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Original Article

Population Size Estimation of High-Risk Behavior in Isfahan, Iran: Using the Network Scale-up Method in 2018

Meysam Abshenas Jami[1], Mohamadreza Baneshi[2, 3], Maryam Nasirian[4, 5]*

[1]School of Public Health, Isfahan University of Medical Sciences, Isfahan, Iran.
[2]Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences Kerman, Iran.
[3]Faculty of medicine, center for longitudinal and life course research, school of public health, University of Queensland, Herston, Queensland 4006, Australia.
[4]Infectious Diseases and Tropical Medicine Research Center, Epidemiology and Biostatistics Department, Health School, Isfahan University of Medical Sciences, Isfahan, Iran.
[5]Faculty of biostatistics and epidemiology, Isfahan University of medical science, Isfahan, Iran.

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ABSTRACT

Background and Objective: Due to the impact of risky behaviors in the community and the need for getting information and planning in this regard, the number of people with high-risk sexual behaviors in Isfahan will be indirectly estimated by the network scale-up method.

Method: In a cross-sectional study conducted in June2018in14districts of Isfahan, a sample of1000 people was recruited by a non-random multistage method and interviewed using a standard questionnaire to identify people with high-risk sexual behavior. Data are analyzed based on a network scale-up method in the STATA application.

Results: According to a report by men, the prevalence of male Extra marital sexual relations (N=2437) and relation with paying prostituted women (N=1211), with non-paying prostituted women (N=298), Homosexuality (N=696) and history of traveling for sexual relations (N =880/100,000); And according to a report by women, the prevalence of female Extra marital sexual relations (N=1386) and Sex Worker women (Monetary) (N=946), Sex Worker women (Non-Monetary) (N=258), and history of travelling for sexual relations (N=13/100,000). In both sexes, the age group of18 to 30years was more at risk for sexual behaviors than other groups.

Discussion and Conclusion: It seems that the prevalence of sexual high-risk behaviors in Isfahan is remarkable as the increased prevalence of sexually transmitted diseases, including HIV, but unfortunately, the required training is low in this regard, more attention should be paying to train people to prevent the prevalence of these high-risk sexual behaviors in society.

Introduction

High-risk sexual behaviors, including having multiple sexual partners, increase the likelihood of sexually transmitted diseases and HIV (1, 2).According to a World Health Organization report, one million people suffer from sexually transmitted diseases

* Corresponding Author: Email: maryamnasirian@who-hivhub.org

daily (3). Studies have shown that the prevalence of high-risk sexual behaviors in the societies is due to cultural and social changes(4), which Iran is no exception to, and research has shown that Iranian society has seen changes in sexual relations patterns in recent years. Extra marital sex is on the rise(5). Currently, about a third of young people are sexually active which may be due to cultural, social and economic changes, as the gap between puberty and marriage is not engaging in high-risk sexual risk behaviors. It is necessary to plan for the control and prevention of sexual risk behaviors and consequently prevent health and social consequences (6).

But the main obstacle to prevention and control is the conception of high-risk sexual behaviors in our country due to social unacceptability, stigma, illegality and non-religious in Iranian culture and Islam (7, 8).This leads to a lack of access to and recognizes the characteristics of these groups, including the size of the population as a first step to prioritize prevention and control programs. Therefore, it is necessary to estimate the population size of these groups in indirect ways, without the need for direct contact with the hidden population.

One of the indirect ways that have been considered in recent years is the network scale method presented by anthropologists, social network experts, and math Mathematicians. The network scale-up method is based on the assumption that participants were asked to know how many people from the subgroups we were looking for. This method is based on the notion that the number and proportion of known people by the participants were linearly proportional to the actual size of the population (9).This method was first used in Mexico to estimate the number of lost people in the earthquake in 1986 (10).In Iran, this method is used for non-reported victims and to estimate the actions of suicides in the Kermanshah (2018) report as well. Treatment failure in people under methadone treatment in Kerman (2019) and estimation of drug use among students in Kerman (2018) (11-13) Also, a study was conducted in 2014 to estimate the high-risk sexual behaviors and substance abuse in some provinces of the country whose results have not yet been published(14).

