Nazarbayev University School of Medicine

Master of Public Health Program

Knowledge about health risks of hookah smoking among hookah servers. A mixed-method study.

Master's Thesis Project Professional Publication Framework

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ABBREVIATION LIST

CNS- central nervous system

CO- carbon monoxide

HS- hookah server

PAH- polycyclic aromatic hydrocarbons

Elements:

Al- Aluminum

Cd- Cadmium

Co- Cobalt

Cr- Chromium

Fe- Iron

Mn- Manganese

Pb- Lead

Zn- Zinc

ABSTRACT

Background

In recent years there was a sharp proliferation of hookah cafes in Kazakhstan. International fashion, originally coming from the Middle East and through other Central Asian states in the south of Kazakhstan very quickly attracted a lot of young people. This new fashion correlated with the decrease of cigarette smoking. A lot of people saw hookah as a safe alternative to cigarette smoking and this added to their popularity. The whole process was taking place despite the legal restrictions on smoking hookahs. They are at place not without a purpose, because a common belief that hookah is safe is actually wrong. In fact, studies show that hookah smoking is no less harmful than cigarette smoking. These risks may be unknown to the general public and for those who do not smoke hookah a lot. However, unlike cigarettes or many other types of tobacco use, hookah require a special preparation, which involves puffing. In hookah cafes, usually this is the job of a separate specialist – a hookah server. If the general public does not necessarily smoke hookah a lot, these specialists are putting themselves at a constant risk by working with hookah all the time. But what do these people know about the potential health risks? Are they informed about the various risks that they face? This study aims to investigate these questions.

Methods

This dissertation employs a mixed-method design. A quantitative analysis is based on a self-reported survey distributed online. After collecting the dataset, I run univariate and bivariate analysis, after which I construct the model using multiple linear regression analysis. A qualitative analysis relies on semi-structured interviews. In both cases, the participants of the study were collected from currently working hookah servers.

Results

The questionnaire comprises 45 questions was analyzed and described in the current study. The multiple linear regression model showed that age, marital status, experience history, number of tables hookah servers cater, job search and job type were statistically significantly associated with the level of knowledge about hookah. Thus, when someone gets older, their knowledge level increases. As compared to the reference group (single), married and divorced people's knowledge decreases. Long working history increases knowledge level. Hookah servers catering 21-30 tables per day have higher knowledge compared to those who serve less than 10 tables a day. Self-search decreases knowledge level, compared to search via friends, and finding a job with the help of relative increases it. People working part-time job, have higher knowledge than those working full-time.

10 people agreed to participate in qualitative research, with the highest age 33 and lowest of 19. During the analysis, 9 themes were developed. Generally, people aware of the main contents and its possible harms, but the real joy they have at the job, prevents most of them to quit it. Although, hookah servers are not aware of specific and exact contents, such as tar and nicotine amount, heavy metals and PAHs presence.

Conclusion

This study identified the knowledge level about hookah and its harms and risks among hookah servers in Kazakhstan. The knowledge level can be modified and changed through increasing awareness among the general younger population.

INTRODUCTION

Hookah or shisha, other names: galyan, nargile, okka pipe, etc. is a device that is used to smoke tobacco. The study by Maziak (2011) suggests that hookah may be "the second global tobacco epidemic since cigarette". The apparatus passes smoke through the liquid (usually water) which then is inhaled by hookah smoker. It is a well-known fact that hookah smoking has been increasing, while cigarettes' usage has decreased (CDC 2014; Nelson et al. 2006; Johnston et al. 2012). The Centers for Disease Control and Prevention states that decrease in cigarette usage is due to increased interestingness in other forms of tobacco. Especially, in Astana city, for the last 5 years, there was a dramatic increase in hookah smoking, because galyan cafes are now distributed almost everywhere in the 2 biggest cities of Kazakhstan (Astana and Almaty). This is happening despite the legal restrictions that prohibit smoking hookahs in:

- in educational institutions, as well as in organizations for the rest of minors,
- in health care organizations,
- in points of public catering,
- in cinemas, theaters, circuses, concert, viewing and exhibition halls, on sports grounds and in other indoor facilities intended for mass leisure including nightclubs and discos,
- in museums, libraries and lecture halls,
- in unidentified places on local and long-distance trains, on air, sea and river transport vessels,
- as well as in the salons of a city, intercity buses, fixed-route taxis and city electric transport, in buildings of airports, railway, automobile and water stations,
- in state bodies and organizations, in premises which are workplaces,
- as well as in the entrances of residential buildings.

However, there is no data on the prevalence of hookah smoking among Kazakhstani people. There are studies on knowledge and prevalence, health risks awareness of hookah among university students or young adults/adults that were conducted in other countries. For example, Aljarrah, Ababneh and Al-Delaimy (2009) argue that hookah users believe that hookah is less harmful, while Nuzzo, et al. (2012), contradicts by saying that there is little association between knowledge and hookah smoking. The scholarship in general agrees that public awareness and knowledge is low, thinking that hookah is less harmful than cigarettes (CDC 2014; Nelson et al. 2006; Johnston et al. 2012; Aljarrah et al. 2009; Nuzzo 2012 et al.). However, there are no studies that research hookah servers' knowledge about the health risks of hookah in Kazakhstan. Hookah servers or simply preparers are people who work at venues, preparing shisha to clients, and re-prepare it when it is needed. Nothing is known about their knowledge of hookah's health effects that they expose themselves during their working hours. To fill this gap, I propose a first and unique study that is going to determine social-demographical aspect as well as knowledge of harms of the device which they are working with.

Vaporized tobacco, charcoal and hookah tube/hose (that can be made from rubber or plastic) can be a cause of a toxic body burden to hookah users. Monzer et al. (2008), says that CO exhaled from hookah produced by charcoal has no difference from cigarettes, so that can lead to high carboxyhemoglobin levels in a body. Also, hookah smoking produces higher PM (particulate matter) in indoor air level than cigarettes (Maziak et al., 2008). Another concern is that hookah related to exposing users to PAH (polycyclic aromatic hydrocarbons) (Monzer et al., 2008). A recent study by Elsayed, Dalibalta and Abu-Farha (2016) showed that the smoke of charcoal in hookah expose seven carcinogens, almost 40 CNS (central nervous system) depressants and more than 30 lung irritants. Kabir et al., (2011), found three trace metals (zinc (Zn), iron (Fe) and lead (Pb)) to be in higher concentration compared with

cigarettes. The most recent study showed the association between head and neck cancer and hookah usage (Patil et al., 2019).

Generally, hookah and cigarettes have minor differences in chemical compound structure. Both contain substances such as tar, tobacco (nicotine), carbon monoxide, PAHs, trace metals and others (Eissenberg and Shihadeh 2009; Monzer et al., 2008; Jacob et al., 2011). One hookah session takes from 20 to 80 minutes (Shihadeh et al., 2004). According to Eissenberg and Shihadeh (2009) and Sepetdjian et al. (2008), during this one hookah session a user is exposed to higher concentrations of CO and nicotine as well as PAHs (20 times), compared with a single cigarette.

