

# Pattern and prevalence of substance use and dependence in two districts of Union Territory of Jammu & Kashmir: Special focus on opioids

Yasir Hassan Rather<sup>1</sup>, Fazle Roub Bhat<sup>2</sup>, Altaf Ahmad Malla<sup>1</sup>, Marya Zahoor<sup>1</sup>, Peerzada Ayash Ali Massodi<sup>3</sup>, Saleem Yousuf<sup>1</sup>

<sup>1</sup>Department of Psychiatry, Institute of Mental Health and Neuroscience, Government Medical College, Srinagar, Kashmir,

<sup>2</sup>Drug De Addiction and Treatment Centre, Department of Psychiatry, Post Graduate Institute of Medical Education and Research, Chandigarh, <sup>3</sup>Department of Social Work, University of Kashmir, Srinagar, Kashmir, India

## ABSTRACT

**Background:** Kashmir has been at the centre of conflict between India and Pakistan after partition of erstwhile British India in 1947. While research suggests that conflict exposure may result in increased substance use, the prevalence of substance use disorders has remained an under-searched area in Kashmir. **Method:** We employed respondent-driven sampling (RDS) for recruiting substance users from two districts of Kashmir. Estimation of substance dependence was done using benchmark multiplier method. **Results:** Prevalence of any substance dependence was estimated to be 1.95% while as for any opioids, it was 1.80%. Heroin was the most common opioid with last year use by 84.33% respondents. Current prevalence of injection drug use was 0.95% and heroin was the most common opioid among Injection Drug User (IDU), being used by 91.12% IDUs followed by Pentazocine (5.92%). **Conclusion:** Our results indicate that RDS was a feasible and acceptable sampling method for recruiting 'difficult to reach' participants like illicit substance users including IDUs. Our results further demonstrate that opioids are highly prevalent in Kashmir and heroin injection is not uncommon. All these findings call for attention from policy makers as opioids are one of the important contributors to mortality and morbidity related to substances.

**Keywords:** Addiction, dependence, Kashmir, opioids, substance

## Introduction

Substance use disorders are widely prevalent throughout the world and are a major public health problem globally. In India, few substances like Cannabis and alcohol have been used since

centuries in view of their religious and cultural acceptance.<sup>[1]</sup> While alcohol and tobacco are widely prevalent substances in India, illicit substances especially opioids including heroin are emerging as a new challenge for policy makers.<sup>[2]</sup> In recent nationwide study conducted by Ministry of Social Justice and Empowerment, Government of India, prevalence of current use of any opioid was 2.06% and heroin being the most commonly used opioid.<sup>[3]</sup> Jammu & Kashmir state has been bone of contention between three neighbouring states of India, Pakistan and China. The valley of Kashmir has been facing armed insurgency since 1989 with multiple studies

**Address for correspondence:** Dr. Fazle Roub Bhat, Senior Resident, Drug De addiction and Treatment Centre, Department of Psychiatry, Post Graduate Institute of Medical Education and Research, Chandigarh - 160 012, India. E-mail: fazleroub@gmail.com

Received: 03-07-2020

Revised: 05-09-2020

Accepted: 22-09-2020

Published: 30-01-2021

### Access this article online

#### Quick Response Code:



**Website:**  
www.jfmpc.com

**DOI:**  
10.4103/jfmpc.jfmpc\_1327\_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Rather YH, Bhat FR, Malla AA, Zahoor M, Ali Massodi PA, Yousuf S. Pattern and prevalence of substance use and dependence in two districts of Union Territory of Jammu & Kashmir: Special focus on opioids. J Family Med Prim Care 2021;10:414-20.

