



# The Identification of Sociodemographic Characteristics and Substance Use Trends Among Individuals with Heroin Addiction in Herzegovina

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## ABSTRACT

**Background:** This study aimed to determine the demographic and substance use trends among heroin addicts in Herzegovina.

**Methods:** Data were analyzed regarding gender, age, and educational attainment, as well as types of psychoactive substances used, reasons for initiating substance use, and transition methods between substances, in addition to the type of substitution therapy, and achievement of abstinence<sup>3</sup> with its usage. The sample consisted of 127 participants.

**Main findings:** Most treated individuals were men, typically initiating psychoactive substance use in adolescence. Heroin was the primary drug of addiction, while tetrahydrocannabinol (THC) was commonly reported as a secondary substance. Intravenous use was frequent and often associated with equipment sharing. Hepatitis C was prevalent among users, with limited vaccination against hepatitis B. Methadone was the predominant substitution therapy. Among those with available outcome data, approximately three quarters achieved abstinence during treatment.

**Principal conclusion:** Individuals treated for heroin addiction in Herzegovina are predominantly male with adolescent-onset substance use, frequent intravenous administration, and substantial infectious-disease burden. Comprehensive strategies – prevention in early adolescence, robust harm reduction, and sustained substitution therapy with psychosocial support – are essential to improve outcomes.

**Key words:** sociodemographic characteristics, substance use, heroin addiction, Herzegovina

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## INTRODUCTION

According to the World Health Organization (WHO), psychoactive substances are defined as chemical agents that, upon consumption, alter mental processes (1). By the mid-20th century, substance addiction had become a widespread social problem in Western countries (2). Substance dependence is defined as a psychological and often physical condition resulting from the use of psychoactive substances. It is characterized by a compulsion to use substances to experience their psychological effects or to avoid withdrawal symptoms that occur in their absence (3). The International Classification of Diseases, 10th Revision (ICD-10), identifies the harmful use of psychoactive substances as a pattern of consumption that results in health impairment, whether physical or mental. Dependence syndrome is described as a cluster of behavioral, cognitive, and physiological phenomena that develop after repeated substance use, and is marked by a strong desire to take the substance, impaired control over its use, and persistence despite harmful consequences (4).

Heroin remains the most commonly used and abused opioid. It induces strong physical and psychological dependence, and with continued use, tolerance develops. Upon cessation, users often experience a withdrawal crisis characterized by symptoms such as muscle pain, fever, sweating, nausea, vomiting, diarrhea, and abdominal cramps (5, 6). Opioid use is associated with severe consequences, including addiction, psychosocial deterioration, increased risk of HIV infection and viral hepatitis, exacerbation of pre-existing psychiatric conditions, and a high risk of overdose and death (7).

According to WHO data from 2019, 5.5% of the global population aged 15–64 reported using a psychoactive substance in the past year. In 2017, approximately 585,000 deaths were attributed to psychoactive substance use. Opioid use remains a major global concern,

with an estimated 29 million users in 2017 (8). In the European Union alone, there were approximately 5,800 overdose deaths in 2020, equating to a mortality rate of 16.7 per million adults. The median age of overdose fatalities was 41 years, with 9% of deaths occurring in individuals under the age of 25. Among those in treatment, psychoactive substance use decreased from 35% in 2013 to 22% in 2020 (9). Adolescence is considered the most vulnerable period for initiating psychoactive substance use (10, 11). Early exposure, particularly in childhood before the age of 10, has been associated with long-term developmental and health consequences (12, 13). Key risk factors include the availability of psychoactive substances, media influence, and sociodemographic variables (age, gender, mental health status, sexual orientation, and family socioeconomic status), as well as individual psychological vulnerabilities (14–17).

Poor mental health, social isolation, and insomnia are commonly linked to increased substance use. A lack of coping mechanisms and the presence of depressive symptoms can drive adolescents toward psychoactive substance use (14, 15). Sexual minorities report higher rates of substance use, likely as a response to stigma, discrimination, harassment, and social stressors (15, 16).

The relationship between socioeconomic status and substance use is complex. Adolescents from middle- and high-income families may have greater financial access to substances, while those from low-income families may experience stressors such as academic challenges and mental health issues that also contribute to substance use (14, 15).

Treatment for opioid addiction is time-intensive, complex, and frequently accompanied by relapses. Successful outcomes often require not only professional intervention but also the active participation of family members (5). The primary goal of treatment is not a cure but rather the

management of a chronic condition – aiming to reduce mortality risk, improves mental health, and restores social functioning (18).

