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Authors

Rafiee, Mahkameh

Karamouzian, Mohammad

Sharifi, Mohammad

et al.

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RESEARCH

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Non-injection drug use among incarcerated people in Iran: Findings from three consecutive national bio-behavioral surveys

Mahkameh Rafiee¹, Mohammad Karamouzian^{2,3}, Mohammad Sharifi¹, Ali Mirzazadeh^{1,4}, Mehرداد Khezri^{1,5}, Ali Akbar Haghdoost¹, Soheil Mehmandoost^{1*} and Hamid Sharifi^{1,6*}

Abstract

Background Prisons often serve as high-risk environments for drug use, and incarcerated people are at a high risk for substance use-related mental and physical harms. This study aimed to determine the prevalence of non-injection drug use inside the prison and its related factors among incarcerated people in Iran.

Methods We utilized data from three national bio-behavioral surveillance surveys conducted among incarcerated people in Iran in 2009, 2013, and 2017. Eligibility criteria were being ≥ 18 years old, providing informed consent, and being incarcerated for over a week. Overall, 17,228 participants across all surveys were recruited through a multi-stage random sampling approach. Each participant underwent a face-to-face interview and HIV test. The primary objective of the study was to assess self-reported non-injection drug use within the prison environment within the last month. A multivariable logistic regression model was built to determine associated covariates with drug use inside prison and an adjusted odds ratio (aOR) with 95% confidence intervals (CI) were reported.

Result The prevalence of non-injection drug use inside the prison was 24.1% (95% CI 23.5, 24.7) with a significant decreasing trend (39.7% in 2009, 17.8% in 2013, 14.0% in 2017; p -value < 0.001). Overall, 44.0% of those who used drugs were also receiving opioid agonist therapy (OAT) and we noted that in 2017, 75.1% of those on OAT used stimulants. In the multivariable logistic regression model, the year of interview (2013: aOR = 1.43 and 2009: aOR = 5.60), younger age (19–29: aOR = 1.14 and 30–40: aOR = 1.37), male sex (aOR = 3.35), $<$ high school education (aOR = 1.31), having a history of previous incarceration (aOR = 1.26), and having a history of lifetime HIV testing (aOR = 1.76) were significantly and positively associated with recent non-injection drug use inside the prison.

Conclusions Approximately one in four incarcerated people in Iran reported drug use within the last month inside prisons. While a declining trend in non-injection drug use was noted, substantial gaps persist in harm reduction programs within Iranian prisons. In particular, there is a pressing need for improvements in drug treatment programs, focusing on the integration of initiatives specifically designed for people who use stimulants.

Keywords Substance-related disorders, Prisons, Harm reduction, Iran

*Correspondence:

Soheil Mehmandoost

mehmandoost.soheil@gmail.com

Hamid Sharifi

hamid.sharifi@ucsf.edu; sharifhami@gmail.com

Full list of author information is available at the end of the article



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Background

In December 2021, approximately 11.5 million people were incarcerated globally, with 70% in low and middle-income countries [1]. Iran, ranking 10th globally with around 180,000 incarcerated individuals in 2023 [2], faces notable health challenges among its prison population. Infectious diseases are particularly prevalent, with high rates of tuberculosis (62.6%), HIV (2.8%), HCV (21.6%), and HBV (2.9%) [3]. These health issues are primarily attributed to high-risk behaviors common among incarcerated individuals in Iran, both before and during imprisonment. Such behaviors include unprotected sex, alcohol consumption [4, 5], and drug use, both through injection and non-injection methods [6, 7].

The intersection of incarceration, health risks inside the prisons, and drug use is a critical public health concern in Iran [6, 8]. The concentration of individuals in prison presents challenges in managing health risks and addressing drug-related concerns. [9, 10]. Despite several policies and interventions to prevent drug trafficking into the prisons, illegal drugs enter prisons through various ways (e.g., visiting relatives, prison staff, newcomers, and postal gifts) [9]. Legal obstacles and limitations in the prisons for drug use shape a condition in which the risk of high-risk behaviors increases. For example, the results of a former study have shown that 67% of people who inject drugs had a history of shared injection, and 19% of the shared injection occurred inside prison [11]. In a more recent study, it was found that 3.8% of incarcerated individuals had a history of shared injection [12]. For many incarcerated people, prisons are one of the first opportunities to engage in risky behaviors, including drug use [13].

Since the onset of the HIV outbreaks inside Iranian prisons a few decades ago, Iran has implemented extensive harm reduction services, including needle and syringe programs, opioid agonist therapy (OAT), and educational initiatives within its prison system [14, 15]. However, drug use inside prisons in Iran continues to be common with an estimated pooled prevalence of lifetime non-injection and injection drug use of 73.8% (95% CI 70.9, 76.6) and 16.0% (95% CI 12.6, 19.7), respectively [16]. In a separate study conducted among incarcerated individuals in Iran, 70.6% of participants reported drug use, with 10.6% specifically reporting injection drug use [12]. Another study indicated that 74.0% of participants reported drug use, with 12.3% reporting injection drug use [17]. Non-injection drug use inside prisons is a significant concern due to its potential progression to injection drug use and other high-risk behaviors inside and outside prisons [18]. Moreover, developing effective harm reduction strategies within prison settings in Iran requires a nuanced understanding of non-injection drug use. However, there is a scarcity of studies focusing on

non-injection drug use among incarcerated individuals in Iran and therefore, this study seeks to address this gap by investigating the prevalence, trends, and associated factors of non-injection drug use among this key population in Iran.