A study that investigated indoor air pollution in shisha bars in New York city, showed elevated concentrations of pollutants, which can be a health threat to employees as well as to clients (Zhou et al., 2015). Another study, that collected air samples in hookah bars, found that exhaled CO levels among bar employees were considerably increased (more than 90 ppm). Also, inflammatory cytokines in blood were elevated after work shift (Zhou et al., 2017). The results show that such bar employees are exposed to second-hand smoke of hookah, and it can cause potential adverse health effects. However, there are still no long-term health effects studies. So, taking into account the fact that air quality in hookah bars are dangerous not only to people who came with reasons besides smoking hookah, but also to bar employees, there is a need to understand why people still working at the bars. Nothing is known about their knowledge about health risks. Although, we can assume, that people who are currently working with a hookah or as hookah servers are professionals, so that they must know about their working area; but what if they do know about health harms, then what is the reasons of staying and working as hookah-server?!

This knowledge is necessary because by knowing the level of knowledge among hookah servers the government itself or non-governmental organizations can create reforms in this direction. Secondly, for the best of our knowledge it is the first study in this specific field.

The main aims of the study are: 1) to measure the level of exposure to hookah smoking among hookah servers; 2) to measure the level of knowledge of health risks associated with hookah smoking among hookah servers; 3) to determine the factors that may be associated with levels of knowledge of hookah health risk among hookah servers.

METHODS

Study design

A cross-sectional study was performed to investigate the level of knowledge, to determine socio-demographic factors and reasons of working among hookah servers in public places, such as cafes, restaurants and other areas, where hookah is provided, in primarily Astana, Kazakhstan. To increase validity and to achieve convenient and credible results we performed a mixed-method study. The study consists of two parts: a self-reported online survey and semi-structured in-depth interview. The study was approved by the Nazarbayev University School of Medicine's Research Ethics Committee. There was minimal risk for participants due to the informed consent form and no personal identifiers in the study instrument. The voluntary basis of answering the survey and interview questions assured that after being acknowledged with the informed consent, participants were aware of their rights. Also, respondents knew that there were no direct benefits for them. Survey and interview participants received no incentives for participating in the study.

Participants. The eligibility criteria for this study was: women and men of different race/ethnic group, who work as hookah servers/preparers of age between 18 and older years, able to read, speak and write in Russian or Kazakh languages. Exclusion criteria included vulnerable groups and people younger than 18 years, because, they are not supposed to

smoke any products that contain tobacco. It is written in the Law of the Republic of Kazakhstan No. 340-II of 10 July 2002. About prevention and restriction of tobacco Smoking. (with changes and additions as of 19.06.2007, sections 8,9. Participants of the study were selected by the method of snowballing, through continuous survey-link sending among hookah servers. For the qualitative part, friends of mine who work as hookah servers, using, again the snowball sampling and their connections in this sphere, connected me with future participants. As a result, 57 people completed the survey and 10 people were recruited for the semi-structured in-depth interview.

Measures

Quantitative part. To develop a study instrument for the qualitative part, as well as for quantitative, an electronic search for the corresponding study was performed at PubMed, Medline, Cochrane, ScienceDirect. We used next keywords for that: "hookah", "shisha", "galyan", "waterpipe tobacco", "hookah servers", "hookah prepares", "shisha servers/prepares", "galyan servers/prepares", "waterpipe tobacco servers/prepares". However, there were no previous studies about knowledge level among hookah servers. So, the survey was based on two combined similar studies, that conducted the knowledge about harmful effects of hookah among college students and the general population (Aljarrah, Ababneh, Al-Delaimy,2009; Nuzzo et al., 2012). Also, we added new questions specifically related to hookah servers. Participants were asked general questions first, including of additional questions regarding the participants' working history, habits, working process, relatives' and friends' attitudes towards their job; then to determine the knowledge of respondents, we used 5-item Likert scale. The final questionnaire consisted of 45 questions. Questionnaires, consent forms were translated into Russian and Kazakh languages. A pre-test was conducted in order to check that the questions are understood by individuals and to make changes if needed.

Qualitative part. The 20-item tool was developed by investigators, and consisted of open-ended questions, and probing technique was used to reach deep, clear understanding of incomplete answers. The qualitative part consisted of 6 parts: Knowledge & Beliefs, family acceptance, health problems, the motive to work, sanitization/cleaning of hookah, desire to quit and socio-demographical information. The study was conducted as a single face-to-face semi-structured in-depth interview, and at public places, mostly at their work-places. The interview took approximately 40 minutes, with 1-2 conducted interviews per day. Each interview was recorded with the help of the voice recorder, and only with the permission of participants.

Data analysis

Quantitative part. Stata 12 was used to perform statistical analysis for the quantitative part of the research. 5 questionnaires were eliminated from the database due to missing answers. Total of 52 participants filled the questionnaire and were analyzed. Basic descriptive statistics were done on questions 1-9 and questions from 10-34 determined hookah related habits and working process characteristics. The part on knowledge about hookah consisted of 11 statements that was based on a five-point Likert scale. The correct answers were scored as "5,4" (totally agree/agree), while incorrect answers were given "1,0" (totally disagree/disagree), "neutral" was given 3 points. An overall score was found by summation of all answers. Thus, the maximum score was 51 points, and the minimum was 24.

First of all, descriptive analysis was conducted, where percentages of each explanatory variables were identified. Secondly, bivariate non-parametric Kruskal-Wallis, Wilcoxon rank sum, the Spearman rank-order correlation coefficient and t-tests were performed to identify independent variables that were statistically significantly associated with outcome variables. Dummy variables were generated for categorical variables to conduct the multivariate analyses. Finally, only those independent variables that were found to be statistically

significant (p-value<0.25) from the aforementioned tests analysis were carried out into the final model that was based on multiple linear regression.

Qualitative part. The NVivo 12 program was used to conduct the analysis. 10 interviews were translated to English and transcribed. Given the fact that there are no any guidelines to the topic, inductive coding was used to analyze the findings. Then, all codes were categorized into several groups. After reviewing codes and categories, indicative patterns and relations were found. Next, specific themes were identified and generated.

RESULTS

Background information. Out of 48 survey participants who indicated their age, the mean age was 23 years with a standard deviation of 3.4, ranging from 18 till 33 (Figure 1). From 52 respondents, who indicated their gender, 46 (88.46%) were males and 6 (11.54%) were females (Figure 2). Out of 51 participants indicating their study level, 45.1% have their bachelor level, 31.37% finished a college, 15.69% finished masters, 3.92% are school graduates, and 1.96% are currently bachelor and college students (Figure 3). Majority of participants were from Almaty 67.31%, from Astana were 17.31%, from Oskemen, Shymkent and Kyzylorda were only 3.85%, while nearly 2% were from Karaganda and Pavlodar (Figure 4). Almost all students were Kazakhs, accounting for almost 60%, 23.5% were Russians, while others were Korean, Kurd, Tatar, Uyghur, Mixed, Tadjik and Uzbek (Table 1).