Although Isfahan, the third major city in the country, is not excluded from changes in the sexual behavior pattern of society, there are unfortunately accurate statistics about risk behaviors. This study was aimed to estimate the prevalence of high-risk sexual behaviors by using a network scale, including at least one out-of-home sexual experience, prostitution in women, having sexual intercourse with the prostituted women, homosexual sex, and traveling overseas for sexual issues. The results of this study will help solve the problems faced by health policymakers in the community for preventing and controlling plans including training.

Method

A descriptive cross-sectional study was conducted using an indirect network scale-up method in 14 districts of Isfahan city in June 2018 and the number of people with high-risk behavior was estimated.

Sample Size and Sampling

The sample size, considering the average estimated prevalence of high-risk behaviors in the national country (0.45) (14), confidence coefficient of 95 percent, an error

level of 0.04 and a loss coefficient of 1.5, is approximately estimated to 1000 people to the non-random multistage sampling method. Each one of 14 municipal districts of the city was considered to be a class and proportional to the size, a sample was assigned to them. Then, in each of these districts, the traffic areas (as a cluster) were found and in any class, two clusters were randomly selected. Sampling from the selected clusters is done as a non-random and regular (every 15 minutes one person) from eligible passers on all days of the week and heavy traffic hours (9 am to 9 pm). Inclusion criteria in this study were the ability to answer questions, to have at least 2 years of residence in Isfahan and being age above 18 years. Exclusion criteria were to participate in a study the day before or unwillingness to cooperate in the study.

Data Collection

A standard questionnaire approved by the Mental Health Bureau of the Ministry of Health was used for data collection(14). The cultural adjustment of this questionnaire to Isfahan people's culture was reviewed and during the inspection meetings and modified some items. Then, the nominal and content validity were assessed by qualitative methods and during a pilot study, its reliability was assessed and Kappa statistics were estimated at around 76.8 percent. The questionnaire contains 8 questions in two parts; the main part consists of questions related to knowing the high-risk sexual behaviors in the past year, such as "men and women have at least one Extra marital sexual relationship, women and men with a history of traveling for having sex, men having sex with women for money at least once, or other than money, men with homosexual relations, monetary and non-monetary women. "In the second part of the questionnaire, as the respondents acknowledged their understanding of the mentioned people, they were asked to recognize and separate the high-risk sexual behaviors based on the gender and three age groups under 18 years, 30-18 years and over 30 years and the questions were inserted in the questionnaire. At the end of the questionnaire, the demographic characteristics of the respondents were asked (age, sex, education, marital status). To do this, four interviewers (two women and two men) from Isfahan were trained and familiar with Isfahan popular culture. Then, the interviewers were selected based on time - spatial schedule and categorization of age and sex groups and selected eligible individuals. The notion of knowing means "people who were in touch with respondents at least one or two years in the past, once in-person or remote contact (via phone, email, cyberspace) and know them by face and name and also they know these people mutually and can easily contact them whenever needed and explain to them (9).

Ethical Considerations

Interviewers, after providing explanations about the project purpose, the independence of the respondents in answering the questions, the anonymity of the questionnaire, the inability to track them and the confidentiality of the respondents' information were verbally informed(15).This study was conducted by Isfahan University of Medical Sciences with an approved code IR.MUI.REC.1396.296140.

