

# Characterizing Mortality from Substance Abuse in Iran: An Epidemiological Study during March 2014 to February 2015

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## Original Article

### Abstract

**Background:** Drug abuse is a severe and chronic disorder that leaves morbidity, disability and premature mortality in the society. The study of death due to substance abuse provides useful information for local, national and international administrators. Thus, by identifying the factors that have an impact on overdose-related mortality we can provide suitable intervention for vulnerable groups. The aim of this study was an investigation of mortality rate caused by consumption of narcotic and psychoactive substances in Iran.

**Methods:** In this cross-sectional study, demographic and epidemiological data about all people whose cause of death was substance abuse in March 2014 to February 2015 were collected from Legal Medicine Organization (LMO). Finally, the information that was extracted from two checklists was analyzed by descriptive statistics.

**Findings:** In this study, 2986 cases died from substances abuse were evaluated. Most deaths have befallen in unmarried young men with mean age of  $36.9 \pm 12.3$ , in the private locations. The mortality rate of drug abuse in the whole country was 38.4 per 1000000 population. The proportion of mortality was higher in Iranian nationality and in people who had a diploma and less education. History of overdose, suicide, hospitalization in a psychiatric hospital, staying in prison and substance abuse in the family were investigated in the study population.

**Conclusion:** The present study revealed that mortality rate from substance abuse is more among unmarried young men aged 30-39 years with low education level and also in the self-employed group. We suggest that policies should be taken to prevent these people from accessing and using the drug.

**Keywords:** Epidemiology; Mortality; Opiate addiction; Psychotropic drugs

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## Introduction

Despite various definitions of substance abuse, it is generally attributed to excessive consumption of a psychotropic or non-medical substances.<sup>1</sup> Substance abuse and dependence affect not only individual, but also children and families, societies, employers and taxpayers in innumerable ways.<sup>2</sup> Various studies around the globe have demonstrated that substance abuse is a severe and chronic public health problem that can produce critical and persistent medical conditions, for example, disability, morbidity and mortality.<sup>3-6</sup> Also, several epidemiological studies have shown that drug and alcohol dependence are important risk factors for suicide ideation, suicide attempt and completed suicide.<sup>7-9</sup>

The mortality rate attributed to substance abuse has been quadrupled from the middle of 1990. This is simultaneous with 4 times raise in the sale of these substances.<sup>10</sup> Several studies have shown that mortality rate among substance abusers is several times higher than the general population.<sup>3,5</sup> A meta-analysis conducted by Coffin et al. demonstrated that among people who have the same sex and age, the mortality rate from substance abuse is 13 times higher than general population.<sup>11</sup>

Afghanistan, located in the proximity of the Islamic Republic of Iran, is the largest producer of opium in the world. Therefore, due to its adjacency to Afghanistan and exposure to the best and shortest transit route for opium, morphine-based drugs and heroin, Iran has a long history of opium smoking and combating substance abuse. But in recent decades, drug abuse has become a virulent social problem with widespread social, psychological, familial, sanitary and economic calamity.<sup>12</sup>

In Iran, little is known about the epidemiology of substance abuse, addiction and therefore its complications.<sup>13</sup> We performed this study in people referred to Legal Medicine Organization (LMO) centers of all provinces of Iran during March 2014 to February 2015 to investigate the following questions: How much is the mortality rate associated with substance abuse? How are the demographic and epidemiological characteristics of people who died from substance abuse?

The answer to these questions can provide useful information for local, national and international

administrators to design interventions for those who take most advantage from it.

## Methods

This research was a cross-sectional study. In Iran, all deaths including the suspicious deaths should be referred to LMO center and death certificate can just be issued after evaluation and confirmation by this organization. Therefore, LMO centers were chosen to do this research. Mortality from substances abuse is one of the definitions of suspicious causes of death. Suspicious causes of death include mortality due to road traffic accidents, burning, drug abuse, drug intoxication, toxin related death, monoxide carbon (CO) intoxication, falling, firearms and cold weapons, suicide and work-related death.