Methadone remains the most widely used medication in heroin addiction treatment. As a long-acting opioid agonist, it effectively alleviates withdrawal symptoms with once-daily dosing, enabling individuals to re-engage in healthy activities and interests (18). Psychosocial interventions are an essential component of addiction treatment; however, in the absence of substitution therapy, their effectiveness is significantly limited (19–21).

## PARTICIPANTS AND METHODS

### Participants

Information was obtained using the Pompidou form, a standardized questionnaire completed for each individual presenting for treatment in the Center for Prevention and Outpatient Treatment of Addiction in Mostar. The final sample consisted of 127 participants.

### Methods

This cross-sectional study was conducted in the Center for Prevention and Outpatient Treatment of Addiction in Mostar. Existing data in the center collected until August 2023 were analyzed and included patients undergoing substitution therapy.

### Statistical analysis

Descriptive statistics for continuous variables are presented as medians with interquartile ranges, and as means with standard deviations. Categorical data are provided as frequencies and percentages. The Chi-square test was employed to analyze nominal and ordinal variables, while differences in continuous variables were assessed using the independent samples t-test. A p-value of less than 0.05 was considered statistically significant. Statistical analyses were performed using SPSS for Windows (version 20.0; SPSS Inc., Chicago, IL, USA).

## RESULTS

A total of 127 individuals undergoing substitution therapy were included in the analysis. The majority of participants were male and in mid-adulthood at the time of assessment, suggesting that heroin addiction in this region typically represents a chronic condition that begins in adolescence and persists for years before treatment is sought. Most participants resided in urban environments and lived with their primary family members, indicating a continued reliance on familial support structures. However, unemployment and unstable work arrangements were prevalent, reflecting the social and economic instability frequently associated with long-standing substance addiction (Table 1).

The majority of participants came from families of average socioeconomic status, most commonly from households with two or three children. The distribution of birth order suggested no clear protective role associated with being the first or subsequent child, implying that broader psychosocial conditions were more influential in the development of substance use patterns (Table 2).

Tetrahydrocannabinol (THC) was the most frequently reported initial substance, followed by the later transition to heroin use. This progression aligns with the commonly observed pattern of early experimentation with more accessible substances prior to the initiation of opioid use. The decision to first experiment with psychoactive substances was most often associated with peer and social influences, curiosity, and the pursuit of pleasurable experiences, while emotional and family difficulties were less frequently cited but remained notable contributing factors (Table 3). Intravenous administration was the predominant route of heroin use among participants. Consistent with this, there was a high prevalence of hepatitis C infection and limited hepatitis B vaccination coverage.

Table 1. Distribution of participants according to basic sociodemographic characteristics

<i>Variable</i>	<i>f</i>	<i>%</i>
<b>Who does the user live with?</b>		
Alone	17	13.4
With primary family	76	59.8
Alone with child	20	15.7
With partner	3	2.4
With partner and child	7	5.5
With friends	1	0.8
Other	1	0.8
Unknown	2	1.6
<b>Coexistence with other users</b>		
Yes	16	12.6
No	109	85.8
Unknown	2	1.6
<b>Marital status</b>		
Married	34	26.8
Single	71	55.9
Divorced	16	12.6
Common-law union	5	3.9
Unknown	1	0.8
<b>Children</b>		
Yes	43	33.9
No	83	65.4
Unknown	1	0.8
<b>Living in the city</b>		
Yes	96	75.6
No	29	22.8
Unknown	2	1.6
<b>Working status</b>		
Full-time job	33	26
Unemployed	56	44.1
Casual job	20	15.7
Pensioner	12	9.4
Self-employed	5	3.9
Unknown	1	0.8
<b>Education level</b>		
Unfinished elementary school	3	2.4
Elementary school	12	9.4
Unfinished high school	10	7.9
High school	94	74
University degree	3	2.4
Master's degree	4	3.1
Unknown	1	0.8

Only a relatively small number of individuals with hepatitis C were receiving antiviral treatment at the time of assessment, highlighting gaps between diagnosis and linkage to care (Table 4).

Methadone was the most widely used substitution treatment within the cohort, while buprenorphine or buprenorphine/naloxone were prescribed less frequently. Among

patients with documented treatment outcomes, a substantial proportion achieved abstinence during the course of substitution therapy, emphasizing the importance of continuity and adherence in achieving positive clinical outcomes.