Data Analysis Method

Calculation of high-risk individuals in this study was done according to this formula.

$$T \times \frac{\sum M}{\sum c} \times \frac{1}{v} \times \frac{1}{p}$$

In this formula, "T" stands for the total number of people in the community; the total population of Isfahan was 1961260 subjects. "M" was the number of high-risk sexual behaviors that a person knows, "C" stands for a social network of people in the country about 308 subjects (13, 16).Given that the size of the social network of individuals with high-risk behaviors was smaller than that of the general population, "P" or called "popularity ratio", "V" means transparency factor and indicates the percentage of people who are in contact with high-risk behavior and know their behaviors were different based on the type of risky behavior in the range of 0.2 to 1 Data were analyzed in STATA software (version 11). Description of the data was performed using the indexes of average, standard deviation, frequency, and frequency percentage. In order to compensate for the non-response rate of participants, and to ensure that participants were similar to the community, thereby increasing the validity of the results, estimation confidence intervals were calculated using survey analysis.

Results

Characteristics of Participants in the Study

Participants aged 18 to 70 years, mean age of men was 35.2 and women were 33.8, and 50% of Sample population are women with no significant differences in demographic characteristics with men (p> 0.001) (Table1).

The estimated prevalence of Extra marital sexual relations in men and women was 2437 / 100,000 subjects which were significantly higher in men than in women (p<0.001).. In men, the estimated prevalence of extra marital sexual relations, sex with prostituted women, and homosexuality was 18 to 30 years higher for other age groups, with the highest prevalence of sexual travels at the age of above 30 years. In men, the estimated prevalence of non-paying sexual relation with prostituted women was lower than for paying ones. Women aged 18 to 30 years have the highest prevalence of sexual risk behaviors than other age groups (Table 2 and Figure 1).

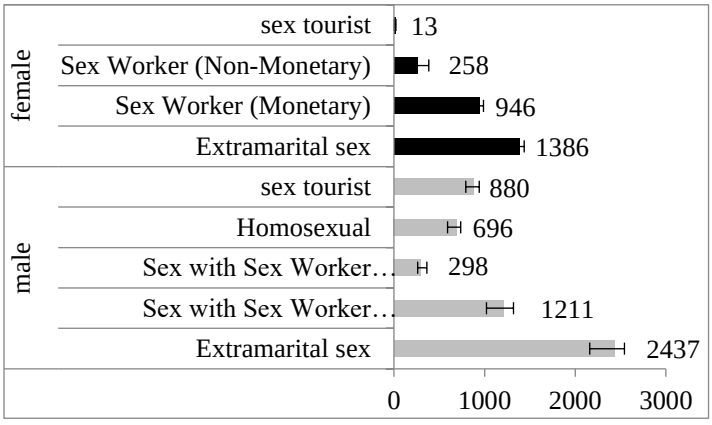

Figure 1 The estimated prevalence (95% CI) of high-risk sexual behaviors among Isfahan residents based on gender in 100000 person.

Table 1. Demographic characteristic of participants

Variable	Male (N=500)	Female (N=500)	P-value*
Age[mean(SD)]	35.2 (12.591)	33.8 (12.050)	t-test= 0.076
Age category [N (%)]			
18-20**(years)**	56(5.6%)	84(8.4%)	
20-30**(years)**	163(16.3%)	140(14.0%)	Chi2= 0.301
>30**(years)**	281(28.1%)	276(27.6%)	
Education [N (%)]			
illiterate or Elementary	34 (3.4%)	20 (2.0%)	
Under Diploma	91 (9.1%)	80 (8.0%)	Chi2= 0.059
Diploma	198(19.8%)	199(19.9%)	
graduated	177(17.7%)	201(20.1%)	
Marital status [N (%)]			
Single	216(21.6%)	169(16.9%)	
Married	280(28.0%)	322(32.2%)	Chi2= 0. 767
divorced	4(0.4%)	5(0.5%)	
Widow	0(0%)	4(0.2%)	

Discussion

The results of the present study showed that the estimated prevalence of high-risk sexual behaviors among Isfahan residents is significant, with more than 2% of men and 1% of women likely having Extra marital sexual relations (1).A study by Shokouhi et al. (2012) in Kerman estimated that about 12 percent of men had Extra marital sexual relations (17).The study results of Motamed et al. (2016) showed that the majority of participants are looking for premarital finding friends (18).A study by Kazem Mohammed et al. (2007) on boys aged 15 to 18 showed that more than 60% of these people reported having friends of the opposite sex and 75% of them reported they had sex with their girlfriends (4).In the present study, the prevalence of extra marital sexual relations was lower in women than in men, as shown in the study by Motamed et al. which showed that about 60 percent of women believed they should remain virgin until marriage, while only 26 percent of boys believed it. They had to be virgins before marriage (18).On the other hand, Iranian women may hide more extramarital sexual relations than men for various social and religious reasons, suggesting that the surgery

of repairing the hymen among girls who had sex before marriage(19).

