

## Twelve-hour before Driving Prevalence of Alcohol and Drug Use among Heavy Vehicle Drivers in South East of Iran Using Network Scale Up

Milad Ahmadi-Gohari<sup>1</sup>, Farzaneh Zolala<sup>2</sup>, Abedin Iranpour<sup>3</sup>, Mohammad Reza Baneshi<sup>1</sup>

### Original Article

#### Abstract

**Background:** Heavy vehicle drivers spend a great deal of time away from their families. This issue and other difficulties around their job may increase risky behaviors among them. The current study aims to investigate the prevalence of opium drugs, stimulants, cannabis, and alcohol use 12 hours before driving among heavy vehicle drivers.

**Methods:** In this cross-sectional study, we selected two sites that were in charge of medical examination of drivers and recruited 363 drivers of heavy vehicles (trucks, trailers, and buses). We asked drivers about total number of drivers they knew and number of drivers who experienced use of different types of drugs. The data were analyzed using Network Scale Up Method (NSUM).

**Findings:** Mean of age and job experience was  $43.28 \pm 10.04$  years and  $16.07 \pm 9.67$  years, respectively. The highest and lowest prevalence of drug use related to opium-based drugs at 12.8% to 14.0% and stimulants at 1.97% to 2.84%, respectively. The prevalence of alcohol use 12 hours before driving was 4%.

**Conclusion:** 12-hour before driving prevalence of opium-based drugs among drivers was high. This might put them in higher risk of road accidents. There is a need to design appropriate educational programs for them.

**Keywords:** Drivers; Trucks; Drug abuse; Alcoholism; Network scale up

**Citation:** Ahmadi-Gohari M, Zolala F, Iranpour A, Baneshi MR. **Twelve-hour before Driving Prevalence of Alcohol and Drug Use among Heavy Vehicle Drivers in South East of Iran Using Network Scale Up.** *Addict Health* 2019; 11(4): 256-61.

Received: 27.05.2019

Accepted: 06.08.2019

1- Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran  
2- Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran  
3- HIV/STI Surveillance Research Center, and WHO Collaborating Center for HIV Surveillance AND Department of Health Education and Promotion, School of Health Sciences, Kerman University of Medical Sciences, Kerman, Iran  
Correspondence to: Mohammad Reza Baneshi, Email: rbaneshi2@gmail.com

## Introduction

Using drugs by the drivers is one of the main reasons for car accidents. Several studies show that consumption of alcohol and drugs like cannabis may reduce the drivers' skills and lead to risky driving.<sup>1-3</sup> Using drugs may disturb cognition, perception, coordination, balance, and other functions of the driver's mind and exposes him to reckless and heedless driving.<sup>4</sup> This could occur particularly among commercial bus and truck drivers due to the challenging condition of their work which makes them adopt with difficult working shifts. Being away from family, driving in every climatic conditions, and low mobility are among harms of this job.<sup>5</sup> Driving for a long time for on-time delivery of the load and conveying passengers causes shortage of sleep and time of rest of drivers. They may get involved in drugs like amphetamine to increase their wide-awakeness hours. The drivers, due to enjoying fewer relations with friends and families, may be exposed to risky behaviors like alcohol and drug abuse.<sup>5</sup>

A great portion of transport in Iran is undertaken by commercial bus and truck drivers due to geographical location, span and insufficient coverage of railroad and air network. The official statistics in 2017 showed that 428 million tons freight has been performed through road transport in Iran.<sup>6</sup> On the other hand, Iran is located in the neighborhood of Afghanistan, one of the greatest producers of drugs in the world.<sup>7</sup> This may influence the prevalence of drug abuse in Iran, in a way that the studies performed in Iran show that 60% of Iranian drivers who have participated in deathful accidents used drugs.<sup>8</sup>

In order to estimate the prevalence of risky behaviors among drivers, different strategies have been used including blood sample tests and self-statement. However, these methods have some limitations. In order to have an accurate blood sample test results, in using some drugs and alcohol, it is necessary to conduct the test at least 12 hours after consumption; otherwise the results are likely to be falsely negative. Self-statement is also useful in case there is little stigma or legal restriction against such behaviors.