Most participants were single- 71.15%, 23.08% were married, while others were divorced (3.85%) and in a civil union (1.92 %) (Figure 5). According to participants' income, the highest salary among 52% of respondents is <150,000 while others (48%) earn more than 150,000 tenge. The lowest was 35,000 (2%), and the highest income was 500,000 (2%) (Table 2). 69.23% of them are working full time, while the rest are on the part-time job. Most of them work 4-5 days a week (54.90%), while 33% work 6 or more days per week. Almost

60% of hookah servers work from 9 to 15 hours per day, and 36.5% work until 8 hours, rest people work more than 15 hours a day (Figure 6). 42% of respondents' employment history as a hookah server is from 2-5 years; 26% work for about a year at the job. 90.38% of hookah servers were introduced to hookah at the age of less than 18, while only 9.62% first tried it when they were older than 18 (Figure 7). Most of the participants serve <20 tables at busy days, such as Fridays and Saturdays, and <10 tables at not busy days (other days) (Table 3). Servers re-prepare hookah usually from 0 to 2 times per table (65.22%) and make mostly 6-10 puffs per table (38.3%) (Figure 8). 75% smoke at their free time, 61% have their own hookah tool, and almost 32% smoke it 1-2 hours. Most of the respondent smoke neither cigarettes nor smokeless tobacco, 51% and 94% respectively. Nearly 70% said that most of their friends and 30% answered that 2 family members smoke hookah, while 42% indicated that only 1 family member smoke cigarettes. Self-search was the main way of finding the job (66%). Finally, working conditions (37.5%) and salary (20.8%) were prime choices as a reason to work as hookah server (Figure 9).

Bivariate analysis

11 questions created to understand the knowledge level among hookah servers were combined in one dependent variable-knowledge (Table 4). The knowledge score was divided into high and low based on the median split, which had amounted to 32.67. The maximum was 51 and the minimum was 24, with standard deviation-4.8. Precisely half of the participants have high and low knowledge levels.

In bivariate analysis, the non-parametric tests were used to determine statistically significant relationship between dependent variable and independent variables. To reduce the chance of missing out potential confounders, p-values ≤ 0.25 were accepted as significant. To be more precise, we used continuous data of our dependent variable. To estimate relationship between dependent variable and independent categorical variables that have 2 or more groups we used

Kruskal-Wallis test (current residence, home-town, education level, marital status, employment, employment history, working days/hours, number of customers they cater per working session, etc.), and for categorical variables that consist of 2 groups, we used Wilcoxon rank sum test (free-time smoking, age first introduced to hookah, gender, etc.). T-test was applied if the independent variable showed normal distribution (cigarettes smoking, do they own hookah, monthly income). Lastly, Spearman's correlation test was used to identify the relationship between continuous variable-age, and dependent variable.

Table 4. Bivariate results of knowledge level about hookah among hookah-servers as an outcome and independent, explanatory variables

		Knowledge (continuous)	
	Freq. (%)	**Mean\coefficients**	**p-value**
Gender			**0.1309***
Men	46 (88.46)	32.97	
Women	6 (11.54)	30.3	
Age		Spearman's=0.2176	**0.1374***
Residence (**current**)			0.9279
Almaty	35 (67.31)	32.685	
Astana	9 (17.31)	32.88	
Karaganda	1 (1.92)	34	
Kyzylorda	2 (3.85)	32	
Oskemen	2 (3.85)	31.5	
Pavlodar	1 (1.92)	30	
Shymkent	2 (3.85)	34	
City/town where you were born (home-town)			**0.2301***
Almaty	21 (42.86)		
Astana	2 (4.08)	33.523	
Bishkek	1 (2.04)	37	
Dushanbe	1 (2.04)	32	
Karaganda	3 (6.12)	38	
Kentau	1 (2.04)	32.3	
Kyzylorda	4 (8.16)	31	
Lenger	1 (2.04)	30.75	
Oskemen	2 (4.08)	37	
Pavlodar	3 (6.12)	31.5	
Saint Petersburg	1 (2.04)	29.66	
Samara	1 (2.04)	34	
Taraz	6 (12.24)	35	
Tekeli	1 (2.04)	30	
	1 (2.04)	26	
		40	
Education			0.3264
Bachelor	23 (45.1)	33.78	
College	16 (31.37)	31.18	

Current Ba Current col Masters School graduate	1 (1.96) 1 (1.96) 8 (15.69) 2 (3.92)	31 41 31.5 33.5	
Mother's education level Bachelor College Masters Post-grad School graduate	 18 (34.62) 11 (21.15) 12 (23.08) 5 (9.62) 6 (11.54)	 34 33 31.66 32.8 30	0.4176
Father's education level Bachelor College Masters Post-grad School graduate	 15 (31.91) 9 (19.15) 13 (27.66) 6 (12.77) 4 (8.51)	 32.93 32.8 32.15 31.5 31.75	0.9054
Marital status Cohabiting Divorced Married Single	 1 (1.92) 2 (3.85) 12 (23.08) 37 (71.15)	 30 28 30.3 33.75	**0.0316***
Employment Full-time Part-time	 36 (69.23) 16 (30.77)	 31.8 34.43	**0.185***
Age first introduced to hookah <=18 >18	 47 (90.38) 5 (9.62)	 32.63 33	0.884
Employment history (length of time worked as hookah server) 0-12 months 13-24 months 25-60 months 60-120 121-180	 13 (26) 6 (12) 21 (42) 8 (16) 2 (4)	 32.3 30 33.52 34.25 28	**0.0775***
Working days on average 0-3 4-5 6 more	 6 (11.76) 28 (54.9) 17 (33.3)	 37.3 31.9 32.058	**0.1612***
Working hours on average Till 8 9-15 15 more	 19 (36.54) 30 (57.69) 3 (5.77)	 33.05 32.93 27.6	**0.1553***
What you put in hookah mostly? Water Other	 50 (96.15) 2 (3.85)	 32.68 32.5	0.9242
Average number of tables you cater per working session at busy days? <20	 18 (36)	 33.5	0.2961

21-30 31-40 41-50 >51	12 (24) 4 (8) 6 (12) 10 (20)	31.25 32.75 35 31.2	
Average number of tables you cater per working session for not busy days? <10 11-20 21-30 31-40 >41	 22 (42.3) 16 (30.7) 7 (13.4) 4 (7.69) 3 (5.77)	 32.318 33.87 34.57 28 30.6	**0.0762***
How many puffs you make per 1 table? <5 6-10 11-15 >15	 15 (31.9) 18 (38.3) 3 (6.38) 11 (23.4)	 32.86 31.2 36.6 32.54	0.6397
How many times on average you re-prepare hookah per table? 0-2 3-5 >6	 30 (65.2) 12 (26.09) 4 (8.7)	 31.9 33.58 31.5	0.6400
Beside job hookah use, do you smoke hookah in your free-time? No Yes	 47 (90.4) 5 (9.6)	 32.63 33	0.5665
Duration of hookah use in your free time on average: <60 61-120 121-180 >180	 11 (28.95) 12 (31.58) 7 (18.4) 8 (21.05)	 30.36 34.16 35.57 29.25	**0.0481***
Where do you smoke it? At home Both Outside	 3 (6.25) 21 (43.75) 24 (50)	 30.6 31.904 33.375	0.7359
Do you own hookah? No Yes	 20 (38.46) 32 (61.54)	 33.15 32.375	0.5763
Do you use waterpipe tobacco with other aims? No Yes	 50 (96.15) 2 (3.85)	 32.64 33.5	0.8484
Do you smoke cigarettes? No Yes	 27 (51.9) 25 (48.08)	 32.44 32.92	0.7250