Table 2. Distribution of participants according to basic sociodemographic characteristics of the primary family

<i>Variable</i>	<i>f</i>	<i>%</i>
<b>Parental status</b>		
Married	52	40.9
Divorced	11	8.7
Beneficiary is an illegitimate child	1	0.8
Widower	16	12.6
Widow	36	28.3
Both parents deceased	10	7.9
Unknown	1	0.8
<b>Number of children in the family</b>		
1	16	12.6
2	56	44.1
3	32	25.2
4 and more	21	16.5
Unknown	2	1.6
<b>Parents' financial status</b>		
Above average	2	1.5
Average	83	65.4
Below average	41	32.3
Unknown	1	0.8
<b>Child according to birth order</b>		
1st	48	37.8
2nd	51	40.2
3rd	19	14.9
4th	7	5.5
5th	1	0.8
Unknown	1	0.8

## DISCUSSION

This study confirms the predominantly male representation among individuals undergoing treatment for heroin addiction, with initiation of substance use commonly occurring during adolescence. The high prevalence of THC as the first substance used supports the concept of a gradual progression from readily accessible substances toward opioids.

Table 3. Characteristics of the first use of psychoactive substances and circumstances of their detection among participants

	<i>n</i>	%	$\chi^2$	<i>p</i>
<b>First using substance</b>			313.276	< <b>0.001</b>
Alcohol	9	7.1		
Cocaine	3	2.3		
THC	105	82.7		
Heroin	8	6.3		
Unknown	2	1.6		
<b>Reason for starting to experiment with drugs</b>			72.624	< <b>0.001</b>
Desire for self-affirmation	30	8.8		
Peer or partner influence	69	20.3		
Family problems	31	9.1		
School problems	3	0.9		
Psychological reasons (depression, neurosis, youthful insecurity)	29	8.5		
Boredom	40	11.8		
Fun	54	15.9		
Curiosity	48	14.1		
Ignorance of harmful consequences	36	10.6		
Referring person/center			210.748	< <b>0.001</b>
Personal	77	60.6		
Family	31	24.4		
Friends	16	12.6		
Other addiction treatment center	1	0.8		
Doctor in primary health care	1	0.8		
Unknown	1	0.8		
<b>Who was the first to know about addiction?</b>				
Police/law enforcement	5	3.9		
Family member	97	76.4		
Health care professional	1	0.8		
Someone else – friend/acquaintance	9	7.1		
Other	6	4.7		
Unknown	9	7.1		
<b>How long did it take for your parents to find out about your first drug use?</b>			56.065	< <b>0.001</b>
Within the first year	26	(20.5)		
After 1 year	6	(4.7)		
After 2–3 years	28	(22)		
After 4 years or more	53	(41.7)		
Parents don't know	10	(7.9)		
Other (parents deceased, parents unknown)	2	(1.6)		
Unknown	2	(1.6)		
<b>Duration of regular drug intake</b>			54.936	< <b>0.001</b>
0–1 year	33	(26)		
2–5 years	63	(49.6)		
6–10 years	23	(18.1)		
11 and over years	6	(4.7)		
Unknown	2	(1.6)		

Table 4. Distribution of respondents with regard to hepatitis B and C

<i>Variable</i>	<i>n</i>	<i>%</i>	$\chi^2$	<i>p</i>
<b>Hepatitis B</b>			278.008	<b>&lt;0.001</b>
Test negative	113	89		
Test positive	5	3.9		
Not tested	1	0.8		
Unknown	8	6.3		
<b>Hepatitis C</b>			5.541	<b>0.019</b>
Test negative	48	37.8		
Test positive	74	58.3		
Not tested	2	1.6		
Unknown	3	2.4		
<b>Hepatitis vaccination</b>			62	<b>&lt;0.001</b>
Yes	4	3.1		
No	76	59.8		
Unknown	47	37		
<b>Hepatitis treated</b>			66.205	<b>&lt;0.001</b>
Yes	27	21.3		
No	85	66.9		
Unknown	15	11.8		

However, this progression is shaped not only by pharmacological factors, but also by social and developmental influences. Adolescents exposed to permissive peer environments, reduced parental supervision, emotional distress, or community-level normalization of substance use are at increased risk of later heroin dependence. Although most participants continued to live with their families, the delay between the onset of substance use and the family's awareness of the addiction highlights the concealed nature of early drug experimentation. This underscores the need for strengthened family-based education and early detection programs,

particularly within school and community health settings (10, 14, 15). The high prevalence of intravenous drug use and hepatitis C infection reflects the ongoing public health burden associated with opioid addiction (9). Limited hepatitis B vaccination coverage indicates missed opportunities for prevention, while low rates of antiviral treatment among hepatitis C-positive individuals suggest barriers to care continuity, including stigma, fragmented services, and logistical access issues. These findings support the expansion of harm-reduction strategies, including structured needle and syringe programs, systematic hepatitis B vaccination protocols, increased testing, and facilitated referral pathways to antiviral therapy (10).