Methods

Three national bio-behavioral surveillance surveys (BBSS) were conducted among incarcerated people in Iran in 2009, 2013, and 2017 to help monitor the trend of HIV and high-risk behaviors among incarcerated people in Iran. The study design and implementation details have been previously described [4]. We collected data from 27 prisons in 2009, 27 prisons in 2013, and 33 prisons in 2017 representing different geographical regions of Iran [19]. The median number of incarcerated people was used as a cutoff to divide prisons into two categories: Prisons with more than the median and less than the median. Overall, using a multi-stage random sampling method, in 2009, 5953 participants, in 2013, 5490 participants, and in 2017, 5785 participants were recruited. Eligible participants were ≥ 18 years old, had been incarcerated for at least one week at the time of the study, and provided informed consent for participation. Gender-matched interviews were conducted in a private room inside the prison facilities. Standard questionnaires were used to assess HIV-related high-risk behaviors (e.g., history of sexual contacts and drug use-related behaviors) and all participants were tested for HIV by a rapid HIV test (SD-Bioline, South Korea). Those with reactive results in the first test were confirmed with a Uni-gold HIV rapid test. These surveys were supported by the global fund (in 2009 and 2013) and the Ministry of Health and Medical Education (in 2013 and 2017).

Outcome variable

The outcome variable of interest in this analysis was self-reported non-injection drug use inside the prison in the last month. We asked the participants, “*Have you used non-injection drugs inside the prison in the last month?*” with the binary answers of “yes” vs. “no”.

Covariates

The covariates included demographic factors containing sex (male vs. female), age at interview (18–29 vs. 30–40 vs. >40), educational level (<high school vs. \geq high school), and current marital status (single vs. divorce/widowed vs. married). Other covariates included history of previous incarceration (yes vs. no), length of previous incarceration (≤ 3 vs. 4–11 vs. 12–36 vs. <36 months), duration of non-injection drug use (<5 years vs. ≥ 5 years), history of drug use in the last month before incarceration (yes vs. no), type of drug use in the last month before incarceration [opioids vs. stimulants vs. others

(including marijuana, ecstasy, tramadol, and other drugs)], receipt of OAT inside the prison (yes vs. no), age at first sexual intercourse (<18 vs. ≥18 years), using condom during last sex (yes vs. no). We also recorded the history of HIV testing (ever vs. never), HIV knowledge about the modes of transmission (sufficient vs. insufficient) about the modes of transmission [20], and HIV serostatus (positive vs. negative).

Statistical analysis

After merging data from the three rounds, descriptive statistics were reported for drug use in the last month inside the prison, including frequencies, percentages, and 95% confidence intervals (CI). We used a bivariable logistic regression to identify associated covariates and included the covariates with p -value < 0.2 in the multivariable logistic regression model. The model was reduced through a backward elimination [21]. We used a multivariable logistic regression model to compare the odds of drug use in the last month of incarceration among different subgroups of incarcerated people after merging the data from three rounds of surveys and adjusting for the year of data collection. Adjusted odds ratios (aOR) were reported, and p -values < 0.05 were considered statistically significant.

Results

Of all invited participants, 25 people (0.4%) in 2009, 22 persons (0.4%) in 2013, and 15 persons (0.2%) in 2017 denied taking part in studies. Among the 17,228 participants recruited from three rounds, the mean (standard deviation [SD]) age was 34.4 (9.6) (32.2 in 2009, 35.4 in 2013, 35.7 in 2017), 96.0% were male (96% in 2009, 98.1% in 2013, 93.9% in 2017), and 55.3% had a previous history of incarceration (47.4% in 2009, 59.4% in 2013, 59.1% in 2017).

Prevalence of drug use inside prison

Among 17,228 included individuals, 4,153 incarcerated individuals 24.1% (95% CI 23.5, 24.7) (39.7% in 2009, 17.8% of participants in 2013, and 14.0% of participants in 2017) had a history of non-injection drug use in the last month inside prison (Fig. 1). Among those who used drugs for five years or more, 3,652 individuals (32.4; 95% CI 31.5, 33.2) reported using drugs inside the prison in the last month (88.5% in 2009, 93.2% in 2013, and 93.9% in 2017) (Table 1). Furthermore, 55 participants (0.3%) [33 (0.5%) in 2009, 19 (0.3%) in 2013, and 3 (0.1%) in 2017] had a history of drug injection in the last month inside the prison. We also noted that the prevalence of OAT uptake has increased over time (Fig. 2). Additionally, 75.1% of the participants who were on OAT reported stimulant use in the last month inside the prison (See supplementary file).