Totally 2986 suspicious deaths that occurred due to substance abuse during March 2014 to February 2015 were registered in LMO of Iran. In this study, a sample of 2474 (82.8%) was evaluated. All the mortality rates are presented according to the total number of 3003 deaths, but the frequency tables and all other details are estimated in the sample size of 2474 persons. The definition of substance abuse and dependence was according to the Diagnostic and Statistical Manual of Mental Disorders-4<sup>th</sup> Edition-Text Revision (DSM-IV-TR) criteria. Death certificate for the study population was coded according to the 10<sup>th</sup> edition of the International Classification of Disease (ICD-10: T40, F10, X42, X62 and Y12). This study was performed in all provinces of Iran and was approved by the Health Research Ethics Board of LMO.

All cases who had consumed drug by inhalation, fumigation and intravenous route and also those that opiate or their metabolites including opium, heroin, crack, cannabis, alcohol and crystal were quantitatively or qualitatively determined to be the cause of death at the time of death were eligible for analysis. Routinely samples from urine, liver, bile and gastric contents were taken for toxicological testing. Then, these samples were analyzed by screening methods including immunochromatography, thin-layer chromatography (TLC) and confirmatory methods containing high-performance liquid chromatography and gas chromatography/mass spectrometry (Agilent Technologies, USA).

All the data were gathered by physicians responsible for the autopsy rooms using two checklists that were designed based on study variables. These checklists were filled for all the corpses that were died due to substance abuse and sent monthly to the Capital Legal Medicine Center in Tehran, Iran.

Content validity of two checklists was examined by obtaining comments of professors, scholars and experts in the field.

Data about demographic variables, location (province) of death and place of residence of deceased, medical illness, history of hospitalization in psychiatric hospitals, history of drug abuse in the family and history of suicide were collected by interviews with friends and relatives of deceased.

Eventually, data were analyzed in Stata software (version 14, StataCorp., College Station, TX) using percentage for categorical variables and mean and standard deviation (SD) for continues variables. The mortality rates were calculated by dividing the number of deaths due to opiate or psychotropic abuse by the population of Iran in each province in March 2014 to February 2015, and were presented per 1000000 population.

The proportionate mortality ratio was estimated by dividing the number of deaths due to alcohol, substances abuse by the total number of deaths in each province in 12 month leading to February 2015 in Iran, and presented them as the percentage. We also estimated the percentage of deaths due to alcohol, opiate and psychotropic abuse among the unnatural causes of deaths including road traffic accidents, burning, drug abuse, drug intoxication, toxin related death, CO intoxication, falling, firearms and cold weapons, suicide and work-related death.

### Results

Among 2986 drug-related death that were extracted from the LMO centers between March 2014 to February 2015, 91.37% (n = 2728) were men and 8.63% (n = 258) were women. The mean age at death was 36.9 ± 12.3 and median was 35 years.

Our research indicated that mortality rate from substance abuse in the whole country was 38.4 per 1000000 population. About one-fourth (n = 749) of deaths were identified in Tehran. Figure 1 provides estimates of mortality rate due to drug abuse in each province of Iran.