Methadone maintenance therapy demonstrated positive treatment outcomes in patients who maintained regular adherence. Pharmacological stabilization through substitution therapy reduces the physiological drive to seek heroin, but long-term recovery requires integrated psychosocial support. This includes psychological counseling, family support interventions, relapse prevention strategies, and vocational rehabilitation efforts (5, 19). The high prevalence of unemployment highlights the importance of addressing socioeconomic reintegration (21). In the broader context, addiction must be addressed not solely as a medical condition but as a chronic biopsychosocial disorder.

Table 5. Types of mental disorders in family members of beneficiaries

<b>Mental disorder</b>	<b>Father</b>	<b>Mother</b>	<b>Brother/Sister</b>	<b>Cousin</b>
	<i>f (%)</i>	<i>f (%)</i>	<i>f (%)</i>	<i>f (%)</i>
Alcoholism	25 (19.7)	1 (0.8)	2 (1.7)	11 (8.8)
Other addiction	2 (1.6)	-	8 (6.7)	16 (12.8)
Psychosis	2 (1.6)	1 (0.8)	-	2 (1.6)
Psychoneurosis	3 (2.4)	1 (0.8)	-	-
Depression	2 (1.6)	3 (2.4)	1 (0.8)	1 (0.8)
Suicide/suicide attempt	4 (3.1)	1 (0.8)	-	2 (1.6)
Other	-	-	-	1 (0.8)
None	83 (65.4)	115 (90.6)	96 (80.7)	84 (67.2)
No siblings/relatives	-	-	8 (6.7)	2 (1.6)
Unknown	6 (4.7)	5 (3.9)	4 (3.4)	6 (4.8)

Table 6. Examination of differences in the age of first use of the main, secondary and first PAT, first IV use and age at first presentation to the center with regard to psychiatric heredity

	<i>Psychiatric heredity</i>				t	p
	Yes		No			
	$\bar{X}$	SD	$\bar{X}$	SD		
Age at first presentation to the center	32.429	7.5	31.019	8.48	0.924	0.357
Age at first taking the main drug	22.161	6.176	22.444	6.291	0.239	0.812
Age of first use of adjuvant drug	17.019	3.622	17	3.651	0.026	0.979
Age at first use of the drug	16.786	3.908	17.434	4.149	0.851	0.397
Age of first IV drug administration	23.382	5.747	23.633	8.508	0.140	0.889

### Strengths and limitations

The strengths of this study include the use of standardized intake instruments and comprehensive characterization across both clinical and social domains. A key contextual strength is that the center serves as the primary treatment facility for opioid dependence in the wider Herzegovina region, allowing the findings to reflect real-world clinical patterns across a broad catchment population.

However, several limitations should be acknowledged. The retrospective study design restricts the ability to infer causal relationships, and the modest sample size limits the precision of subgroup analyses. In addition, incomplete testing and treatment documentation for infectious diseases, along with missing longitudinal outcome data for a subset of patients, may introduce information bias and constrain evaluation of long-term treatment trajectories.

### Implications and future directions

Early, school-linked prevention and broader family-focused education efforts are needed to reduce delays in the detection of substance use among adolescents. Scaled harm reduction and vaccination initiatives should be prioritized to address preventable infectious complications. Future research should incorporate multicenter prospective cohorts, enhanced linkage with infectious-disease registries, and standardized outcome measures to evaluate long-term treatment effectiveness and relapse patterns.

Strengthening intersectoral collaboration between addiction treatment services, mental health programs, and employment support systems will be essential to improving recovery outcomes.

### CONCLUSION

Individuals treated for heroin addiction in Herzegovina are predominantly male with adolescent-onset substance use, frequent intravenous administration, and substantial infectious-disease burden. Comprehensive strategies – prevention in early adolescence, robust harm reduction, and sustained substitution therapy with psychosocial support – are essential to improve outcomes.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

### AUTHORS' CONTRIBUTIONS

Marina Berberovic: contribution to study conception and design. Ivan Vasilj: supervision. Marina Berberovic: writing of the paper, critical revision of the paper. Tanja Zovko: interpretation of data. Sanjin Lovric: acquisition of data. Danijela Karaban: literature review. Igor Karaban: assistance in writing the paper. Marina Curlin: acquisition of data.