Do you use smokeless tobacco? No Yes	 49 (94.23) 3 (5.77)	 32.83 30	0.3645
What is your monthly income? <=150000 >150000	 26 (52) 24 (48)	 31.96 33.16	0.3788
. How did you find the job? . Friends . Relatives Self-search	 16 (32) 1(2) 33 (66)	 33.43 51 31.72	**0.1036***
. Reasons to work as hookah-server . Colleagues . Salary . Conditions . Hobby . Love for job	 6 (12.5) 10 (20.83) 18 (37.5) 5 (10.42) 9 (18.75)	 33 33.5 32.61 30.6 32.3	0.8215
. Do your friends smoke hookah? All of them Most Some	 7 (13.46) 36 (69.23) 9 (17.31)	 33 32.61 32.6	0.9137
. Number of people who smoke hookah in your family? . 0 . 1 . 2 . 3 . >4	 19 (36.54) 14 (26.92) 16 (30.7) 1 (1.92) 2 (3.85)	 33.84 31.85 32.875 33 25.5	0.3268
. Number of people who smoke cigarettes in your family? . 0 . 1 . 2 . 3 . >4	 12 (23.08) 22 (42.31) 10 (19.23) 7 (13.46) 1 (1.92)	 33.91 32.45 31.6 32.7 33	0.9415
. Do you smoke hookah with your family? . No . Yes	 39 (75) 13 (25)	 33.61 28.84	**0.0142***
. Cleaning . After every guest . Once per day . Once per 2-3 days	 47 (90.38) 4 (7.69) 1 (1.92)	 32.57 33.5 34	0.7478

*Note: *statistically significant at p<0.25*

There was a statistical significance between dependent variable and age (p-value=0.137), gender (p-value=0.13), home-town (p-value=0.23), marital status (p-value=0.03), employment (p-value=0.185), employment history (p-value=0.07), working days per week

(p-value=0.16), working hours per day (p-value=0.15), number of tables they cater during not busy days (p-value=0.076), duration of hookah smoke at their free time (p-value=0.04), job-search (p-value=0.1), and smoking with family members (p-value=0.01).

Multiple linear regression

The variables that were found to be statistically significant from the bivariate analyses, were included in the multiple linear regression, in order to find associations between independent and dependent variables, adjusting for potential confounders. Variables are considered as statistically significant, if they have a p-value <0.05. Those independent variables that turned out not statistically significant were removed from the initial model. The home-town variable showed collinearity, so some variables were omitted, that's why we removed the variable from the model. The first variable that showed not significant result is hookah smoking duration at their free time (p-value=0.815), next was smoking with family (p-value=0.72), then gender (p-value=0.69). Probably, because sample size for women was small. After, we excluded working hours per day (p-value=0.56) and working days per week (p-value=0.51). We did not find any confounders that would significantly change the model. The last variable that we could exclude was work shift (full or part time) (p-value=0.02) (Table 5). After comparing the two models (with and without variable), we found that it is not necessary to exclude the variable (p-value=0.004).

Table 5. Multivariate results: Multiple Linear Regression of Knowledge about hookah (final model)

Knowledge about hookah (reference group)	**groups**	**coefficients**	**p-value**	**95% Confidence Interval**
Age (continuous)		0.3917	**0.003***	.1416977 .6417561
Marital status (reference group: single)	Cohabiting	-1.9318	0.422	-6.777993 2.914271
	Divorced	-8.6833	**0.000***	-12.52426 -4.842502
	Married	-5.9767	**0.000***	-8.370788 -3.582707
Experience history (0-12)	13-24	5.3698	**0.004***	1.857937 8.881728
	25-60	2.3714	**0.017***	.4532167 4.289719

	61-120	5.4926	**0.001***	2.515527 8.469743
	121<	-2.2467	0.368	-7.271006 2.777481
Table catering (not busy days) (<10)	11--20	0.9254	0.340	-1.024495 2.875463
	21--30	5.5653	**0.000***	3.070725 8.059951
	31--40	-2.4794	0.158	-5.975438 1.016561
	41<	-2.2407	0.304	-6.61966 2.138089
How did you find the job? (friends)	relatives	18.445	**0.000***	13.59805 23.29217
	self-search	-1.9743	**0.018***	-3.586114 -.3626216
Job type (full-time)	Part-time	1.9456	**0.024***	.2768188 3.614409

*Note: *statistically significant at p<0.05*

According to the final multiple linear regression model, age, marital status, experience history, number of tables they cater, job search and job type were statistically significantly associated with the level of knowledge about hookah. Thus, when someone gets older, the knowledge level increases by 0.392. Next, as compared to the reference group (single), married and divorced people's knowledge decreases by 5.97 and 8.7, respectively. Next group we compared was experience history. Comparing to the reference group (working history from 0 month to 1 year), more experience increases knowledge level by 5.37, 2.37, 5.49 for groups 13-24, 25-60, 61-120 months, accordingly; while working more than 10 years decreases it. Hookah servers catering 21-30 tables per day have higher knowledge (5.565) comparing to those who serve less than 10 tables a day. Other variables appeared to be not statistically significant. Job search showed interesting trends. Self-search decreases knowledge level by 1.97, compared to search via friends, and finding a job with the help of relative increases it by 18.4. The last variable that showed statistical significance is job type. People working a part-time job, have higher knowledge (1.94) than those working full-time.

Results of the qualitative study

8 men and 2 women agreed to participate in the study. The youngest participant was 19 years old, while the eldest was 33 years old (Table 6). Most of them have a bachelor's degree, however, their participation in education seems little. 9 themes were identified after analysis of the interviews. All participants were given "P-number" names.

Table 6. Participants' characteristics

Characteristic	Number (%) or mean
Age	23.5
Gender	Females:2 Males:8
Ethnicity	Kazakhs:7 Russian:1 Tatar:1
Occupation:	Student:1 Working:9
Working history	3.5 years

Categories and themes.

Theme 1: Smoking initiation

Usually people became hookah servers (HS), if they previously worked as waiters/waitress or were guests at hookah bars.

P5: "When I was 15, I started to work as a waiter. After a while, my friend called me to work as hookah server in a new restaurant. I agreed, and stayed there because the salary was higher and the job itself much easier"

However, one participant said that he started to smoke, because of relatives.

P1: "When I was 13 years old, my father gave it to me to try. Since then, I learned about hookah, its flavors and it was interesting how smoke happens in the body and why it's so pleasant to taste. I started to read about hookah more"

Theme 2: Reasons to work

There was no 1 specific reason to work at the position. Several factors influence on their decision to stay as HS. Only one respondent said that the main and the only one reason to work as HS is salary. Others have a real interest and joy of working there.

P2: "I like discovering new things... you are busy. Also, it brings good income and the job is easy. I like not money, not people, but hookah itself"

P10: "You work on ease, have high income. There is little responsibility. Socializing with people and meet new ones that are my reasons"

P5: "Hookah is my job and it brings pleasure. I like to work as HS. People respect me. It's fun to talk to guests, I like my staff. They became my friends. Recently, I had some big problems in my personal life. All of them, including my boss, helped me a lot. I appreciate it, really. I love that we act like a family"

Last respondent mentioned assistance and helping hand inside the "community", and he was not the only one:

P7: "Guests became friends and it's my income…"
P8: "Another nice thing about working as HS, is that you become friends with staff, and most of them… they all are very friendly"

Theme 3: Authorities' opinion

Some respondents noted that they have guests or friends who are actual sportsmen, and due to the fact that even sportsmen smoke, they consider hookah as harmless thing.