Nevertheless, using drugs is against law with considerable stigma. Therefore, direct methods such as blood sample and self-statement might give an inaccurate result.

Network Scale up Method (NSUM) is one of the indirect methods to estimate hidden groups. The logic of this method is that the frequency of people with hidden behavior in the social network of investigated population is an estimation of frequency of that behavior in general population.<sup>9</sup> This method has been widely used in various regions of the world to estimate the prevalence of drug abuse and the number of female sex workers and men who sex with men.<sup>10-12</sup>

The aim of this study is to estimate the prevalence of drug and alcohol abuse 12 hours before driving among commercial bus and truck drivers. Previous studies using direct method reported prevalence estimation. In this study, we used indirect method of NSUM.

## Methods

This cross-sectional study was performed in Kerman, the capital of the largest province in Iran. In Kerman, there are 2 centers for drivers' examinations where they refer for periodic tests. We designed a self-administered questionnaire to investigate the 12-hour before deriving prevalence of opium-based drugs, stimulants, cannabis, and alcohol use among heavy vehicle drivers. The data were collected from November 2018 to April 2019. Opium-based drugs included opium, heroin, crack, methadone, cannabis, and methamphetamine drugs (crystal and ecstasy pill).<sup>13</sup>

The questionnaire included demographic characteristics as well as NSU-related questions. We asked drivers about total number of drivers they knew. It was followed by asking a series of consecutive questions: "How many of them used drug 'X' 12 hours before deriving even for one episode?" By knowing we meant that the individual at least in the past one or two years, has had a phone, personal, or email contact with them and knew them by name and face and whenever required he could easily contact them.<sup>14</sup>

We asked the centers' authorities to explain aims of the study to drivers and to provide them with questionnaires. We assured the drivers about confidentiality of the data and only those consented verbally were included in the study.

The NSUM assumes that the prevalence of a risky behavior in a network of randomly-selected drivers is more or less the same as that of their whole population.<sup>15</sup>

Previous studies suggested that the social

network size of Kermanian males was 303.<sup>16</sup> We assumed that 'other drivers' accounts for at most one-third of network of drivers. In other words, each driver knows a maximum of 100 other drivers. To clean the data, we followed two approaches:

Firstly, we considered a ceiling of 100. That is, replies above 100 were replaced by 100. The number they knew in each risky group was also reduced proportionally. In the second strategy, drivers who claimed that they knew more than 100 drivers were excluded from study.

Basic NSU formula is  $e/t = m/c$ . Here, 'm' and 'c' show 'number of those engaged in risky behavior' reported by drivers and their network size, respectively. Therefore,  $m/c$  gives proportion of risky behavior in the network size of drivers. Total population is shown by 't'. Also, 'e' shows the size of the hidden group. Therefore,  $e/t$  shows proportion in the whole population. We applied the above formula to calculate the prevalence. To construct the confidence interval (CI) for estimates, Monte Carlo method was applied. We assumed that 'm' and 'c' follow Poisson distributions with a parameter equal to mean of replies. We generated 1000 random numbers and calculated the prevalence of 1000 times. Percentiles of 2.5 and 97.5 were used as lower and upper bounds of CI.

The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences (Code of Ethics: IR.KMU.REC.1397.600).

## Results

In total, 363 male commercial bus and truck drivers participated in the study. The mean age was  $43.28 \pm 10.04$  years. With respect to education level, 45.0% were under diploma and 13.2% had an academic degree. The mean of work experience was  $16.07 \pm 9.67$  years. About 7.3% were single, 91.2% were married, and 1.5% were widow or divorced.