Table 2. The estimated prevalence (95% CI) of high-risk sexual behaviors among Isfahan residents based on gender and age groups report

Reported by	At least one time in the past year	Point estimation (95% CI) per 100000 person			
		Total (CI)	<18	18-30	>30
male	Extra marital sex	2437(2113 – 2760)	124(68 – 180)	1657(1408 – 1906)	656(558 – 755)
	Sex with paying prostituted (Monetary)	1211(932 – 1490)	32(11 – 52)	665(510 – 819)	515(313 – 716)
	Sex with non-paying prostituted (Non-Monetary)	298(171 – 423)	9(4 -22)	138(64 – 211)	151(82 – 219)
	Homosexual	696(532 – 861)	128(59 – 197)	376(289 – 463)	192(96 – 288)
	Traveling for sexual	880(728 – 1031)	14(3 – 30)	421(342 – 500)	445(359 - 531)
female	Extramarital sex	1386(1143 – 1629)	171(90 – 252)	846(685 – 1006)	370(290 – 450)
	Sex Worker (Monetary)	946(740 – 1152)	33(11 – 54)	537(362 – 712)	376(314 – 440)
	Sex Worker (Non-Monetary)	258(152 – 363)	20(2 – 38)	120(70 – 170)	117(62 – 173)
	Traveling for sexual	13(4 – 17)	0	8(2 – 14)	3(1 – 6)

Rostami's study (2017) showed that about 7% of women aged 10 to 49 years old with one of the sexually transmitted infections referred to the clinic and had extra marital sexual relations during the past year.

In the present study in both sexes, the prevalence of extra marital sexual relations was maximal; this result is from a reason that extra marital sexual relations cover other sexual risk behaviors examined in this study. Given that the study was not possible to verify there is no overlap, it is offered in future studies of risk behaviors in more detail and with less overlap.

In women aged 18 to 30 years had the highest incidence of sexual risk behaviors. In men, the highest prevalence of risky sexual behaviors, except for traveling to sexuality (sexual tourist) in the age groups of 18 to 30 years. High levels of sexual risk behaviors in men and women 18 to 30 years are probably due to sexual maturity, independence, social and economic subjects. In Honarvar's study (2016) in Shiraz, the median age at first marriage was 18 years and the mean age of first sex was about 18 years (20). Age group 18 years and above for reasons such as education, military service, career choice may be far from family and less supervision

from their parents and the likelihood of risky behavior in them is high (21).Therefore, it is suggested that more educational programs for adolescents and young age groups should be considered before they reach high-risk ages to find out the consequences of these high-risk behaviors (22).

The results show that approximately 9.0% of men above 30 years in Isfahan experience traveling to other countries to have sex. These may include religious and legal prohibitions as well as social stigma regarding prostitution or association with prostitution in Iran (23).Although the prevalence of sex tourism was lower in women than in men, it was significant and more common in the age group of 18 to 30 years. It is more likely that women will travel to other countries for prostitution, while men are more likely to buy services (sex) for traveling to other countries. In any case, this issue may not be based on the data obtained in the present study; study more about why traveling to other countries and there is a difference between men and women and different age groups.

In men, the prevalence of monetary sexual relation with the prostituted women was about one percent higher than that of the non-paying one.

The results of Khajekazemi‘s study (2013) conducted in more than 10 provinces of the country showed that more than 30% of the interviewed injecting drug users stated that they had paid for sex (24). Khodabandeh’s study (2018) showed that there was a significant relationship between drug use and sex for money (25). Sex for money exists in many parts of the world. There are reports that there are between 40 and 42 million sex workers in the world who are paid for sex (26).

