
Interest in HIV pre-exposure prophylaxis use and associated factors among people who inject drugs in Iran: a nationwide survey in 2023

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1 **Interest in HIV pre-exposure prophylaxis use and associated factors**
2 **among people who inject drugs in Iran: a nationwide survey in 2023**

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29 **Abstract**30 **Background:** Despite the effectiveness of pre-exposure prophylaxis (PrEP) in
31 reducing HIV incidence, this intervention is inaccessible in Iran.32 **Methods:** We examined the interest in using PrEP and associated
33 factors among people who inject drugs (PWID) in 2023 using data from 2,174
34 PWID. The main outcome was interest in using PrEP, which was divided into
35 three categories: interest in using PrEP under any circumstances, interest in
36 using PrEP if provided for free, and no interest in using PrEP.37 **Results:** We found that 37.9% of PWID were interested in using PrEP under
38 any circumstances, 48.3% were interested in using PrEP if provided for free,
39 and 13.8% were not interested in using PrEP. Additionally, only 7.7% of
40 participants reported awareness of PrEP. Having high school or more
41 education (adjusted relative risk ratios [ARRR]: 1.92; 95% confidence interval
42 [CI]: 1.42, 2.61), having access to opioid agonist treatment (OAT) in the last
43 six months (ARRR: 1.59; 1.13, 2.25), and having sufficient HIV knowledge
44 (ARRR: 2.87; 2.03, 4.06) were positively associated with interest in using
45 PrEP under any circumstances. Similarly, having high school or more
46 education (ARRR: 1.50; 1.10, 2.04), having access to OAT in the last six
47 months (ARRR: 2.63; 1.88, 3.67), and having sufficient HIV knowledge
48 (ARRR: 4.53; 3.23, 6.37) were associated with interest in using PrEP if
49 provided for free. Health insurance was negatively associated with interest

50 in using PrEP under any circumstances (ARRR: 0.64; 0.47, 0.87) and with
51 interest in using PrEP if provided for free (ARRR: 0.33; 0.23, 0.45).

52 **Conclusion:** The findings show a strong potential for PrEP acceptance,
53 indicating that addressing financial and logistical barriers to free PrEP access
54 could greatly reduce HIV among PWID.

55 **Keywords:** Pre-exposure prophylaxis; Harm reduction; People who inject
56 drugs; HIV infection, Iran.

57 **Introduction**

58 Pre-exposure prophylaxis (PrEP) has emerged as a significant HIV prevention
59 strategy that has become a central part of national HIV elimination programs
60 in recent years (1, 2). Initially approved by the US Food and Drug
61 Administration in 2012 for HIV-negative adults at high risk of HIV, it has
62 demonstrated 99% effectiveness in preventing HIV transmission when taken
63 consistently daily (3). This result led the World Health Organization (WHO)
64 to publish guidelines advocating that pre-exposure prophylaxis (PrEP) be
65 included as part of a combined prevention strategy for people with high HIV
66 risk (4). While oral formulations are well-established, PrEP alternatives are
67 continually evolving. Long-acting injectable method may enhance adherence
68 and increase the effectiveness of PrEP (5). Furthermore, the WHO
69 emphasizes the importance of integrating PrEP as part of a comprehensive
70 approach that encompasses routine HIV testing, counseling, and the
71 promotion of safer sexual practices. This comprehensive approach aims to

72 reduce the stigma linked to HIV prevention strategies and to motivate a more
73 significant number of at-risk individuals to consider PrEP as a suitable
74 preventive method (6).

75 The HIV epidemic in Iran is concentrated in certain groups, including people
76 who inject drugs (PWID) (7). According to the latest reports, injection drug
77 use remains one of the main ways HIV is transmitted in Iran (7, 8). Despite
78 the implementation of traditional strategies such as condom use, the
79 reduction of high-risk sexual behaviors, and the use of safe needles to prevent
80 HIV transmission, these interventions have not been sufficient to prevent HIV
81 in the Iranian context (9) and in some other contexts (10). Opiates and
82 stimulants are the initial substances injected by PWID in Iran (11). Needle
83 and syringe programs (NSPs) and opiate substitution therapy are the primary
84 components of harm reduction programs among PWID in Iran (12, 13).
85 However, studies show that the use of harm reduction programs is still
86 insufficient (14), and service availability varies significantly by area (13).
87 Additionally, the recent study estimated that the prevalence of HIV among
88 PWID in Iran is about 3.5% (15). Biomedical prevention is an additional
89 approach, with one of the most effective recent interventions being PrEP (16,
90 17). PrEP is an antiretroviral medication given to HIV-negative individuals at
91 risk of HIV infection. When taken regularly, PrEP is a cost-effective and highly
92 effective intervention of preventing HIV among key populations (18-20).

