

Population Size Estimation of Drug Users in Isfahan City (Iran) Using Network Scale-up Method in 2018

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Original Article

Abstract

Background: To provide prevention programs and educate drug users (DUs), the estimation of their population is necessary. This study aimed to estimate the population size of this hidden group in Isfahan city as a metropolitan in Iran using the network scale-up method (NSUM).

Methods: This cross-sectional study was performed in summer 2018 on 1000 people selected through a multistage sampling method based on 14 region of the municipality of Isfahan. The data collection tool was a questionnaire that was previously used in Dr. Baneshi's national plan without any changes. The Cronbach's alpha value of the questionnaire was 0.826. Using correction factors such as transparency of response and the ratio of social network size used in previous national studies, the number of people with high-risk behaviors was estimated. The results were analyzed through NSUM based on survey analysis.

Findings: Among all kinds of DUs, men were the largest consumers. The prevalence of use of opium, cannabis, heroin/crack, stimulants, ecstasy, hallucinogens, tramadol, zolpidem, tobacco, and drug injection was 2983, 2342, 613, 766, 86, 268, 1185, 213, 5869, 135 in 100000 people, among individuals of over 18 years of age. In both sexes, the prevalence of using opium and its nectar and illegal treatment with methadone and buprenorphine was higher in people of over 30 years of age, while the prevalence of consuming cannabis, ecstasy, tramadol, tobacco products, and stimulants was higher in the age group of 18 to 30 years.

Conclusion: The results indicated that the prevalence of different DUs in Isfahan city, especially among men was higher than the reported average (especially in young men of 18-30 years of age). Since the prevalence of drug use varies based on the type of substance used among age groups, targeted preventive planning based on the type of drug used and age group is recommended.

Keywords: Drug users; Network scale-up method; Hidden population; Iran

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Introduction

To estimate the population size of hidden groups such as drug users (DUs) is a challenge for researchers and health care practitioners as well as society. The amount and type of drug use differ throughout the world. In a review in 2018, the prevalence of drug injection was estimated to be 0.033 among 31 countries.¹ In a national research in Iran in 2014, the total number of DUs was estimated to be about 7500/100000 people.² The results of various studies in Iran (2008-2012) have indicated that addiction with a frequency of 16.4% is the most important issue in the community.³ On average, 3 family members of an addicted person face drug-related problems directly.⁴ Disorganized family, increased crime rate, and some diseases such as hepatitis B and C, reduced work efficiency, as well as economic complications due to the high cost of care and treatment for DUs are some of the consequences of drug use.⁵ Therefore, with increase in the prevalence of drug use among the general population, individual, social, and economic problems in society will multiply.⁶ Therefore, planning to prevent and control drug use seems necessary and requires an understanding of all aspects of DU groups including their population size. Despite frequent efforts, for many reasons such as legal prohibition, stigma and discrimination, and lack of social acceptance in many countries of the world including Iran, these groups remain hidden and inaccessible, which makes it difficult to estimate their population size.^{7,8}

There are 2 methods for estimating the population size of hidden groups, direct and indirect. Direct methods such as census, counting, and referring have disadvantages such as the need for direct contact with the hidden population, individuals' hesitation in responding directly to questions, and the likelihood of the occurrence of response bias and social desirability bias that lead to underestimation.^{9,10} Therefore, indirect methods such as network scale-up method (NSUM), mapping, crosswise, and capture-recapture have been used to estimate the population size of hidden groups.⁷ Studies have indicated that NSUM is a more accurate method of estimating the population size of hidden groups than other indirect methods.^{11,12} This method does not require direct contact with hidden groups;^{7,13} a random sample of the general population is questioned about the

number of people who have hidden behaviors on their social network. Then, considering the social network size in the general population and some other indicators, the size of the hidden population is estimated.¹⁴⁻¹⁶

This method was used for the first time in 1986 to estimate the population size of people lost in the Mexican earthquake.¹¹ It was then used to estimate the size of other hidden groups such as HIV affected individuals, earthquake victims, and homosexuals.¹⁷ In Iran, this method was also used to estimate the size of some hidden populations, for example, patients suffering from breast, uterine, ovarian, prostate, and bladder cancer in Kerman city, Iran,¹⁸ as well as dead and injured people in Bam earthquake in 2014.¹⁹ In addition, it was found in Golhesar village in Rey city, Iran, in 2016 that groups with the highest population among all DUs were men who smoked (103 per 1000 people), used hookah (88 per 1000 people), and used opium (76 per 1000 people).³

In a national NSUM study performed in 2014, the prevalence of the use of opium and its nectar, heroin/crack and stimulants, tramadol and sedatives, illicit substances, and legal and illegal methadone therapy in Isfahan, as the third immigrant-friendly metropolis in Iran with a population of 2 million people, was above the national average.² Although this study was conducted nationally, based on the Ministry of Health's suggestion, it was decided to estimate the population of DUs in Isfahan using NSUM. The results of this study can be helpful to provincial policymakers and experts in estimating the extent, direction, and type of preventive activities required, the costs, and required manpower as well as to obtain economic and executive support.