Bivariable regression model

From demographic covariates, male sex (Crude odds ratio [cOR]=3.18, < 0.001), and less than high school education (cOR=1.33, <0.001) were significantly associated with non-injection drug use inside the prison. Also, having a history of previous incarceration (cOR=1.25, <0.001), condom-less sex in the last sexual act (cOR=1.54, <0.001), and having a history of HIV testing (cOR=1.11, <0.001) were associated with drug use in the last month inside the prison (Table 2).

Multivariable logistic regression model

In the multivariable logistic regression model, the year of interview [2013: aOR=1.43; 95% CI 1.25, 1.63 and 2009: aOR=5.60; 95% CI 4.90, 6.41], younger age [19–29: aOR=1.14; 95% CI 1.02, 1.29 and 30–40: aOR=1.37; 95% CI 1.23, 1.54], male sex [aOR=3.35; 95% CI 2.49, 4.49], < high school education [aOR=1.31; 95% CI 1.19, 1.45],

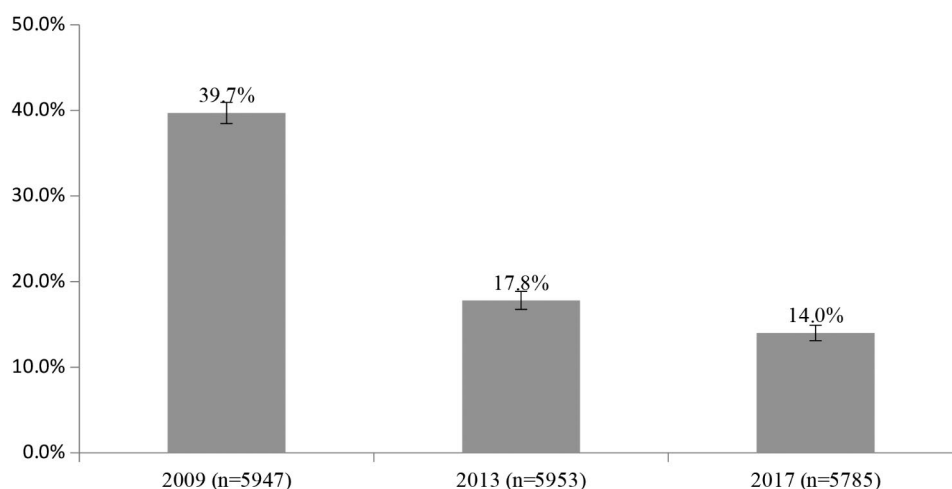


Fig. 1 Prevalence of non-injection drug using inside prison in last month in national bio-behavioral surveillance surveys

Table 1 Drug use inside the prison in the last month among incarcerated people in Iran in 2009, 2013, and 2017

Variables	Non-injection drug use in the last month		
	2017 (N=5785) n (%) ^a	2013 (N=5953) n (%) ^a	2009 (N=5947) n (%) ^a
Total	810 (14.0)	980 (17.8)	2363 (39.7)
Age at interview			
> 40	164 (10.9)	191 (14.1)	387 (40.9)
30 - 40	422 (15.4)	480 (19.0)	1000 (47.9)
18 - 29	222 (14.7)	309 (19.2)	976 (38.0)
Sex			
Female	11 (3.1)	18 (17.5)	36 (16.0)
Male	799 (14.7)	962 (17.9)	2327 (43.3)
Educational level			
High school and higher	234 (13.0)	199 (14.9)	494 (37.6)
Less than high school	573 (14.4)	781 (18.8)	1869 (43.6)
Current marital status			
Married	332 (11.1)	128 (19.3)	43 (49.4)
Divorce/widowed	168 (18.1)	481 (16.0)	1414 (43.4)
Single	309 (16.5)	371 (20.3)	903 (43.2)
History of previous incarceration			
No	182 (7.7)	275 (12.3)	1205 (54.2)
Yes	627 (18.3)	705 (21.6)	1158 (31.0)
Length of previous incarceration (months)			
≤ 3	92 (15.1)	125 (18.9)	351 (39.5)
3 - 11	74 (13.9)	115 (20.9)	721 (57.0)
12 - 36	191 (17.4)	212 (20.6)	802 (67.4)
< 36	263 (22.9)	241 (25.1)	489 (69.6)
Duration of non-injection drug use			
< 5 years	49 (16.2)	65 (20.6)	261 (41.2)
≥ 5 years	752 (18.5)	890 (22.5)	2010 (61.6)
History of drug use in the last month before incarceration			
No	77 (9.2)	NA	171 (40.7)
Yes	733 (20.6)	NA	2189 (60.4)
Type of drug used in the last month before incarceration			
Opioids	295 (17.5)	NA	1695 (61.7)
Stimulants	355 (22.9)	NA	227 (57.6)
Other ^b	82 (25.5)	NA	239 (57.2)
Receipt of opioid agonist therapy (OAT) inside the prison			
No	355 (14.9)	648 (22.6)	971 (98.8)
Yes	451 (22.3)	329 (22.1)	1372 (99.8)
Age at first sexual intercourse			
≥ 18	303 (11.3)	NA	1383 (43.3)
< 18	446 (19.0)	NA	754 (51.1)
Using condom in the last sex			
No	586 (77.8)	190 (16.6)	127 (50.0)
Yes	167 (13.8)	674 (19.1)	1201 (50.3)
History of HIV testing			
Ever	553 (17.0)	385 (18.7)	1080 (58.4)
Never	256 (10.2)	585 (17.3)	1267 (35.6)
HIV knowledge about the modes of transmission			
Insufficient	159 (18.0)	122 (15.8)	25 (58.1)
Sufficient	651 (13.3)	858 (18.2)	2338 (58.4)
HIV serostatus			
Negative	797 (13.9)	945 (17.8)	1884 (40.7)
Positive	12 (24.0)	17 (22.1)	55 (61.8)

