

## Analysis of Mortality Rate of Illicit Substance Abuse and its Trend in Five Years in Iran, 2014-2018

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### Original Article

#### Abstract

**Background:** Addiction and drug misuse is an illness that affects every community in every country. Based on the previous research in many parts of the world, illicit drug use is considered as a well-known risk factor for morbidity, disability, and premature mortality. Although this issue is a hot topic for public health, little studies have looked the epidemiology of substance abuse death and its trends among Iranian society. This study aims to calculate the rate of substance misuse mortality and investigate its trend in Iran.

**Methods:** This research was a cross-sectional study. For doing this study, the demographic and epidemiological data of people who died from substance misuse from 2014-2018 were extracted from Legal Medicine Organization (LMO). Finally, descriptive statistics were used to analyze the data.

**Findings:** 15304 deaths due to drug misuse were recorded in 2014-2018. The substance abuse mortality rate has increased during the study period in men and women. There were significant differences in death rates between men and women. Crude mortality rate was significantly higher among men compared to women. The majority of deaths has occurred in young men aged 30-39 years with high school education and self-employed.

**Conclusion:** The results revealed that death from substance misuse has increased during the study period. This increasing trend was observed in women and men. Further preventive measures, however, should be devised to reduce drug-related deaths. The majority of deaths occurred in young men aged 30-39 years with high school education and self-employed. In our opinion and based on the study results, programs, policies, and preventive measures should be taken to prevent these people from accessing and using the drug.

**Keywords:** Epidemiology; Substance-related disorders; Opiate-related disorders; Mortality; Trends; Iran

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## Introduction

Substance abuse and dependence is an illness that is responsible for considerable disability, morbidity, mortality, and social problems. This issue has disastrous consequences for individuals, families, and communities.<sup>1,2</sup> The misuse of alcohol and illicit drugs has been implicated as a sufficient or contributing factor in at least 90 causes of death and disease.<sup>2</sup> Based on the statistics presented by the World Health Organization (WHO) in 2017, the number of people who use drugs is around 255 million people and every year the lives of almost 2.5 million people are cut concise as a result of the harmful use of drugs.<sup>3</sup>

It should be noted that illicit drug consumers have experienced more deaths than general population.<sup>4</sup> A meta-analysis found a mortality rate among illicit opiate users 13 times that of the general population.<sup>5</sup> English and Holman performed a meta-analysis of the published scientific literature and found that 5% of all deaths in Australia were attributable to high alcohol use and substance abuse.<sup>6</sup> Based on the Iranian study accomplished in 2017, mortality from substance abuse is responsible for 0.61% of total deaths that occurred in each year.<sup>7</sup> Similarly, 9% of the overall mortality in France was found to be attributable to alcohol and drug abuse.<sup>8</sup>

Afghanistan is a large producer of opium in the world that is the eastern neighbor of Iran. With due attention to the geographical situation of Iran, substance abuse and negative influences of this issue have an inveterate history in this realm.<sup>7</sup> Although destructive disease of addiction has a long history in Iran, a few pieces of research have perused epidemiological characteristics of deceased people from this problem.<sup>9</sup> Furthermore, no national-level research estimated the mortality of drug abuse and its trend by the kind of drug in Iran; thus, this study aims to calculate the mortality rate of substance abuse in Iran during 2014-2018. It is hoped that this research will contribute to a deeper understanding of the epidemiology of substance abuse and provide essential information for planning and also further researches.

## Methods

**Study population and study protocol:** This

prevalence study evaluated the epidemiological characteristics of the deceased from substance abuse referred to the Legal Medicine Organization (LMO) of Iran between 2014 and 2018. For doing this research, there was no sampling and all of the subjects who died from substance abuse throughout the country between March 2014 and February 2018 (equal to 1392-1396 Hijri) were studied as the study population. We excluded suicides that were done using drug use and drinking alcohol. We used the LMO as the source for data on opioid-related death. In Iran, LMO is liable for evaluating all deaths of people believed to have died in the preternatural method. Drug-related death is one of the definitions of unnatural death. Thus, we used the most complete source for substance abuse mortality data in Iran, which collects information from all provinces of the country. Responsible physicians in the forensic medicine autopsy room register and report deaths due to drug abuse in each province every month using standard forms. The psychometric properties of them were evaluated by obtaining comments of scholars and professors outside and inside the forensic medicine. The first part of the forms included questions on demographic characteristics like age, gender, education, and marital status, and the second section included questions about the type of substance used, history of suicide, hospitalization in the psychiatric hospital, staying in prison, and diary of substance use in family and friends. In this research, information of the type of substance used was obtained by verbal autopsy. In verbal autopsy method, information, and a description of the type of drug use are acquired from conversations or interviews with a person or persons familiar with the deceased.