93 Although many countries have approved the use of PrEP among key
94 populations, including PWID (21-24), awareness and interest in using PrEP

95 among this group are still low (25, 26). Furthermore, systematic reviews and
96 meta-analyses focusing on key populations have shown that PWID have the
97 lowest use of PrEP in comparison to other key populations, including men
98 who have sex with men (MSM) and transgender women (27). The available
99 evidence indicates that insufficient knowledge and the lack of perceived risk
100 of HIV transmission can constitute obstacles for PWID to uptake PrEP (25,
101 28). Other factors that can increase interest in using PrEP include access to
102 health services and reducing stigma towards PrEP (26, 29) Limited studies
103 assessed the awareness and interest in using PrEP for HIV prevention among
104 PWIDs in lower and middle-income countries. Moreover, PrEP is not yet used
105 as part of the HIV national prevention strategy in Iran. Before conducting this
106 intervention among PWID, it is important to understand the interest in using
107 PrEP among PWID. The insufficient research conducted within the local
108 context results in a knowledge gap in understanding effective strategies for
109 starting PrEP among PWID. Consequently, this study reports on the interest
110 in using PrEP among PWIDs in Iran.

111 **Methods and Materials**

112 ***Study Design and Sampling***

113 This analysis utilized information from the fifth national biobehavioral
114 surveillance survey of Iranian PWID, conducted in 14 major cities: Sari
115 (north), Tehran (central north), Robat-Karim (central north), Shahriar(central
116 north), Eslamshahr (central north), Karaj (central north), Tabriz (northwest),

117 Mashhad (northeast), Yazd (central), Kermanshah (west), Khorramabad
118 (west), Dorud (west), Shiraz (south), Ahvaz (southwest), Kerman (southeast),
119 Zahedan (southeast) and Saravan (southeast) across diverse regions.
120 Eligibility criteria included individuals who were 18 years old or older, had
121 reported using at least one injection drug in the previous 12 months, and had
122 a valid referral coupon following the study's protocol except for seeds.
123 Additionally, participants who self-reported as HIV-negative at screening and
124 whose HIV test was negative were recruited for this study. Individuals were
125 recruited using respondent-driven sampling (RDS) between May and August
126 2023. RDS is a recruitment method that uses long-chain peer referrals to
127 identify and recruit a diverse representation of PWID (30). The recruitment
128 process began by selecting three seeds using a non-random method, with
129 each seed given three referral coupons and trained on how to use them to
130 recruit up to three peers. For all participating cities except Tehran,
131 recruitment was conducted at only one study site. In Tehran, due to the high
132 population, recruitment was conducted across three geographically separate
133 sites, with three seeds initiating the process at each site. The final sample
134 size for each city was determined based on its population proportion, with
135 larger samples allocated to cities with bigger populations. Participants were
136 compensated with 1.5 USD for their participation, followed by three coupons
137 to distribute to their peers for recruitment. An additional 1 USD was provided
138 to participants for each redeemed coupon. This procedure was repeated until
139 the desired sample size was achieved.

140 ***Data Collection***

141 Data collection for this study was conducted over four months, from May
142 2023 to August 2023. All interviews were conducted face-to-face using a
143 standard questionnaire by a gender-matched interviewer in a private room.
144 The questionnaire was in Farsi and included sections on sociodemographic
145 data, history of incarceration, sexual behaviors, HIV status, drug use and
146 injection practices, mental health, and access to harm reduction services,
147 including their interest in using HIV PrEP. After the interviews, participants
148 underwent a brief HIV counseling session and had a whole-blood sample
149 collected via finger-stick by a certified nurse counselor. HIV testing was
150 conducted using the SD-Bioline rapid tests from South Korea; if reactive, the
151 Unigold HIV rapid test was used to confirm the result.

152 ***Study Variables***

153 A brief description of PrEP was provided to participants, followed by
154 questions on their interest in using PrEP. This briefing defined PrEP as an
155 HIV prevention strategy, explained that it is available in long-acting
156 injectable, daily oral, and other forms, summarized its effectiveness, and
157 highlighted the importance of continuous adherence to all available
158 formulations. The main outcome of the study included interest in the use of
159 HIV PrEP. Participants were asked about their awareness of PrEP. If they
160 were unfamiliar with it, they were given a brief overview of PrEP before being
161 asked if they would be interested. They were asked a specific question: "Are

162 you interested in the use of HIV PrEP, if it is available?" With response
163 options "interest in using PrEP under any circumstances," interest in using
164 PrEP if provided for free, and "no interest in using PrEP." No interest in using
165 PrEP was considered the reference group. Only individuals who self-reported
166 as HIV-negative during screening were asked about their interest in using
167 PrEP.