The '12-hour before driving' prevalence of opium-based drug use was 12.80% (95% CI: 12.09-13.45) in ceiling scenario and 14% (95% CI:

13.78-15.27) in deletion scenario, respectively. The prevalence of alcohol use in both scenarios was about 4%. Prevalence of cannabis drug use was slightly above 3%. The prevalence of simulant drug use was 1.97% (95% CI: 1.71-2.23) and 2.74% (95% CI: 2.35-3.10) (Table 1) in ceiling and deletion scenarios, respectively.

## Discussion

This study aimed at estimation of prevalence of alcohol drinking, opium-based drug, cannabis and its derivatives, and simulant drugs use, 12 hours before driving. We found that the prevalence of opium use was much higher than cannabis and stimulant drug use. The 12-hour before driving prevalence of alcohol use was about 4.0%.

Most studies had addressed the last-year or current prevalence. No clear definition of current was given. Here, we provided a comparison between our estimates and current estimates with other studies.

**Alcohol:** We have found that the 12-hour before driving prevalence of alcohol use was about 4.0%. Between 2002 and 2008, in Sao Paulo, Brazil, 1250 truck drivers were stopped by police cooperation. In 1.44% of cases, the alcohol oral fluid test was positive.<sup>17</sup>

In a study conducted in Iran, 349 long-distance truck drivers from different provinces who referred to parking lot in Tehran, Iran, were recruited. Data were gathered through face to face interview. The prevalence of last-month alcohol use among drivers was 1.4%.<sup>18</sup>

In Pakistan, with interviewing 857 commercial bus and truck drivers, it was reported that about 10% of truck drivers used alcohol while driving.<sup>19</sup>

Although our study and the study conducted in Tehran provided an estimate for 12-hour before driving and last-month prevalence, our estimate for alcohol use was about three times higher than that of Tehran study.

This can partially be explained by differences between methodologies. We applied NSU

**Table 1.** Estimated prevalence of drug and alcohol use 12 hours before driving

Case studies	Ceiling scenario [% (95% CI)]	Deletion scenario [% (95% CI)]
Drinking	3.91 (3.51-4.30)	4.06 (3.61-4.56)
Opium-based drugs	12.80 (12.09-13.45)	14.00 (13.78-15.27)
Cannabis	3.27 (2.92-3.58)	3.02 (2.66-3.42)
Simulant drugs	1.97(1.71-2.23)	2.74 (2.35-3.10)

CI: Confidence interval

methodology where respondents provided replies on behalf of other drivers. However, in Tehran study data were gathered by means of face to face interviews. Due to cultural issues, respondents might not be willing to disclose their sensitive characteristics. On the other hand, our figure was much lower than Brazil study. Although in Brazil, alcohol use is not banned, its use before driving is limited. We believe that prevalence among Brazilian general population is much higher, but possibly due to its availability, drivers avoid its drinking before driving.

**Opium-based drugs:** In our study, opium use among drivers was calculated between 12.8% and 14.0%. In North Carolina, USA, a self-administered questionnaire was submitted to 316 male truck drivers. The last-month prevalence of opium use was estimated at 2.5%.<sup>20</sup>

In another study in France, by analyzing urine samples of 1000 truck drivers, the result of 4.1% of cases was positive. The urines were collected during annual examinations, before recruitment of new drivers (pre-employment exam) or when the work was stopped for any reason.<sup>21</sup>

The study conducted in Iran showed that 33.0% of truck drivers used opium in the last month.<sup>18</sup> In contrast to alcohol, prevalence of opium use in Iran was much higher than western countries. Having a long border with Afghanistan might explain the high prevalence of opium use in Iran. Another justification is that alcohol use is against religious values but opium use is not.