documenting high prevalence of psychiatric disorders such as Post traumatic Disorder (PTSD) and depression.<sup>[4-6]</sup> This has been compounded by multiple natural disasters like snow storms, floods and earth-quakes in last few decades which have further worsened the psychological state of residents. Researchers in Kashmir have focussed only on identifying rates of PTSD and other common mental disorders, ignoring the fact there is a bidirectional relationship between substance use and other mental disorders.<sup>[7]</sup> Multiple studies have documented higher prevalence of substance use disorders in conflict ridden areas however data from Kashmir is surprisingly missing.<sup>[8,9]</sup> The nationwide study was the first study which extensively studied substance prevalence throughout Union Territory of Jammu and Kashmir (J & K), however findings may not provide well-defined picture about Kashmir as it has witnessed multiple stressors like conflict and above mentioned natural disasters which the other parts of state (Jammu and Ladakh) escaped to a greater extent.<sup>[3]</sup> As compared to other two divisions of the state, Kashmir has different socio-cultural and geographical factors, all of which are important in initiation, maintenance and treatment of substance use disorders.

We thus felt that there was a need to study the overall substance dependence in two districts of Kashmir with special focus on opioid users including Injection drug users as there have been anecdotal reports suggesting an alarming rise in opioid problem in valley. We also aimed to study the injection use pattern among respondents. Since primary care physicians are the point of entry for treatment seeking for substance using patients, hence need to be aware of the common substances prevalent in the community. This could also help in better treatment and referral to higher centres (if needed) for such patients.

While population or general household surveys are considered the best direct method of estimation of prevalence of different disorders, these are not widely acceptable methods for estimation of illicit substance as their use is highly stigmatized.<sup>[10]</sup> Hence, population size of substance users is usually estimated by indirect methods like benchmark- multiplier method (BMM) which was employed in this study.

## Materials and Methods

From December 3, 2019 to January 10, 2020, we conducted this pilot project using respondent-driven sampling (RDS) among substance users residing in two districts of Kashmir valley in view of diversification purposes. To our knowledge, except for nationwide study by Ambekar *et al.*,<sup>[3]</sup> the use of RDS aimed at substance users has not been attempted before in Kashmir Valley. We sought to recruit a total of 300 responders in these two districts. The study employed six fieldworkers, who also conducted the face to face interviews, all the field workers were having Masters in Social Work as their basic qualification, had at least one year of experience of working in the area of substance

use in Kashmir. Two qualified psychiatrists trained field workers for two weeks regarding the research ethics and methodology including RDS. In each of the districts, one site was selected as RDS centre. Prior to participant recruitment, formative research was conducted regarding development of data collection, instrument application, sampling methodology, participant's awareness of risk factors, complications related to substance use etc. We included subjects in the age group of 10-75 years or older, of Kashmiri descent and living in Kashmir for at least 1 year, dependent on any substance (s) and agreeing for participation in the study. Every subject was explained about the purpose of the study and a written informed consent was obtained from each of them. Strict confidentiality was ensured. Study was approved by ethical committee of the institute. The study was approved by ethical committee of the institute approved on 22<sup>nd</sup> May 2019.

## Instruments

- Semi structured proforma: This includes questions on sociodemographic characteristics, consequences of substance use, IDU pattern including complications.
- WHO alcohol, smoking, and substance involvement screening test (ASSIST) : The ASSIST is an clinician-administered questionnaire which queries about nine categories of psychoactive substances and contains eight items (which ask for each substance for which lifetime or past 3-month use is endorsed).<sup>[11]</sup>
- Definition of IDU: Any person who has used any psychoactive drug through injections in a non-medical context – ‘within previous six months’ as an IDU.
- Definition of dependence: Dependence on any substance was established as per International Classification of Diseases-10 (ICD-10) criteria.

## Sampling

In the first week of operation, four initial participants known as “seeds,” from each of the sites were enrolled who would then enable recruiting further subjects. We selected purposively while keeping in consideration different sociodemographic variables like education and geographic background. Both seeds as well as recruits had to fulfil same eligibility criteria for enrolment in the study.

All participants were provided two types of coupons- a primary coupon for participation and two secondary coupons for distribution to their peers whom they encouraged to visit the study site. Secondary coupons were reimbursed if seeds were able to recruit successful participants. Every effort was made to minimize coupon tampering. Coupons could be redeemed for Kashmiri *shawls*, caps, towels as no cash was directly paid to any participant.