Methods

In a descriptive, cross-sectional study approved by the Vice-Chancellor for Research of Isfahan University of Medical Sciences, Iran, under code IR.MUI.REC.1396.296140, the number of DUs in Isfahan in June 2018 was estimated indirectly using NSUM.

The sample size was estimated at about 1000 people considering the drug use prevalence of 0.025 based on a national study,² 95% confidence interval (CI), error rate of 0.03, and dropout coefficient of 0.02. Sampling was performed using

non-random multistage sampling; 14 districts of Isfahan municipality were considered as stratified and, based on information obtained from the Health Deputy of Isfahan University of Medical Sciences, the sample size was determined proportionate to the size of each of these districts. Then, a list of crowded areas of the city (as clusters) was prepared and two clusters were randomly selected from within each district (cluster). Within the clusters in the regular days of the week and at busy hours (9:00-13:00 and 15:00-21:00), a passer-by was randomly selected once every 15 minutes. The study inclusion criteria included residing in Isfahan for at least 2 years, being 18 years of age and older, and having the mental ability to answer the questions. The exclusion criteria included completion of the questionnaire in the previous days and not willing to participate in the study.

A standard questionnaire was used for data collection; its validity was evaluated by the experts in the Ministry of Health's Mental Health Bureau and its Cronbach's alpha was 0.826.² Moreover, in order to localize the questionnaire for people in Isfahan, the questionnaire was also reviewed and modified during the sessions with experts in Isfahan and its content and nominal validity were evaluated through qualitative methods. Its reliability was evaluated in a pilot study and the kappa coefficient was estimated at 0.76. The main part of the questionnaire consisted of 12 questions on identifying at least 1 instance of using a drug such as opium, cannabis, heroin/crack, stimulants, ecstasy pills, hallucinogens, tramadol, zolpidem, and tobacco, injections of drugs in the past year, and using legal or illegal treatment with methadone, buprenorphine, and opium syrup. Each question is divided into 2 parts based on gender, male and female, and has three age groups: under 18, 18 to 30, and over 30. In each section, if the respondents knew someone, they would report the number of people. The last part included demographic questions (i.e., age, sex, education, and marital status).

Four interviewers (2 women and 2 men) were selected and trained through a roleplaying method (Mr. Tavasoli, Mr. Torkan, Ms. Rezaei, and Ms. Talebi Por). The interviewers were assigned to different districts according to the timetable and based on the age-sex sampling table; they selected the passers-by and asked them

for an informed consent. Before asking the questions, the interviewer explained the term "recognition" to the participants (having a relationship with an addicted person since 2 years ago, either in person or by phone, email, or any other methods).

Ethical considerations: All questionnaires were completed anonymously and all information remained confidential. In order to persuade people to answer the questions, the interviewers tried to find a relatively secluded place. Due to the possibility of increasing unwillingness to take part in the study, verbal consent was obtained rather than a written one.²⁰

The following formula was used to estimate the risk groups in the NSUM:

$$T \times \frac{\sum M}{\sum c} \times \frac{1}{v} \times \frac{1}{p}$$

where T is the total number of people in the community (the total population of Isfahan was 1961260 people), M is the number of DUs recognized by each participant, C is the social network size that is estimated at about 308 people in Iran.^{2,18} Due to the fact that the social network size of people with high-risk behaviors is smaller than general people, the popularity ratio (p), the ratio of the size of the network of high-risk groups to the general population, was used.² Visibility (v) or the transparency coefficient is the percentage of people in contact with a DU and aware of their addiction. In this study, the transparency coefficient varied from 0.45 to 1 based on the type of drug.² Stata Software (version 11; StataCorp, College Station, TX, USA) was used to analyze the data. The indicators of mean, standard deviation, frequency, and frequency percentage were used to data analysis and independent t-test and chi-squared test were used for data analysis. To compensate for the possible lack of response of the participants and to ensure that the participants were similar to the members of the community, and thus, to increase the validity of the results, the 95% CI of the estimates was calculated using survey analysis. Thus, participants from each of the 14 regions were weighted based on the population of that area (probability weight). The selected clusters from each area were also coded 1 to 4 as primary sampling units. The sex variable was considered as a stratum. A Finite population correlation was

used to determine the odds equivalent in selecting the samples. Finally, the estimations were calculated to a 95% CI.

