained interviewers conducted interviews towards data collection. Participants were interviewed individually for 30–40 min in a private setting. Most interviews were conducted at a DIC. The research team also went to various field sites (shooting gallery, drug users' homes, cemetery, etc) to recruit participants who were willing to participate in the study but did not want to come to the DIC.

### Data analysis

Data were coded and entered using the Statistical Package for the Social Sciences, SPSS V.16 (SPSS Inc, Chicago, Illinois, USA) for all analyses. Data analysis was carried out separately for IDUs and NIDUs. Descriptive statistics and  $\chi^2$  tests were used to compare participants' background characteristics. Bivariate analyses were initially conducted to examine factors associated with HIV testing. Finally, all covariates were simultaneously entered into the multiple regression model to calculate adjusted ORs (AORs), 95% CIs and corresponding p values.

### Ethical considerations

This study protocol was approved by the Research Ethics Committee of the Graduate School of Medicine, the University of Tokyo, Tokyo, Japan and by the Institutional Ethical Review Committee of the Department of Medical

Research (Lower Myanmar), Ministry of Health, Yangon, Myanmar. The objectives of the study were made clear to respondents before their voluntary participation, and individual written informed consent was obtained from all participants. Each participant was allowed to withdraw from the study at any time. Confidentiality of the entire data set was maintained at all stages of data collection and analysis.

## RESULTS

### Sociodemographic and drug use characteristics

Of the 368 respondents, 158 were IDUs and 210 were NIDUs (table 1). The mean age was significantly different between IDUs and NIDUs; 29.8 (SD 6.7) years for IDUs and 25.5 (SD 5.8) years for NIDUs ( $p<0.001$ ). With regard to education levels, about a third of the IDUs and NIDUs had primary or no formal education. Overall, 12.7% of IDUs and a significantly higher percentage of NIDUs (31.9%) had migrated to Lashio from another part of Myanmar ( $p<0.001$ ).

### Factors associated with HIV testing among IDUs

In total, 76.6% of IDUs had ever tested for HIV (table 2). Bivariate analysis showed that those who belonged to the older age group (OR 2.57; 95% CI 1.17 to 5.66) and those who had a regular job (OR 2.91; 95% CI 1.26 to 6.70) were more likely to have tested for HIV. Conversely, IDUs who practiced risky behaviours such as using more than two kinds of drugs (poly drugs; OR 0.40; 95% CI 0.18 to 0.85) and injecting drugs at least twice daily (OR 0.41; 95% CI 0.19 to 0.88) were less likely to have tested for HIV. Participants who had ever received drug treatment (OR 14.57; 95% CI 5.82 to 36.47), who had ever registered as a drug user (OR 5.33; 2.25 to 12.62) and who perceived themselves as being at risk of HIV infection (OR 3.57; 95% CI 1.51 to 8.43) were significantly more likely to have tested for HIV.

The multiple regression model for IDUs indicated that those who were married (AOR 0.24; 95% CI 0.06 to 0.94) and those who injected drugs at least twice daily (AOR 0.30; 95% CI 0.09 to 0.97) were less likely to have tested for HIV. Meanwhile, IDUs having a regular job (AOR 4.50; 95% CI 1.08 to 23.17), who had received drug treatment (AOR 13.07; 95% CI 3.38 to 50.53) and who perceived themselves as being at risk of contracting HIV (AOR 5.70; 95% CI 1.40 to 23.25) were more likely to have undergone HIV testing.

### Factors associated with HIV testing among NIDUs

Nearly half of the NIDUs (45.7%) had ever tested for HIV (table 3). Being of Shan (OR 0.28; 95% CI 0.12 to 0.62) or Kachin (OR 0.21; 95% CI 0.09 to 0.49) ethnicity, reporting poly drug use (OR 0.40; 95% CI 0.21 to 0.74), and having visited a female sex worker within the last 3 months (OR 0.50; 95% CI 0.29 to 0.88) were negatively associated with HIV testing. Conversely, NIDUs who had ever received drug treatment (OR 2.73; 95%