In our study, Benchmarkmultiplier method was used for estimating the prevalence of substance dependence. This method makes use of pre-existing data like overdose related deaths or substance-treatment data, known as benchmark.<sup>[12]</sup> For example, if this method is applied to in-treatment data, then the benchmark

would the total number of drug-users who underwent inpatient treatment in a given year.<sup>[10]</sup>

The formula is as follows:

T: Estimated total of problematic substance users

B : Total number of problematic substance users who underwent treatment in a given year in two districts of Kashmir (Srinagar and Anantnag)

c : Estimated in-treatment rate during the same period in these regions

M : Multiplier, i.e., reciprocal of c

$$T = B/c = B \times M$$

Statistical analysis was done using Statistical Package for Social Sciences (SPSS), version 22, SPSS Inc., Chicago, IL, USA.

## Results

Most of the respondents were males in the age group of 20-29 years, having minimum educational qualification up to 10<sup>th</sup> class. More than two-third of the respondents were unmarried and most were skilled workers [Table 1]. More than half of the patients were having monthly income of at least 30,000 Rupees (393\$) and about 74% subjects were having *pukka* accommodation. There was almost an equal representation of subjects from nuclear and joint families. As shown in Table 2, tobacco was the most commonly reportedly substance (92.66%) ever used in lifetime. This was followed by life time use of opioid (90.66%). Among other substances, lifetime use of cannabis, alcohol and sedatives-hypnotics was reported as 50.33%, 21.33% and 18.33% respectively. With regarding to dependence, opioids were the most prevalent illicit substances (87.33%) followed by cannabis (43.66%). Among the respondents, 20 (6.67%) reported of having admission in the past one year for substance related issues which yielded a multiplier of 14.99. There were 1186 total of substance dependent-admissions in all government recognized de addiction centers in these two districts which was henceforth kept as benchmark. Upon multiplying these two, a total estimate of 17,768 came out [Table 3]. Prevalence of substance dependence was calculated by dividing this figure as numerator (17,768) by the suitable denominator. Final denominator was calculated as below:

Since the numerator was based on 10–75 year population, the denominator also had to be same age group population of these two districts (924955 are males and 402496 are females).<sup>[13]</sup> Further, because the sample from which the size estimate of 17,768 was derived was 97% male and only 3% female, we weighted the denominator based on gender (97% of 924955 plus 3% of 402496 = 909,281). This was the final denominator. Thus, the prevalence rate of any substance

**Table 1: Socio demographic profile of the participants**

Variable	Frequency (%)
Gender	
Males	291 (97.00)
Females	9 (3.00)
Age in years	
Up to 19	42 (14.00)
20-29	181 (60.33)
30 and above	77 (25.667)
Educational Level	
Illiterate	33 (11.00)
Literate without formal education	5 (1.67)
Primary School Certificate	5 (1.67)
Middle School Certificate	42 (7.00)
Matric/High School certificate	128 (42.66)
Intermediate	18 (6.00)
Diploma Certificate	21 (7.00)
Graduate and above	48 (16)
Marital status	
Married	83 (27.66)
Never Married	208 (69.34)
Divorced	6 (2.00)
Separated	3 (1.00)
Profession	
Professional	10 (3.33)
Semi- Profession	6 (2.00)
Clerical	8 (2.66)
Shop Owner	54 (18.00)
Farmer	5 (1.66)
Skilled Worker	86 (28.66)
Semi-Skilled Worker	49 (16.33)
Unskilled worker	9 (3.00)
Unemployed	73 (24.33)
Income	
Upto 10,000	23 (7.66)
10,000-19,000	57 (19.00)
20,000-29,000	55 (18.33)
30,000 and above	165 (55.00)
Family type	
Nuclear	154 (51.00)
Joint	143 (48.00)
Extended	3 (1.00)
Type of accommodation	
Kuccha	9 (3.00)
Semi pukka	67 (22.34)
Pukka	224 (74.66)