P1: "A lot of sportsmen smoke it, and have no problems"
P5: "A lot of sportsmen smoke it, and it's ok for them"

Theme 4: Positive effect of smoking hookah

Generally, 2 main categories were identified in this theme: relaxing and socializing. Many hookah servers said that the job gives them opportunities to meet new people, socialize, make new friends, and generally smoking it brings more fun, relaxing feelings.

P3: "Connection with people, agreeable pastime. It's relaxing, especially after hard day"
P4: "Relaxing nerves. Body burden is low. And I know that when people smoke it, their concentration becomes better"

Theme 5: Health consequences

9 mentions about 'hookah is a safe alternative' were made by HSs.

P7: "Hookah is less harmful than cigarettes. There is an opinion, that 100 cig-s are equal to 1 hookah smoke. But nobody takes into account that hookah contains 10 times less nicotine. Plus, we don't smoke benzol, and CO, and products of combustion of cigarette's paper. It's clean and natural product. The only harm thing is flavoring matters, because they are chemicals"

Some of them noted smoking frequency and its harm:

P8: "Other HS-s are not going to say so, because they love to smoke. It is lung burden, but the point is in frequency. If you smoke hookah as regular as cigarettes, then, I think, it is much harmful than cigarettes. Usually, people smoke it during weekends"
P4: "Toxicants same as in cigarettes, but in less quantity"

In general, respondents know about harms of hookah, but consider it as safe alternative. 4 people mentioned that body adjust to everything. Also, 4 people think that air we breathe and living conditions are worse, than hookah smoking.

P2: "…Last 3-4 months I have no symptoms. Maybe because I got used to it. The body adjust to anything. For me there are no consequences for health. I can play football, but when I got tired, I rest a little bit, then go to play again for 2 hours. I'm not a sportsman, but I have good health. Currently, I feel myself comfy…"
P1: "A lot of things is harmful in this life. Even to live is harmful. We have bad ecology, dirty water, foods quality is not good; hookah is another need, and it is not much harmful than those things which I mentioned before"
One person said about risk of getting cancer: *P4: "It may cause lung cancer. I know some guys (hookah servers and regular smoker) who have the diagnosis. It is really harmful when you smoke it at summertime, at open space cafes. Because, water boils and heated smoke goes to the body, which may cause the cancer"*
Almost all of the participants agreed that hookah is the cause of symptoms, such as dizziness, headache, and nausea.

P6: "2 years ago, I prepared 37 hookahs. At my 25th, I fell unconscious. In 1.5 minutes, I recovered. After 37th, again fell unconscious"
P7: "Everything has its own harm. Hookah has its main negative outcome- CO2 poisoning. The coal that heats the tobacco, releases its own…something. People relaxes due to excess amount of O2 in the brain. That's why your head become dizzy. I heard of lung cancer as a consequence, but, personally, I don't believe it"
P9: "If you prepare more than 10 hookahs, you have sleepiness and you want to die. You need to smoke it all in moderation. Maybe, symptoms will manifest later in future, but I'm young and I feel fine right now. I have headaches, because of coal and flavors. If there is no air conditioner, symptoms get worse"
Also, I asked them about addiction problems. However, there is no evidence that it can cause the addiction. Definitely, hookah contains nicotine, but how much of it someone need to develop addiction is still unknown. Only one participant said that there is absolutely no nicotine, while others have same opinion, that cigarettes cause worse addiction. So, basically, they know that it can cause addiction, but not heavy dependence.

Theme 6: Safety products

During the interviews I heard that there are some products that can help to fight or to ease the symptoms. *P6: "I washed my face with cold water, drunk black tea with lemon. Also, milk helps, to clean lungs"* or as P7 said*: "That's why I drink water, because, when you breathe the smoke of hookah it dries throat, so you need to drink tea. Tea depends on BP. High BP- green tea".* Another person said (P5)*: "I drink white tar, it helps body to be cleaned"*. As

learning sources, they mentioned: YouTube bloggers, Google search and mostly, their own experience.

Theme 7: Filtration

It is said that water in hookah jar filtrates the toxins, so smoke is clean and safe to people. However, studies show that it does not, and actually smoke contains PAH's and other particulate matters (Maziak et al., 2008). Some of HS-s believe that it cleans the smoke, and others do not. *P1: "Apparatus should be clean. It's very important. Especially water jar should be very clean, because it contains water and water itself is a filter"*
P7: "Water does not filtrate… it cools the smoke"

Theme 8: Policy

The theme is about policy, laws and taxes. Most of them expressed dissatisfaction with current situation in our country. Generally, they say that in order to avoid corruption, the government should amend the law, legalize hookah smoking at specific public areas (cafes, bars, etc.) and include proper taxes. Also, it would help to avoid illegal trafficking.

P1: "Government always tries to make new laws, to close us, etc. When, there are more and bigger problems, that need to be solved. Then, those people come to us to smoke-it's a controversy. Government think, that we cannot be rich, so they try to close us, or try to create some barriers (laws) against our business"
P3: "Police and those who inspects such places, come to take money. There should be laws and regulations"
P6: "I wish there were taxes. So, smoking hookah at public spaces would be official. For now, we need to pay (kick back) inspectors. Once, epidemiologists came, they took our hookahs to expertise, and found nothing"
P7: "There should be taxes. It should be legalized. Because, illegal traffic is developing"

Theme 9: Quitting

To understand for how long they stay to work as hookah server, we asked them about future plans.

P9: "Currently, I'm quitting. I want to be a make-up artist. I want to stabilize my schedule. I want to be awakened in the morning, and sleep at night. My husband and I have problems, we are arguing, because of the work schedule"
3 people said it is insignificant job, and working as HS is appropriate only for young people.

P5: "I need to find better job. Maybe open my own hookah café. Working as hookah server at the age of 35 is a bad idea. It lowers status. It's good when you have your own business (hookah café) and prepare it to the guests, while being a boss"
Most of them were sure that even if they quit someday, they absolutely going to smoke

waterpipe tobacco after.

DISCUSSION

This study was designed to explore the knowledge level about hookah among HS in Astana. Most of the participants work 4-5 days a week, and 9-15 hours per day. They prepare hookah 1-2 times and make in average 6-10 puffs to 1 table. Also, they serve approximately, 10-20 tables per day and most of them work in this business for 2-5 years. It is not hard to calculate how much they smoke per month, and it's beside the fact that 75% smoke hookah at their free time. The interesting thing we have found was the fact that 90% of respondents first tried shisha at the illegal age, which is less than 18 years. It corresponds with previous study where mean age of hookah smoking initiation was also under the age of 18 (Narain et al., 2011). As to come to reasons of working as hookah server, the primary factor has been working conditions, and salary as second-best option. After multiple linear regression test, several interesting results were found. First of all, the older someone work as hookah server, the higher knowledge he has. As there is no such study yet, we compared this result to similar studies among hookah users. It was found out that knowledge increases with age and it has significant association with knowledge (Holtzman, Babinski, Merlo, 2013). Secondly, what we have found is being single increases your knowledge, while married and divorced have less awareness about hookah harms. Probably, it is due to the fact that those people do not have time to increase knowledge, because of busyness, or they do not care, because of salary demand. Other studies have no statistically significant differences between these groups (Jeihooni et al., 2018). Next, there is an association between high knowledge and experience history. With each passing year knowledge increases continuously. However, people with working history of 10 years and more diminishes knowledge level. Interestingly, individuals who found the job through relatives have highest level of knowledge than those, who found it through friends; and participants who found the position on their own, have the lowest level

of knowledge. Lastly, part-time job has also been found to be among the factors associated with the knowledge among hookah servers. One possible reason for that can be a small sample size. Another factor might be the fact that people know about harms- preferred to work half a day. Because, the job is the source of high income, even for those who work part-time. Especially, it is considered high among young people.