^a Row% per variable level; ^b Including marijuana, ecstasy, and other drugs

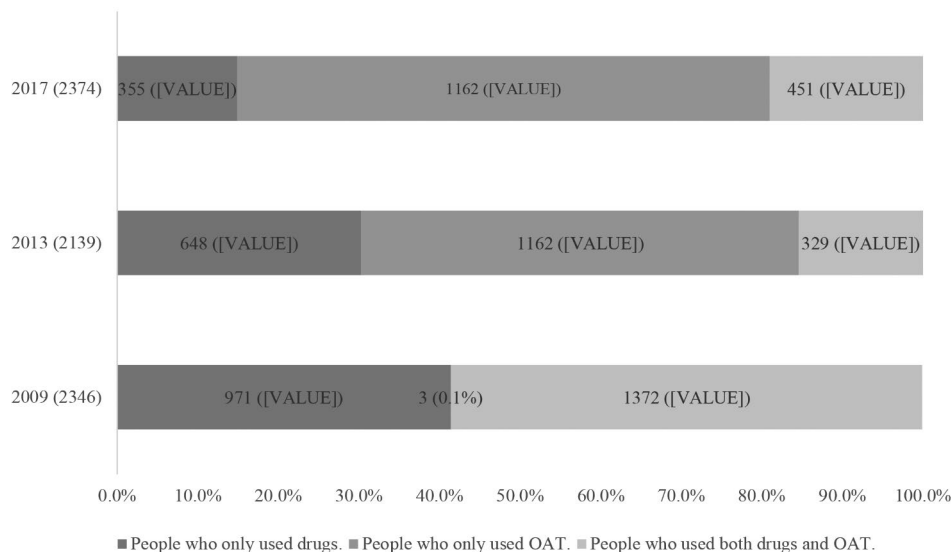


Fig. 2 Non-injection drug use and opioid agonist therapy (OAT) inside prison in last month in national bio-behavioral surveillance surveys

having a history of previous incarceration [aOR=1.26; 95% CI 1.16, 1.38], and having a history of HIV testing [aOR=1.76; 95% CI 1.60, 1.94] were positively and significantly associated with drug use in the last month inside the prison (Table 3).

Discussion

In our analysis of data gathered through three rounds of the BBSS conducted among incarcerated people in Iran, we found that despite a decline in reported drug use from 2009 to 2017, approximately one in four participants still reported non-injection drug use within prison during the month preceding the survey. Male sex, younger age, low education, history of previous incarceration, and history of HIV testing were significantly and positively associated with drug use. The prevalence of injection drug use was approximately 3 per 1,000 incarcerated individuals, also exhibiting a decreasing trend from 2010 to 2017. This low prevalence and downward trajectory suggest that the implementation of harm reduction services may have been effective, facilitating a transition towards lower-risk drug-use practices among the prison population.

About 25% of the incarcerated people in the surveys reported using drugs inside the prison within the last month. A few studies have provided insights into the prevalence of drug use within correctional facilities in different countries. For example, in Spain, the prevalence of drug use inside the prison in the past six months among women was reported as 52% [22]. A study in Ghana reported a drug use prevalence of 25.3% in the last month inside the prison [23]. The variability in drug use prevalence across these studies likely reflects the complex interplay of factors influencing substance use in correctional settings. Cultural differences, divergent

national drug policies, and variations in prison management strategies may all contribute to these differences [24]. Despite existing services inside Iranian prisons, the uptake of harm reduction programs remains sub-optimal. To address this, a multi-faceted approach is needed. Implementing comprehensive screening upon entry can help identify high-risk groups, allowing for more targeted interventions. These interventions should include expanding harm reduction programs, improving access to OAT, and offering educational and supportive programs. To increase the uptake of these services, prisons can employ various strategies. Internal advertising campaigns can raise awareness about available programs. Additionally, implementing behavioral counseling sessions can help motivate incarcerated individuals to engage with these interventions. By combining improved access with increased awareness and motivation, prisons can potentially reduce drug use-related harms more effectively. At a more structural and upstream level, ending the war on drugs is imperative, particularly in Iran, where over 80,000 incarcerations are attributed to drug-related charges [25]. Shifting from punitive measures to a public health approach would enable evidence-based harm reduction in prisons, fostering rehabilitation, reducing recidivism, and addressing the root causes of substance use more effectively [26, 27].