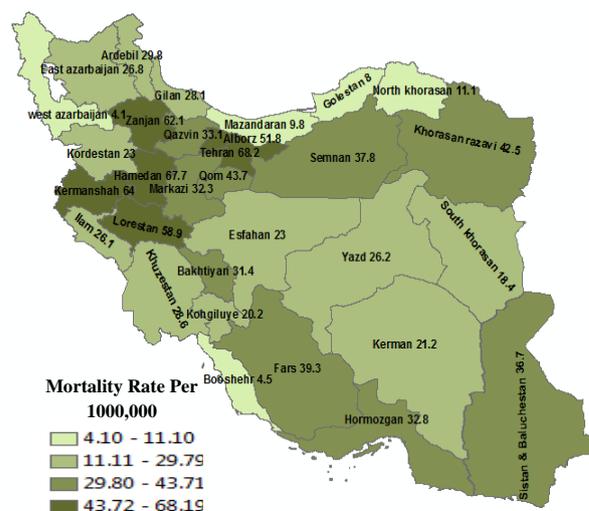


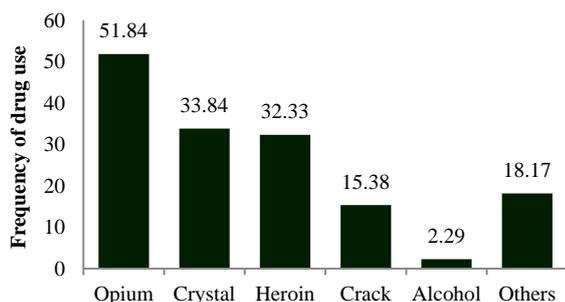
Figure 1. Estimates of mortality rate due to opiate and psychotropic abuse in each province of residence in 12 months leading to February 2015 in Iran

Most of the deaths due to substance abuse occurred predominantly in unmarried young men at the age of 30-39 years with Iranian nationality. About 6.18% of them did not have a recognizable identity. Further socio-demographic details of the study population are documented in table 1.

Table1. The absolute and relative frequency distribution of drug abuse-related deaths by demographic variables in 12 months leading to February 2015 in Iran

Variables	n (%)
Sex	Man 2728 (91.37)
	Woman 258 (6.63)
Age (year)	0-9 27 (0.89)
	10-19 113 (3.80)
	20-29 665 (22.27)
	30-39 1009 (33.79)
	40-49 651 (21.79)
	50-59 303 (10.15)
	60-69 88 (2.95)
	70-79 35 (1.17)
Nationality	80-100 8 (0.28)
	Unknown 87 (2.91)
	Iranian 2659 (89.06)
	Afghan 55 (1.84)
	Pakistani 0 (0)
Marriage status	Iraqi 8 (0.25)
	Unknown 264 (8.85)
	Single 1419 (47.52)
	Married 1187 (39.73)
Educational level	Divorced 341 (11.43)
	Wife died 39 (1.32)
	Illiterate 320 (10.72)
	Elementary 730 (24.44)
	Junior high school 954 (31.94)
High school 787 (26.34)	
University 196 (6.57)	

About 28.09% of the deceased had a history of substance abuse in their family. History of overdose, hospitalization in psychiatric hospitals and drug injection were observed in 21.10%, 9.55% and 29.57%, respectively. History of suicide and imprisonment were observed in 5.22% and 28.83%, respectively. The most common drug used within the last month before death according to the history was opium. More details about this topic are shown in figure 2.



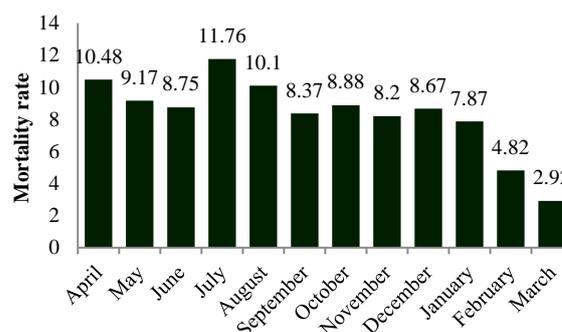
**Figure 2.** The relative frequency of the type of drug consumed in the people referred to the Legal Medicine Organization (LMO) in 12 months leading to February 2015 in Iran

Regarding the concomitant use of different kinds of drugs and alcohol in the last month of living, 1380 (46.24%) of subjects used just one drug in the last month before death, 513 (17.18%) and 202 (6.78%) had history of concurrent use of 2 and 3 drugs or alcohol, respectively, and 99 (3.31%) had history of 4 or more simultaneous drug or alcohol abuse. In 820 (27.49%) of them, the history was unknown.