**Cannabis:** The prevalence of cannabis use in the present study was estimated about 3.02% to 3.27%. In North Carolina study, the last-month prevalence of cannabis use was about 3.4%.<sup>20</sup> In Pakistan study, the prevalence of marijuana use while driving was calculated at 10.4%.<sup>19</sup> In Sao Paulo study, based on urine sample analysis, it has been found that 11.9% of cases used cannabinoids.<sup>22</sup> The result of the France study showed that 8.5% of drivers used cannabinoids.<sup>21</sup>

**Simulant drugs:** The prevalence of simulant drug use in our study was calculated between 1.97% and 2.74%. The result of Iran study showed that 0.9% of truck drivers used simulants in the last month.<sup>18</sup> The result of North Carolina study showed that the last-month prevalence of simulant drug use was 1.9%.<sup>20</sup>

We should mention that use of traditional forms of drug, such as opium, is more common in

Iran, in particular among drivers. This is why use of traditional forms was higher in Iran, while the opposite was true in the case of chemical forms.

The study of the prevalence of drug and alcoholic drinks abuse highly depends on cultural and religious conditions, law status, and even geographical situation of that country. Iran is a neighbor of Afghanistan and for years, it has been a pathway of drugs trade to Europe.<sup>8</sup> Previous studies showed that opium abuse in Iran had a high rank compared to other countries. So, the prevalence of drug use in the occupational class of heavy vehicles drivers in Iran is expected to be more than some countries.<sup>23</sup>

**Weakness and strength:** The drivers who referred to the centers voluntarily participated in the study. Blood and urine samples were not taken from study participants. Drug and alcohol use that has higher stigma in the context of Iran might have low visibility. In addition, conducting this study as follows, stopping the drivers, and collecting blood and urine samples required a great deal of coordination. Also, the drivers and their unions have resisted in this regard. In our study, we used NSUM that is an indirect method. In this way, without having to take blood and urine samples, we could estimate the prevalence by completing the questionnaire. This is one of the most important advantages of this method.

## Conclusion

Regarding the obtained results from NSU approach, it seems that this method has been able to provide an appropriate estimation of the hidden behaviors in the occupational group of drivers. 12-hour before driving prevalence of opium-based drugs use was more prevalent than other drugs among drivers of heavy vehicles. Probably, drivers have more tendency to use opium-based drugs to stay awake and combat fatigue caused by much work. This might put them in the higher risk of road accidents. There is a need to design appropriate educational programs for them.

## Conflict of Interests

The Authors have no conflict of interest.

## Acknowledgements

The authors thank the Institute for Futures Studies in Health, Kerman University of Medical Sciences, for funding this research.

### Authors' Contribution

MAG; contributed to design the study, data collection, data analysis, data interpretation, drafting and revising the manuscript. FZ; contributed to data interpretation, drafting and

revising the manuscript. AI; contributed to design the study. MRB; contributed to primary design the study, data analysis, data interpretation, and revising the manuscript. All authors approved the final copy of the manuscript.

