



Determinants of Consistent Condom Use Among Iranians Living with HIV/AIDS: Implication for Prevention

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Received 2015 November 01; Revised 2016 November 04; Accepted 2017 March 15.

Abstract

Background: Individuals that are HIV positive can transmit the infection through unprotected sex.

Objectives: The present study aimed to evaluate the prevalence and determinants of consistent condom use among Iranian people living with HIV/AIDS as one of the most stigmatized and hard-to-access groups in this country.

Patients and Methods: This cross-sectional study was conducted in Tehran, Iran. A total of 400 heterosexuals living with HIV/AIDS were sampled from 5 behavioral consulting centers through a purposive sampling method. Data were collected through an interviewer-administered questionnaire. Bivariate logistic regression, chi-square test, and multivariate logistic regression model were used as the statistical models in this study.

Results: Of all 400 participants, 240 (60%) were men. The mean age was 34.7 for both sexes. During the past year, 335 (83.7%) were sexually active and 269 (67.9%) reported never having used a condom. Consistent condom use (always using condom in sexual intercourse) was reported by 67 (16.7%) of the participants. Consistent condom use was significantly associated with participation in HIV prevention courses ($P = 0.003$), knowledge of unsafe sex consequences ($P = 0.017$), condom use as a dual protection method ($P = 0.0001$), having a HIV-positive sexual partner ($P = 0.0001$), as well as being in a regular sexual relationship ($P = 0.005$).

Conclusions: Development and improvement of the HIV prevention programs seems necessary to control the transmission of HIV in each community. However, results of the present study emphasize the importance of more attention to some specific programs such as prevention of mother-to-child transmission as a result of the willingness of Iranian people living with HIV/AIDS to child bearing. In addition, more attention should be paid to women as the more vulnerable part of the community to better prevent and control HIV in Iran.

Keywords: HIV, Acquired Immunodeficiency Syndrome, Condoms, Iran

1. Background

In the Middle East and North African region, Iran has the highest rate of HIV-positive people (1). By the end of 2014, over 70000 people were living with HIV/AIDS in Iran, giving a prevalence of 0.1% among adults aged between 15 and 49 (2). Although injecting drugs was the main route of HIV transmission for several years, this pattern is being changed to sexual transmission (3). Results of the global burden of disease (GBD) study show a dramatic increase in disability-adjusted life years (DALYs) due to HIV/AIDS in Iran from 2000 DALYs in 1990 to more than 114000 DALYs in 2010 (4). Considering a high prevalence of the risk factors

such as drug use in this country (5), the above-mentioned considerable load of burden attributable to HIV/AIDS does not seem surprising.

Determinants of HIV risk behaviors among the most at-risk groups have frequently been discussed in the literature. In this regard, a cross-sectional bio-behavioral study on 2146 Iranian injecting drug users revealed that less than half of the participants have ever been tested for HIV, while awareness of the location of a testing site, age, multiple incarcerations, and monthly income were significantly associated with HIV testing among the participants (6). A comprehensive systematic review was conducted to evalu-

ate the prevalence of HIV and viral hepatitis in Iran. It was found that HIV and its co-infections with hepatitis B and C are more prevalent among Iranians who inject drugs, compared to prisoners, street children, healthcare workers, and the general community (7). It should be taken into account that due to being stigmatized, it is difficult to access the most vulnerable population and design preventive interventions to reduce HIV transmission among them.

Different variables influence whether an at-risk person uses condoms to prevent the transmission of HIV and other sexually transmitted infections (STIs). A systematic review showed that Chinese female sex workers (FSWs) involved in behavioral interventions were 2.3-5.0 times more likely to use condoms during sex with their male clients, and 2.3 - 3.4 times to consistently use condoms in the last sexual encounter, compared to their pre-intervention period (8). In a bio-behavioral survey conducted among young gay and bisexual men in New Zealand, some variables such as recruitment type, ethnicity, lower education, sero-positivity of HIV, sex with females, and having more than 20 sex partners were found as the associated parameters of infrequent condom use (9). Review of condom use among the most at risk populations including FSWs, men who have sex with men (MSM), as well as adolescents and young adults in Europe revealed that the pattern of inconsistent condom use depends on the geographic areas and the populations (10). Different cultural norms and different HIV prevention programs in the target countries can partly justify these findings.