dependence was calculated as  $17,768/909,281 \times 100 = 1.95\%$ . Similar method was used to estimate the prevalence rates of opioid dependence and it was found to be 1.80% for opioid dependence. As we lacked the exact figures regarding number of IDUs (benchmark) but had the percentage of total opioid dependent who were IDUs ( $135/262 = 51.53\%$ ), we estimated the IDU number as 8445 (51.33% of 16,389) and total prevalence of 0.92% ( $8445/909,281$ ). Table 4 shows that there were a total of 135 injection drug users with heroin being the most common (91.12% of IDUs) opioid used. 57.04% of IDUs has experimented with their first injection before the age of 20 years while as 87.11% were using injection in a daily pattern. Sharing of needles/Syringes and re use of needles/syringes was reported by 96 (71.11%) and 94 (69.63%) IDUs. A history of

being diagnosed as seropositive for HCV and HIV was found in 3.70 and 2.96% respectively. A history of non-fatal overdose was reported by 37.77% IDUs.

### Focused group discussion themes

Perception of Substance users regarding different issues like stigma, effect of conflict and awareness regarding high risk behaviour was studied in focussed group discussions. These thematic questions were unstructured and later qualitative analysis was done.

Most of the respondents reported that there were insufficient services regarding management of substance use and the approach of Government focussed more on using Narcotic Drug and Psychotropic Substance Act and Public Safety Act against substance users. Majority of the respondents believed that stigma was one of the major hindrance in availing treatment for substance use. A large section of respondents also reported that current conflict was one of the factors in substance initiation as well as treatment discontinuation. Participants reported that job and financial losses, boredom due to prolonged curfews made them experiment with substances.

Drug Used	Lifetime use	Last year use	Current dependence
Tobacco	278 (92.66)	277 (92.33)	276 (92.00)
Alcohol	64 (21.33)	47 (15.66)	32 (10.66)
Cannabis- any variety	151 (50.33)	136 (45.33)	131 (43.66)
Cannabis-Bhang Cannabis-(Other than Bhang)	52 (17.33)	48 (16.00)	-
Opioids-any type	272 (90.66)	267 (89.00)	262 (87.33)
Natural opioids	30 (10.00)	30 (10.00)	-
Heroin	253 (84.33)	253 (84.33)	-
Pharmaceuticals opioids	73 (24.33)	66 (22.00)	-
Sedatives-hypnotics (Non-Prescription use)	55 (18.33)	47 (15.66)	39 (13.00)
Inhalants	10 (3.33)	6 (2.00)	4 (1.33)
Cocaine	8 (2.66)	6 (2.00)	2 (0.66)
Amphetamine type stimulants	1 (0.33)	1 (0.33)	-
Hallucinogens	1 (0.33)	1 (0.33)	-

### Discussion

The benchmark-multiplier method (BMM) is an established, indirect method for estimation of population size in cases of difficult to reach population.<sup>[10]</sup> It has been used successfully for estimating various hidden populations like IDUs, sex workers and substance use among street children.<sup>[14-16]</sup> In a society like Kashmir where substance use is highly stigmatised, estimation of substance using population especially opioid users is a challenging task, hence this benchmark-multiplier method was the most appropriate in this case.

In our study, substance dependence prevalence was found to be 1.95%. Data on prevalence of substance use in Kashmir has been compounded by lack of community based studies. Global Adult Tobacco Survey-2 (GATS -2) had revealed that 23.7% of

Substance	Patients with annual dependence	Patients admitted last year	Multiplier	Benchmark	Substance dependent population	Substance dependence prevalence
Any substance	300	20	14.99	1186	17,768	1.95%
Opioids	262	18	14.55	1126	16,389	1.80%