Qualitative part. The present qualitative study determined knowledge, reasons and general thoughts on hookah among hookah servers in Kazakhstan. The following 9 themes developed during the analysis of interviews: smoking initiation, reasons to work, authorities' opinion, positive sides, health consequences, safety products, filtration, policy, and quitting. The main reason to work was that the job is easy and socializing. Salary was considered as a pleasant bonus, but important factor as well. This theme has common categories with theme about positive effects of smoking hookah. People mostly said, they make connections and friends at the job. Also, it has relaxing feeling, that means there is no stress. Next, positive side was learning and developing. Participants said they are constantly learning new flavors, tools, and hookah making processes. One participant even compared hookah to an "esthetic pleasure". Then I asked respondents about addiction possibilities and nicotine presence. Most of them, agreed that tobacco contains nicotine, only one disagreed and one said it depends on tobacco type. Generally, they believe that nicotine in hookah does not cause any addiction or addiction from cigarettes is much worse. They consider hookah as safe alternative to cigarettes. 7 out of 10 do not smoke cigarettes, recognizing it as harmful and terrible smelling. As there is still no strong evidence that hookah can cause addiction, we passed this part. Another issue is that people do not know exact contents of hookah. Many studies showed that hookah contains same toxicants such as tar and Polycyclic Aromatic Hydrocarbons (PAHs), as a result of burning charcoal (Monzer et al., 2008). Recent study of American Heart Association (Bhatnagar et al., 2019) released research about water pipe

tobacco. They confirmed that 1) hookah smoke contains half or more of the PAHs exhaled by smoker; 2) it contains acrolein, benzene, phenols, and propionaldehyde, 27-fold greater levels of formaldehyde, 4-fold greater acetaldehyde, 19-fold greater acrolein, 9-fold greater propionaldehyde, and 4-fold greater methacrolein levels; 3) hookah smoke contains heavy metals: Zn, Fe, Cd, Al, Pb, Cr, Mn, and Co (amounts same or higher than in cigarette smoke). Some of them believe there is no tar or other toxicants, while others know, but do not feel that all of it may cause harms. They say that body adjust and all symptoms will disappear after a while or if you are not hungry. Another concern, some participants said that we drink dangerous water and breathe with polluted air, which is actually true, but, it should not down-grade the importance of their health. New thing that I explored myself is that by drinking milk, green or black tea (as I was told, it depends on your blood pressure) or white tar help to reduce the symptoms, and this is something needed to be studied. Next, all of them clean hookah after every guest, using "Fairy" or other cleaners. They wash it under hot water and then freezes it. So that, it cleans, as well as eradicates the smell. However, we are not aware about effectiveness and to what extent it is powerful against infections. At the time of conversation, three people had thought on quitting the job and 1 participant already was in change of employment process. Others wished to open their own hookah cafes and sometimes prepare hookah for the guests.

STRENGTHS AND LIMITATIONS OF THE STUDY

To the best of our knowledge it is the first study that investigated knowledge and factors, the working process among hookah servers in Kazakhstan.

This is a mixed method study which provide more complete and comprehensive understanding of the research problem.

The sample is geographically diverse, data was collected in 6 biggest cities of Kazakhstan increasing generalizability of the study results. However, there are some limitations to this study. It is a cross-sectional study, so no causal relationship can be deduced from the results of this study. Another, is small sample size could result in imprecise estimate of the true relationship between exposures and outcome. Self-reporting-recall bias may weaken the data. Due to the absence of any guidelines and surveys specifically designed for hookah servers, a new questionnaire was developed by investigators of the study, and the limitation is that it is not validated. Also, the categorization of some variables was based on sample size and theoretical knowledge. Only one investigator conducted interviews, so that responses and analysis could lead to bias.

CONCLUSION

Hookah servers or prepares are unexplored niche. This study tried to determine awareness of hookah tool and its harms to body among HS, as well as find statistically significant factors associated with knowledge level. Generally, people aware of main contents and its possible harms, but the real joy they have at a job, prevents them to quit it. Although, HS do not know exact contents, such as tar and nicotine amount, heavy metals and PAHs presence. Also, no one mentioned the possibilities of circulatory diseases occurrence. Another big and important concern relates to work schedule. Most of the hookah prepares work at night times, which can lead to various problems, including the simplest symptom-tiredness. These knowledge level can be modified and changed through increasing awareness among them. More importantly, contents, evidence-based study conclusions, and risk factors of hookah smoking should be presented among the young population. Especially, as we have found that first hookah smoking appears to be at the age of under 18 years. However, considering current economic situation in the country, this job brings relatively high income. Which is another

important factor to work as hookah prepares. As we know, health is not only the physical absence of disease, but also, mental and social well-being. So, while most of them really enjoy their job, we can be sure that at least, one side of their well-being remain healthy.

RECOMMENDATIONS

Further research should be conducted to develop effective interventions that will increase awareness and knowledge of hookah use risk and harm among the young population. Also, to increase the validity and quality of the study, inclusion of more sample size is recommended.

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TABLES AND FIGURES

Figure 1.

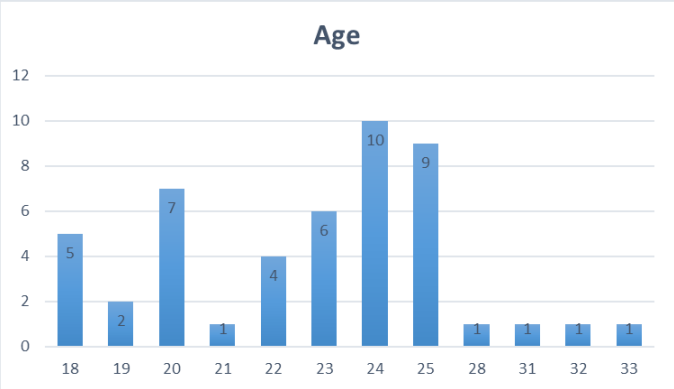
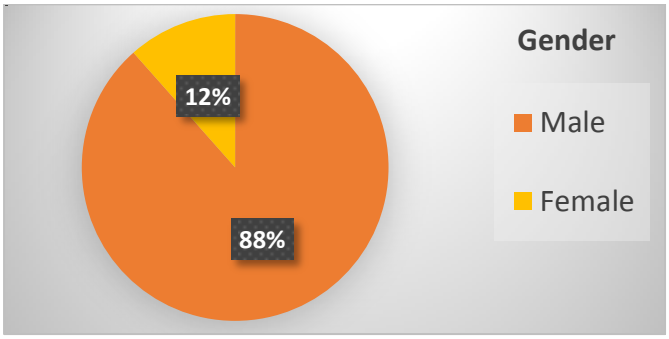


Figure 2.