**Table 1** Sociodemographic characteristics of participants (n=368)

Characteristics	IDUs (n=158)		NIDUs (n=210)		p Value
	n/mean	Per cent/SD	n/mean	Per cent/SD	
Age	29.8	7.2	25.5	5.8	<0.001
≤20	17	(10.8)	40	(19.0)	
21–30	77	(48.7)	134	(63.8)	
31–40	50	(31.6)	30	(14.3)	
41–50	14	(8.9)	6	(2.9)	
Ethnicity					0.943
Burma	35	(22.2)	45	(21.4)	
Shan	46	(29.1)	66	(31.4)	
Kachin	35	(22.2)	48	(22.9)	
Others	42	(26.5)	51	(24.3)	
Marital status					0.137
Single	75	(47.5)	110	(52.4)	
Married	66	(41.8)	68	(32.4)	
Divorced/widower	17	(10.7)	32	(15.2)	
Education					0.227
Primary/no formal education	52	(32.9)	61	(29.0)	
Secondary education	58	(36.7)	67	(31.9)	
High school or above	48	(30.4)	82	(39.1)	
Employment status					0.315
Non-regular job	32	(20.3)	34	(16.2)	
Regular job	126	(79.7)	176	(83.8)	
Living status (inter-regional migration)					<0.001
Resident	138	(87.3)	143	(68.1)	
Migrant	20	(12.7)	67	(31.9)	

Mean age 29.8 (SD 7.2) for IDUs and 25.5 (SD 25.5) for NIDUs. IDUs, injecting drug users; NIDUs, non-injecting drug users.

CI 1.51 to 4.92), had ever registered as a drug user (OR 3.48; 95% CI 1.61 to 7.49) and who perceived themselves as being at risk of HIV infection (OR 3.29; 95% CI 1.86 to 5.83) were more likely to have tested for HIV.

In the multiple regression model for NIDUs, individuals who were of Shan (AOR 0.30; 95% CI 0.11 to 0.84) or Kachin (AOR 0.30; 95% CI 0.10 to 0.87) ethnicity and who reported poly drug use within the last 3 months (AOR 0.33; 95% CI 0.14 to 0.77) were less likely to have tested for HIV. Similar results as were observed among IDUs were also observed among NIDUs, viz, NIDUs who had ever received drug treatment (AOR 3.58; 95% CI 1.38 to 9.24), who had ever registered as a drug user (AOR 4.38; 95% CI 1.31 to 14.65) and who perceived themselves as being at risk of HIV infection (AOR 4.46; 95% CI 2.06 to 9.65) were more likely to have tested for HIV.

**DISCUSSION**

This is the first study to identify factors associated with HIV testing uptake among IDUs and NIDUs in Lashio, where HIV prevalence among IDUs has been one of the highest in Myanmar.<sup>13</sup> The HIV testing rate among IDUs was higher compared with that among NIDUs where harm reduction programmes were implemented, especially where such programmes targeted IDUs. Such harm

reduction programmes include primary healthcare services, needle and syringe exchange programmes, recreational activities (tea, video, sports and games), and drug/HIV counselling.<sup>16</sup> Among IDUs, 76.6% had ever tested for HIV, while 45.7% of NIDUs had ever tested for HIV. These percentages are much higher compared with the 1-year testing rates reported among Italian drug users: 37.4% for IDUs and 28% for NIDUs.<sup>17</sup> Nonetheless, a comparably high HIV testing rate (76.2%) in the last 6 months was reported among Thai IDUs.<sup>18</sup>

HIV testing was positively associated with ever having received drug treatment and with perception of personal risk of HIV infection among both IDUs and NIDUs. IDUs who had a regular job at the time of the survey were also more likely to have undergone HIV testing. Married IDUs and IDUs who injected at least twice daily, meanwhile, were less likely to have undergone HIV testing. Among NIDUs, those who had ever registered as a drug user were more likely to have undergone HIV testing. NIDUs of Shan or Kachin ethnicity and who reported poly drug use within the last 3 months were less likely to have undergone HIV testing.