High-risk behaviors and consequently prevalence of HIV are prevalent among the most at risk populations in Iran (11-13). The prevalence of HIV was found to be 4.5% among street and labor children, while drug use among parents, experience of sex work, and HCV infection were significantly associated with higher probability of acquiring HIV (14). A total of 5% of Iranian female sex workers were found to be HIV positive in 2013, and the infection was significantly associated with having more sex partners and younger age (15). HIV prevalence was 20.2% among a sample of Iranian drug users, and the positives were more likely to be male, share needles, have unsafe sex, and have a history of imprisonment (16). Another study stated that FSWs predictors of unsafe intercourse with people who inject drugs (PWIDs) included higher education, perceived HIV risk, and perceived family intimacy during childhood (17). Condom use among male PWIDs who had sex with men was only 20% during last sexual intercourse (18). Being unmarried, younger age, and at a more perceived HIV risk have been suggested as the associated parameters of unprotected anal sex among heterosexual IDUs in Iran (19). The above-mentioned circumstances regarding risk taking

among high-risk populations might justify the huge load of burden due to HIV in Iran.

HIV positive people can transmit HIV through unprotected sex with their uninfected partners. In spite of the existing studies evaluating sexual risk taking among the most at risk populations, no study has assessed this issue among Iranian people living with HIV/AIDS (PLWHA). The present study aimed to scrutinize the prevalence and determinants of consistent condom use among PLWHA as a highly stigmatized population in Iran.

2. Objectives

The present study aimed to evaluate the prevalence and determinants of consistent condom use among Iranian people living with HIV/AIDS as one of the most stigmatized and hard-to-access groups in this country.

3. Patients and Methods

3.1. Design and Setting

Participants of the study were HIV-positive individuals referred to 5 behavioral disorders counseling centers (BDCCs) in Tehran. From all the centers, 3 were located in Varamin, Shahryar, and Robat Karim districts, and 2 centers were Imam Khomeini hospital and West healthcare center in Tehran. BDCCs are the governmental organizations offering free condoms, HIV testing and counseling, antiretroviral therapy (ART), and other services to PLWHA, and the most at-risk populations in Iran. PLWHA learn harm reduction methods through group training courses, divided by gender. The main purpose of BDCCs is harm reduction among their patients. The present results come from the quantitative section of a mixed-method study evaluating the sexual life of Iranian PLWHA. Results of the qualitative section appear elsewhere (20). Condom use was considered as consistent, when the respondents reported "always" using a condom in the past year.

3.2. Sampling

By considering the value on the Z table at 95% confidence level=1.96, sampling error at 5%, maximum probability of consistent condom use (P) at 50%. i.e. (0.5), sample size was calculated as 384 individuals, which increased to 400 in anticipation of non-response or withdrawal of consent. Participants were selected through a purposive sampling method (PSM). Individuals who were diagnosed as HIV positive less than 6 month ago, those with severe physical disabilities, and PLWHA who did not consent to participate were all excluded.

3.3. Research Instrument

A pilot study tested the interviewer-administered questionnaire through semi-structured face-to-face interviews with a sample of 45 HIV-positive individuals (25 women and 20 men). The questionnaire was sent to 7 experts (physicians, HIV consultants, stakeholders, and etc.) to assess it as well as making the questionnaire more easy-to-understand. The questionnaire covered socio-demographic characteristics, history of drug and alcohol use, duration of HIV diagnosis, ART status, as well as sexual activities of the respondents.

To evaluate the reliability of the questionnaire, test-retest and inter-observer reliability methods were applied. During the test-retest procedure, the questionnaire was sent to 20 HIV-positive individuals (10 men and 10 women) to obtain the first results. The second results were obtained a week later. The KAPPA coefficient for test-retest reliability found to be 0.78. In terms of inter-observer reliability, 2 researchers gathered information from 20 individuals living with HIV (10 men and 10 women) and analyzed the obtained data. The KAPPA coefficient for inter-observer reliability found to be 0.82.

3.4. Interview Procedure

The data were collected through structured interviews conducted by 6 expert interviewers. Prior to starting the interviews, the interviewers were invited to participate in a course to be briefed about the entire aspects of the project such as confidentiality of the obtained data. Each interview lasted between 40 and 50 minutes.