Our study findings indicate that the prevalence of OAT uptake within prisons has shown a consistent upward trend from 2010 to 2017. While this is encouraging, it is important to note that concurrent OAT uptake and drug use remain high and have shown an increasing trend from 2013 to 2017. In 2017, a striking three-fourths of participants receiving OAT reported concurrent stimulant use inside prison. This finding highlights a critical

Table 2 Bivariable model of non-injection drug use inside a prison in the last month among incarcerated people in Iran in 2009, 2013, and 2017

Variables	Total n (%) ^a	Drug use in the last month n (%) ^b	Crude odds ratio (95% CI ^c ; P-value)
Year			
2017	5785 (33.6)	810 (14.0)	Ref
2013	5490 (31.9)	980 (17.8)	1.33 (1.20, 1.48; <0.001)
2009	5953 (34.5)	2363 (39.7)	4.04 (3.69, 4.43; <0.001)
Age			
> 40	3805 (22.6)	742 (19.5)	Ref
30 - 40	7360 (43.7)	1902 (25.8)	1.44 (1.31, 1.58; <0.001)
18 - 29	5688 (33.7)	1507 (26.5)	1.49 (1.35, 1.64; <0.001)
Sex			
Female	678 (4.0)	65 (9.6)	Ref
Male	16197 (96.0)	4088 (25.2)	3.18 (2.46, 4.12; <0.001)
Educational level			
High school and higher	4448 (26.4)	927 (20.8)	Ref
Less than high school	12414 (73.6)	3223 (26.0)	1.33 (1.23, 1.45; <0.001)
Current marital status			
Married	1679 (10.0)	339 (20.2)	Ref
Divorce/widowed	9232 (55.3)	2227 (24.1)	1.26 (1.10, 1.43; <0.001)
Single	5790 (34.7)	1583 (27.3)	1.49 (1.30, 1.70; <0.001)
History of the previous incarceration			
Yes	8923 (55.8)	2207 (24.7)	1.25 (1.16, 1.35; <0.001)
No	7078 (44.2)	1469 (20.7)	Ref
Length of previous incarceration^d(months)			
≤ 3	2599 (21.6)	728 (28.0)	Ref
3 - 11	2736 (22.7)	831 (30.4)	1.12 (1.00, 1.26; 0.058)
12 - 36	3666 (30.4)	1025 (28.0)	1.00 (0.89, 1.11; 0.965)
> 36	3038 (25.2)	881 (29.0)	1.05 (0.93, 1.18; 0.413)
Duration of non-injection drug use			
< 5 years	1250 (10)	375 (30.0)	Ref
≥ 5 years	11284 (90.0)	3652 (32.4)	1.12 (0.98, 1.26; 0.09)
History of drug use in the last month before incarceration			
No	1260 (14.9)	248 (19.7)	Ref
Yes	7179 (85.1)	2922 (40.7)	2.80 (2.42, 3.24; <0.001)
Type of drug used in the last month before imprisonment			
Opioids	4857 (60.1)	2419 (49.8)	Ref
Stimulants	2432 (30.1)	1068 (43.9)	0.78 (0.71, 0.87; <0.001)
Other ^e	793 (9.8)	374 (47.2)	0.9 (0.94, 1.05; 0.168)
Age at first sex			
≥ 18	5867 (60.0, 71, 6)	1686 (28.7)	Ref
< 18	3820 (39.4)	1200 (31.4)	1.13 (1.04, 1.24; 0.005)
Using condom in the last sex			
Yes	3665 (21.6)	484 (18.2)	Ref
No	9646 (78.4)	2461 (25.5)	1.54 (1.38, 1.72; <0.001)
History of HIV testing			
Never	6969 (51.2)	1862 (26.7)	Ref
Ever	6649 (48.8)	1913 (28.8)	1.11 (1.03, 1.19; 0.007)
HIV knowledge			
Sufficient	1699 (9.9)	306 (18.0)	Ref
Insufficient	15529 (90.1)	3847 (24.8)	1.50 (1.32, 1.70; <0.001)
HIV status			
Negative	11137 (94.9)	264 (43.9)	Ref
Positive	601 (5.1)	1798 (16.1)	0.24 (0.21, 0.29; <0.001)

^a Column %; ^b Row %; ^c Confidence Intervals; ^d Excluding the current incarceration; ^e Including marijuana, ecstasy, and other drugs

Table 3 Multivariable logistic regression on non-injection drug use inside the prisons in the last month among incarcerated people in Iran in 2009, 2013, and 2017