Variable	Sub-variable	Frequency (%) n=135
Drug	Heroin	123 (91.12)
	Pentazocine	8 (5.92)
	Other opioids (Buprenorphine/Tramadol)	4 (2.96)
Age at first injection use	Up to 20 years	77 (57.04)
	21 years and above	58 (42.06)
Frequency of injection	Less than once a week	3 (2.22)
	Once a week	4 (2.96)
	2-3 times a week	6 (4.44)
	4-6 times a week	4 (2.96)
	Daily users	118 (87.11)
Associated complications	Any history of abscess/ulcers	67 (49.62)
	Any history of vein related complication (thrombophlebitis, vein block, varicose veins)	66 (48.88)
	History of HCV a	5 (3.70)
	History of HIV b	4 (2.96)
	History of overdose	51 (37.77)
	History of receiving Anti- Retroviral Therapy	1 (0.74)
Treatment related	Tested for HIV/HCV	77 (57.04)
	History of treatment seeking for substance use	15 (11.11)
	History of receiving Anti- Retroviral Therapy	1 (0.74)

aHepatitis C Virus infection. bHuman Immunodeficiency Virus

J & K's population are current tobacco users.<sup>[17]</sup> The low figures in our study are probably because of different methodology used in our survey along with the fact most of subjects in our survey were opioid users. Since BMM was used in our study, most of the admissions in our study which were primarily opioid users led to exclusion of tobacco users and hence an overall lower substance use prevalence including tobacco use. The prevalence of tobacco dependence was found to be 5.5 per cent in neighbouring Punjab in another.<sup>[18]</sup> The reason why alcohol was present at very low rate as compared to other studies from rest of India (8.4% in persons aged 15 years and above in a rural community region in South India) could be explained by the fact that study was conducted in both these have a Muslim majority population in which alcohol use is considered as a taboo and is strongly rejected.<sup>[19]</sup>

As per Ambekar *et al.*, opioid prevalence in the state of Jammu & Kashmir is 0.62% which is comparatively lower as compared to our study.<sup>[3]</sup> There are methodological differences between the two studies as our study focussed on only those two districts having recognised de addiction services in Kashmir division. This is in comparison to former study which had focussed on entire state of Jammu & Kashmir. Our prevalence of substance/opioid dependence is comparatively higher than a study conducted in Chandigarh which was having similar methodology where the prevalence of opioids was 1.53%.<sup>[20]</sup> As 45% of our respondents were using injectable opioids which suggests a greater prevalence of injectable opioids especially heroin in Kashmir. In previous hospital based studies on substance use among Kashmiri population, the pattern of use was predominated by non-injectable opioids which has now changed to an injection pattern.<sup>[21,22]</sup> Substance use pattern is liable to change owing to varied factors like sociodemographic profile, availability of substances, perception about drug-related safety, legal and cultural factors.<sup>[23]</sup> There are an estimated 25000 IDUs in entire state of Jammu & Kashmir while as per our study, there are 8,444 in two districts of Kashmir division.<sup>[3]</sup> All respondent IDUs were using opioids like heroin and other pharmaceutical opioids. Heroin was used by majority of IDUs and the same trend is in Asia and most parts of India where heroin continues to predominate as preferred drug for injection route.<sup>[3,24]</sup> We did not find any primary case of stimulant or benzodiazepine injection use as reported in different countries.<sup>[25,26]</sup> In recent times, law enforcement agencies in Kashmir have also reported increased seizures of heroin with increased episodes of interstate and cross-border opioid smuggling. 22% of our respondents were using different pharmaceutical opioids like Tramadol, codeine-containing cough syrups, dextropropoxyphene etc., which could reflect the easy accessibility in the pharmacy markets where they are sold due to lax mechanisms.<sup>[27]</sup> Natural opioids like *afeem/bhukki* (known locally as *Khash-khash*) were least common opioids used by our respondents.

Since benchmarks were not available for other substances and most of the respondents reported having admission in

deaddiction centres for opioid use, we could not determine prevalence of these substances in Kashmir.