168 Covariates of interest included a range of sociodemographic variables, age at
169 interview (< 30 vs. \geq 30 years old), sex (male vs. female), marital status
170 (currently married vs. single/divorced/widowed), educational level (less than
171 high school vs. high school or more), employment status (unemployed, having
172 a temporary job vs. having a permanent job), having health insurance (yes vs.
173 no), history of homelessness in 12 months (yes vs. no), sex partner (main
174 partners vs. causal partner), lifetime arrest/incarceration (yes vs. no), history
175 of condomless sex with casual partners in last 6 months (yes vs. no), age at
176 first drug use (< 18 vs. \geq 18), receptive needle/syringe sharing in last 6
177 months (yes vs. no), last 6-month daily injection (yes vs. no), last 3-month non-
178 fatal overdose (yes vs. no), last 3-month primary drug injected (opioids vs.
179 stimulants), last 6-month access to opioid agonist therapy (OAT) (yes vs. no),
180 Lifetime experience of HIV test (yes vs. no), HIV knowledge (insufficient vs.
181 sufficient), and aware of PrEP (yes vs. no). Receptive needle/syringe sharing
182 in the past six months was defined as self-reporting the use of a needle or
183 syringe that had previously been used by another person within the six
184 months prior to the survey. The HIV knowledge was assessed using a

185 standard questionnaire with eight questions (31). Sufficient knowledge was
186 considered to answer all ten questions correctly.

187 ***Statistical Analysis***

188 Descriptive statistics were employed to compare the characteristics of
189 participants stratified by interest in the use of HIV PrEP. The descriptive
190 statistics, including the prevalence estimates shown in Table 1, are based on
191 RDS-weighted data derived with the RDS-II estimator using RDS-A software
192 version 0.42 (32). The RDS-II estimator was used to calculate RDS-weighted
193 point estimates and 95% CI (33). The number of eligible peers in each
194 participant's social network was used as the network size parameter for the
195 weighting procedure, and these weights were calculated appropriately. The
196 bivariable and multivariable multinomial logistic regression models were run
197 without RDS weighting data. First, a bivariable multinomial logistic
198 regression model was used to test the associations between each covariate
199 and the outcome variable. Covariates with P values of 0.2 or less were
200 included in the multivariable multinomial logistic regression models (34), and
201 P values of 0.05 or less were considered statistically significant. Covariates
202 were added to the model one at a time based on their statistical significance
203 and contribution to model fit using a forward stepwise approach for variable
204 selection (entry criterion: $P < 0.20$; retention criterion: $P \leq 0.05$). As a result,
205 only the variables that remained significant in the final model are reported.
206 Additionally, we included covariates that showed a significant association
207 ($P < 0.2$) with any of the non-reference outcome categories in pairwise

208 comparisons against the reference outcome in the final multivariable model.
209 For example, a variable might be linked to "Interest under any
210 circumstances," but not to "Interest if provided for free." To assess their fully
211 adjusted effects across all outcome comparisons, these variables were
212 retained in the final model. In the multinomial logistic regression models, no
213 interest in using PrEP was considered the reference group. Crude relative
214 risk ratios (RRR), adjusted relative risk ratios (aRRR), and 95% confidence
215 interval (CI) were reported. Stata 17 was used for all analyses. Under the
216 adjusted covariates, these aRRRs should be interpreted as the relative risk of
217 experiencing one outcome compared to the reference outcome.

218 ***Ethical Considerations***

219 Study staff ensured confidentiality by using anonymous questionnaires and
220 obtaining informed consent from participants for data collection. They were
221 told that their decision to decline participation would not affect them in any
222 way. They were assured that they could refuse to answer any questions they
223 wanted and stop the interview at any time. The Kerman University of Medical
224 Sciences research ethics committee reviewed and approved the protocol and
225 procedures for the current study (Ethics Code: IR.KMU.REC.1401.216). In
226 addition, all methods were performed in accordance with the relevant
227 guidelines and regulations.

228 **Results**

229 ***Characteristics of the sample***

230 Among 2,174 PWID, most participants (95.9%) were men and aged more than
231 30 years old (94.2%) (Table 1). About two-thirds (66.1%) had less than a high
232 school education, and 76.1% were single, divorced, or widowed. Most
233 participants (86.4%) had temporary employment and did not have health
234 insurance (81.6%). Over two-thirds (70.7%) had been incarcerated in their
235 lifetime, and 48.1% had a history of homelessness in the last year. Nearly half
236 (48.3%) reported daily injections in the last six months, with opioids as the
237 primary drug injected in the last three months (96.1%). Only 7.7% were
238 aware of PrEP.