**Data processing:** After collecting the data, the process of data cleaning was done. Duplicate cases were deleted based on the similarity in the victims' names, national codes, time of death, and identification number (ID number) for burial. Death registry coordinator by obtaining verbal autopsy from a responsible doctor in autopsy room corrected missing and inaccurate codes in the dataset.

**Ethical considerations:** This study was approved by the Ethical Committee of LMO, Tehran, Iran. The deceased families were assured

of the confidentiality of their information. In order to protect the confidentiality of information, we analyzed the data anonymously.

**Measures:** We calculated the crude mortality rate for each year from 2014 to 2018. The population of the country which was used as the denominator in calculating the mortality rate was extracted from Iranian Statistical Center website. Population count in Iran is conducted every five years. So we obtained population in 2012 and 2017 and with using the linear interpolation calculated the population for the intervening years. All rates were presented per 1000000 population.

The necessary statistics were calculated using Stata software (version 14, Stata Corporation, College Station, TX, USA). We used percentage for describing the categorical variable, while continuous variables were characterized with median, mean, and standard deviation (SD).

### Results

In 2014-2018, the LMO recorded 15304 deaths due to substance misuse all over the country. Generally, the number of deaths due to substance abuse by years of study was 2957, 2986, 3003, 3269, and 3089, respectively. In this study, a sample of 12625 (82.49%) was evaluated that the number of them for each separate year of study was 2396, 2467, 2306, 2750, and 2706, respectively. The most affected age group was those aged 30-39 years (34.28% of all mortality). The mean age of victims in our study was  $36.61 \pm 12.60$  years (men:  $37.01 \pm 12.29$ , women:  $32.66 \pm 14.62$ ) and the median age was 35 (men: 36, women: 32). Among all the deceased, 90.28% were men and 9.72% were women. The majority of deaths occurred in single people. In this study, the majority of the deceased were self-employed, unemployed, and worker in decreasing order. In terms of educational status, people with high school education and university education had the highest and the lowest frequency, respectively. Further demographic details of the study population are documented in table 1.

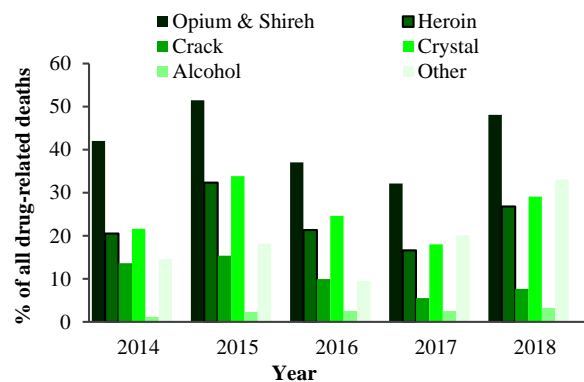
The total number of substance abuse deaths per year increased from 2957 in 2014 to 3089 in 2018. Table 2 shows a number of substance abuse deaths and crude mortality rate of substance abuse between 2014 and 2018. The substance abuse mortality rate has increased during the study period (P-value for trend: 0.640). The

mortality rate for illicit drug use was less in women than in men. This favorable situation can be observed during the five-year period of the study. Generally, the trend of mortality rate was increasing in women (P = 0.180) and men (P = 0.050).

In general, Kermanshah, Hamedan, and Lorestan Provinces (Iran) with the relative value of 70.9, 68.4, and 65.4 deaths per one million people had the highest mortality rate, respectively. Table 3 shows the information on substance and alcohol abuse mortality rate per 1000000 population by province of the country.

Figure 1 shows the percentage of deaths in each year according to the main drug implicated in the death. Opium was considered for the most percentage (49.27%) of drug-related deaths during the five-year period of study. In addition, the response rate about the type of drug used was 65.89%.