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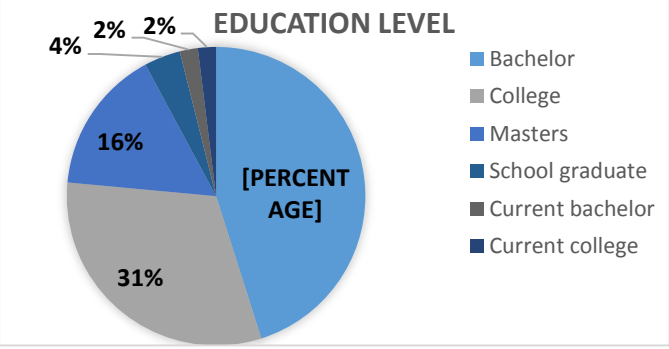

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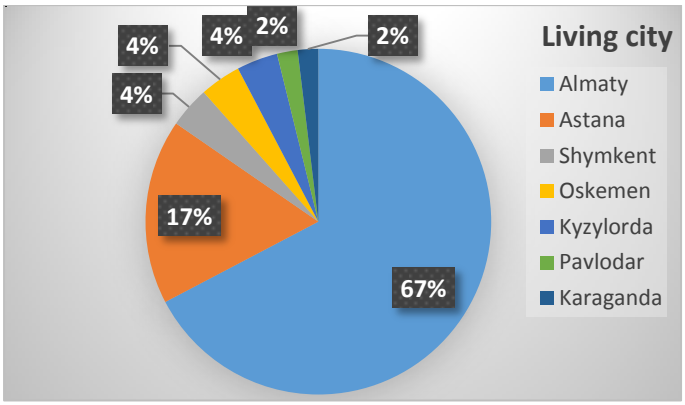


Table 1.

Ethnicity	Freq.	Percent	Cum.
Kazakh	26	50.98	50.98
Korean	3	5.88	56.86
Kurd	1	1.96	58.82
Mixed	2	3.92	62.75
Russian	12	23.53	86.27
Tadjik	1	1.96	88.24
Tatar	2	3.92	92.16
Uyghur	3	5.88	98.04
Uzbek	1	1.96	100.00
Total	51	100.00	

Figure 5.

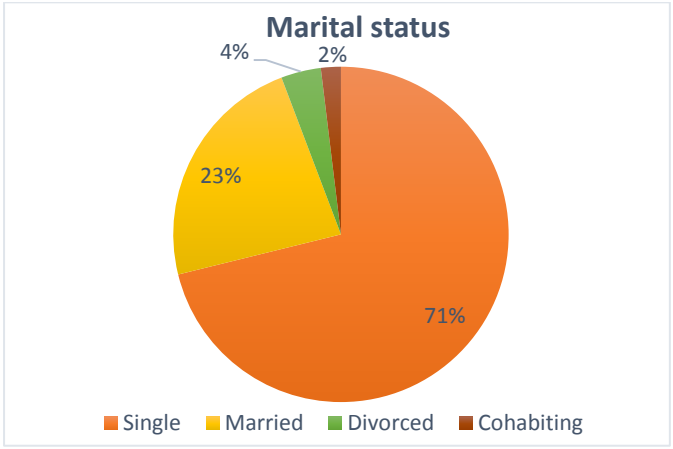


Table 2.

Salary	Freq.	Percent	Cum.
35 000 tg	1	2.00	86.00
100 000-150 000 tg	18	36.00	36.00
150 000 <tg	16	32.00	68.00

200 000 tg	**1**	**2.00**	**70.00**
200 000-250 000 tg	**3**	**6.00**	**76.00**
250 000 tg	**2**	**4.00**	**80.00**
250 000<tg	**1**	**2.00**	**82.00**
300 000-400 000 tg	**1**	**2.00**	**84.00**
500 000 tg	**1**	**2.00**	**88.00**
Total	**50**	**100.00**	

Figure 6.

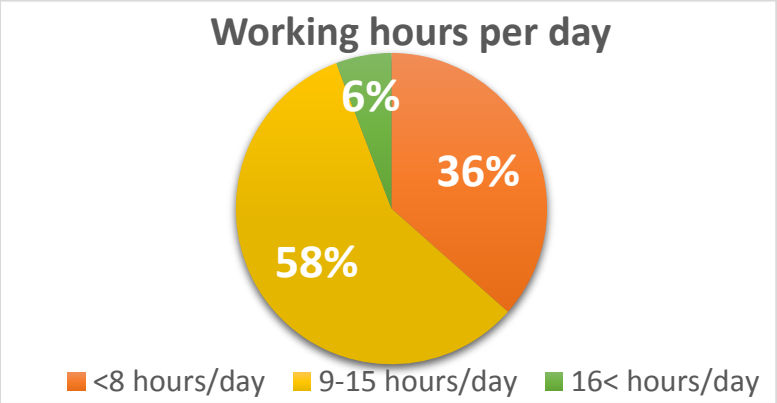


Figure 7.

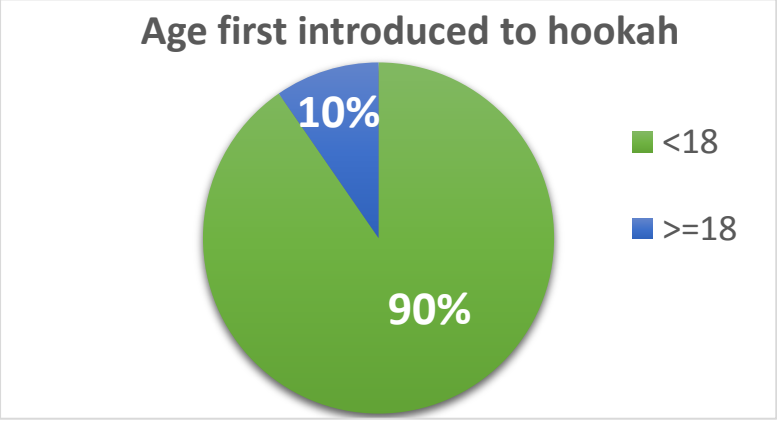


Table 3.

Average number of tables you cater per working session at busy days?	**Mean (%)**	**SD**	**observations**
129. <20 130. 21-30 131. 31-40 132. 41-50 133. >51 134.	2.56	1.567	Total: 50 18 (36%) 12 (24%) 4 (8%) 6 (12%) 10 (20%)

Average number of tables you cater per working session for not busy days?	Mean (%)	SD	observations
135. <10 136. 11-20 137. 21-30 138. 31-40 **139.** >41	2.038	1.1875	Total: 52 22 (42.31%) 16 (30.77%) 7 (13.46%) 4 (7.69%) 3 (5.77%)

Figure 8.