The majority of deaths (14.05, 47.01%) occurred at home or in another private residence, 21.34% of them happened in the hospital, 11.84% in public places, 2.38% in addiction retreat camps, 2.18% in prison and 7.96% in other places. The situation was unknown in 7.17% of cases. Around 24.62% of people lived alone at the time of death, while 75.38% (2250) were living with family or somebody else.

Approximately 19.6% (485) of all people died from substance abuse, while they were under treatment for leaving addiction. The treatment situation was not clear among 24.00% (590) of subjects. Among people who were under treatment at the time of death, 48.25% received methadone, 4.54% opium tincture and 1.44% received buprenorphine. Also, 6.40% of addicts were under treatment with detoxification and 5.60% were

treated traditionally at home. 35.88% of drug users were under treatment for drug rehabilitation in legal and authorized centers, 2.00% in unauthorized centers and 0.80% in drop-in centers (DIC). Also, 2.90% of addicts were receiving drug addiction treatment by command of judicial officials. Figure 3 shows the mortality rate from drug abuse in 2014, disaggregated by months of the year.



**Figure 3.** Mortality rate from opiate and psychotropic abuse by month in 12 months leading to February 2014 in Iran

Mean and SD of age at first use of narcotic or psychoactive substance among 1568 who responded to this question was  $25.6 \pm 8.5$  years. Median of the age of beginning drug use was 24 years. Minimum age in starting of drug use was 10 years and a maximum of that was 85 years. The mean and SD of time between onset of drug use to death by abuse were  $12.8 \pm 8.9$  years.

Most people in this study were self-employed (1124, 37.64%) or unemployed (742, 24.84%). 3.4% of an addict who died from substance abuse suffered from cardiovascular disease. Table 2 shows additional information about the history of medical conditions, history of a war injury, place of death and employment status.

Figure 4 shows the relative frequency of death from opiate and psychotropic abuse among unnatural causes of death in each province of Iran. Among unnatural deaths, Tehran province had the highest proportion of drug-related mortality (16.60%). Bushehr and West-Azerbaijan, Iran, had the lowest proportion.

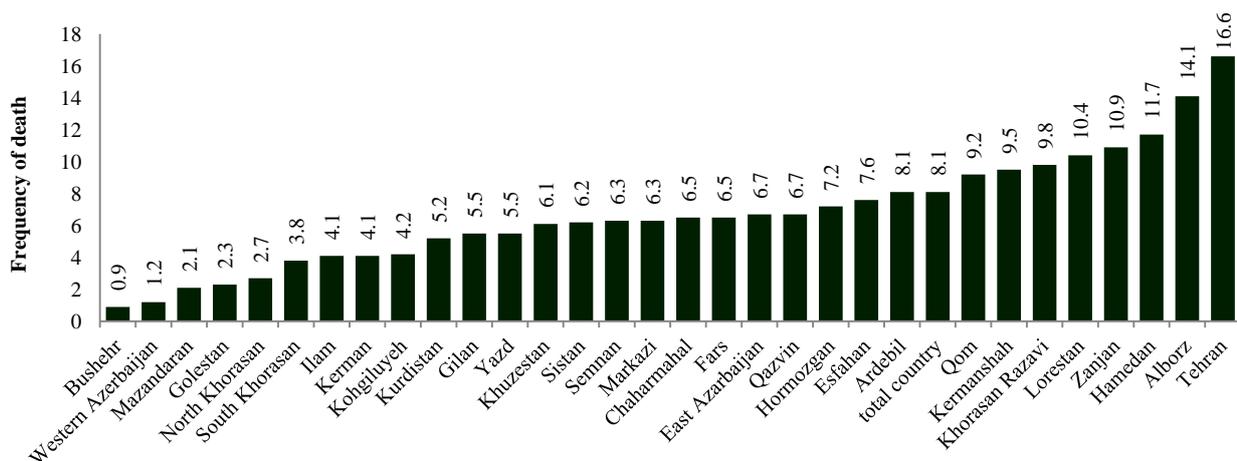
Figure 5 shows the proportionate mortality ratio from substance abuse in each province ordered by their rates per 100 population. The value of this index in Tehran indicates that 1.61% of all deaths occurred in Tehran province is due to substance abuse.