3.5. Ethical Aspects

The present study was approved by the ethical committee of Tehran University of Medical Sciences (TUMS). Informed consent was obtained from the respondents before participation in the project. Participants were assured regarding the confidentiality of their personal information. In addition, all interviewers were required to answer queries of the participants to clarify the vague circumstances.

3.6. Statistical Analyses

Bivariate logistic regression was applied to find the possible association between the quantitative variables (including age, duration of HIV diagnosis, duration of ART, and financial status) and chi-square test for the variables (gender, education level, marital status, drug and alcohol use history, condom use as a dual protection method, occupation, living status, etc.). Backward: Wald logistic regression was performed as the multivariate analysis method. Statistical analyses were performed by SPSS 15. Odds ratios

(ORs), and confidence intervals (CIs) were reported, and P value less than 0.05 was considered as a significance level.

4. Results

Of all participants, 240 (60%) were men, majority (44.1% men and 51.2% women) aged between 25 and 34 years, and the mean age was 34.7 for both sexes. Most of the participants (50.4% men and 38.1% women) had attended secondary and high school. Of the participants, 32.5% men and 3.7% women had never been married. A total of 27 (23.6%) married females and 46 (33.7%) married males had HIV-negative spouses.

During the past year, 335 (83.7%) HIV-positive individuals were sexually active. Of whom, 54 (13.5%) had sex with permanent non-spouse partners and 71 (17.7%) with casual sex partners. Of the participants, 269 (67.2%) reported having used a condom during the past year. Frequency of condom use was reported as "always" by 67 (25%), "mostly" by 86 (32%), and "sometimes" by 116 (43%) participants in the past year. Condom use was the mutual decision of both sex partners among 124 (46%) HIV-positive participants.

The main self-reported reasons of condom non-use by male respondents were reported as: unavailability of condom by 57 (23.7%), opposition of sexual partner by 47 (19.5%), reduction of sexual pleasure by 42 (17.5%), and intention to pregnancy by 38 (15.8%) participants. These reasons were reported as: opposition of sexual partner by 60 (37.5%), HIV sero-positivity of the partner by 33 (20.6%), reduction of sexual pleasure by 23 (14.3%), and intention to pregnancy by 22 (13.7%) females.

Based on the multivariate analysis, consistent condom use was significantly associated with the parameters including: participation in HIV prevention courses ($P = 0.003$; OR = 2.6 (95% CI = 1.4 - 5.5)), knowledge of unsafe sex consequences ($P = 0.017$; OR = 2.1 (95% CI = 1.1 - 3.8)), condom use as a dual protection method ($P = 0.0001$; OR = 4.2 (95% CI = 2.2 - 8.4)), having a HIV-positive sexual partner ($P = 0.0001$; OR = 3.5 (95% CI = 1.8 - 7)), and sexual relationship with permanent sexual partners ($P = 0.005$; OR = 2.9 (95% CI = 1.4 - 5.9)).

5. Discussion

As results demonstrated, consistent condom use has been reported by 25% of the participants, while partner's condom refusal, and unavailability were the most frequent causes of inconsistent condom use by women and men, respectively. Consistent condom use among Iranian PLWHA was significantly associated with attending HIV prevention

Table 1. Socio-Demographic Characteristics of Iranian People Living with HIV/AIDS