### References

1. Laude JR, Fillmore MT. Simulated driving performance under alcohol: Effects on driver-risk versus driver-skill. *Drug Alcohol Depend* 2015; 154: 271-7.
2. Martin JL, Gadegbeku B, Wu D, Viallon V, Laumon B. Cannabis, alcohol and fatal road accidents. *PLoS One* 2017; 12(11): e0187320.
3. Sewell RA, Poling J, Sofuoglu M. The effect of cannabis compared with alcohol on driving. *Am J Addict* 2009; 18(3): 185-93.
4. Lipari RN, Hughes A, Bose J. Driving Under the Influence of Alcohol and Illicit Drugs. The CBHSQ Report. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2016.
5. Anderson DG, Riley P. Determining standards of care for substance abuse and alcohol use in long-haul truck drivers. *Nurs Clin North Am* 2008; 43(3): 357-65.
6. Islamic Republic of Iran Road Maintenance and Transportation Organization. Statistical Yearbook of Transportation 2017 [Online]. [cited 2017]; Available from: URL: <http://rmto.ir/Pages/SalnameAmari.aspx>
7. United Nations Office on Drugs and Crime (UNODC). World Drug Report 2018 [Online]. [cited 2018]; Available from: URL: <https://www.unodc.org/wdr2018/>
8. Assari S, Moghani LM, Dejman M, Farnia M, Alasvand R, Sehat M, et al. Drug use among Iranian drivers involved in fatal car accidents. *Front Psychiatry* 2014; 5: 69.
9. Bernard HR, Hallett T, Iovita A, Johnsen EC, Lyerla R, McCarty C, et al. Counting hard-to-count populations: The network scale-up method for public health. *Sex Transm Infect* 2010; 86(Suppl 2): ii11-ii15.
10. Ezoë S, Morooka T, Noda T, Sabin ML, Koike S. Population size estimation of men who have sex with men through the network scale-up method in Japan. *PLoS One* 2012; 7(1): e31184.
11. Guo W, Bao S, Lin W, Wu G, Zhang W, Hladik W, et al. Estimating the size of HIV key affected populations in Chongqing, China, using the network scale-up method. *PLoS One* 2013; 8(8): e71796.
12. Maghsoudi A, Baneshi MR, Neydavoodi M, Haghdoost A. Network scale-up correction factors for population size estimation of people who inject drugs and female sex workers in Iran. *PLoS One* 2014; 9(11): e110917.
13. United Nations Office on Drugs and Crime (UNODC). Terminology and Information on Drugs. Vienna, Austria: UNODC Publications; 2016.
14. Killworth PD, McCarty C, Bernard HR, Shelley GA, Johnsen EC. Estimation of seroprevalence, rape, and homelessness in the United States using a social network approach. *Eval Rev* 1998; 22(2): 289-308.
15. Johnsen EC, Bernard HR, Killworth PD, Shelley GA, McCarty C. A social network approach to corroborating the number of AIDS/HIV + victims in the US. *Social Networks* 1995; 17(3): 167-87.
16. Shokoohi M, Baneshi MR, Haghdoost AA. Estimation of the active network size of kermanian males. *Addict Health* 2010; 2(3-4): 81-8.
17. Yonamine M, Sanches LR, Paranhos BA, de Almeida RM, Andreuccetti G, Leyton V. Detecting alcohol and illicit drugs in oral fluid samples collected from truck drivers in the state of Sao Paulo, Brazil. *Traffic Inj Prev* 2013; 14(2): 127-31.
18. Maarefvand M, Kassaie B, Ghiasvand H, Abolfathi GR, Khubchandani J. Sexual and drug use risk behaviors of internal long distance truck drivers in Iran. *Iran J Public Health* 2016; 45(5): 606-13.
19. Mir MU, Khan I, Ahmed B, Abdul Razzak J. Alcohol and marijuana use while driving--an unexpected crash risk in Pakistani commercial drivers: A cross-sectional survey. *BMC Public Health* 2012; 12: 145.
20. Shattell M, Apostolopoulos Y, Collins C, Sonmez S, Fehrenbacher C. Trucking organization and mental health disorders of truck drivers. *Issues Ment Health Nurs* 2012; 33(7): 436-44.
21. Labat L, Fontaine B, Delzenne C, Doublet A, Marek MC, Tellier D, et al. Prevalence of psychoactive substances in truck drivers in the Nord-Pas-de-Calais region (France). *Forensic Sci Int* 2008; 174(2-3): 90-4.
22. Leyton V, Sinagawa DM, Oliveira KC, Schmitz W, Andreuccetti G, De Martinis BS, et al. Amphetamine, cocaine and cannabinoids use among truck drivers on the roads in the State of Sao Paulo, Brazil. *Forensic Sci Int* 2012; 215(1-3): 25-7.
23. Zarghami M. Iranian common attitude toward opium consumption. *Iran J Psychiatry Behav Sci* 2015; 9(2): e2074.