239 ***Interest in using PrEP***

240 The prevalence of interest in using PrEP under any circumstances, interest
241 in using PrEP if provided for free, and no interest in using PrEP use was
242 37.9% (95% CI: 35.8, 39.9), 48.3% (95% CI: 46.2, 50.4), and 13.8% (95% CI:
243 12.3, 15.2), respectively (Table 1).

244 **Factors associated with interest in using PrEP under any
245 circumstances**

246 Bivariable multinominal logistic regression showed that interest in using
247 PrEP under any circumstances was significantly associated with being male,
248 being single/divorced/widowed, having a high school education or more,
249 having a temporary or permanent job, not having health insurance, having a
250 casual partner, not having lifetime incarceration, not having history of
251 condomless sex with casual partners in last six months, having needle/syringe

252 sharing in the previous six months, access to OAT in the last six months,
253 having a history of HIV test, and having sufficient HIV knowledge (Table 2).

254 The multinomial logistic regression showed that interest in using PrEP under
255 any circumstances was significantly associated with high school education
256 (ARRR: 1.92; 95% CI: 1.42, 2.61), lack of health insurance (ARRR: 0.64; 95%
257 CI: 0.47, 0.84), access to OAT in the last six months (ARRR: 1.59; 95% CI:
258 1.13, 2.25), and sufficient HIV knowledge (ARRR: 2.87; 95% CI: 2.03, 4.06)
259 (Table 3).

260 **Factors associated with interest in using PrEP if provided for free**

261 Bivariable multinominal logistic regression showed that interest in using
262 PrEP, if provided for free, was significantly associated with being male, being
263 single/divorced/widowed, having a high school education and more, having a
264 temporary or permanent job, not having health insurance, having a history of
265 homelessness in the last year, having a casual partner, not having a history
266 of condomless sex with casual partners in last six months, having a daily
267 injection in the last six months, access to OAT in the last six months, having
268 experience of non-fatal overdose in last three months, primary drug injected
269 in the past 3 months, having a history of HIV test, having sufficient HIV
270 knowledge and aware of PrEP (Table 2).

271 The multinomial logistic regression showed that interest in using PrEP if
272 provided for free was significantly associated with high school education
273 (ARRR:1.50; 95% CI: 1.10, 2.04), not having health insurance (ARRR:0.33;

274 95% CI: 0.23, 0.45), having access to OAT in the last six months (ARRR: 2.63;
275 95% CI: 1.88, 3.67), and having sufficient HIV knowledge (ARRR: 4.53; 95%
276 CI: 3.23, 6.37) (Table 3).

277 **Discussion**

278 We found that only one in 13 PWID in Iran were previously aware of PrEP.
279 Once the intervention was explained to them, nearly 40% were interested in
280 using PrEP under any circumstances, and nearly half were interested in using
281 PrEP if provided for free. We also found that interest in the use of HIV PrEP
282 without being free was significantly associated with high school education
283 and, more, not having health insurance, having access to OAT in the last six
284 months, and having sufficient HIV knowledge. If offered for free, interest in
285 using PrEP was significantly associated with high school education, not
286 having health insurance, having access to OAT in the last six months, and
287 having sufficient HIV knowledge.

288 The fact that approximately 40% of respondents expressed interest in using
289 PrEP regardless of having to pay for it underscores the strength of the
290 perceived benefits to individuals in reducing the risk of HIV transmission.
291 Then, the interest in using PrEP is a significant finding for policymakers.
292 Although recent studies showed a notable interest in using PrEP, especially
293 if cost barriers were removed (35, 36), the interest in using PrEP in our study
294 was different from other studies, with interest rates of 59% in San Francisco
295 (26), 63% in Baltimore (35), and 65% in Connecticut (37). Low baseline
296 awareness cannot be the only explanation for the difference because our

modeling showed that basic awareness alone was not significantly associated with interest. Instead, this suggests that a deeper level of precise, comprehensive knowledge may be required to transition from basic awareness to genuine interest in using PrEP, which may not have been achieved in our study (where familiarity was below 8%). Evidence that stigma continues to be a barrier to interest in using PrEP further complicates this (38). This finding is consistent with a previous study in Iran. It has been shown that stigma is one of the main barriers to PrEP uptake among high-risk groups for HIV, such as PWID in Iran (39). Furthermore, studies have demonstrated that factors such as PrEP awareness, knowledge, perceived HIV risk, perceived need for PrEP, and social factors play crucial roles in individuals' intention to use PrEP (40, 41). A previous national survey showed that harm reduction programs, such as HIV testing, are still inadequate, which may show gaps in perceived HIV risk or awareness among PWID (42). These findings underscore the importance of addressing social, financial, and informational barriers to enhance the uptake of PrEP and reduce the incidence of HIV among key populations, especially for PWID. Additionally, our findings suggest that removing financial barriers could immediately produce a substantial impact at the real population level that surpasses what awareness campaigns alone can achieve. Moreover, it is essential to address sociocultural barriers to PrEP utilization, as neglecting this issue could reduce the potential advantages of biomedical prevention strategies.