A worrying trend from this pilot study is the emergence of Pentazocine use in the community which is known to be associated with cutaneous complications like skin ulceration and scleroderma.<sup>[28]</sup> About 87% of IDUs were injecting at least daily which reflects the severity of opioid use. Sharing of needles/syringes was found in 71.11% of IDUs while as 69.63% reported re use of needles/syringes. This assumes significance as these are key risk factors for transmissions of infections like human immunodeficiency virus (HIV) and hepatitis C virus (HCV) including hepatitis B virus, this prevalence is high as compared to another multi centric study from India where sharing of needles/syringes was reported as 14.4%.<sup>[29]</sup> In comparison to other studies, low prevalence of HIV and HCV could be explained by the fact that in our study retrospective reporting by patients was employed.<sup>[30]</sup> This prevalence is still higher as compared to a community based study from Kashmir where HCV prevalence in general population was found to be 1.9%.<sup>[31]</sup> Similar to HCV, HIV prevalence was found to be lower and could be explained by the same methodological issue in our study. However, rate of 3.70% among IDUs is nonetheless a worrisome number as Jammu & Kashmir is one of the states having HIV seropositivity as low as 0.03%.<sup>[32]</sup> These figures call for urgent public awareness regarding high risk factors as well as need to upgrade treatment services such as needle syringe exchange programme and Opioid Agonist Therapy. Further studies may provide a comprehensive picture about the prevalence and risk factors for HCV and HIV among substance users.

More than one third of IDUs in our study reported history of non-fatal overdose which is an obvious concern since a history of non-fatal overdose increases future risk of fatal overdose.<sup>[33]</sup> Lifetime overdose among opioid users may be as high as 45% which is slightly higher than as reported in our study.<sup>[34]</sup> Data on overdose related deaths is compounded by high degree of stigma attached to substance use as well as lack of research. Drug overdose deaths have recently made to headlines in local dailies and these have affected youth. With almost half of IDUs in our study having complications like abscess and ulcers, this area needs attention from service providers.

## Conclusions

This pilot study provides a comprehensive picture of substance use especially opioid users in Kashmir including demographics and estimation of dependence. Our study found that BMM was a feasible methodology for estimation of substance dependence which reported to be 1.95% and opioid dependence prevalence of 1.80%. An estimated 8,444 IDUs are in these two districts of Kashmir valley which calls for large scale intervention. There is poor utilisation of treatment services which need to be augmented especially at primary care level in rural areas. We hope our study will be useful to policy makers to guide planning and resource allocation in dealing with the challenge of substance use in Kashmir valley.

## Limitations

Our study had few limitations which are inherent to RDS-BBM method. It is possible that RDS may have selectively attracted those IDUs aspiring for incentives. Our study could not control for non-response bias as we did not explore for non-response rate from participants returning for incentives. There might be few patients who might have got admitted in outside valley while as others might have got admitted in multiple centres located in the valley. Some of these limitations could be done away with modification in methodology like capture-recapture method which should be planned in future. Our study also had the limitation that our estimates of HIV and HCV seroprevalence were based on retrospective testing as we did not offer HIV/HCV testing, future studies are needed to estimate the exact prevalence among IDUs in Kashmir.

## Acknowledgements

We would like to thank our field workers who were engaged in fieldwork activities.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