Results

Participant's characteristics: A total of 1000 participants took part in the survey 50% of which were women. The age of the participants ranged from 18 to 73 years. The mean age (SD) of the participants was 34.4 (12.46) years and there was no significant difference between the mean age of men and women ($P = 0.301$). In both genders, most of the participants had a diploma. There was no significant difference between men and women in terms of education ($P = 0.059$). Most of the participants were married. There was no significant difference in marital status in both sexes ($P = 0.757$) (Tables 1 and 2).

The average total DUs (Drug use regardless of their use method except tobacco and sedatives) in Isfahan were estimated to be 9,016/100,000 people (95% CI: 8145 - 9887). The number for men and women was 8,593/100000 people (95% CI: 9462-9462) and 422/100000 people (95% CI: 565-281), respectively. In all types of drugs, the prevalence of drug use was higher in men than women. In general, the highest prevalence was related to the use of tobacco, opium, and heroin/crack, respectively (Figure 1). Among men, cannabis was the third most used drug after tobacco, and opium and its nectar, while it was the second most used drug among women.

In both sexes, the prevalence of opium and Shireh use and illegal treatment with methadone and buprenorphine among people over 30 years of age was higher than that in other age groups.

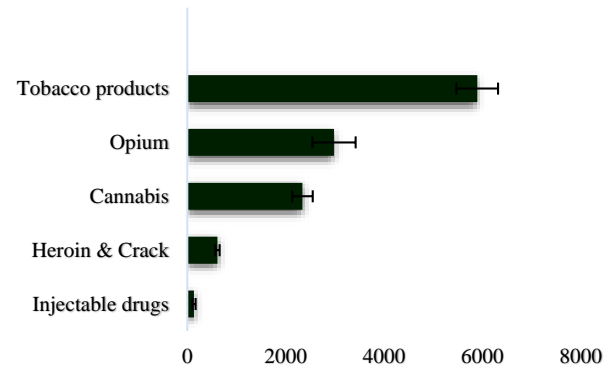


Figure 1. Prevalence of drug use in 100000 people based on drug type (industrial drugs)

Likewise, the prevalence of cannabis, ecstasy, hallucinogens, tramadol, tobacco, stimulants, and zolpidem among men of 18-30 years of age was higher than that among the older and younger age groups. In addition, the prevalence of cannabis, stimulants, ecstasy, tramadol, zolpidem, and tobacco, legal treatment with methadone and buprenorphine, and injecting drug use was higher in women of 18 to 30 years of age. Furthermore, the prevalence of injecting drug use and legal treatment with methadone and buprenorphine was 0 in women under 18 years of age (Table 2).

Table 1. Demographic characteristics of the participants

Variable	Male	Female	P
Age (mean ± SD)	35.2 ± 12.591	33.8 ± 12.050	t-test = 0.076
Age category (year) [n (%)]			
18-20	56 (5.6)	84 (8.4)	$\chi^2 = 0.301$
20-30	163 (16.3)	140 (14.0)	
> 30	281 (28.1)	276 (27.6)	
Education [n (%)]			
Illiterate or elementary	34 (3.4)	20 (2.0)	$\chi^2 = 0.059$
Pre-diploma	91 (9.1)	80 (8.0)	
Diploma	198 (19.8)	199 (19.9)	
Graduated	177 (17.7)	201 (20.1)	
Marital status [n (%)]			
Single	216 (21.6)	169 (16.9)	$\chi^2 = 0.767$
Married	280 (28.0)	322 (32.2)	
Divorced	4 (0.4)	5 (0.5)	
Widowed	0 (0)	4 (0.2)	

SD: Standard deviation

Table 2. The estimated prevalence [95% confidence interval (CI)] of drug use based on gender and age groups