Notably, both IDUs and NIDUs who had ever received drug treatment were more likely to have been tested for HIV. This finding is in line with studies conducted in similar populations globally. In Vietnam, female sex workers who spent time in a rehabilitation centre were



**Table 2** Factors associated with HIV testing among injecting drug users in Lashio, Myanmar (n=158)

	n	Per cent	OR	95% CI	AOR	95% CI
Age						
≤29	68	43.0				
>29	90	57.0	2.57	1.17 to 5.66*	2.06	0.63 to 6.76
Marital status						
Single	75	47.4				
Married	66	41.8	0.61	0.28 to 1.35	0.24	0.06 to 0.94*
Divorced/widower	17	10.8	0.55	0.17 to 1.82	0.26	0.04 to 1.94
Education						
Primary/no formal education	61	29.0				
Secondary education	67	31.9	1.57	0.64 to 3.86	2.59	0.63 to 10.60
High school or above	82	39.1	1.11	0.45 to 2.71	1.82	0.29 to 4.86
Ethnicity						
Burma	35	22.2				
Shan	46	29.0	0.93	0.27 to 3.22	2.15	0.32 to 14.57
Kachin	35	22.2	0.22	0.07 to 0.71*	0.58	0.11 to 2.94
Others	42	26.6	0.53	0.16 to 1.74	0.83	0.16 to 4.27
Employment status						
Non-regular job	32	20.3				
Regular job	126	79.7	2.91	1.26 to 6.70*	4.50	1.08 to 23.17*
Living status (inter-regional migration)						
Migrant	20	12.7				
Resident	138	87.3	0.80	0.25 to 2.55	0.81	0.14 to 4.81
Most used drug type in the last 3 months						
Heroin	156	98.7	S/S		S/S	
Stimulant and others	2	1.3				
Had a history of poly drug use in the last 3 months						
Never	83	52.5				
Ever	75	47.5	0.40	0.18 to 0.85*	0.44	0.14 to 1.43
Had a history of unsafe injection practice in the last 3 months†						
No	107	52.5				
Yes	51	47.5	1.72	0.76 to 3.86	1.01	0.27 to 3.84
Frequency of injections per day						
≤2	86	54.4				
>2	72	45.6	0.41	0.19 to 0.88*	0.30	0.09 to 0.97*
Had a history of FSW visit in the last 3 months						
Never	73	46.2				
Ever	85	53.8	0.74	0.35 to 1.56	1.34	0.25 to 7.12
Sexual orientation						
Heterosexual	135	85.4				
Bisexual/homosexual	23	14.6	0.21	0.08 to 0.53**	0.61	0.13 to 2.84
Had more than one partner in the last 3 months						
No	73	46.2				
Yes	85	53.8	0.40	0.18 to 0.89*	0.20	0.04 to 1.11
Ever received drug treatment						
No	31	19.6				
Yes	127	80.4	14.57	5.82 to 36.47**	13.07	3.38 to 50.53***
Ever registered as a drug user						
No	78	49.4				
Yes	80	50.6	5.33	2.25 to 12.62**	2.21	0.57 to 8.63
Ever been in prison or jail						
No	106	67.1				
Yes	52	32.9	0.56	0.26 to 1.19	0.44	0.10 to 1.84
Perceived HIV risk						
No	90	57.0				
Yes	68	43.9	3.57	1.51 to 8.43**	5.70	1.40 to 23.25*

\*p&lt;0.05.

\*\*p&lt;0.01.

\*\*\*p&lt;0.001.

†Had either receptive or distributive needle/syringe sharing.

AOR, adjusted OR; FSW, female sex worker; S/S, small sample size.