319 The findings from the multivariable multinomial logistic regression analysis
320 highlighted the significant effect of education level and HIV knowledge on
321 individuals' interest in using PrEP as a strategy against HIV transmission.
322 The results indicated that individuals with higher levels of education were
323 more inclined to consider using PrEP than those with lower education. As
324 mentioned in previous studies, these results show a potential link between
325 education and health literacy in influencing preventive health behavior (43,
326 44). Moreover, the positive relationship between HIV knowledge and interest
327 in using PrEP, demonstrated in previous studies, highlights the critical role
328 of education in shaping individuals' attitudes and behaviors toward
329 preventive strategy (25, 45). Education may foster an understanding of
330 complex health information which promotes the understanding of how PrEP
331 may be used to prevent HIV, which in turn may drive interest. Additionally,
332 the association between knowledge of HIV and interest in using PrEP
333 highlights the critical role of education in people's attitudes and behaviors
334 toward preventive health measures. By implementing this strategy, we can
335 improve individuals' awareness of HIV and PrEP, thereby increasing their
336 interest in using PrEP and contributing to improved public health outcomes.
337 In addition, the multinomial logistic regression showed that interest in using
338 PrEP was significantly associated with having access to OAT. Furthermore,
339 the association between OAT access and increased interest in using PrEP
340 underscores the integration of HIV prevention efforts. Some studies showed
341 that individuals with a history of OAT utilization might benefit from targeted

342 interventions integrating PrEP education within the existing healthcare
343 services (37, 46). This finding is especially important in the Iranian context,
344 where OAT serves as a primary harm reduction delivery channel for PWID
345 and is mainly administered by government-supported treatment centers (47).
346 This association highlights the effectiveness of integrated programs in
347 preventing HIV. Since OAT users already receive structured healthcare
348 services, these facilities are the ideal places to include PrEP education and
349 improve access in Iran (48). Additionally, individuals undergoing OAT often
350 engage with healthcare services focused on substance use treatment and
351 preventive health initiatives. Such involvement creates an environment
352 where conversations about HIV prevention, including PrEP, are more likely
353 to occur. Moreover, those in OAT programs may be more aware of their
354 health risks and the significance of preventive measures, which can boost
355 their interest in obtaining PrEP. Furthermore, people who are on OAT are
356 also probably used to administering their medications on a regular schedule
357 for a chronic condition (49). This prior experience may reduce the perceived
358 barriers associated with treatment frequency and adherence challenges
359 frequently connected to long-term preventive measures such as PrEP,
360 thereby enhancing their willingness to use it. Integrating PrEP education
361 within OAT services may enhance knowledge of PrEP and facilitate access to
362 this method. By implementing this plan, we can use the existing framework
363 of OAT services to enhance interest and access to PrEP, thereby enhancing
364 overall HIV prevention efforts.

365 We also found that individuals with health insurance were significantly less
366 likely to express interest in using PrEP, whether provided for free or at a cost.
367 This finding indicates the role of health insurance coverage in shaping
368 perceptions of preventive healthcare services such as PrEP. The inverse
369 relationship between health insurance status and interest in PrEP uptake
370 underscores the need for further investigation into the underlying factors
371 driving this disparity. In contrast to the results of our study, previous studies
372 emphasized the positive role of having health insurance in key populations
373 (36, 50) receiving PrEP. This difference probably suggests that health
374 insurance in Iranian PWID functions primarily as a proxy marker for higher
375 Socio-Economic Status (SES) and established engagement with formal
376 healthcare systems, rather than merely indicating affordability or access
377 barriers as is often the case in other contexts. Individuals with formal
378 employment usually have comprehensive coverage through the Social
379 Security Organization in Iran. However, marginalized populations often
380 depend on subsidized national health insurance plans that might offer more
381 limited coverage. Considering this SES indicator, there are several reasons
382 why insured individuals may be less interested in using PrEP: they may have
383 a lower personal risk profile compared to uninsured groups, or they could
384 have a higher baseline level of general health literacy, decreasing their
385 perceived need for a new intervention like PrEP. Addressing these barriers
386 through focused interventions and education campaigns could help reduce
387 the PrEP uptake gap among those with health insurance, resulting in more

388 equitable access to HIV prevention programs in all populations. Furthermore,
389 collaborating with health insurance providers to deliver PrEP-related
390 educational materials to their members can enhance awareness and
391 understanding of this preventive method.