After performing the verbal autopsy with relatives and friends of the deceased, suicide background, being admitted to the psychiatric hospital, incarceration, accidental overdose, injection drug use, and history of substance abuse in the family were observed in 4.59%, 7.97%, 24.61%, 18.98%, 18.86%, and 20.93%, respectively.



**Figure 1.** The relative frequency of the type of drug consumed in the bodies referred to the Legal Medicine Organization (LMO) from 2014 to 2018 in Iran (response rate: 65.89%)

### Discussion

This study was conducted to evaluate the mortality rate of drug abuse and its trend in five years (2014-2018) in Iran. The study shows that mortality rates among illicit drug users have increased during the study period.

**Table 1.** The absolute and relative frequency distribution of drug abuse-related deaths by demographic variables between 2014 and 2018 in Iran

Characteristics	Year				
	2014	2015	2016	2017	2018
Sex [n (%)]					
Male	2202 (91.90)	2253 (91.33)	2052 (88.99)	2454 (89.25)	2437 (90.05)
Female	194 (8.10)	214 (8.67)	254 (11.01)	296 (10.75)	269 (9.95)
Age (year) [n (%)]					
0-9	43 (1.79)	22 (0.89)	34 (1.50)	36 (1.32)	34 (1.27)
10-19	83 (3.46)	94 (3.81)	105 (4.50)	139 (5.05)	136 (5.02)
20-29	548 (22.87)	547 (22.17)	604 (26.20)	642 (23.35)	641 (23.70)
30-39	878 (36.64)	907 (36.77)	754 (32.70)	946 (34.39)	843 (31.15)
40-49	451 (18.82)	537 (21.77)	483 (20.90)	541 (19.66)	608 (22.46)
50-59	275 (11.48)	251 (10.17)	222 (9.60)	285 (10.36)	291 (10.77)
60-69	84 (3.51)	73 (2.96)	73 (3.20)	114 (4.14)	102 (3.88)
70-79	24 (1.00)	29 (1.18)	25 (1.10)	35 (1.28)	27 (1.00)
80-100	10 (0.42)	7 (0.28)	6 (0.30)	12 (0.45)	23 (0.85)
Marital status [n (%)]					
Single	1180 (49.24)	1172 (47.52)	1122 (48.60)	1285 (46.75)	2054 (75.91)
Married	975 (40.68)	981 (39.75)	875 (38.00)	1115 (40.55)	594 (21.95)
Divorced	221 (9.23)	282 (11.42)	285 (12.40)	316 (11.49)	50 (1.83)
Widow	20 (0.85)	32 (1.31)	24 (1.00)	33 (1.22)	8 (0.30)
Education level [n (%)]					
Illiterate	267 (11.13)	264 (10.71)	231 (10.00)	280 (10.18)	43 (1.95)
Elementary	616 (25.70)	603 (24.44)	504 (21.87)	603 (21.93)	521 (19.27)
Junior high school	735 (30.67)	788 (31.94)	692 (30.00)	842 (30.62)	894 (33.03)
High school	673 (28.07)	650 (26.35)	701 (30.39)	856 (31.13)	960 (35.49)
University	106 (4.43)	162 (6.56)	178 (7.73)	169 (6.15)	278 (10.62)
Employment status [n (%)]					
Student	36 (1.22)	43 (1.43)	38 (1.65)	63 (2.29)	2 (0.09)
University student	25 (0.84)	46 (1.53)	44 (1.91)	41 (1.49)	44 (1.62)
Housewife	195 (6.58)	202 (6.76)	173 (7.51)	201 (7.31)	245 (9.06)
Employee	56 (1.89)	59 (1.98)	70 (3.04)	64 (2.33)	72 (2.68)
Worker	359 (12.15)	399 (13.38)	269 (11.68)	264 (9.60)	263 (9.74)
Skilled worker	52 (1.76)	38 (1.26)	29 (1.26)	36 (1.31)	62 (2.30)
Solider	21 (0.71)	38 (1.26)	33 (1.43)	20 (0.73)	26 (0.98)
Retired	53 (1.80)	59 (1.98)	41 (1.78)	54 (1.96)	75 (2.76)
Unemployed	667 (22.55)	742 (24.84)	531 (23.00)	496 (18.04)	509 (18.79)
Farmer	58 (1.97)	44 (1.48)	35 (1.52)	34 (1.24)	55 (2.04)
Urban driver	55 (1.84)	47 (1.57)	51 (2.21)	30 (1.09)	48 (1.79)
Suburban driver	24 (0.80)	36 (1.21)	22 (0.95)	22 (0.80)	22 (0.81)
Military	20 (0.67)	27 (0.90)	26 (1.13)	28 (1.02)	16 (0.60)
Self-employed	1234 (41.74)	1124 (37.64)	892 (38.72)	1102 (40.07)	1203 (44.47)
Drug-dealer	7 (0.25)	5 (0.18)	3 (0.13)	3 (0.11)	2 (0.09)
Beggar/vendor	10 (0.34)	15 (0.49)	7 (0.30)	16 (0.58)	3 (0.13)
Other	85 (2.89)	62 (2.07)	40 (1.74)	276 (10.03)	56 (2.08)