### ETHICAL BACKGROUND

**Institutional review board statement:** The study was conducted according to the guidelines of the Declaration

of Helsinki, and approved by the Ethics Committee of the Center for Prevention and Outpatient Treatment of Addictions Mostar.

**Informed consent statement:** Informed consent was obtained from all subjects involved in the study.

**Data availability statement:** We deny any restrictions on the availability of data, materials, and associated protocols.

## REFERENCES

1. World Health Organization. Terminology [Internet]. Available from: <https://www.who.int/teams/mental-health-and-substance-use/alcohol-drugs-and-addictive-behaviours/terminology>. Accessed March 28, 2024.
2. Sakoman S, Raboteg-Šarić Z, Kuzman M. Prevalence of substance abuse among Croatian high school students. *Društvena istraživanja*. 2002;11:311-34.
3. Medić A, Dželalija B. Epidemiological characteristics of intravenous drug addicts in Zadar County. *Medica Jadertina*. 2006;36:13-21.
4. International Classification of Diseases and Related Health Conditions, 10th Revision [Internet]. Available from: <https://mediately.co/hr/icd>. Accessed March 29, 2024.
5. Babić D, et al. Psychoactive substances: mental and behavioral disorders caused by the use of psychoactive substances. Mostar: Sveučilište u Mostaru; 2016.
6. Milella MS, D'Ottavio G, De Pirro S, Barra M, Caprioli D, Badiani A. Heroin and its metabolites: relevance to heroin use disorder. *Transl Psychiatry*. 2023;8:13:120.
7. Sharma B, Bruner A, Barnett G, Fishman M. Opioid use disorders. *Child Adolesc Psychiatr Clin N Am*. 2016;25:473-87.
8. The United Nations Office on Drugs and Crime. *World Drug Report 2019*. New York: United Nations; 2019.
9. Hrvatski zavod za javno zdravstvo. European report on drugs 2022 [Internet]. Available from: <https://www.hzjz.hr/aktualnosti/objavljeno-europsko-izvjesce-o-drogama-2022/>.
10. Škrtić M. Sociodemographic and epidemiological characteristics of drug addicts in Primorje-Gorski Kotar County [Internet]. Rijeka: Sveučilište u Rijeci, Fakultet zdravstvenih studija; 2018. Available from: <https://urn.nsk.hr/urn:nbn:hr:184:826665>.
11. Sakoman S. Uloga obitelji u razvoju ovisničkih ponašanja. *Medicus*. 2009;18:193-204.
12. Aly SM, Omran A, Gaulier JM, Allorge D. Substance abuse among children. *Arch Pediatr*. 2020;27:480-4.
13. Hočevar A. What can schools do in the area of preventing drug use and abuse in children and young people? *Hrvatska revija za rehabilitacijska istraživanja*. 2008;44:65-76.
14. Nawi AM, Ismail R, Ibrahim F, Hassan MR, Manaf MRA, Amit N, et al. Risk and protective factors of drug abuse among adolescents: a systematic review. *BMC Public Health*. 2021;13;21:2088.
15. Čerpinko E. Consumption of psychoactive substances in adolescence [Internet]. Zagreb: Sveučilište u Zagrebu, Pravni fakultet; 2023. Available from: <https://urn.nsk.hr/urn:nbn:hr:199:055135>.
16. Hatzenbuehler ML, Jun HJ, Corliss HL, Bryn Austin S. Structural stigma and sexual orientation disparities in adolescent drug use. *Addict Behav*. 2015;46:14-18.
17. Morales BN, Plazas M, Sanchez R, Ventura CA. Factores de riesgo y de protección relacionados con el consumo de sustancias psicoactivas en estudiantes de enfermería. *Rev Lat Am Enfermagem*. 2011;19:673-83.
18. Bell J. Pharmacological maintenance treatments of opiate addiction. *Br J Clin Pharmacol*. 2014;77:253-63.
19. Bart G. Maintenance medication for opiate addiction: the foundation of recovery. *J Addict Dis*. 2012;31:207-25.
20. Ruíz Ruíz JJ, Martínez Delgado JM, García-Marchena N; ANDOPIO Study Group. Evaluation of functional status among patients undergoing maintenance treatments for opioid use disorders. *Harm Reduct J*. 2021;13;18:41.
21. World Health Organization. Guidelines for the Psychosocially Assisted Pharmacological Treatment of Opioid Dependence [Internet]. Geneva: WHO; 2009 [cited February 11, 2025]. Available from: [https://apps.who.int/iris/bitstream/handle/10665/43948/9789241547543\\_eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/43948/9789241547543_eng.pdf).