392 Our study has limitations. First, the cross-sectional design of this study
393 precludes the establishment of causal relationships. Second, a noticeable
394 proportion of participants surveyed were introduced to PrEP for the first time
395 through this study, which may influence their perceptions of interest in using
396 PrEP. Finally, we could not evaluate the perceived risk of HIV acquisition
397 during the data collection process. Because of this limitation, our model
398 cannot show how this factor impacts preventive behaviors (like using PrEP).
399 To better understand the barriers and motivators of PrEP use, future studies
400 should include validated tools to assess risk perception in this group.

401 **Conclusions**

402 While prior awareness of PrEP was low, most PWID were interested in using
403 PrEP once made aware of its potential efficacy in preventing getting HIV
404 through sex or sharing injection equipment. This finding demonstrates to
405 policymakers the importance of integrating PrEP into national harm
406 reduction programs and how it can reduce HIV incidence in this key
407 population by lowering costs and expanding access. Our country, therefore,
408 must examine the conditions for the inclusion of PrEP in the national harm
409 reduction program. A complex association between education level, access to

410 OAT, HIV knowledge, and health insurance coverage affects people's
411 motivation to use PrEP as a preventive intervention for HIV transmission.
412 These findings emphasize the need to overcome educational, information,
413 and access barriers to increase PrEP use and support effective HIV
414 prevention strategies among key populations. This can be achieved through
415 educational campaigns and collaboration with various organizations.

416 **List of abbreviations**

417 **PrEP:** Pre-exposure prophylaxis

418 **WHO:** World Health Organization

419 **PWID:** People who inject drugs

420 **RDS:** Respondent-driven sampling

421 **RRR:** Crude relative risk ratios

422 **ARRR:** Adjusted relative risk ratios

423 **OAT:** Opioid agonist therapy

424 **Statements and Declarations:**

425 **Ethical Approval**

426 The Ethics committee of Kerman University of Medical Sciences approved
427 the study protocol (Ethics code: IR.KMU.REC.1401.443).

428 **Consent for publication**

429 Not applicable

430 **□ Availability of data and materials**

431 All data generated or analyzed during this study are included in this
432 published article.

433 **□ Competing Interests**

434 The authors declare that they have no competing interests.

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438 **□ Authors' contributions**

439 "**H.M**: Contribution to the work's acquisition, analysis, and design, and
440 confirmation of the sent version. **S.M**: Contribution to the work's acquisition,
441 design, and confirmation of the sent version. **F.T**: Contribution to the work's
442 acquisition, design, and confirmation of the sent version. **M.B**: Contribution
443 to the work's acquisition, design, and confirmation of the sent version. **N.N**:
444 Contribution to the work's acquisition, design, and confirmation of the sent
445 version. **H.M**: Contribution to the work's acquisition, design, and
446 confirmation of the sent version. **N.S**: Contribution to the work's acquisition,
447 design, and confirmation of the sent version. **M.K**: Contribution to the design,
448 and confirmation of the sent version. **A.H**: Contribute to the conception and
449 design of the work, revise the drafted work, and confirm the sent version.

450 **A.M:** Contribute to the conception and design of the work, revise the drafted
451 work, and confirm the sent version. **W.M:** Contributed to the conception and
452 design of the work, revised the drafted work, and confirmed the sent version.
453 **M.R:** Contribution to the design, and confirmation of the sent version. **M.K:**
454 Contribute to the conception and design of the work, interpret data, and
455 confirm the sent version. **H.S:** Contribution to the conception, design of the
456 work, interpretation of data, revised drafted work, and confirmation of the
457 sent version. All authors read and approved the final manuscript."

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462 **Participate declarations**

463 Not applicable

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Table 1. Interest in the use of HIV pre-exposure prophylaxis (PrEP) by sociodemographic characteristics, HIV risk and injection-related factors, and harm reduction utilization among people who inject drugs (PWID) in Iran, 2023.