| Variable | Men / N = 240 (%) | Women / N = 160 (%) | Total / N = 400 (%) |
|--|-------------------|---------------------|---------------------|
| Age | | | |
| 18 - 24 | 7 (2.9) | 22 (13.7) | 29 (7.2) |
| 25 - 34 | 106 (44.1) | 82 (51.2) | 188 (47) |
| 35 - 44 | 91 (37.9) | 47 (29.3) | 138 (34.5) |
| 45 and more | 36 (15) | 9 (5.6) | 45 (11.2) |
| Mean | 36.2 | 32.5 | 34.7 |
| Education | | | |
| Illiterate | 7 (2.9) | 7 (4.3) | 14 (3.5) |
| Primary school | 62 (25.8) | 36 (22.5) | 98 (24.5) |
| Secondary or high school | 121 (50.4) | 61 (38.1) | 182 (45.5) |
| High school diploma/pre-university | 44 (18.3) | 41 (25.6) | 85 (21.2) |
| University degree | 6 (2.5) | 15 (9.3) | 21 (5.2) |
| History of marriage or Have ever been married | | | |
| Yes | 162 (67.5) | 154 (96.2) | 316 (79) |
| No | 78 (32.5) | 6 (3.7) | 84 (21) |
| HIV status of current spouse | | | |
| | n=136 | n=114 | n=250 |
| Negative | 46 (33.7) | 27 (23.6) | 73 (29.3) |
| Positive | 84 (62) | 85 (74.5) | 169 (67.7) |
| Unknown | 6 (4.3) | 2 (1) | 8 (3) |

courses, knowledge towards unsafe sex consequences, condom use as a dual protection method, having HIV-positive partner, and having sex with a permanent partner.

Similar to our findings, the association between HIV prevention interventions such as attending educational courses and condom use has been suggested in numerous studies in the literature (21-23). According to the health belief model (HBM) as one of the most reliable behavioral theories explaining the mechanism of behavioral change in high-risk populations, change in people's attitude would lead to change in their behavior through influencing the components including: perceived susceptibility, perceived benefit, perceived severity, and perceived barriers (24). If we suppose that Iranian PLWHA have mostly acquired their knowledge of unsafe sex consequences from the educational courses at BDCCs, their knowledge might have influenced the "perceived severity", and consequently, lead to consistent condom use among them.

Significant association between consistent condom use and its application as a dual protection method seems unsurprising. Couples who are committed on having a child would not use condoms during their sexual relationships. In this study, 60 individuals (15%) reported "intention to pregnancy" as their main reason for not using a

condom. However, evidence suggest that most of the sexual and reproductive health needs of Iranian PLWHA have been overlooked by the health policy makers in this country (20). Therefore, development and enhancement of the relevant services such as treatment, care, support, as well as pre- and post-delivery counseling seems necessary to prevent mother to child transmission of HIV (PMTCT) in the community.

Although seeking a HIV positive sex partner has been introduced as a risk reduction strategy against transmission, risk of co-infection, reinfection, and super-infection might be doubled among PLWHA through unprotected sexual intercourse (25). In the present study, consistent condom use was significantly associated with having a HIV positive spouse. In other words, those with a HIV positive spouse were more likely to consistently use condoms during sex. This finding suggests that Iranian PLWHA are well informed about the consequences of unsafe sex with a positive partner. Further research projects can be designed and conducted to evaluate the possible sources of knowledge among Iranian PLWHA, and consequently to boost their sexual behaviors.

Compared to the frequency of consistent condom use among 48% of PLWHA in Nigeria (26), about 80% in

Table 2. History of Sexual Relationship and Condom Use Among Iranian People Living with HIV/AIDS During the Past Year

| Variable | Men / N = 240 (%) | Women / N = 160 (%) | Total / N = 400 (%) |
|---------------------------------------|-------------------|---------------------|---------------------|
| History of sexual relationship | | | |
| Yes | 201 (83.7) | 134 (83.7) | 335 (83.7) |
| No | 39 (16.2) | 26 (16.2) | 65 (16.2) |
| Type of sexual partner | | | |
| Spouse | 130 (54.1) | 109 (68.1) | 239 (59.7) |
| Permanent partner other than spouse | 33 (13.7) | 21 (13.1) | 54 (13.5) |
| Casual partner | 64 (26.6) | 7 (4.3) | 71 (17.7) |
| History of condom use | | | |
| Yes | 167 (69.5) | 102 (63.7) | 269 (67.2) |
| No | 73 (30.4) | 58 (36.2) | 131 (32.7) |
| Frequency of condom use | | | |
| | n=167 | n=102 | n=269 |
| Always | 41 (24.6) | 26 (25.5) | 67 (25) |
| Mostly | 60 (35.9) | 26 (25.5) | 86 (32) |
| Sometimes | 66 (39.5) | 50 (49) | 116 (43) |
| Condom use recommended by | | | |
| | n=167 | n=102 | n=269 |
| The respondent | 91 (54.5) | 46 (45) | 137 (51) |
| The sexual partner | 5 (3) | 3 (3) | 8 (3) |
| Mutual decision | 71 (42.5) | 53 (52) | 124 (46) |

