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10.4103/jehp.jehp\_920\_21

# Estimating the prevalence of high-risk behaviors using network scale-up method in medical university students

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## Abstract:

**BACKGROUND:** There is not much information about high-risk behaviors in young groups, especially students. This study was conducted to estimate the prevalence of high-risk behaviors in students of universities of medical sciences in West Azerbaijan Province, Iran, by network scale-up (NSU) method.

**MATERIALS AND METHODS:** This cross-sectional study was performed on 450 students from the universities of medical sciences. A researcher-developed checklist was used to collect the data. We considered number 16 for the social network size of students according to a previous study. Based on the response of individuals to each of the high-risk behaviors (including cigarette smoking, hookah use, opium consumption, alcohol drinking, tramadol/ecstasy taking, and extramarital sex) in their social network, the prevalence of these behaviors was estimated. The required calculations were performed using the NSU method. Furthermore, 95% uncertainty interval (UI) was calculated using the bootstrap method.

**RESULTS:** Totally, 196 (44%) participants were male. The mean age (standard deviation) of the participants was  $22 \pm 2$  years. Results showed that hookah use (20% 95% UI [18.9–21.1]) and opium consumption (0.4% 95% UI [0.24–0.6]) had the highest and lowest frequencies, respectively. Cigarette smoking (17% 95% UI [15.8–18]), alcohol use (8.3% 95% UI [7.5–9.1]), extramarital sex (8.2% 95% UI [7.4–9]), and tramadol/ecstasy taking (4% 95% UI [6.4–4.6]) were the next most common high-risk behaviors, respectively.

**CONCLUSIONS:** Given that hookah use and cigarette smoking are the most common high-risk behaviors in students, especially males, appropriate cultural activities and educational programs should be employed by relevant authorities to reduce these behaviors.

## Keywords:

Dangerous behavior, health occupation students, prevalence

## Introduction

Any typical behavior, regardless of moral, social, or customary rules, that leads to dangerous consequences for the health of individuals or society is called a risky behavior.<sup>[1]</sup> Despite the ongoing activities in the last three decades, high-risk behaviors have been growing exponentially worldwide.<sup>[2]</sup> There is an increasing trend in some high-risk behaviors that threaten the health of communities at the national and

international levels.<sup>[2]</sup> High-risk behaviors such as smoking, drug or alcohol abuse, and unhealthy sexual intercourses are important health and social problems.<sup>[3]</sup> In recent years, alcohol, methamphetamine, and various illegal drug abuses have become significant concerns in Iran<sup>[2,4,5]</sup> that have increased medical care costs.<sup>[6]</sup> Adolescents and young people are the main groups that are most prone to high-risk behaviors. These behaviors increase the risk of premature death, disability, and increased incidence of

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**How to cite this article:** Moghaddam Tabrizi F, Sharafkhani R, Heydari Z, Khorami Markani A, Ahmadi Aghziyarat N, Khalkhali HR. Estimating the prevalence of high-risk behaviors using network scale-up method in medical university students. *J Edu Health Promot* 2022;11:356.

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Received: 23-06-2021  
Accepted: 12-01-2022  
Published: 26-11-2022

chronic diseases.<sup>[7]</sup> Iran has a young population, 25% of which is within the age range of 15–29 years, according to the latest population census in 2016.<sup>[8]</sup> Living away from the family imposes stresses such as leading independent personal life, providing the expenditures, employment while studying, academic pressures, and examinations. Besides the deprivation of supervision and emotional support of family, these conditions predispose to high-risk behaviors.<sup>[9-11]</sup>

In Iran, despite the precautions taken in this regard, the increasing drug abuse among young people, especially students, has become a significant concern for policymakers and planners.<sup>[12]</sup> Moreover, lack of awareness of the side effects of drug abuse among young people has made this age group more prone to infectious diseases such as hepatitis B and C and HIV. In a study conducted among the youth and students in Tehran, the young people’s awareness of the consequences of high-risk behaviors was low.<sup>[13]</sup> In most studies, the data collection tool is a self-administered, direct, or interview questionnaire. When questions about sensitive behaviors are asked directly in a questionnaire, it generally leads to intense biases such as nonresponse and low reporting errors by the study participants. This issue reduces the number of correct answers and accuracy of data collection. Therefore, the estimates will suffer from a low accuracy.<sup>[14-16]</sup>