Similarly, according to the WHO report in 2015, the number of deaths per year attributed to drug abuse in the United States (US) increased from 18000 deaths in 1999 to more than 50000 deaths in 2015. According to the global statistics, between 1999 and 2015, drug misuse mortality in the United Kingdom (UK) increased from 18 per 1000000 people to 43 per 1000000 people.<sup>10</sup> These

increases in mortality from drug abuse can be attributed to an increase in drug availability, inefficiencies in harm reduction approaches, and delay in providing emergency measures for people who had overdose after substance abuse. This finding suggests that further preventive measures should be devised to reduce drug-related death.<sup>11</sup>

**Table 2.** The number of substance abuse deaths and crude mortality rate by sex in the five-year period from 2014 to 2018 in Iran

Year	Number of deaths			Crude mortality rate		
	Sex			Sex		
	Total	Male	Female	Total	Male	Female
2014	2957	2717	240	38.38	56.57	5.09
2015	2986	2727	259	38.29	57.12	5.55
2016	3003	2672	331	38.03	51.34	6.51
2017	3269	2917	352	40.90	60.59	7.51
2018	3089	2782	307	38.18	59.38	6.75

Overall, men experienced a higher mortality rate from substance abuse than women (56.57% per 1000000 vs. 5.09% per 1000000, in 2014). Although the mortality rates in men are higher than women, in both sexes, we have seen an increasing trend in drug use mortality rates during the study. These findings are in accordance with previous researches, which

report that in most of the societies men have more authority in social and familial relationships and they work in society more than women. Therefore, their access to illicit drugs is higher than women. In other words, women relationships in Iranian society is much more closely monitored than men which result in fewer opportunities for illicit drug use.

**Table 3.** Crude mortality rate due to opiate and psychotropic abuse per 1000000 people by the province of residence and years of the study in Iran

Province of residence	Year				
	2014	2015	2016	2017	2018
East Azerbaijan	36.00	26.80	26.30	37.09	25.58
West Azerbaijan	8.50	4.10	5.20	11.94	12.11
Ardabil	26.38	29.80	31.10	34.63	24.32
Isfahan	73.21	23.00	43.60	42.76	39.84
Alborz	43.19	51.80	43.60	59.72	29.89
Ilam	46.07	26.10	48.20	17.23	37.62
Bushehr	17.52	4.50	14.20	14.61	23.50
Tehran	63.56	68.20	32.10	58.41	49.79
Chaharmahal and Bakhtiari	57.20	31.40	32.10	56.97	40.49
South Khorasan	41.96	18.40	27.30	15.61	20.20
Razavi Khorasan	47.17	42.50	48.90	37.45	37.54
North Khorasan	58.32	11.10	10.50	41.71	21.00
Khuzestan	34.94	28.60	21.90	21.01	17.69
Zanjan	80.06	62.10	44.40	46.33	38.46
Semnan	75.25	37.80	50.50	37.01	58.53
Sistan and Baluchestan	60.02	36.70	37.60	38.92	48.48
Qazvin	77.60	33.10	29.60	47.10	53.54
Qom	48.37	43.70	52.60	59.58	49.91
Kordestan	27.48	23.00	30.00	26.20	27.68
Kerman	39.62	21.20	22.10	32.86	34.56
Kermanshah	75.98	64.00	66.80	94.24	74.72
Kohgiluyeh and Boyer-Ahmad	59.95	20.20	17.10	37.86	33.70
Golestan	22.06	8.00	14.20	11.77	14.30
Gilan	70.64	28.10	39.30	43.86	33.45
Fars	59.31	39.30	48.90	52.35	63.42
Lorestan	101.00	58.90	65.00	67.02	69.81
Mazandaran	11.03	9.80	10.40	9.13	10.82
Markazi	30.36	32.30	18.40	25.18	35.60
Hormozgan	31.33	32.80	21.60	22.52	16.49
Hamedan	150.57	67.70	60.70	55.80	61.90
Yazd	54.11	26.20	22.90	27.22	28.65