**Table 3** Factors associated with HIV testing among non-injecting drug users in Lashio, Myanmar (n=210)

	n	Per cent	OR	95% CI	AOR	95% CI
Age						
≤25	116	55.2				
>25	94	44.8	1.17	0.68 to 2.02	0.75	0.33 to 1.71
Marital status						
Single	110	52.4				
Married	68	32.4	0.62	0.33 to 1.15	0.52	0.22 to 1.21
Divorced/widower	32	15.2	0.88	0.40 to 1.94	0.39	0.13 to 1.18
Education						
Primary/no formal education	52	32.9				
Secondary education	58	36.7	2.04	1.01 to 4.13	2.38	0.95 to 5.97
High school or above	48	30.4	1.29	0.66 to 2.55	1.48	0.58 to 3.77
Ethnicity						
Burma	45	21.4				
Shan	66	31.4	0.28	0.12 to 0.62*	0.30	0.11 to 0.84*
Kachin	48	22.9	0.21	0.09 to 0.49**	0.30	0.10 to 0.87*
Others	51	24.3	0.43	0.19 to 1.00	0.52	0.18 to 1.49
Employment status						
Non-regular job	34	16.2				
Regular job	176	83.8	1.67	0.78 to 3.59	1.35	0.44 to 4.14
Living status (inter-regional migration)						
Migrant	67	31.9				
Resident	143	68.1	0.52	0.29 to 0.94*	0.55	0.26 to 1.17
Most used drug type in the last 3 months						
Heroin	87	41.4				
Stimulant and others	123	58.6	1.15	0.66 to 2.00	1.54	0.63 to 3.79
Had a history of poly drug use in the last 3 months						
Never	58	27.6				
Ever	152	72.4	0.40	0.21 to 0.74*	0.33	0.14 to 0.77**
Had a history of FSW visit in the last 3 months						
Never	80	38.1				
Ever	130	61.9	0.50	0.29 to 0.88*	0.63	0.30 to 1.33
Sexual orientation						
Heterosexual	76	36.2				
Bisexual/homosexual	134	63.8	1.77	0.99 to 3.14	1.72	0.73 to 4.03
Had more than one partner in the last 3 months						
No	35	16.7				
Yes	175	83.3	0.87	0.42 to 1.80	0.80	0.27 to 2.38
Ever received drug treatment						
No	139	66.2				
Yes	71	33.8	2.73	1.51 to 4.92**	3.58	1.38 to 9.24**
Ever registered as a drug user						
No	173	82.4				
Yes	37	17.6	3.48	1.61 to 7.49**	4.38	1.31 to 14.65**
Ever been in prison or jail						
No	174	82.9				
Yes	36	17.1	1.08	0.52 to 2.21	1.28	0.35 to 4.65
Perceived HIV risk						
No	120	57.1				
Yes	90	42.9	3.29	1.86 to 5.83*	4.46	2.06 to 9.65***

\*p<0.05.

\*\*p<0.01.

\*\*\*p<0.001.

AOR, adjusted OR; FSW, female sex worker.

more likely to have tested for HIV.<sup>19</sup> Moreover, IDUs in Italy who had ever received both pharmacological and psychological treatments were more likely to have tested for HIV than were those who underwent only one kind of treatment.<sup>17</sup>

Drug treatment is playing an important role in reducing the risk of HIV infection among IDUs and NIDUs alike.<sup>20</sup> However, HIV testing is not currently a compulsory service at drug treatment centres (DTCs) in Myanmar unless a drug user undergoing detoxification

requests it. Since HIV testing and counselling effectively reduce risk behaviours in drug using populations, the US Centers for Disease Control and Prevention recommends that HIV testing should be integrated into drug treatment services.<sup>20</sup> Expanding drug treatment to incorporate HIV testing services may also increase the number of IDUs and NIDUs accessing HIV testing services in Myanmar.

In the present study, NIDUs who registered as drug users in the government facilities were more likely to have been tested for HIV. Registering as a drug user is a way to access drug treatment, including MMT and other medical services, at government-run facilities in Myanmar. Following registration, a drug user is scheduled to receive a minimum of 6 weeks' compulsory detoxification. Drug users who fail to register or do not comply with treatment may face a 3-year to 5-year prison sentence. Currently, drug treatment in Myanmar is provided through 26 major DTCs, with a 450 bed capacity per day, and 40 minor DTCs.<sup>21</sup> Encouraging drug users to register as such may be effective in increasing the uptake of HIV testing services among drug users. Nevertheless, most of the drug users surveyed were reluctant to register their drug use due to several barriers, including stigma towards drug addicts, financial problems,<sup>22</sup> fear of being known as a drug user, low perceived efficacy of available treatment and the possibility of losing employment opportunities.<sup>23 24</sup>

Among both IDUs and NIDUs, those who had engaged in high-risk behaviours were less likely to have tested for HIV. Additionally, IDUs who injected at least twice daily as well as IDUs and NIDUs who used more than two drugs (poly drug use) were less likely to have been tested for HIV. A similar finding was reported in Thailand, where IDUs who practiced high-risk behaviours were also less likely to undergo HIV testing.<sup>18</sup> It is not surprising that drug users are more prone to feel reticent to learn of their HIV status through testing due to their risky behaviours,<sup>25</sup> and to stigma/discrimination related to drug use and its illegality.<sup>19 26</sup> However, injecting drug use is the main mode of HIV transmission in Myanmar,<sup>2 3</sup> and studies indicate that poly drug users are especially likely to practice unsafe sexual behaviours.<sup>27 28</sup> HIV transmission among drug users engaging in risky behaviours might thus be fuelling the HIV epidemic in Myanmar. Hence, HIV testing programmes targeting drug users who exhibit high-risk behaviours are urgently needed, and such programmes might also fruitfully incorporate educational campaigns towards reducing discrimination against drug use.