Variable	Total N (%)	Interest in using PrEP		
		Interest in using PrEP under any circumstances n (RDS* adjusted %)	Interest in using PrEP if provided for free n (RDS adjusted %)	No interest in using PrEP n (RDS adjusted)
Overall	2,174	824 (37.9)	1,051 (48.3)	299 (13.8)
Current age (years)				
< 30	125 (5.8)	49 (5.6)	54 (5.5)	22 (9.5)
≥ 30	2,049 (94.2)	775 (94.4)	997 (94.5)	277 (90.5)
Sex				
Male	2,084 (95.9)	793 (94.9)	1,012 (95.3)	279 (91.6)
Female	90 (4.1)	31 (5.1)	39 (4.7)	20 (8.4)
Education				
Less than high school	1,441 (66.1)	502 (37.1)	709 (34.5)	223 (21.2)
High school or more	738 (33.9)	321 (62.9)	340 (65.5)	76 (78.8)
Marital Status				
Currently married	519 (23.9)	221 (26.2)	192 (22.9)	106 (21.9)
Single/divorced/widowed	1,654 (76.1)	602 (73.8)	859 (77.1)	193 (78.1)
Current employment				
Unemployed	82 (4.7)	20 (1.5)	27 (0.5)	35 (0.8)
Having a temporary job	1,496 (86.4)	570 (86.1)	732 (93.1)	51 (86.8)
Having a permanent job	153 (8.9)	72 (12.4)	51 (6.4)	30 (12.4)
Having health insurance				
No	1,763 (81.6)	637 (73.8)	923 (89.8)	203 (74.8)
Yes	398 (18.4)	181 (26.2)	124 (10.2)	93 (25.2)
History of homelessness, last year				
No	1,126 (51.9)	487 (64.5)	443 (57.3)	496 (58.6)
Yes	1,046 (48.1)	337 (35.5)	606 (42.7)	103 (41.4)
Sex partner				
Main partner	1,083 (61.5)	405 (69.4)	517 (75.6)	161 (65.5)
Casual partners	679 (38.5)	258 (30.6)	352 (24.4)	69 (34.5)

Lifetime incarceration				
No	637 (29.3)	288 (38.8)	267 (42.5)	82 (38.0)
Yes	1,535 (70.7)	535 (61.2)	783 (57.5)	217 (62.0)
History of condomless sex with casual partners in last 6 months				
No	509 (71.3)	226 (79.9)	246 (61.0)	37 (65.6)
Yes	204 (28.7)	48 (20.1)	119 (39.0)	37 (34.4)
Age at first drug use, years				
< 18	1,462 (67.2)	566 (72.9)	695 (67.3)	201 (61.6)
≥18	712 (32.8)	285 (27.1)	356 (32.7)	98 (38.4)
Receptive needle/syringe sharing, last 6 months				
No	1,849 (86.8)	657 (91.1)	932 (94.9)	260 (87.9)
Yes	279 (13.2)	151 (8.9)	103 (5.1)	25 (12.1)
Daily injection in last 6 months				
No	1,099 (51.7)	459 (66.4)	463 (58.5)	177 (70.9)
Yes	1,025 (48.3)	357 (33.6)	551 (41.5)	177 (29.1)
Experience of non-fatal overdose, last year				
No	2,010 (93.5)	752 (91.3)	991 (95.3)	267 (94.9)
Yes	140 (6.5)	64 (8.7)	50 (4.7)	26 (5.01)
Primary drug injected, last 3 months				
Stimulants	68 (3.9)	29 (7.9)	19 (3.8)	20 (15.6)
opioids	1,640 (96.1)	611 (92.1)	821 (96.2)	208 (84.4)
Opioid agonist treatment, last 6 months				
Monthly or less	637 (29.3)	205 (21.6)	379 (27.4)	53 (22.4)
Weekly or daily	1,537 (70.7)	619 (78.4)	672 (72.6)	246 (77.6)
HIV knowledge**				
Insufficient	1,311 (60.3)	520 (65.1)	539 (66.7)	252 (77.3)
Sufficient	863 (39.7)	304 (34.9)	512 (33.3)	47 (22.7)
History of HIV test, lifetime				
No	412 (19.0)	153 (25.8)	154 (22.2)	105 (32.1)
Yes	1,762 (81.0)	671 (74.2)	897 (77.8)	194 (67.9)
Aware of PrEP				
No	1,987 (92.3)	732 (90.4)	990 (93.2)	265 (89.5)
Yes	164 (7.7)	82 (9.6)	57 (6.79)	25 (10.5)

* Respondent-driven sampling

** Measured using an 8-item set of questions covering basic knowledge of HIV/AIDS transmission and prevention

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Table 2: Bivariable multinominal logistic regression of associated factors with interest in the use of HIV preexposure prophylaxis (PrEP) and associated factors among people who inject drugs in Iran, 2023, (n = 2,174).