A better expression is that addiction in women because of the special culture texture of Iran, is more hidden than men. This fact asks for more attention such as the establishment of specialized centers for women, as well as prevention measures with particular attention to addiction therapy.<sup>12-16</sup>

Our analysis confirms that death from substance use is more prevalent in people with high school education. Also, only a small percentage of victims have a university education. This finding explains that increasing the awareness of people with academic education about the social, familial, psychological, hygienic, and economic adverse effect of addiction will reduce their tendency to substance use, although longitudinal data are required to support this inference.<sup>16-18</sup> In Gfroerer et al. study, rates of illicit drug use and mortality from drug abuse were highest among people with high school level of education. So, substance use in high school population is an important public health concern and these people are the key point in harm reduction program.<sup>16</sup>

Among the participants of this study, 4.59% of the deceased had the history of suicide. Several epidemiological studies have evaluated the role of illicit drug use in suicidal behaviors. Based on the findings of these studies, substance use disorders (SUDs) are strongly associated with an increased risk of suicide ideation, suicide attempt, and suicide death. Therefore, illicit drugs of any kinds can be considered as important predictors of suicide and hence a great source of premature death.<sup>19,20</sup> Based on the meta-analysis conducted by Poorolajal et al., there is a strong association between SUD and suicide outcomes [odds ratio (OR): 2.04, 95% confidence interval (CI): 1.59-2.50].<sup>21</sup>

In this study, 24.61% of cases had a history of incarceration. The relationship between offending and substance misuse is proven in a several of criminal justice and medical settings. In numerous studies, the prevalence of drug misuse among prisoners is several times higher than the general population. Regarding the prevalence of drug use in prisoners, screening for identification of addicts should be carried out at the reception of prisons. In the next step, addiction treatment services in prisons and follow up after release should be provided.<sup>22,23</sup>

Being single is prevalent in death from substance

misuse. This reflects the positive impact of family support in preventing drug use and addiction rehabilitation programs.<sup>7,10</sup> Based on the cross-sectional household surveys in 15 countries from the WHO, marriage was associated with reducing the risk of SUD and negative influences.<sup>24</sup>

Based on the results, during the study period, majority of deaths caused by illicit drug use occurred in unemployed people. In fact, in people who do not have a steady source of income, especially in young people, death from narcotic substance use increases. On the other hand, an appropriate-paying vocation is a preventive factor for drug use tendency. Findings from previous researches that examined the relationship between unemployment and addiction propose that unemployment may be a risk indicator for increasing drug and alcohol consumption among young people.<sup>25,26</sup>

Based on our analysis, the history of drug abuse in the deceased family was observed in 20.93% of cases. There is good evidence that family history is a powerful predictor for tendency and dependence on the drugs. Based on the previous researches, exposure to parental smoking produces a dose-related increase in the likelihood of smoking in adolescents, with the number of over-smoking parents and current smoking status both being positively associated with smoking in the offspring.<sup>27,28</sup>

During the whole study period, the age group of 30-39 years (young people) had the highest frequency. This leads to an increase in years of life lost due to premature mortality. Based on the results of previous studies, the occurrence of the large proportion of deaths from drug abuse in the young age groups leads to loss of potential years of life. Since this group is active in social and economic programs in society, reducing their death has a positive economic and social impact.<sup>7,10,28</sup>

Strengths and limitations: We used data on death from substance abuse recorded in the LMO. According to Iran's law, all suspicious deaths should be investigated in this organization; hence, our data is the most comprehensive information about drug abuse deaths in Iran. However, because addiction and drug dependence is a sensitive issue among the population, there may be some under-reporting by families. Another limitation is that a cross-sectional study is not



longitudinal by design, so exposure and outcome are not simultaneously assessed; this matter limits the ability to draw any causal inference.