Variables	Adjusted odds ratio (95% CI)	P-value
Year		
2017	Ref	Ref
2013	1.43 (1.25, 1.63)	<0.001
2009	5.60 (4.90, 6.41)	<0.001
Age		
< 40	Ref	Ref
30 - 40	1.37 (1.23, 1.54)	<0.001
18 - 29	1.14 (1.02, 1.29)	0.026
Sex		
Female	Ref	Ref
Male	3.35 (2.49, 4.49)	<0.001
Education		
High school and higher	Ref	Ref
Less than high school	1.31 (1.19, 1.45)	<0.001
History of the previous incarceration		
Yes	1.26 (1.16, 1.38)	<0.001
No	Ref	Ref
History of HIV testing		
Never	Ref	Ref
Ever	1.76 (1.60, 1.94)	<0.001

gap in the harm reduction programs currently implemented inside Iranian prisons. While existing programs primarily focus on opioid use, with the government mandated to provide methadone for incarcerated individuals who use drugs [28], the issue of stimulant use remains largely overlooked. This oversight is significant, as there are currently no specific interventions tailored for those who use stimulants in Iranian prisons. The lack of comprehensive drug treatment programs that address both opioid and stimulant use may explain why many participants continue to use drugs despite having access to OAT. Due to the high prevalence of stimulant use among the incarcerated people in Iran, specified drug use in a range of psychosocial (e.g., matrix model [29], cognitive-behavioral therapy, contingency management), and pharmacological treatments (e.g., monoamine agonists and dopamine agonists [30]) for stimulant use disorders should be introduced in the mental health care packages presented inside prisons. By broadening the scope of interventions, Iranian prisons can better support the health and well-being of incarcerated individuals struggling with various forms of substance use.

Previous history of incarceration was an indicator that an individual may engage in drug use while in prison. This association may arise from the fact that repeated or extended periods of incarceration are linked to risk factors associated with drug use [9]. Moreover, people with a history of incarceration often face difficulties, such as limited access to social support and increased susceptibility to exposure to risky behaviors [31]. In our study,

over half of the incarcerated people had a history of previous incarceration, and a majority of them had a history of drug use inside the prison. Other studies have also shown similar results [9]; 53.8% of participants in a national study in Iran [9], and 41.0% of participants in a study in Pakistan had a previous history of incarceration which was a significant risk factor for drug use [32]. Evidence shows many people experience drug use for the first time inside prison [9, 33], potentially contributing to higher rates of substance use within prisons compared to the general population. According to recent studies, opium is the most prevalent drug in Iran with an estimation of 1500 per 100,000 population followed by shire (660 per 100,000), crystal methamphetamine (590 per 100,000), hashish (470 per 100,000), heroin/crack (350 per 100,000), methamphetamine, LSD and ecstasy (300 per 100,000) and injecting drugs (280 per 100,000) [34]. Some studies have shown that incarceration can increase drug use inside prison for those who are already vulnerable to a broad range of social stresses [33]. This vulnerability, combined with the prison environment, may increase the likelihood of drug use initiation or continuation. Furthermore, repeated incarcerations may escalate the probability of drug use, creating a cycle that is difficult to break. Connecting incarcerated people with support networks and community-based drug treatment services before release can significantly reduce post-incarceration drug use and risky behaviors. By providing continuous support from prison to community, these connections address key factors contributing to recidivism, such as housing, employment, and ongoing treatment needs [35, 36]. This strategy helps maintain progress made during incarceration and supports a smoother transition back into society. Accessing support networks or social networks, and connecting incarcerated individuals with community-based drug use treatment and support services after prison can reduce risky behaviors and their tendency to use drugs after being released. This approach can facilitate reintegration into society and reduce the likelihood of reoffending.

Limitations

We acknowledge the limitations of our study. First, it was a repeated cross-sectional study, so we could not find evidence of a temporal and causal relationship between the variables. Second, using self-report as the method of data collection can cause underestimation, and participants may not answer our questions correctly for various reasons which could result in information bias. To reduce this bias, gender-matched interviewers conducted face-to-face interviews in a private room inside the prison and we assured the participants that the questionnaires were anonymous. Third, recall bias was unavoidable because some of the questions required participants to remember

old information. To reduce this bias, the recent behaviors were assessed during the interview. Fourth, Due to the anonymous nature of the questionnaires and the absence of recorded identification by the study team, it is not possible to determine if any participants took part in the survey across multiple years.

Conclusions

We found that despite the decreasing trend of drug use inside prisons in Iran, around one out of every four incarcerated people had recently used drugs inside prison. Current prison drug programs in Iran primarily target opioid use, neglecting the prevalent issue of stimulant use. This oversight may contribute to ongoing substance use despite available OAT services. To address this gap, it is essential to incorporate comprehensive interventions for stimulant use disorders into prison mental health services. Expanding treatment options would provide more holistic support for incarcerated individuals facing various substance use challenges.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12954-024-01072-0>.

Supplementary Material 1

Acknowledgements

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Data availability

The data obtained from the survey cannot be publicly shared due to the sensitive nature of the information and the need to uphold the privacy and security of the participants.

Declarations

Ethical approval

All participants were informed about the purpose of the study and participation was completely voluntary. All participants provided verbal consent to be interviewed and tested. The study team assured the participants they would not be affected if they refused to participate. Gender-matched interviews were conducted in a private room inside the prisons. The questionnaires were anonymous and no identification was recorded in any survey. The participants were informed that they could refuse to answer any questions they wanted. There was no compensation for participating in these surveys. Only the eligible study team had access to the data, and prison staff did not have access. The Ethical Committee of Kerman University of Medical Sciences reviewed and approved the study protocol in all surveys. All methods were performed in accordance with the relevant guidelines and regulations (Reference number: K/93/207, IR.KMU.REC.1394.609).