In this study, perceived risk of HIV infection was a significant predictor for HIV testing among both types of drug users (ie, IDUs and NIDUs). Such individuals may perceive themselves as being at risk of HIV infection after learning of their partner's HIV status,<sup>29</sup> or they may be compelled to consider the implications of their risky drug use and sexual behaviours,<sup>30</sup> prompting them to seek HIV counselling and to have their HIV status

tested. In this study, we did not confirm participants' HIV status due to ethical considerations. Regardless of HIV status and risk behaviours, however, perceived risk of HIV infection would appear to serve as a self-protective behaviour which can motivate individuals to practice safer behaviours.

This study showed that IDUs who had a regular job were more likely to have been tested for HIV infection. One possible explanation for this is that the Myanmar National AIDS Programmes have included the workplace as a priority setting for intervention/prevention efforts.<sup>31</sup> Thus, IDUs with a regular job are likely to have been tested for HIV infection through such programmes. On the other hand, conflicting findings have emerged from studies of Russian IDUs<sup>32</sup> and tuberculosis patients from Uganda<sup>33</sup> and Ethiopia.<sup>34</sup> In these studies, unemployed or part-time workers were more likely to test for HIV than were employed or full-time workers. Further investigation may thus be necessary to explore the impact of employment status on HIV testing behaviours in different contexts.

In the present study, married IDUs were less likely to have been tested for HIV than were single IDUs. This is an important finding, as two-fifths of all new HIV infections in Myanmar occurred through husband-to-wife transmission in 2010. Moreover, the trend of husband-to-wife transmission is estimated to increase to nearly half of all new infections among women by 2015.<sup>35</sup> In China, too, married men who have sex with men were less likely to have been tested for HIV than were single men.<sup>36</sup> Clearly, HIV testing programmes urgently need to focus on encouraging married IDUs to undergo HIV testing.

Another important finding was that NIDUs who were of Shan or Kachin ethnicities were less likely to have been tested for their HIV status than were those of Burma ethnicity. This may be because most of the IEC materials, HIV testing information and HIV counselling services were conducted in the Myanmar language with which the Shan and Kachin ethnicities are not always familiar. Owing to a lack of Myanmar language ability, participants who do not speak or read the Myanmar language may have had difficulty in accessing HIV testing services. Other ethnicities would also benefit if HIV testing services could be conducted in languages representing a broader range of ethnicities such as Shan and Kachin, or if the services could employ staff conversant in the languages of other ethnicities.

Our findings are derived from a cross-sectional study; as such, several possible limitations should be noted in their interpretation. First, HIV testing was self-reported by drug users, and we were not able to confirm their HIV status. Second, our results may not be generalised to drug users in other cities or to drug users who did not participate in this study because they may have characteristics different from those who participated in the study. However, our findings are generally consistent with those of another study from Thailand.<sup>18</sup>

Despite their potential limitations, our results present the first look at HIV testing behaviours among drug users in Lashio, Myanmar's famous border trade city, with a high burden of HIV infection. At the same time, further research is needed to understand the barriers and decisions to access HIV testing among drug users, especially for those who are married and engaged in risky behaviours.

## CONCLUSIONS

Both IDUs and NIDUs who had ever received drug treatment were more likely to have tested for HIV in the present study. More IDUs received HIV testing compared with NIDUs. Low HIV testing rates were found among IDUs who were married and who injected at least twice daily and among NIDUs reporting poly drug use within the last 3 months and who were of Kachin or Shan ethnicity. To increase HIV testing rates, especially among NIDUs, we need to encourage them to register as drug users and to provide them with HIV services in the Myanmar language as well as in other ethnic languages. Integrating HIV testing into existing drug treatment programmes and expanding drug treatment services thus emerges as an effective way to increase utilisation of HIV testing among both types of drug users in Myanmar.

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