**Table 2.** Distribution of history of medical conditions and death by place and employment status in drug abuse related deaths in Iran in 12 months leading to February 2015

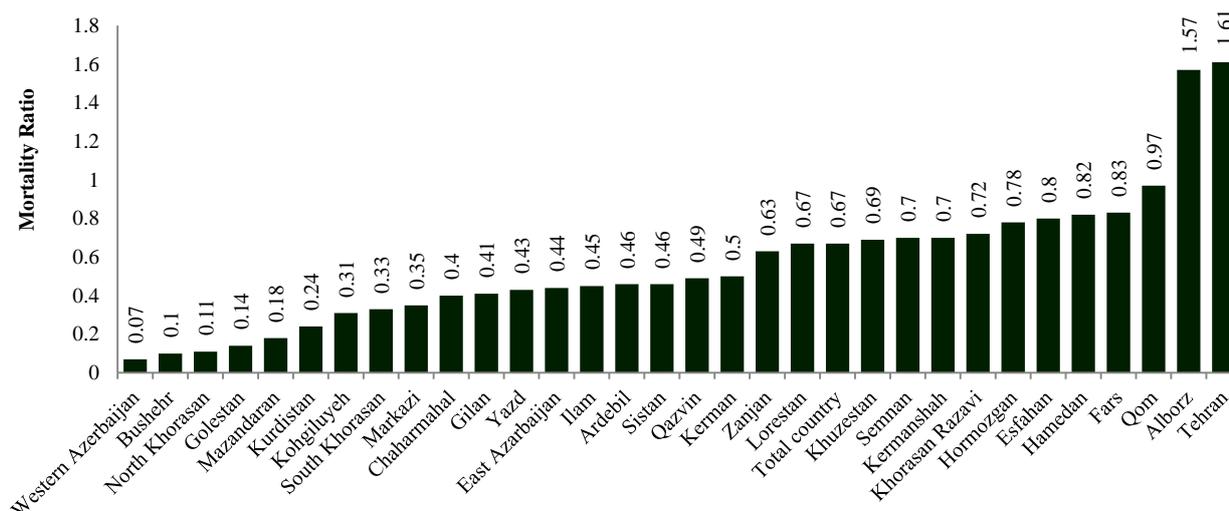
Variables	n (%)	
Employment status	Student	43 (1.43)
	University student	46 (1.53)
	Housewife	202 (6.76)
	Employee	59 (1.98)
	Worker	399 (13.38)
	Skilled worker	38 (1.26)
	Solider	38 (1.26)
	Retried	59 (1.98)
	Unemployed	742 (24.84)
	Farmer	44 (1.48)
	Urban driver	47 (1.57)
	Suburban driver	36 (1.21)
	Military	27 (0.90)
	Self-employed	1124 (37.64)
	Drug-dealer	5 (0.18)
	Beggar/Vendor	15 (0.49)
	Other	62 (2.07)
Medical condition	CVD	101 (3.40)
	Diabetes	21 (0.70)
	Cancers	9 (0.30)
	Chronic pain	27 (0.90)
	Physical disability	18 (0.60)
	No disease/No response	2810 (94.30)
	Place of death	Home
Prison		65 (2.18)
Addiction treatment center		71 (2.38)
Public places		353 (11.84)
Greenhouse		3 (0.12)
Hospital		637 (21.34)
Other		238 (7.96)
Unknown		214 (7.17)

CVD: Cardiovascular disease

Figure 4 shows the proportionate mortality ratio from drug and psychotropic abuse in each province ordered by their rates per 100 population.