Variable	Interest in using PrEP under any circumstances		Interest in using PrEP if provided for free	
	Crude risk ratios ^a (95% CI ^b)	P-value	Crude risk ratios ^a (95% CI ^b)	P-value
Current age (years)				
< 30	Ref		Ref	
≥30	1.25 (0.75- 2.11)	0.391	1.46 (0.87- 2.11)	0.144
Sex				
Male	Ref		Ref	
Female	0.54 (0.30- 0.97)	0.040	0.53 (0.30- 0.93)	<0.001
Marital status				
Currently married	Ref		Ref	
Single/divorced/widowed	1.49 (1.12- 1.98)	0.0051	2.45 (1.84- 3.26)	<0.001
Education level				
Less than high school	Ref		Ref	
High school or more	1.87 (1.39- 2.54)	<0.001	1.40 (1.05- 1.88)	0.021
Current employment				
Unemployed	Ref		Ref	
Having a temporary job	5.14 (2.89- 9.11)	<0.001	4.89 (2.88- 8.27)	<0.001
Having a permanent job	4.20 (2.09- 8.41)	<0.001	2.20 (1.12- 4.32)	0.022
Having health insurance				
No	Ref		Ref	
Yes	0.62 (0.46- 0.83)	<0.002	0.29 (0.21- 0.39)	<0.001
History of ever homelessness in the last year				
No	Ref		Ref	
Yes	1.31 (1.00- 1.17)	<0.050	2.60 (1.99- 1.73)	<0.001
Sex partner				
Main partners	Ref		Ref	
Casual partner	1.48 (1.07- 2.05)	0.016	1.58 (1.16- 2.17)	0.004
Lifetime arrest/incarceration				
No	Ref		Ref	
Yes	0.67 (0.52- 0.93)	0.017	1.10 (0.82- 1.48)	0.487
History of condomless sex with casual partners in last 6 months				
No	Ref		Ref	

Yes	0.21 (0.12- 0.36)	<0.001	0.28 (0.29- 0.80)	<0.005
Age at first drug use				
< 18	Ref		Ref	
≥18	0.93 (0.70- 1.24)	0.641	1.05 (0.79- 1.38)	0.723
Receptive needle/syringe sharing, last 6 months				
No	Ref		Ref	
Yes	2.39 (1.52- 3.73)	<0.001	1.41 (0.72- 1.81)	0.551
Daily injection in the last 6 months				
No	Ref		Ref	
Yes	1.17 (0.89- 1.54)	0.240	1.80 (1.38- 2.34)	<0.001
Experience of non-fatal overdose, last 3 months				
Yes	Ref		Ref	
No	0.87 (0.54- 1.40)	0.580	0.51 (0.31- 0.84)	0.009
Primary drug injected, last 3 months				
Stimulants	Ref		Ref	
Opioids	1.23 (0.91- 1.44)	0.070	1.21 (0.99- 1.46)	0.062
Access to opioid agonist therapy in the last 6 months				
No	Ref		Ref	
Yes	1.53 (1.09- 2.15)	0.012	2.61 (1.89- 3.61)	<0.001
HIV knowledge				
Insufficient	Ref		Ref	
Sufficient	3.13 (2.22- 4.41)	<0.001	5.09 (3.64- 7.11)	<0.001
History of HIV test, lifetime				
No	Ref		Ref	
Yes	2.37 (1.79- 3.18)	<0.001	3.15 (2.35- 4.22)	<0.001
Aware of PrEP				
No	Ref		Ref	
Yes	1.18 (0.74- 1.89)	0.473	0.61 (0.37- 1.01)	0.051

a: The reference group for the risk ratios was not interested in using PrEP.

b: Confidence Interval

Table 3: Multivariable nominal logistic regression of associated factors with interest in the use of HIV preexposure prophylaxis (PrEP) and associated factors among people who inject drugs in Iran, 2023, (n = 2,174).

Variable	Interest in using PrEP under any circumstances		Interest in using PrEP if provided for free	
	adjusted risk ratios^a (95% CI^b)	P-value	adjusted risk ratios^a (95% CI^b)	P-value
Education level				
Less than high school	Ref		Ref	
High school or more	1.92 (1.42-2.61)	<0.001	1.50 (1.10-2.04)	0.010
Having health insurance				
No	Ref		Ref	
Yes	0.64 (0.47-0.87)	0.004	0.33 (0.23-0.45)	<0.001
Access to opioid agonist therapy in the last 6 months				
No	Ref		Ref	
Yes	1.59 (1.13-2.25)	0.008	2.63 (1.88-3.67)	<0.001
HIV knowledge				
Insufficient	Ref		Ref	
Sufficient	2.87 (2.03-4.06)	<0.001	4.53 (3.23-6.37)	<0.001

a: The reference group for the risk ratios was not interested in using PrEP.

b: Confidence Interval