Despite the sensitivity of high-risk behaviors and the religious, cultural, legal, and social stigma associated with them, there is not much information about risky or hidden behaviors in young groups, especially students.<sup>[17]</sup> Therefore, there are few internal and valid studies in this field to be regarded as literature. The limitations of direct methods in estimating high-risk behaviors necessitate faster studies such as indirect methods for estimating such sensitive behaviors.<sup>[2]</sup> The network scale-up (NSU) method is a relatively new approach that facilitates the estimation of high-risk behaviors in hidden groups of society. In this method, instead of asking about the individual’s behaviors, the behaviors of people in their social network are questioned, and it is assumed that the prevalence of the behavior of interest in the sample network is more or less representative of its prevalence in the whole society.<sup>[18,19]</sup>

Due to the need for being aware of the prevalence of high-risk behaviors in groups at risk, we decided to conduct a study using this new approach among the students of universities of medical sciences in West Azerbaijan Province, Iran.

## Materials and Methods

### Study design and setting

A cross-sectional study was performed on students from

the universities of medical sciences in West Azerbaijan Province, Iran.

### Study participants and sampling

There is no specific formula for estimating sample size in NSU studies. According to the total number of students, which was close to 5000, and according to the size of the student’s social network, which was estimated at 16 in a previous study,<sup>[11]</sup> 450 people enrolled in the study. The sample size of each school was determined by proportional method (according to the number and sex of students in each school) [Table 1].

### Data collection tool and technique

A researcher-developed checklist was used to collect the data. Interviews with students were conducted in the faculty on different days of the week. The study sample was the students studying at Urmia/Khoy universities of medical sciences in 2019 that at least 1 year had passed since their enrollment. In case of one’s refusal to participate in the study, another person replaced him/her. The researchers explained to the individuals that participating in the survey was voluntary and subject to their informed consent before the interview. Individuals were also assured that their personal information was safe and confidential.

### Network scale-up method

The first step in this method is to determine the size of the social network of individuals. Since the social network size of Iranian students was 16 in a previous study,<sup>[11]</sup> this number was used in this study. Using trained interviewers, the participants were asked about high-risk behaviors in their social network (people who knew each other by name and face, met several times a week, and spent at least 2 h a week outside their classes) to assess the prevalence of high-risk behaviors among

**Table 1: Subjects enrolled in the study by location**

Urmia University of Medical Sciences	Number of male students	Number of female students
School located in Urmia city		
Nursing-Midwifery	30	33
School of Medicine	74	80
International Branch	0	29
School of Applied Medical Sciences	23	36
School of Pharmacy	7	9
School of Health	11	25
School of Dentistry	10	9
School located other cities		
School of Nursing – Naqadeh city	8	7
School of Nursing – Bukan city	9	0
School of Nursing – Salmas city	6	5
Khoy School of Medical Sciences – Khoy city	18	21
<b>Total</b>	<b>196</b>	<b>254</b>

students. Based on the response of individuals to each of the high-risk behaviors (including cigarette smoking, hookah use, opium consumption, alcohol drinking, tramadol/ecstasy taking, and extramarital sex) in their social network, the prevalence of these behaviors was estimated. The required calculations were performed using the following formula.

$$\frac{e}{t} = \frac{m}{c}$$

m: The mean number of students with high-risk behavior in the social network of students (for example, hookah use)

c: The size of the students' social network

e: Estimated total number of students with high-risk behavior

t: Total number of students

Data were analyzed using SPSS software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). The 95% uncertainty interval (UI) was calculated using the bootstrap method. Percentiles of 2.5 and 97.5% were considered as lower and upper limits. We compared whether the estimated prevalence of high-risk behaviors was significantly different between males and females.<sup>[20]</sup>

### Ethical consideration

This study acquired an ethical code from Khoy University of Medical Sciences (IR.KHOY.REC.1397.001).

## Results

According to the latest available statistics, 4667 people were studying, while 2149 (46%) of them were male, and the rest (54%) were female. This study interviewed 196 men and 254 women from the student population of universities of medical sciences. The mean age (standard deviation) of the participants was 22 ± 2 years. Some other demographic variables, including marital status and education, were examined; most of them were single and undergraduate students [Table 2].