- Basu D, Malhotra A, Varma VK. Cannabis related psychiatric syndromes: A selective review. *Indian J Psychiatry* 1994;36:121-8.
- Avasthi A, Ghosh A. Drug misuse in India: Where do we stand & where to go from here? *Indian J Med Res* 2019;149:689-92.
- Ambekar A, Agarwal A, Rao R, Mishra A, Khandelwal SK, Chadda RK. National Survey on Extent and Pattern of Substance Use in India. Magnitude of Substance Use in India. [Internet]. New Delhi: Ministry of Social Justice and Empowerment, Government of India; 2019 [Cited 2020 Jun 10]. Available from <http://socialjustice.nic.in/writereaddata/UploadFile/Survey%20Report636935330086452652.pdf>.
- Margoob AM, Ahmad SA. Community prevalence of adult post traumatic stress disorder in South Asia: Experience from Kashmir. *JK-Practitioner* 2006;13(Suppl 1):S18-25.
- Margoob MA, Khan AY, Mushtaq H. PTSD symptoms among children and adolescents as a result of mass trauma in south Asian region: Experience from Kashmir. *JK-Practitioner* 2006;13(Suppl 1):S45-8.
- Housen T, Lenglet A, Shah S, Sha H, Ara S, Pintaldi G, *et al.* Trauma in the Kashmir valley and the mediating effect of stressors of daily life on symptoms of posttraumatic stress disorder, depression and anxiety. *Confl Health* 2019;13:58.
- Lai L. Treating substance abuse as a consequence of conflict and displacement: A call for a more inclusive global mental health. *Med Confl Surviv* 2014;30:182-9.
- Haidary AS. Socioeconomic factors associated with opioid drug use among the youth in Kabul, Afghanistan. *RCAPS* 2016;34:80-92.
- Alaryan T, Hasan TA, Eshelli M, Alzeer S. The misuse of prescribed drugs during the syrian crisis: A cross-sectional study. *Int J Ment Health Addiction* 2019:1-10. doi: 10.1007/s11469-019-00180-4.
- Hickman M, Hope V, Platt L, Higgins V, Bellis M, Rhodes T. Estimating prevalence of injecting drug use: A comparison of multiplier and capture-recapture methods in cities in England and Russia. *Drug Alcohol Rev* 2006;25:131-40.
- Humeniuk R, Ali R, Babor TF, Farrell M, Formigoni ML, Jittiwutikarn J, *et al.* Validation of the Alcohol, Smoking And Substance Involvement Screening Test (ASSIST). *Addiction* 2008;103:1039-47.
- In-direct methods for estimating the size of the drug problem. [Internet]. Vienna (Austria): United Nations International Drug Control Programme; 2002 [Cited 2020 Jun 10]. Available from: [https://www.unodc.org/pdf/gap\\_toolkit\\_module3\\_estimation.pdf](https://www.unodc.org/pdf/gap_toolkit_module3_estimation.pdf).
- Census of India, 2011. [Internet]. Ministry of Home affairs, Government of India. [Cited 2020 Jun 10]. Available from: [https://censusindia.gov.in/2011-prov-results/prov\\_data\\_products\\_J&K.html](https://censusindia.gov.in/2011-prov-results/prov_data_products_J&K.html).
- Abdul-Quader AS, Heckathorn DD, Sabin K, Saidel T. Implementation and analysis of respondent driven sampling: Lessons learned from the field. *J Urban Health* 2006;83:1-5.
- Mensch BS, Friedland BA, Abbott SA, Katzen LL, Tun W, Kelly CA, *et al.* Characteristics of female sex workers in Southern India willing and unwilling to participate in a placebo gel trial. *AIDS Behav* 2013;17:58597.
- Dhawan A, Mishra AK, Ambekar A, Chatterjee B, Agrawal A, Bhargava R. Estimating the size of substance using street children in Delhi using Respondent-Driven Sampling (RDS). *Asian J Psychiatr* 2020;48:101890. doi: 10.1016/j.ajp.2019.101890.
- GATS - 2 (Global Adult Tobacco Survey - 2) Factsheet. India 2016-17. [Internet]. Ministry of Health and Family Welfare, Govt. of India. World Health Organisation; Tata Institute of Social Sciences. [Cited 2020 Jun 10]. Available from: [http://www.searo.who.int/india/mediacentre/events/2017/gats2\\_india.pdf?ua=1](http://www.searo.who.int/india/mediacentre/events/2017/gats2_india.pdf?ua=1).
- Chavan BS, Garg R, Das S, Puri S, Banavaram AA. Prevalence of substance use disorders in Punjab: Findings from National Mental Health Survey. *Indian J Med Res* 2019;149:489-96.
- Gopikrishnan SK, Ponraj DG, Newtonraj A, Purty AJ, Manikandan M, Vincent A. Prevalence and determinants of Alcohol use in a remote rural area in South India: A community-based cross-sectional study. *J Family Med Prim Care* 2020;9:4333-6.
- Avasthi A, Basu D, Subodh BN, Gupta PK, Malhotra N, Rani P, *et al.* Pattern and prevalence of substance use and dependence in the Union Territory of Chandigarh: Results of a rapid assessment survey. *Indian J Psychiatry* 2017;59:284-92.