Ethiopia (23), and 65% in Uganda (27), consistency of condom use is much less among those in Iran. In a study evaluating inconsistent condom use among Iranian injecting drug users, the consistency was 25%, which was less than some other countries such as Thailand, Vietnam, and the United States of America (28). The above-mentioned statistics suggest the need for urgent interventions such as educational courses to persuade PLWHA and the most at risk population to use condoms more consistently, and consequently to prevent dissemination of infection in the community.

Evidence leaves no doubt that women are more vulnerable to HIV/AIDS than men (17, 29, 30). In this study “partner’s condom refusal” was the main reason of condom non-use among women living with HIV/AIDS. “My partner did not want to use a condom” is a common self-reported reason for condom non-use among PLWHA (31). However, despite the existing efforts (32) it seems that more interventions are needed to empower Iranian women, especially to inform them about their natural rights (such as refusing sex without condom) in their sexual relationships.

Although the present study is conducted in Tehran and is not a nationally representative survey, it should be noted that Imam Khomeini Hospital as the main centers of data collection is the only referral center of HIV/AIDS in Iran

and the patients come from all around the country to receive treatment, care, and support. In addition to the drug users, HIV/AIDS patients are one of the most stigmatized populations in Iran, due to the specific socio-cultural situation in this country (5, 33-35). Since PLWHA in small cities do not want to be recognized as a “positive” in their own cities, they prefer to go to this center and receive their services there. In addition, the quality of the offered services in this center is much higher than the other centers, especially in the small cities of Iran. This should be considered that travel and accommodation costs impose a huge load of burden on the shoulders of the patients and their families.

The present study had some limitations; for instance, it was not possible to evaluate causal relationships because of the cross-sectional setting of the study. Cross-sectional design and local setting of the study prevent the researchers to generalize the results of the study. Besides, similar to many other stigmatized issues, the participants may have over reported or under-reported their responses, or avoided to answer the questions. To address the issue, skillful interviewers with experience of conducting interviews on sensitive research questions were recruited to lead the interviews. In addition to the above-mentioned limitations, in the present study, the type of sex (Anal, vagi-

Table 3. Self-Reported Reasons for Non-Use of Condom Among Iranian People Living with HIV/AIDS

| Variable | Men/N = 240 (%) | Women/N = 160 (%) | Total/N = 400 (%) |
|--|-----------------|-------------------|-------------------|
| Reasons for non-use of condom | | | |
| Unavailability | 57 (23.7) | 12 (7.5) | 69 (17.2) |
| Opposition of sexual partner | 47 (19.5) | 60 (37.5) | 107 (26.7) |
| Low quality of condoms | 18 (7.5) | 2 (1.2) | 20 (5) |
| Allergy, itching | 3 (1.2) | 2 (1.2) | 5 (1.2) |
| Condom breakage | 14 (5.8) | 14 (8.7) | 28 (7) |
| Reduction of sexual pleasure | 42 (17.5) | 23 (14.3) | 65 (16.2) |
| Intention to pregnancy | 38 (15.8) | 22 (13.7) | 60 (15) |
| Fear of partner's suspicion about their HIV status | 21 (8.7) | 2 (1.2) | 23 (5.7) |
| HIV sero-positivity of the partner | 31 (12.9) | 33 (20.6) | 64 (16) |

nal, or oral) was not evaluated. CD4 count and viral load of the participants have not been measured as well. In spite of the existing limitations, to the best of our knowledge this is the first study assessing and criticizing the prevalence and determinants of consistent condom use among Iranian PLWHA.

5.1. Conclusion

Development and improvement of the HIV prevention programs such as information, education, and communication (IEC), voluntary testing and counseling (VTC), prevention and treatment of sexually transmitted infections, as well as prevention and treatment of drug use and dependence seems necessary to control the transmission of HIV in each community. However, results of the present study emphasize the importance of more attention to some specific programs such as PMTCT as a result of the willingness of Iranian PLWHA to child bearing. In addition, more attention should be paid to women as the more vulnerable part of the community to better prevent and control HIV in Iran.