Pollin's study (2007) found that sex-based on receiving money or gifts were far more than expected on sex on the basis of friendship (27). Economic problems are one of the reasons for the rising age of marriage among young people. Given that in Iran there are no relations between the opposite sexes as is common in Western countries, there are other methods, including sexual intercourse, based on arbitrary payment as a Mahr. In fact, this relationship is based on financial interests (28). Existence and increase in this behavior raise the risk of sexually transmitted diseases (especially HIV). Therefore, raising public awareness and knowledge about family health and sex can be used to prevent sexual dysfunction, with increased sexual behavior and healthy hygienic, appropriate and effective mental health, sexual identity and the family health establishment (29). More detailed studies have been suggested to investigate the number of such high-risk behaviors in the country and the reasons for their existence that may be effective in enhancing the sexual health of the population.

According to the results of the present study, the prevalence of the paying prostituted women was estimated at about 1 percent that this number is about 3 times the prevalence of non-paying prostitution. Non-paying prostitution is referred to as a woman who is trafficked for nothing but money, such as clothing, food, bedding, and other means (23). Regarding the official references, there are more than 80,000 prostituted women in Iran (4). A study in 13 cities estimated the number of prostituted women about 91500 subjects (30). Age of beginning prostitution in Iran is 16 to 22 years, although recent

research shows this age is decreasing (31). According to Karami (2017), most female sex workers were aged 25 to 39 years (15). In the present study, however, the highest prevalence of prostitution was at the age of 18 to 30 years. The estimated prevalence for female sex workers in the form of paying and non-paying is quite close and harmonious with prevalence for men having sex with female monetary and non-monetary prostitutes that may cause the accuracy of the results of the study. In any case, prostitutes and their clients are one of the main groups involved in the transmission of HIV infection and planning for these two groups is very important.

The estimated prevalence of homosexual men in Isfahan is more than 5.0 percent, while in Honarvar's study (2016), homosexuality in both sexes around was estimated at 5.0 percent, with an average age of 16 years (20).

This study had limitations that must be considered when using and interpreting the results. One of the limitations was random sampling from the house. Because of the sensitivity of the study, people at home may not answer the questions correctly and explicitly (15). To address this problem, it was attempting to make sampling in crowded city centers where more people were likely to be present. Also, by sampling 15-minute intervals between samples, sampling was attempted to approach a systematic model. Another limitation of the study is that a constant value was used for the size of male and female social networks, although this may differ in both sexes and even at different ages, due to the lack of accurate information, it is possible to apply them. There was no social network size for men and women. Another limitation of the present study is the indirect information gathering that individuals need to understand and report accurately on the concept of cognition. There is also the possibility of a reminder bias occurring, and on the other hand, participants may have reported a number of people not residing in Isfahan, which may be overestimated. However, despite all these problems, it seems that the current scale of the network has fewer errors than other forms. Also, considering the confidence interval statistical methods estimated in the present study, some results may be reliable. Given that the assumptions of the network scale-up method are observed, it can be expected that the obtained estimates will have both high internal and external validity (generalizability).

Conclusion

It seems that the prevalence of sexual high-risk behaviors as a transit route for sexually transmitted diseases, especially HIV is significant among Isfahan residents and particularly among men aged 18 to 30 years. The efforts and attention of policymakers and planners are to prevent and control these high-risk behaviors and related illnesses. Learning about loyalty and having a partner, using condoms and other contraceptives, avoiding sex with people who have multiple sex partners, reducing alcohol and drugs before the sex and sexual knowledge of strategies can be helpful in prevention. On the other hand, planning to reduce the barriers and problems of youth marriage, mental health education on self-esteem, especially for youth and adolescents as well as girls and women, is also highly recommended.

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Conflicts of interest:

The authors declare that they have no conflict of interest.

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