21. Farhat S, Hussain SS, Rather YH, Hussain SK. Sociodemographic profile and pattern of opioid abuse among patients presenting to a de-addiction centre in tertiary care Hospital of Kashmir. *J Basic Clin Pharma* 2015;6:94-7.
22. Rather YH, Bashir W, Sheikh AA, Amin M, Zahgeer YA. Socio-demographic and clinical profile of substance abusers attending a regional drug de-addiction centre in chronic conflict area: Kashmir, India. *Malays J Med Sci* 2013;20:31-8.
23. Sharma HK. Sociocultural perspective of substance use in India. *Subst Use Misuse* 1996;31:1689-714.
24. Ambekar A, Tripathi BM. Size estimation of injecting drug use in Punjab and Haryana. [Internet]. New Delhi: UNAIDS India; 2008.
25. Werb D, Hayashi K, Fairbairn N, Kaplan K, Suwannawong P, Lai C, *et al.* Drug use patterns among Thai illicit drug injectors amidst increased police presence. *Subst Abuse Treat Prev Policy* 2009;4:16.
26. Hayashi K, Suwannawong P, Ti L, Kaplan K, Wood E, Kerr T. High rates of midazolam injection and associated harms in Bangkok, Thailand. *Addiction* 2013;108:944-52.
27. Larance B, Ambekar A, Azim T, Murthy P, Panda S, Degenhardt L, *et al.* The availability, diversion and injection of pharmaceutical opioids in South Asia. *Drug Alcohol Rev* 2011;30:246-54.
28. Mudrick C, Isaacs J, Frankenhoff J. Case report: Injectable pentazocine abuse leading to necrotizing soft tissue infection and florid osteomyelitis. *Hand* 2011;6:457-9.
29. Ambekar A, Rao R, Mishra AK, Agrawal A. Type of opioids injected: Does it matter? A multicentric cross-sectional study of people who inject drugs. *Drug Alcohol Rev* 2015;34:97-104.
30. Basu D, Sharma AK, Gupta S, Nebhinani N, Kumar V. Hepatitis C virus (HCV) infection & risk factors for HCV positivity in injecting & non-injecting drug users attending a de-addiction centre in northern India. *Indian J Med Res* 2015;142:311-6.
31. Shah NA, Kadla SA, Singh J, Khan BA, Shah AI, Sheikh SA, *et al.* Genotype distribution of hepatitis c virus in patients with chronic Hepatitis C infection in Kashmir: A cross sectional study. *J Clin Exp Hepatol* 2016;6(Suppl):S12-3.
32. Government of India. India HIV Estimations 2017: Technical Report. New Delhi: National AIDS Control Organization and ICMR-National Institute of Medical Statistics, Government of India; 2018. [Cited 2020 Jun 10]. Available from: [http://naco.gov.in/sites/default/files/HIV%20Estimations%202017%20Report\\_1.pdf](http://naco.gov.in/sites/default/files/HIV%20Estimations%202017%20Report_1.pdf).
33. Caudarella A, Dong H, Milloy MJ, Kerr T, Wood E, Hayashi K. Non-fatal overdose as a risk factor for subsequent fatal overdose among people who inject drugs. *Drug Alcohol Depend* 2016;162:51-5.
34. Saini R, Rao R, Parmar A, Mishra AK, Ambekar A, Agrawal A, *et al.* Rates, knowledge and risk factors of non-fatal opioid overdose among people who inject drugs in India: A community-based study. *Drug Alcohol Rev* 2020;39:93-7.