The results of population size estimation based on the maximum likelihood function of the network generalization estimator showed that hookah use (20% 95% UI [18.9–21.1]) and opium consumption (0.4% 95% UI [0.24–0.6]) had the highest and lowest frequencies, respectively, among the groups with high-risk behaviors. Cigarette smoking (17% 95% UI [15.8–18]), alcohol drinking (8.3% 95% UI [7.5–9.1]), extramarital sex (8.2% 95% UI [7.4–9]), and tramadol/ecstasy taking (4% 95% UI [6.4–4.6]) were the next most

**Table 2: Some characteristics of the participants**

Variable	Frequency (%)
Sex	
Male	197 (43.7)
Female	254 (56.3)
Education	
Undergraduate	233 (51.6)
General medicine	217 (48.1)
Upper graduate	1 (0.2)
Marital status	
Single	435 (96.2)
Married	16 (3.5)
Divorced	1 (0.2)

**Table 3: Prevalence of high-risk behaviors in all students and stratified by gender**

High-risk behavior	Total	Male	Female
Hookah use	20* (18.9–21.1)#	32.6 (29.5–33.6)	9 (7.9–10.2)
Cigarette smoking	17 (15.8–18)	29.2 (27.3–31.2)	6.8 (5.8–7.8)
Alcohol use	8.3 (7.5–9.1)	13.8 (12.4–15.4)	3.6 (2.9–4.3)
Extramarital sex	8.2 (7.4–9.0)	12.0 (10.7–13.4)	5.0 (4.2–5.9)
Tramadol and ecstasy	4.0 (3.4–4.6)	8.0 (7.0–9.2)	1.0 (0.64–1.4)
Opium	0.4 (0.24–0.6)	0.9 (0.5–1.3)	No data

\*Percent, #95% UI. UI=Uncertainty interval

common high-risk behaviors, respectively. The results also showed that the prevalence of high-risk behaviors is significantly higher in males than in females [Table 3]. The biggest difference was related to hookah use, while the least difference was related to extramarital sex and tramadol/ecstasy use ( $P = 0.001$ ).

## Discussion

This study applied an indirect method to estimate the prevalence of high-risk behaviors because the results of other research have shown that indirect methods provide better estimations than direct methods.<sup>[21,22]</sup> The results of this study and other studies conducted in Iran<sup>[11,21,23,24]</sup> indicated a lower prevalence of high-risk behaviors in Iran compared to other countries.<sup>[25-27]</sup> The reason may be the prevailing cultural and religious beliefs in Iran. In addition, the results of this study showed that high-risk behaviors such as hookah use, cigarette smoking, alcohol use, and sexual intercourse are more common among students. Moreover, all the high-risk behaviors were more prevalent in males, which was consistent with the results of other studies.<sup>[11,21]</sup> In general, these high-risk behaviors have adverse consequences on the health of individuals and society. For example, cigarette smoking and hookah use are two of the most important risk factors for chronic diseases such as cardiovascular disease and cancer.<sup>[28]</sup> Numerous documents have also reported that opium consumption and taking drugs such as ecstasy and tramadol cause students to drop out of school due

to mental disorders.<sup>[3,29]</sup> Alcohol drinking leads to liver disorders and accidents, especially at young ages,<sup>[30]</sup> and extramarital sex increases the risk of sexually transmitted diseases.<sup>[31]</sup> Kazemzadeh *et al.*, who conducted a study by the NSU method, examined 563 students from Kerman University of Medical Sciences and concluded that the most common high-risk behaviors in males are: friendship with the opposite sex (40%), alcohol drinking (14.6%), and extramarital sex (10.5%). Moreover, consumption of any narcotics (such as opium and heroin) was reported at 4.2%.<sup>[24]</sup> In the present study, alcohol use, extramarital sex, and opium consumption in males were 13.8, 12, and 0.9%, respectively. These prevalences were estimated as 3.6, 5, and 0% in the female population, respectively. These percentages were 1.5, 4, and 0.3% in Kazemzadeh's study. Perhaps, one of the reasons for the difference in the results of the two studies is the spatial and temporal variation.