Have used at least once in the past year	Total	Point prevalence (95% CI) per 100000							
		Female				Male			
		Total	< 18	18-30	> 30	Total	< 18	18-30	> 30
Opium	2983 (2561-3406)	2685 (2302-3068)	58 (34-82)	917 (715-1118)	1942 (1620-2193)	61 (36-86)	1.57 (0.7-3.9)	21 (5.5-36)	44 (28-60)
Cannabis	2342 (1902-2782)	2101 (1692-2509)	391 (239-542)	1387 (1139-1636)	323 (224-421)	241 (147-336)	29 (14-43)	184 (110-259)	28 (6-50)
Heroin and Crack	613 (406-820)	597 (393-801)	21 (12-31)	271 (175-367)	283 (172-394)	22 (5-39)	0.6 (0.2-1.6)	14 (2-26)	7 (2-12)
Stimulants	766 (575-965)	722 (537-907)	33 (13-53)	425 (305-545)	264 (186-341)	44 (21-67)	3 (0.5-7)	26 (7-44)	15 (7-23)
Ecstasy	86 (40-137)	68 (35-100)	5 (0.7-10)	55 (27-82)	6 (2-14)	21 (0.5-42)	3 (0.3-6)	16 (4-35)	2 (1-6)
Hallucinogens	268 (186-350)	256 (182-331)	45 (18-71)	201 (146-256)	10 (1.5-22)	11 (0.3-23)	2 (1-6)	7 (1-12)	2 (1-6)
Tramadol	1185 (976-1394)	1123 (954-1293)	98 (52-145)	764 (625-903)	263 (167-340)	59 (25-94)	3 (1-7)	41 (16-66)	15 (4-26)
Zolpidem	213 (4-431)	140 (5-285)	38 (6-83)	56 (2-115)	45 (0.5-90)	74 (1-148)	9 (5-23)	33 (11-76)	32 (5-58)
Tobacco products	5869 (5480-6257)	5010 (4532-5488)	552 (453-651)	2710 (2493-2927)	1737 (1590-1883)	870 (761-978)	77 (56-98)	532 (456-608)	260 (225-296)
Injectable drugs	135 (90-180)	131 (87-174)	4 (1-6)	58 (19-96)	69 (48-90)	5 (0.1-9)	0	3 (1-7)	2 (1-4)
Continuous injectable drugs	57 (24-90)	57 (24-89)	0.5 (0.2-1)	34 (2-67)	22 (11-33)	0	0	0	0
Legitimate treatment with Methadone and Buprenorphine	1592 (1426-1757)	1568 (1403-1732)	62 (29-95)	621 (518-724)	884 (728-987)	18 (5-30)	0	12 (2-23)	5 (0.5-10)
Illegitimate treatment with Methadone and Buprenorphine	434 (358-509)	432 (357-507)	16 (2-29)	137 (90-183)	279 (223-336)	1 (0.5-2)	0	0	1 (0.5-2)

CI: Confidence interval

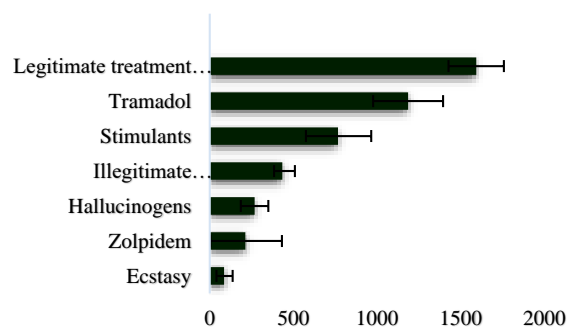


Figure 2. The estimated prevalence of drug use in 100000 people based on drug type (traditional drugs)

Discussion

The results indicated a high prevalence of use of different types of drugs in Isfahan. Tobacco use was had the highest prevalence, followed by opium and cannabis in men, and cannabis and opium among women, respectively.

The highest prevalence of drug use in Isfahan was related to tobacco. In a study by Meysamie et al., the use of tobacco and its derivatives was estimated at 14.8% in the country and 13.7% in the population aged 15-64 years.²¹ The prevalence of smoking and hookah was 12.5% and 2.7%, respectively.²² Holding educational programs to reduce the use of tobacco and especially hookah in the Iranian younger generation is recommended.

The prevalence of the use of opium and its nectar in Isfahan was likely similar to that of a study by Baneshi (2565/100000 people),² but it is higher than the national average estimate reported in a study by Nikfarjam et al. (1500/100000 people).²² In the present study, after tobacco products, opium was the second and third most used substance among men and women, respectively.