Acknowledgments

The present study was one of the research projects of Iranian research center for HIV and AIDS, number 89 04 55 11973. The authors would like to thank the centre for infectious diseases control of Iranian ministry of health and medical education, as well as UNAIDS of Iran, health and research deputies of Tehran University of Medical Sciences, and health deputy of Shahid Beheshti University of Medical Sciences.

Footnote

Conflict of Interest: None declared.

References

1. UNAIDS . *The gap report*. 2014. Available from: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf.
2. UNAIDS . *Islamic Republic of Iran*. 2014. Available from: <http://www.unaids.org/en/regionscountries/countries/islamicrepublicofiran/>.
3. UNGASS . *Islamic Republic of Iran AIDS progress report*. 2015.
4. Institute of Health Metrics and Evaluation . *HIV/AIDS in Iran*. Institute of Health Metrics and Evaluation; 2015. Available from: <http://vizhub.healthdata.org/gbd-compare/>.
5. Moazen B, Shokoohi M, Noori A, Rahimzadeh S, Saeedi Moghaddam S, Rezaei F, et al. Burden of Drug and Alcohol Use Disorders in Iran: findings from the Global Burden of Disease Study 2010. *Arch Iran Med*. 2015;**18**(8):480-5. [PubMed: 26265515].
6. Shokoohi M, Karamouzian M, Osooli M, Sharifi H, Fahimfar N, Haghdoost A, et al. Low HIV testing rate and its correlates among men who inject drugs in Iran. *Int J Drug Policy*. 2016;**32**:64-9. doi: 10.1016/j.drugpo.2016.03.009. [PubMed: 27157980].
7. Bagheri Amiri F, Mostafavi E, Mirzazadeh A. HIV, HBV and HCV Coinfection Prevalence in Iran—A Systematic Review and Meta-Analysis. *PLoS One*. 2016;**11**(3):151946. doi: 10.1371/journal.pone.0151946. [PubMed: 27031352].
8. Chow EP, Tung K, Tucker JD, Muessig KE, Su S, Zhang X, et al. Behavioral Interventions Improve Condom Use and HIV Testing Uptake Among Female Sex Workers in China: A Systematic Review and Meta-Analysis. *AIDS Patient Care STDS*. 2015;**29**(8):454-60. doi: 10.1089/apc.2015.0043. [PubMed: 26217931].
9. Lachowsky NJ, Dewey CE, Dickson NP, Saxton PJ, Hughes AJ, Milhausen RR, et al. Habitual condom use across partner type and sexual position among younger gay and bisexual men: findings from New Zealand HIV behavioural surveillance 2006-2011. *Sex Transm Infect*. 2015;**91**(6):445-50. doi: 10.1136/sextrans-2014-051759. [PubMed: 25605969].
10. Amirkhanian YA. Review of HIV vulnerability and condom use in central and eastern Europe. *Sex Health*. 2012;**9**(1):34-43. doi: 10.1071/SH11025. [PubMed: 22348631].