In the present study, hookah use was 31.6% and 9% in male and female students, respectively. These estimates were 51% and 13% in Zahedi's study, respectively.<sup>[21]</sup> One of the reasons for the low estimate of this high-risk behavior may be the lack of visibility factor in the present study. In the present study, the prevalence of cigarette smoking was 29.2% and 6.8% in men and women, respectively, which were 25% and 3.4% in Zahedi's study. The shared point of both studies is the high level of hookah use compared to cigarette smoking, which can be seen in Maghsoudi's study as well.<sup>[11]</sup> Over the last decade, studies<sup>[32]</sup> have reported an increasing trend in hookah use than cigarette smoking. The most important reasons are the lower perception of risk and lower social stigma of hookah use in society.<sup>[33]</sup> Alcohol drinking was reported as 26% and 5.5% in men and women, respectively, in Zahedi's study,<sup>[21]</sup> while they were 13.8% and 3.6% in the present study. Zahedi's analysis was performed on 2157 students from three universities of Bahonar, Chamran, and Medical Sciences. The comparison between the present study and studies conducted in Kerman indicates high use of narcotics in Kerman and a slightly higher prevalence of alcohol drinking in West Azerbaijan Province. In this regard, the prevalence of alcohol drinking was 33% among all students in Sajjadi's study, which was conducted on 801 medical students from three universities in Tehran and Karaj.<sup>[34]</sup> Likewise, 25% of male and 12% of female students in Lar city, Fars Province, Iran, drink alcohol.<sup>[11]</sup> It seems that based on the environmental and behavioral conditions of each region, there are differences in the prevalence of high-risk behaviors.<sup>[35]</sup>

A web-based survey conducted in Tabriz city (Northwest of Iran) indicated that the prevalence of health risk behaviors was higher in male students. The prevalence of cigarette smoking, hookah use, alcohol

drinking, and extramarital sex was 36%, 32.6%, 13.8%, and 20% in male students, respectively.<sup>[23]</sup> The results of the two studies were almost identical, especially in alcohol drinking and extramarital sex. Perhaps, the most important reason was the similarity of dominant cultural and social values in the two regions.

Tramadol/ecstasy taking was estimated as 8% and 1% in male and female students, respectively, in the studied province, which is consistent with the results of a case study by Maghsoudi among students in Lar, Fars Province (Tramadol taking was 11% and 1% in males and females, respectively).<sup>[11]</sup> In Sajjadi and the present study, tramadol taking was 6.2% and 4% among the students.<sup>[34]</sup> Opium consumption was 0.33% in Sajjadi's study which was consistent with the present study results.<sup>[34]</sup> However, this rate was 2.2% in Kazemzadeh *et al.* study, which was higher than the value obtained in this study.<sup>[24]</sup> Studies have shown that narcotics consumption and drug addiction are highly affected by gender,<sup>[36]</sup> ethnicity, religion, and cultural and social differences.<sup>[37,38]</sup> It seems that hookah use and consumption of narcotics such as opium are more common in students in the south of the country.

### Limitation and recommendation

Lack of calculation of transparency coefficients was the most important limitation of the present study. Studies have shown that the visibility factor in female students is lower than in male students.<sup>[21,34]</sup> Perhaps, the most important reason is that women do not share their sensitive behaviors even with close friends. According to the results of similar studies,<sup>[21,34]</sup> it seems that the lack of visibility factor has led to underestimation in the present study, especially in male students. The present study was conducted with an indirect method to estimate the prevalence of high-risk behaviors in medical students in the province. We recommend that a study be conducted, at least every 5 years, to find out the latest status of high-risk behaviors in students of each university.

### Conclusion

Adolescence is one of the riskiest periods of the tendency to high-risk behaviors due to its special physical and mental characteristics. Therefore, addressing this issue among students is one of the basic topics of youth health and one of the most important challenges in the public health-care system. In general, the results showed that high-risk behaviors such as hookah use, cigarette smoking, drinking alcohol, and extramarital sex are more prevalent, especially in male students. Therefore, to reduce these behaviors, appropriate cultural activities and educational programs should be presented to health and medicine-related students when entering the university and during the study period by the relevant authorities.

## Acknowledgement

We thank the Khoy University of Medical Sciences for sponsoring this study, also we thank all the participating students.

## Financial support and sponsorship

This study was supported by Khoy University of Medical Sciences. (Grant number: 97-911836).

## Conflicts of interest

All authors declare that they have no conflicts of interest.

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