## شیوع مصرف الکل و مواد مخدر ۱۲ ساعت قبل از رانندگی، در بین رانندگان وسایل نقلیه سنگین جنوب شرق ایران با استفاده از روش بسط شبکه‌ای

میلاذ احمدی گوهری<sup>۱</sup>، فرزانه ذوالعلی<sup>۲</sup>، عابدین ایران‌پور<sup>۳</sup>، محمد رضا بانسی<sup>۱</sup>

### مقاله پژوهشی

### چکیده

**مقدمه:** رانندگان وسایل نقلیه سنگین، زمان زیادی را دور از خانواده خود می‌گذرانند. این موضوع و سایر مشکلات پیرامون شغل آن‌ها، ممکن است سبب افزایش رفتارهای پرخطر در آنان شود. هدف از انجام پژوهش حاضر، بررسی شیوع مصرف مواد مخدر تریاک، محرک‌ها، حشیش و مصرف الکل، ۱۲ ساعت قبل از رانندگی، در بین رانندگان وسایل نقلیه سنگین بود.

**روش‌ها:** اطلاعات مربوط به ۳۶۳ راننده ماشین سنگین (کامیون، تریلی، اتوبوس) که به دو سایت معاینات پزشکی ویژه رانندگان مراجعه کرده بودند، مورد بررسی قرار گرفت. از رانندگان مراجعه‌کننده، تعداد کل رانندگانی را که می‌شناختند و تعدادی از آن‌ها که تجربه استفاده از انواع مواد مخدر را داشتند، سؤال شد. در نهایت، داده‌ها با استفاده از روش بسط شبکه‌ای تجزیه و تحلیل گردید.

**یافته‌ها:** متوسط سن رانندگان  $43/28 \pm 10/04$  سال و میانگین سابقه فعالیت حرفه‌ای آن‌ها  $9/67 \pm 16/07$  سال بود. بیشترین و کمترین میزان شیوع مصرف مواد مخدر به ترتیب به مواد مخدر گروه تریاک بین  $12/8$  تا  $14/0$  درصد و مواد محرک بین  $1/97$  تا  $2/84$  درصد اختصاص داشت. شیوع مصرف الکل ۱۲ ساعت قبل از رانندگی، ۴ درصد گزارش شد.

**نتیجه‌گیری:** شیوع مصرف مواد مخدر گروه تریاک ۱۲ ساعت قبل از رانندگی، در بین رانندگان زیاد بود و این موضوع ممکن است آن‌ها را در معرض خطر حوادث رانندگی قرار دهد. این امر نیاز به طراحی برنامه‌های آموزشی مناسب برای آن‌ها دارد.

**واژگان کلیدی:** رانندگان، کامیون‌ها، سوء مصرف مواد مخدر، مشروبات الکلی، بسط شبکه‌ای

**ارجاع:** احمدی گوهری میلاذ، ذوالعلی فرزانه، ایران‌پور عابدین، بانسی محمد رضا. شیوع مصرف الکل و مواد مخدر ۱۲ ساعت قبل از رانندگی، در بین رانندگان وسایل نقلیه سنگین جنوب شرق ایران با استفاده از روش بسط شبکه‌ای. مجله اعتیاد و سلامت ۱۳۹۸؛ ۱۱ (۴): ۶۱-۲۵۶.

تاریخ پذیرش: ۱۳۹۸/۵/۱۵

تاریخ دریافت: ۱۳۹۸/۳/۶

۱- مرکز تحقیقات مدل‌سازی در سلامت، پژوهشکده آینده‌پژوهی در سلامت، دانشگاه علوم پزشکی کرمان، کرمان، ایران  
 ۲- مرکز تحقیقات عوامل اجتماعی مؤثر بر سلامت، پژوهشکده آینده‌پژوهی در سلامت، دانشگاه علوم پزشکی کرمان، کرمان، ایران  
 ۳- مرکز تحقیقات مراقبت HIV و عفونت‌های آمیزشی و مرکز همکار سازمان جهانی بهداشت و گروه آموزش بهداشت و ارتقای سلامت، دانشکده بهداشت، دانشگاه علوم پزشکی کرمان، کرمان، ایران

Email: [rbaneshi2@gmail.com](mailto:rbaneshi2@gmail.com)

نویسنده مسؤول: محمد رضا بانسی