### Conclusion

In the study period, crude mortality rate from substance abuse has increased throughout the country and by sex. These findings suggest that interventions for reducing mortality from substance abuse especially in woman are still needed. Descriptive epidemiology indicates that a large number of deaths from illicit substance abuse occur in unmarried young men aged 30-39 years with low

education levels and also in self-employed ones. Therefore, preventive measures and training programs in public health arena as well as harm reduction approaches for drug rehabilitation should be designed for high-risk groups.

### Conflict of Interests

The authors have no conflict of interest.

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## بررسی میزان مرگ و میر ناشی از سوء مصرف مواد مخدر و روند پنج ساله آن در ایران (سال‌های ۱۳۹۲ تا ۱۳۹۶)

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### مقاله پژوهشی

### چکیده

**مقدمه:** سوء مصرف مواد مخدر به عنوان یک بیماری در نظر گرفته می‌شود که هر جامعه‌ای را کم و بیش تحت تأثیر قرار می‌دهد. این مشکل، عامل خطری برای ابتلا به بیماری‌های مختلف و مرگ و میر در نظر گرفته می‌شود. با وجود اهمیت اعتیاد و سوء مصرف مواد مخدر، در کشور ما مطالعات محدودی در سطح ملی به بررسی اپیدمیولوژی آن در جامعه ایرانی پرداخته‌اند. هدف از انجام پژوهش حاضر، بررسی روند میزان مرگ و میر استاندارد شده سنی ناشی از سوء مصرف مواد مخدر و عوامل مؤثر بر این میزان مرگ و میر در ایران بود.

**روش‌ها:** در این تحقیق توصیفی-مقطعی، داده‌های مربوط به همه افرادی که در بازه سال‌های ۱۳۹۲ تا ۱۳۹۶ به دلیل سوء مصرف مواد مخدر فوت کرده بودند، از سازمان پزشکی قانونی کل کشور جمع‌آوری شد. در ابتدا میزان مرگ و میر خام ناشی از سوء مصرف مواد مخدر محاسبه گردید و در گام بعدی با استفاده از اطلاعات دموگرافیک و اپیدمیولوژیک، به توصیف موارد مرگ پرداخته شد.

**یافته‌ها:** در طول دوران ۵ ساله مطالعه، ۱۵۳۰۴ نفر در ایران به دلیل مصرف مواد مخدر جان خود را از دست داده بودند. میزان مرگ و میر منتسب به سوء مصرف، هم به طور کلی و هم به تفکیک جنسیت روند افزایشی را نشان داد. اختلاف معنی‌داری بین زنان و مردان در میرایی ناشی از مواد مخدر وجود داشت (میزان مرگ و میر در مردان به طور معنی‌داری بیشتر از زنان بود). در تمام طول دوره تحقیق، اغلب مرگ‌ها در مردان جوان ۳۰ تا ۳۹ ساله با تحصیلات دبیرستان و دارای شغل آزاد اتفاق افتاده بود.

**نتیجه‌گیری:** در طول دوران مطالعه میزان مرگ و میر افزایش یافته و این روند افزایشی به تفکیک زنان و مردان نیز قابل مشاهده بود. بنابراین، اقدامات موجود در جهت کاهش اثرات منفی سوء مصرف مواد مخدر کفایت لازم را نداشته است و باید اقدامات پیشگیرانه بیشتر و جدیدتری برای کاهش این روند افزایشی اتخاذ گردد. از طرف دیگر، بالا بودن میزان مرگ و میر در مردان جوان مجرد ۳۰ تا ۳۹ ساله با سطح تحصیلات پایین و شغل آزاد، توصیه‌کننده این موضوع است که اقدامات پیشگیری از دسترسی و مصرف مواد مخدر باید در این گروه متمرکز شود.

**واژگان کلیدی:** اپیدمیولوژی، اختلالات وابستگی به مصرف مواد، اعتیاد به مواد مخدر، مرگ و میر، روند، ایران

**ارجاع:** شهبازی فاطمه، میرترابی داوود، قدیرزاده محمدرضا، هاشمی نظری سید سعید. **بررسی میزان مرگ و میر ناشی از سوء مصرف مواد مخدر و روند پنج ساله آن در ایران (سال‌های ۱۳۹۲ تا ۱۳۹۶)**. مجله اعتیاد و سلامت ۱۳۹۷؛ ۱۰ (۴): ۲۶۸-۲۶۰.

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