11. Mirzazadeh A, Nedjat S, Navadeh S, Haghdoost A, Mansournia MA, McFarland W, et al. HIV and related risk behaviors among female sex workers in Iran: bias-adjusted estimates from the 2010 National Bio-Behavioral Survey. *AIDS Behav.* 2014;**18** Suppl 1:S19–24. doi: [10.1007/s10461-013-0548-3](https://doi.org/10.1007/s10461-013-0548-3). [PubMed: 23857356].
12. Kazerooni PA, Motazedian N, Motamedifar M, Sayadi M, Sabet M, Lari MA, et al. The prevalence of human immunodeficiency virus and sexually transmitted infections among female sex workers in Shiraz, South of Iran: by respondent-driven sampling. *Int J STD AIDS.* 2014;**25**(2):155–61. doi: [10.1177/0956462413496227](https://doi.org/10.1177/0956462413496227). [PubMed: 23970644].
13. Karamouzian M, Foroozanfar Z, Ahmadi A, Haghdoost AA, Vogel J, Zolala F. How sex work becomes an option: Experiences of female sex workers in Kerman, Iran. *Cult Health Sex.* 2016;**18**(1):58–70. doi: [10.1080/13691058.2015.1059487](https://doi.org/10.1080/13691058.2015.1059487). [PubMed: 26317368].
14. Foroughi M, Moayedi-Nia S, Shoghli A, Bayanolhagh S, Sedaghat A, Mohajeri M, et al. Prevalence of HIV, HBV and HCV among street and labour children in Tehran, Iran. *Sex Transm Infect.* 2017;**93**(6):421–3. doi: [10.1136/sextrans-2016-052557](https://doi.org/10.1136/sextrans-2016-052557). [PubMed: 27601728].
15. Moayedi-Nia S, Bayat Jozani Z, Esmaeeli Djavid G, Entekhabi F, Bayanolhagh S, Saatian M, et al. HIV, HCV, HBV, HSV, and syphilis prevalence among female sex workers in Tehran, Iran, by using respondent-driven sampling. *AIDS Care.* 2016;**28**(4):487–90. doi: [10.1080/09540121.2015.1109582](https://doi.org/10.1080/09540121.2015.1109582). [PubMed: 26565671].
16. Salehi A, Naghshvarian M, Marzban M, Bagheri Lankarani K. Prevalence of HIV, HCV, and High-Risk Behaviors for Substance Users in Drop in Centers in Southern Iran. *J Addict Med.* 2015;**9**(3):181–7. doi: [10.1097/ADM.0000000000000112](https://doi.org/10.1097/ADM.0000000000000112). [PubMed: 25748560].
17. Ahmadi K, Rezaade M, Nafarie M, Moazen B, Yarmohammadi Vassel M, Assari S. Unprotected Sex with Injecting Drug Users among Iranian Female Sex Workers: Unhide HIV Risk Study. *AIDS Res Treat.* 2012;**2012**:651070. doi: [10.1155/2012/651070](https://doi.org/10.1155/2012/651070). [PubMed: 22506107].
18. Zamani S, Ono-Kihara M, Ichikawa S, Kihara M. Potential for sexual transmission of HIV infection from male injecting-drug users who have sex with men in Tehran, Iran. *Sex Transm Dis.* 2010;**37**(11):715–8. doi: [10.1097/OLQ.0b013e3181e2c73f](https://doi.org/10.1097/OLQ.0b013e3181e2c73f). [PubMed: 20693938].
19. Mirabi P, Vassel MY, Moazen B, Sehat M, Rezaadeh M, Ahmadi K. Unprotected anal Intercourse among Iranian Intra-Venous Drug Users. *Front Public Health.* 2013;**1**:34. doi: [10.3389/fpubh.2013.00034](https://doi.org/10.3389/fpubh.2013.00034). [PubMed: 24350203].
20. Nedjat S, Moazen B, Rezaei F, Hajzadeh S, Majdzadeh R, Setayesh HR, et al. Sexual and reproductive health needs of HIV-positive people in Tehran, Iran: a mixed-method descriptive study. *Int J Health Policy Manag.* 2015;**4**(9):591–8. doi: [10.15171/ijhpm.2015.68](https://doi.org/10.15171/ijhpm.2015.68). [PubMed: 26340488].
21. Juneja S, Rao Tirumalasetti V, Mishra RM, Sethu S, Singh IR. Impact of an HIV prevention intervention on condom use among long distance truckers in India. *AIDS Behav.* 2013;**17**(3):1040–51. doi: [10.1007/s10461-012-0314-y](https://doi.org/10.1007/s10461-012-0314-y). [PubMed: 23008122].
22. Van Devanter N, Gonzales V, Merzel C, Parikh NS, Celantano D, Greenberg J. Effect of an STD/HIV behavioral intervention on women's use of the female condom. *Am J Public Health.* 2002;**92**(1):109–15. [PubMed: 11772772].