Competing interests

The authors declare no competing interests.

Author contributions

Design and conduct of the survey: MK, AM, AAH, and HSH; Data collection: MR, MSH, SM, MKH, and HSH; Data analysis: MR, SM, and HSH; Conceptualization and supervision: AM, MK, AAH, and HSH; Writing the

original draft: MR, MK, MSH, and SM. All authors contributed to the revision of the manuscript and approved the final version of the manuscript.

Author details

¹HIV/STI Surveillance Research Center, and WHO Collaborating Center for HIV Surveillance, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

²Centre on Drug Policy Evaluation, MAP Centre for Urban Health Solutions, St. Michael's Hospital, Toronto, ON, Canada

³Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada

⁴Department of Epidemiology and Biostatistics, University of California, San Francisco, CA, USA

⁵Department of Epidemiology, New York University School of Global Public Health, New York, NY, USA

⁶Institute for Global Health Sciences, University of California, San Francisco, CA, USA

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References

1. The World Prison Brief is an online database providing free access to information on prison systems around the world. It is a unique resource, which supports evidence-based development of prison policy and practice globally. [internet]. WPB. 2018 [cited 2023 11.01]. 3. [<https://www.prisonstudies.org/#:~:text=The%20latest%20World%20Prison%20Population,of%2011.5%20million%20prisoners%20worldwide>]
2. Highest to Lowest. - Prison Population Total: world prison brief; 2023 [updated 2023]. https://www.prisonstudies.org/highest-to-lowest/prison-population-total/trackback?field_region_taxonomy_tid=All
3. Mehmandoust S, Khezri M, Mousavian G, Tavakoli F, Mehrabi F, Sharifi H, et al. Prevalence of HIV, Hepatitis B virus, and hepatitis C virus among incarcerated people in Iran: a systematic review and meta-analysis. *Public Health*. 2022;203:75–82.
4. Shahesmaeili A, Shokoohi M, Tavakoli F, Rabiee MH, Kamali K, Haghdoost AA, et al. Prevalence of Symptom-based sexually transmitted infections and related factors among incarcerated men in Iran, 2013. *Med J Islamic Repub Iran*. 2021;35:185.
5. Hosseinkhani Z, Mohammadkhanloo M, Zamanian M, Moradzadeh R, Ramezani M, Cheraghi Z, et al. Prevalence of alcohol consumption in most at-risk groups in Iran: a systematic review and meta-analysis. *J Subst Use*. 2023;28(2):135–42.
6. Zamani S, Farnia M, Torknejad A, Abbasi Alaei B, Gholizadeh M, Kasraee F, et al. Patterns of drug use and HIV-related risk behaviors among incarcerated people in a prison in Iran. *J Urb Health*. 2010;87:603–16.
7. Massoglia M, Remster B. Linkages between incarceration and health. *Public Health Rep*. 2019;134(1suppl):S8–14.
8. Rafi Bazrafshan M, Sharif F, Molazem Z, Mani A. The effect of paternal addiction on adolescent suicide attempts: a qualitative study. *Int J High Risk Behav Addict*. 2016;5(3):e22588.
9. Moradi G, Darvishi S, Asaadi L, Azimian Zavareh F, Gouya MM, Tashakorian M, et al. Patterns of Drug Use and related factors among prisoners in Iran: results from the National Survey in 2015. *J Prim Prev*. 2020;41(1):29–38.
10. Jalilian F, irzaei Alavijeh M, Amoei MR, Zinat Motlagh F, Hatamzadeh N, Allahverdiipour H. Prevalence and pattern of drug abuse among prisoners in Kermanshah City. *Iran J Health Educ Health Promotion*. 2013;1(2):41–50.
11. Day C, Nassirimanesh B, Shakeshaft A, Dolan K. Patterns of drug use among a sample of drug users and injecting drug users attending a General Practice in Iran. *Harm Reduct J*. 2006;3:1–5.
12. Moradi G, Jafari S, Zarei B, Mahboobi M, Zavareh FA, Molaeipoor L et al. Prevalence and risk factors for hepatitis B and hepatitis C exposure in Iranian prisoners: a national study in 2016. *Hepat Monthly*. 2019;19(7).
13. Hamzeh B, Najafi F, Heydarpour F, Moradinazar M, Moradinazar Z. The main factors affecting the tendency for Injection Drug Use. *Int J High Risk Behav Addict*. 2018;7(3):e12646.
14. Ekhtiari H, Noroozi A, Farhoudian A, Radfar SR, Hajebi A, Sefatian S, et al. The evolution of addiction treatment and harm reduction programs in Iran: a chaotic response or a synergistic diversity? *Addiction*. 2020;115(7):1395–403.