In the current study, cannabis use was estimated at around 2000/100000 people, which is much higher than the estimated number reported by Nikfarjam et al.²² (2016) (457/100000 people) and Baneshi (854/100000 people).² Although a study indicated that cannabis use was not common among Iranian women,²³ in the present study, cannabis was the second most commonly used substance among women in Isfahan after tobacco products.

The prevalence of tramadol use in Isfahan was approximately similar to that reported by Baneshi (1185/100000 people).² Easy access to this drug, lack of parental awareness of its consequences, the treatment of early ejaculation, and the lack of a

serious plan for its use in society are some of the causes of the tendency to use tramadol.²⁴

The prevalence of stimulant drug use in Isfahan was similar to that in the study by Baneshi (864/100000),² but higher than that in the study by Nikfarjam et al. (300/100000).²² In the study by Shokouhi et al.²⁵ and Ansari-Moghaddam et al.²⁶ the substances with the highest prevalence of use among adolescents in the country were hallucinogens (25.3%), sedatives (25%), hookah (23.1%), and opium (22.0%) and stimulants, respectively; they reported entertainment and coping with stress and anxiety (20.1%), and social crises as some of the motivations for substance abuse. Evidently, easy and low-cost access to different drug compounds and purity rates are other reasons for increase in drug use.¹⁷

The prevalence of heroin/crack use in Isfahan is like that reported by Baneshi,² but is higher than that reported by Nikfarjam et al. (350 per 100000 people).²² The prevalence of hallucinogens in Isfahan was like that in the study by Baneshi (221/100000),² but was lower than that in the study by Nikfarjam et al. in which the use of hallucinogens combined with ecstasy and amphetamines was examined (300/100000).²² In a study by Hamdieh et al., the rate of delusional and psychotropic substances like ecstasy among adolescents and young people aged 15 to 35 years in Tehran, Iran, was reported to be 3.8%.²⁷ Further study into how this age group can gain access to hallucinogens is recommended.

The highest prevalence of the use of ecstasy pills in the city of Isfahan, which was first estimated by the NSUM, was in the sexually active age group of 18-30 years. Prolonged duration of ejaculation may be one of the reasons for the use of ecstasy pills. A study reported a prevalence of about 21% for the use of ecstasy pills at least once in the lifetime of students of Guilan University of Medical Sciences, Iran.²⁸

The present study estimated the prevalence of zolpidem in Isfahan through NSUM for the first time, and the results indicated that the use of this hypnotic drug was much higher than the expected medical consumption, especially in people of 18 to 30 years of age. There have been reports of zolpidem addiction in athletes, physicians, and students, necessitating attention to this modern addiction and examination of the causes of young people's tendency to take this drug.²⁹

The prevalence of injecting drug use in Isfahan was lower than estimations in the studies by Baneshi (457000),² and Nikfarjam et al.²² and Jafari et al. in Tabriz (280/100000 people).³⁰ People who inject drugs are one of the key groups at higher risk of HIV/HCV infection in some parts of the world including Iran.³¹

Female sex workers, homosexual men, and injecting drug users (IDUs) are the 3 most vulnerable groups of a society at risk of developing HIV.³²

In the present study, it was estimated that more than one-third of men who inject drugs had a constant behavioral addiction, while the prevalence of injecting drugs in women was 0.

The results of this study indicated that the prevalence of different drug abuse types among men is more likely than women. The results of several national surveys in Iran indicated that men make up more than 90% of the addicted population.³³ The reasons for this gender difference in drug use include greater family and social freedom and higher income in men, as well as the fear of disclosing this behavior in women due to cultural reasons, and therefore, low reporting among women.²¹

According to the results of the present study, the highest prevalence of drug use among men and women was observed in the age groups of 18 to 30 and over 30 years, which is in line with the study by Nikfarjam et al.²² In the study by Kelishadi et al. in Isfahan, the age of onset of smoking and hookah use was 14.5 and 11.2 years, respectively.³⁴ According to the subject of 10-year causes of the country's prisons and state addiction treatment centers, about 70% of the country's addicts are between 19 and 39 years of age.³⁵ One of the reasons for the high prevalence of substance use at this age may be achieving social independence after entering university, work, or military environments. Evidently, it is also important to pay attention to children of less than 18 years of age. A study by Ranjbaran et al. indicated that students with poor economic status and a large family are more likely to be exposed to drug use and addiction.³⁶ In another study, the most number of drug users used cigarettes, hookah, pills, cannabis, drinks, boys were aged 19-20 and then 17-18 years.³⁷

One of the limitations of the present study was the impossibility of household-based random sampling due to the sensitivity of the considered

subject, i.e., drug use. Therefore, through multistage sampling and random selection of people at specified intervals, we attempted to approach the sampling systematically. Second, there is likely reporting bias because some refusing people to participate in the study may recognize many DUs in their social network. However, due to the inability to track people, it was not possible to check and compare the characteristics of DUs with those participating in the study. Third, the size of the social network of DUs is smaller than that of the general population,⁷ which will cause underestimation. Moreover, the size of the social network of the general population may vary by gender and age, and even by various regions of the country. However, due to the lack of accurate information in this regard, it was decided to use the indices used in earlier studies in Iran.