23. Shewamene Z, Legesse B, Tsega B, Bhagavathula AS, Endale A. Consistent condom use in HIV/AIDS patients receiving antiretroviral therapy in northwestern Ethiopia: implication to reduce transmission and multiple infections. *HIV AIDS (Auckl).* 2015;**7**:119–24. doi: [10.2147/HIV.S79122](https://doi.org/10.2147/HIV.S79122). [PubMed: 25926757].
24. Glanz K. *Health behavior and health education: Theory, research, and practice.* 2nd ed. Lewis FM, Rimer BK, editors. San Francisco, Calif: Jossey-Bass Publishers; 1996.
25. Kalichman SC, Eaton L, Cherry C, Kalichman MO, Pope H, White D, et al. HIV super-infection beliefs and sexual practices of people living with HIV/AIDS. *Sex Health.* 2010;**7**(4):420–4. doi: [10.1071/SH09121](https://doi.org/10.1071/SH09121). [PubMed: 21062581].
26. Ayoola OD, Victoria GO, Bamidele O, Olufela KO, Oluwatosin SE, Mbaneifo EP, et al. Pattern, challenges and correlates of condom use among Nigerians living with HIV infection. *Asian Pac J Trop Biomed.* 2014;**4**(Suppl 1):S198–203. doi: [10.12980/APJTB.4.2014.C1003](https://doi.org/10.12980/APJTB.4.2014.C1003). [PubMed: 25183080].
27. Ayiga N. Rates and predictors of consistent condom-use by people living with HIV/AIDS on antiretroviral treatment in Uganda. *J Health Popul Nutr.* 2012;**30**(3):270–80. [PubMed: 23082629].
28. Assari S, Yarmohammadi Vassel M, Tavakoli M, Sehat M, Jafari F, Narenjiha H, et al. Inconsistent Condom Use among Iranian Male Drug Injectors. *Front Psychiatry.* 2013;**4**:181. doi: [10.3389/fpsy.2013.00181](https://doi.org/10.3389/fpsy.2013.00181). [PubMed: 24772093].
29. Strathdee SA, West BS, Reed E, Moazen B, Azim T, Dolan K. Substance Use and HIV Among Female Sex Workers and Female Prisoners: Risk Environments and Implications for Prevention, Treatment, and Policies. *J Acquir Immune Defic Syndr.* 2015;**69** Suppl 2:S110–7. doi: [10.1097/QAI.0000000000000624](https://doi.org/10.1097/QAI.0000000000000624). [PubMed: 25978477].
30. Dolan K, Moazen B, Noori A, Rahimzadeh S, Farzadfar F, Hariga F. People who inject drugs in prison: HIV prevalence, transmission and prevention. *Int J Drug Policy.* 2015;**26** Suppl 1:S12–5. doi: [10.1016/j.drugpo.2014.10.012](https://doi.org/10.1016/j.drugpo.2014.10.012). [PubMed: 25727258].
31. Delgado Hurtado JJ, Pineda M, Cazali I, Mejia C. Knowledge of HIV transmission and condom use among HIV-positive heterosexual men and women in Guatemala. *J Int AIDS Soc.* 2011;**14**:58. doi: [10.1186/1758-2652-14-58](https://doi.org/10.1186/1758-2652-14-58). [PubMed: 22182532].
32. Dolan K, Salimi S, Nassirimanesh B, Mohsenifar S, Allsop D, Mokri A. Six-month follow-up of Iranian women in methadone treatment: drug use, social functioning, crime, and HIV and HCV seroincidence. *Subst Abuse Rehabil.* 2012;**3**(Suppl 1):37–43. doi: [10.2147/SAR.S21349](https://doi.org/10.2147/SAR.S21349). [PubMed: 24474875].
33. Noori R, Jafari F, Moazen B, Khoddami Vishteh HR, Farhoudian A, Narenjiha H, et al. Evaluation of anxiety and depression among female spouses of Iranian male drug dependents. *Int J High Risk Behav Addict.* 2015;**4**(1):21624. doi: [10.5812/ijhrba.21624](https://doi.org/10.5812/ijhrba.21624). [PubMed: 25861583].
34. Farhoudian A, Sadeghi M, Khoddami Vishteh HR, Moazen B, Fekri M, Rahimi Movaghar A. Component analysis of Iranian crack; a newly abused narcotic substance in Iran. *Iran J Pharm Res.* 2014;**13**(1):337–44. [PubMed: 24734089].
35. Jafari F, Noori R, Moazen B, Khoddami Vishteh HR, Narenjiha H, Mirabi P. Perceived sexual satisfaction among women with drug-dependent husbands in Iran. *J Subst Use.* 2014;**19**:416–20.