15. SeyedAlinaghi S, Taj L, Mazaheri-Tehrani E, Ahsani-Nasab S, Abedinzadeh N, McFarland W, et al. HIV in Iran: onset, responses, and future directions. *AIDS*. 2021;35(4):529–42.
16. Mehrabi F, Mehmandoost S, Khezri M, Mousavian G, Tavakoli F, Fathi HR, et al. Drug use and unsafe injection among adults who live in prisons in Iran: a systematic review and meta-analysis. *Drugs: Educ Prev Policy*. 2024;31(2):179–88.
17. Moradi G, Gouya MM, Azimizan Zavareh F, Mohamadi Bolbanabad A, Darvishi S, Aghasadeghi MR, et al. Prevalence and risk factors for HBV and HCV in prisoners in Iran: a national bio-behavioural surveillance survey in 2015. *Tropical Med Int Health*. 2018;23(6):641–9.
18. Narenjiha H, Rafiee H, Baghestani A, Nouri R, Ghafouri B, Soleimaninia L. Rapid situation assessment of drug abuse in Iran (year 2007). Tehran: Danjeh Publication; 2009.
19. Shahesmaeili A, Karamouzian M, Tavakoli F, Shokoohi M, Mirzazadeh A, Hosseini-Hooshyar S, et al. HIV prevalence and continuum of care among incarcerated people in Iran from 2010 to 2017. *Harm Reduct J*. 2022;19(1):93.
20. Navadeh S, Mirzazadeh A, Gouya MM, Farnia M, Alasvand R, Haghdoost A-A. HIV prevalence and related risk behaviours among prisoners in Iran: results of the national biobehavioural survey, 2009. *Sex Transm Infect*. 2013;89(Suppl 3):iii33–6.
21. Dohoo IR, Martin SW, Stryhn H. *Methods in epidemiologic research* Charlotte-town. P.E.I.: VER, Inc.; 2012.
22. Sánchez FC, Fearn N, Vaughn MG. Prevalence and correlates of in-prison substance use among incarcerated women in Spain. *J Ethn Subst Abuse*. 2018;17(3):356–74.
23. Norman C. A global review of prison drug smuggling routes and trends in the usage of drugs in prisons. *WIREs Forensic Sci*. 2023;5(2):e1473.
24. Lintonen TP, Vartiainen H, Aarnio J, Hakamäki S, Viitanen P, Wuolijoki T, Joukamaa M. Drug use among prisoners: by any definition, it's a big problem. *Subst Use Misuse*. 2011;46(4):440–51.
25. Mohseni F, Moghimi Khorasani E, Nadi Ghara AA, Rafeiee R. Arrestees substance abuse: moving toward Rehabilitation camps or prisons. *Iran Rehabilitation J*. 2020;18(1):65–72.
26. Amin-Esmaeili M, Rahimi-Movaghar A, Sharifi V, Hajebi A, Radgoodarzi R, Mojtabei R, et al. Epidemiology of illicit drug use disorders in Iran: prevalence, correlates, comorbidity and service utilization results from the Iranian Mental Health Survey. *Addiction*. 2016;111(10):1836–47.
27. Crepault J-F, Russell C, Watson TM, Strike C, Bonato S, Rehm J. What is a public health approach to substance use? A qualitative systematic review and thematic synthesis. *Int J Drug Policy*. 2023;112:103958.
28. Alam-Mehrjerdi Z, Abdollahi M, Higgs P, Dolan K. Drug use treatment and harm reduction programs in Iran: a unique model of health in the most populated Persian Gulf country. *Asian J Psychiatry*. 2015;16:78–83.
29. Amiri Z, Mirzaee B, Sabet M. Evaluating the efficacy of regulated 12-Session Matrix Model in reducing susceptibility in methamphetamine-dependent individuals. *Int J Med Res Health Sci*. 2016;5(2):77–85.
30. Ronsley C, Nolan S, Knight R, Hayashi K, Klimas J, Walley A, et al. Treatment of stimulant use disorder: a systematic review of reviews. *PLoS ONE*. 2020;15(6):e0234809.
31. Fahmy C. First weeks out: social support stability and health among formerly incarcerated men. *Soc Sci Med*. 2021;282:114141.
32. Kazi AM, Shah SA, Jenkins CA, Shepherd BE, Vermund SH. Risk factors and prevalence of tuberculosis, human immunodeficiency virus, syphilis, hepatitis B virus, and hepatitis C virus among prisoners in Pakistan. *Int J Infect Dis*. 2010;14:e60–6.
33. Boys A, Farrell M, Bebbington P, Brugha T, Coid J, Jenkins R, et al. Drug use and initiation in prison: results from a national prison survey in England and Wales. *Addiction*. 2002;97(12):1551–60.
34. Nikfarjam A, Shokoohi M, Shahesmaeili A, Haghdoost AA, Baneshi MR, Hajj-Maghsoudi S, et al. National population size estimation of illicit drug users through the network scale-up method in 2013 in Iran. *Int J Drug Policy*. 2016;31:147–52.
35. Håkansson A, Berglund M. Risk factors for criminal recidivism—a prospective follow-up study in prisoners with substance abuse. *BMC Psychiatry*. 2012;12:1–8.
36. Yukhnenko D, Blackwood N, Fazel S. Risk factors for recidivism in individuals receiving community sentences: a systematic review and meta-analysis. *CNS Spectr*. 2020;25(2):252–63.

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