**Figure 4.** Relative frequency of death due to opiate and psychotropic abuse among unnatural causes of death in each province in 12 months leading to February 2015 in Iran



**Figure 5.** Proportionate mortality ratio from drug and psychotropic abuse in each province ordered by their rates per 100 population in 12 months leading to February 2016 in Iran

## Discussion

The application of the epidemiological studies in the field of drug abuse is to provide noteworthy information about the importance of substance abuse and their complications throughout the globe. These studies can also provide the possibility of comparison of substance abuse and its consequences in different places and times. The results of these epidemiological studies can help us to identify appropriate prevention and harm reduction programs for high-risk groups.

Epidemiological findings of this study indicate that most of the mortality caused by illegal consumption of drug occurs in unmarried men who are 30-39 years old.

Social freedom among men increases their access to drugs, in the other words, in our society women's relationships are more controlled by their family members than men. It, in turn, results in fewer opportunities for illicit drug use among them.<sup>14</sup> Of course, there is limited information about the frequency of substance abuse among Iranian women. Addicted women in Iranian society are considered hidden population who do not tend to receive drug addiction treatment. Nevertheless, the importance of substance abuse in women should not be underestimated and it is essential and important to establish a particular clinic for addicted women with woman personnel to encourage them to seek treatment.<sup>15</sup>

The high mortality rate among unmarried

compared to married addicts represent the importance of family support in addiction rehabilitation programs. So, any increase in the rate of marriage can result in a reduction of drug abuse and any subsequent morbidity and mortality.<sup>16,17</sup>

The results of this study indicate that a high rate of mortality happens in younger age group (20-29 and 30-39 years) who are in the working age. This finding has also been reported in another survey in Iran in 2016.<sup>17</sup> Unemployment is one of the reasons for drug use in this age group. Unemployment is a social phenomenon that provides a context for various deviations particularly addictions. Also, drug abuse among youth increases the potential years of life lost by premature mortality.<sup>16</sup>

According to this study, most of the deaths that are caused by consumption of narcotic and psychoactive substance occur in the home or private places. Thus, focusing on cardiopulmonary resuscitation (CPR) training, providing emergency medical services (EMS) and services based on family support for those who are in close contact with drug users (for example family members and friends) can minimize overdoses-related death.<sup>16</sup>

Unfortunately, bystanders of overdose events delay alarming the emergency services or even providing timely basic life support activities because of fear of manslaughter charges. Besides, the medical staff when encounter with a patient

whose appearance is like addicts, might delay providing medical assistance. Therefore, training general population and medical staff and cultural programs are essential to overcome these obstacles.<sup>18-20</sup>

Generally, in our research, most of the drug-related deaths occurred in people who had a diploma or less diploma education; and only 6.57% of people had a university education. Tendency for consumption of drugs reduces by increasing awareness of social, familial, psychological, economic and sanitary drug adverse effects. Programs which focus on education of illiterates and increase general awareness about the adverse effects of drug abuse can decrease drug-related morbidity and mortality.<sup>21</sup>

Our finding shows the existence of death from drug abuse among prisoner. It can be a serious warning for directors and authorities. In fact, drug use can be the underlying cause for crime from one hand, while drug use in prison can create numerous health problems such as viral infections on the other hand.<sup>22</sup>

According to this study, family history of drug abuse increases chance of addiction in other family members. Kardia et al. in their study demonstrated that parental substance abuse is a predictor factor for tendency and dependence on the drug.<sup>23</sup>

### Conclusion

What is clear from this study is that fatal opioid overdose is a serious problem in unmarried young men, unemployed and self-employed individuals,

people with low education level and people with a history of substance abuse in their family and history of suicide and hospitalization in psychiatric hospitals. Therefore, innovative training programs and harm reduction approaches must be designed for these high-risk groups in order to reduce the mortality associated with drug use.

Since most drug abuse-related deaths occur at home or in other private places, authorities must focus on training overdose prevention programs, overdose recognition and basic life support measurements in friends and relatives of opioid users.