Conclusion

The results of the present study showed that the prevalence of drug use in Isfahan city, especially in men, is significant and in some cases even higher than the average reported in other studies in the country. Since the prevalence of drug use varies by the type of substance used in the age groups of 18-30 and over 30 years, targeted preventive planning by type of drug and age group is recommended.

Conflict of Interests

The Authors have no conflict of interest.

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Authors' Contribution

Collected data, analysis, and wrote the original draft: MAJ; statistics advisor- contributed to analysis: MB; contributed to analysis, review, and editing: MN.

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برآورد اندازه گروه‌های پرخطر مصرف‌کننده مواد با استفاده از روش بسط شبکه‌ای در شهر اصفهان

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مقاله پژوهشی

چکیده

مقدمه: برای ارایه برنامه‌های پیشگیری و آموزش مصرف‌کنندگان مواد مخدر (Drug users یا DUs)، برآورد جمعیت آن‌ها مورد نیاز است. پژوهش حاضر با هدف برآورد اندازه جمعیت این گروه پنهان در شهر اصفهان به عنوان کلانشهر ایران با استفاده از روش بسط شبکه‌ای (NSUM یا Network scale-up method) انجام شد.

روش‌ها: این مطالعه مقطعی در تابستان ۱۳۹۷ بر روی ۱۰۰۰ نفر به روش نمونه‌گیری چند مرحله‌ای در ۱۴ منطقه شهرداری اصفهان انجام شد. اطلاعات با استفاده از پرسش‌نامه‌ای که پیش‌تر در طرح ملی دکتر بانسی استفاده شده بود، بدون تداخل خاصی مورد استفاده قرار گرفت. مقدار Cronbach's alpha نیز ۰/۸۲۶ به دست آمد. با استفاده از عوامل اصلاحی مانند شفافیت پاسخ به سؤالات و نسبت اندازه شبکه اجتماعی استفاده شده در مطالعات ملی پیشین، اندازه تخمینی افراد دارای رفتارهای پرخطر برآورد گردید. نتایج با استفاده از NSUM بر اساس آنالیز بقا مورد تجزیه و تحلیل قرار گرفت.

یافته‌ها: در بین انواع مصرف‌کنندگان مواد، بیشترین آمار مربوط به مصرف‌کنندگان مرد بود. شیوع مصرف تریاک، حشیش، هروئین/کراک، محرک‌ها، اکستازی، توهم‌زا، ترامادول، زولپیدم، تنباکو و تزریقی مواد مخدر در افراد بالای ۱۸ سال به ترتیب ۲۹۸۳، ۲۳۴۲، ۶۱۳، ۷۶۶، ۸۶، ۲۶۸، ۱۱۸۵، ۲۶۰، ۲۶۰، ۲۶۰ به دست آمد. در هر دو جنس، شیوع مصرف تریاک و شیره آن و درمان غیر قانونی با متادون و بوپرنورفین در افراد بالای ۳۰ سال بیشتر بود؛ در حالی که شیوع مصرف حشیش، اکستازی، ترامادول، فرآورده‌های تنباکو و مواد محرک در گروه سنی ۱۸ تا ۳۰ سال بیشتر گزارش شد.

نتیجه‌گیری: شیوع مصرف‌کنندگان مختلف مواد مخدر در شهر اصفهان به ویژه در بین مردان، بالاتر از میانگین می‌باشد به ویژه در مردان جوان (۱۸ تا ۳۰ سال). از آنجایی که شیوع مصرف مواد بر اساس نوع ماده در گروه‌های سنی متفاوت است، برنامه‌ریزی پیشگیرانه هدفمند بر اساس نوع مصرف مواد و گروه سنی توصیه می‌شود.

واژگان کلیدی: مصرف‌کنندگان مواد؛ روش بسط شبکه‌ای؛ گروه‌های پنهان؛ ایران

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