Some studies demonstrated that methadone and buprenorphine should be the cornerstone of any community overdose prevention program. Many communities instead of this method use naloxone overdose control programs. Naloxone is a particular opiate antagonist without agonist properties or potential for abuse. Community-based naloxone program is an inexpensive and nonscheduled program in which drug users are trained to diagnose early overdose symptom and administer an intramuscular injection of naloxone to reverse the effect of opioid overdose.

### Conflict of Interests

The Authors have no conflict of interest.

### Acknowledgements

The authors would like to thank LMO and also legal medicine research center for providing the data of this research.

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## توصیف مرگ و میر ناشی از سوء مصرف مواد مخدر در ایران: یک مطالعه اپیدمیولوژیک طی سال‌های ۹۴-۱۳۹۳

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### مقاله پژوهشی

### چکیده

**مقدمه:** سوء مصرف مواد مخدر به عنوان یک اختلال مزمن و شدید، باعث افزایش ابتلا به بیماری‌ها، ناتوانی و مرگ و میر زودرس در جامعه می‌شود. مطالعاتی که به بررسی سوء مصرف مواد مخدر می‌پردازند، اطلاعات مفیدی را برای مدیران منطقه‌ای، ملی و بین‌المللی فراهم می‌کنند. بنابراین، با شناسایی عوامل تأثیرگذار بر مرگ و میر ناشی از مصرف مواد مخدر، می‌توان مداخلات مناسب و اثربخشی را در گروه‌های آسیب‌پذیر متمرکز نمود. هدف از انجام پژوهش حاضر، بررسی میزان مرگ و میر ناشی از سوء مصرف مواد مخدر و عوامل مؤثر بر آن در ایران بود.

**روش‌ها:** این مطالعه به صورت توصیفی-مقطعی انجام شد. اطلاعات دموگرافیک و اپیدمیولوژیک تمام افرادی که در سال ۱۳۹۳ علت مرگ آن‌ها توسط سازمان پزشکی قانونی مصرف مواد مخدر و روانگردان اعلام شده بود، با استفاده از دو چک‌لیست استخراج گردید و با استفاده از آمار توصیفی مورد تجزیه و تحلیل قرار گرفت.

**یافته‌ها:** طی انجام پژوهش، ۲۹۸۶ مورد مرگ ثبت شده بود که بیشتر موارد در مردان مجرد ایرانی با سطح تحصیلات پایین و در مکان‌های شخصی اتفاق افتاده بود. میانگین سنی افراد مورد بررسی،  $36/87 \pm 12/26$  سال به دست آمد. میزان مرگ و میر ناشی از سوء مصرف مواد در کل کشور، ۳۸/۴ نفر به ازای هر یک میلیون نفر جمعیت برآورد گردید. سابقه کیفی، خودکشی، مصرف بیش از حد مواد، بستری در بیمارستان روانی و سابقه سوء مصرف مواد مخدر در خانواده با نسبت‌های متفاوتی در افراد مورد مطالعه زخ داده بود.

**نتیجه‌گیری:** عمده مرگ‌های ناشی از سوء مصرف مواد مخدر در مردان مجرد ۳۹-۳۰ ساله که شغل آزاد و سطح تحصیلات پایینی داشتند، اتفاق افتاده بود. بنابراین، توصیه می‌شود اقدامات پیشگیری از دسترسی و مصرف مواد مخدر در این قشر متمرکز شود.

**واژگان کلیدی:** اپیدمیولوژی، مرگ و میر، اعتیاد به مواد مخدر، داروهای روانگردان

**ارجاع:** شهبازی فاطمه، میرترابی سید داوود، قدیرزاده محمدرضا، هاشمی نظری سید سعید، برزگر عبدالرزاق. **توصیف مرگ و میر ناشی از سوء مصرف مواد مخدر در ایران: یک مطالعه اپیدمیولوژیک طی سال‌های ۹۴-۱۳۹۳.** مجله اعتیاد و سلامت ۱۳۹۶؛ ۹ (۳): ۱۷۴-۱۶۶.

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