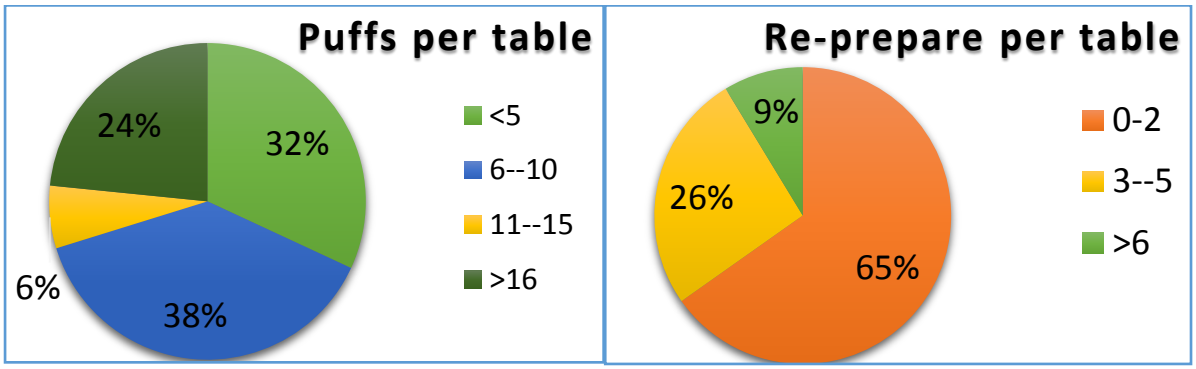
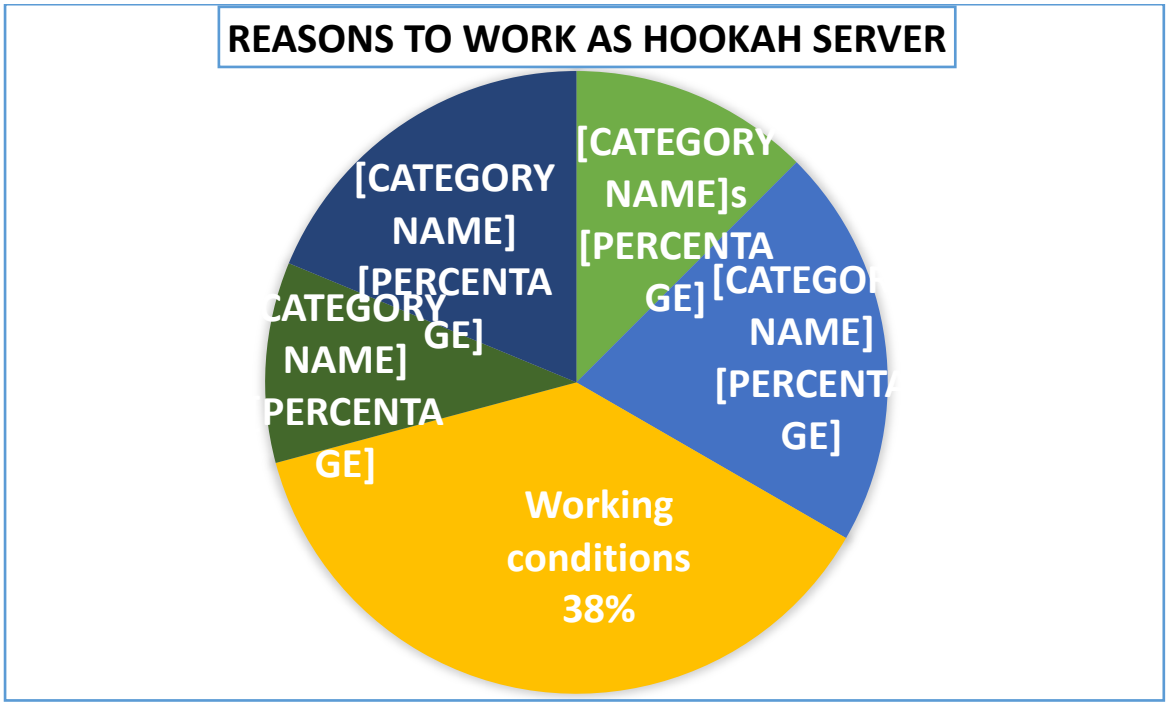
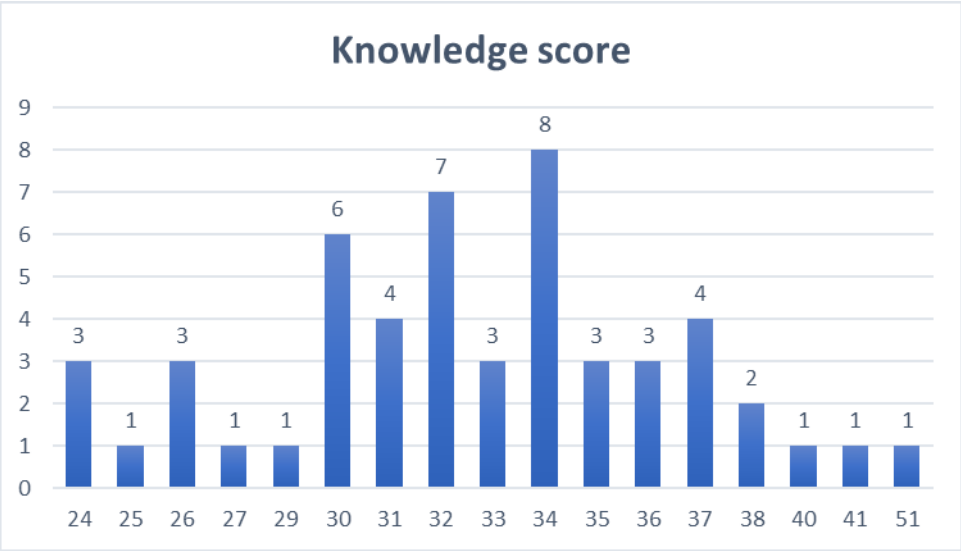


Figure 9.



Participants' knowledge level characteristics



Knowledge score	Freq.	Percent	Cum.
24	3	5.77	5.77
25	1	1.92	7.69
26	3	5.77	13.46
27	1	1.92	15.38
29	1	1.92	17.31
30	6	11.54	28.85
31	4	7.69	36.54
32	7	13.46	50.00
33	3	5.77	55.77
34	8	15.38	71.15
35	3	5.77	76.92
36	3	5.77	82.69
37	4	7.69	90.38
38	2	3.85	94.23
40	1	1.92	96.15
41	1	1.92	98.08
51	1	1.92	100.00
Total:	52	100	

Initial model:

Source	*SS*	*df*	*MS*
Model	866.511093	23	37.6743954

Residual	62.3639067	8	7.79548833
Total	928.875	31	29.9637097

Number of obs = 32
F (23, 8) = 4.83
Prob > F = 0.0134
R-squared = 0.9329
Adj R-squared = 0.7398
Root MSE = 2.792

k_1	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
gender	2.190977	3.579594	0.61	0.557	-6.063582	10.44554
Age	.4195386	.3133637	1.34	0.217	-.3030794	1.142157
Marital status						
2	-8.991838	3.634529	-2.47	0.038	-17.37308	-.6105986
3	-4.337024	2.771063	-1.57	0.156	-10.72711	2.053059
Experience						
2	4.949843	3.570479	1.39	0.203	-3.283695	13.18338
3	2.75185	2.174005	1.27	0.241	-2.261415	7.765115
4	4.868403	4.126873	1.18	0.272	-4.648184	14.38499
5	-.01015	5.860696	-0.00	0.999	-13.52494	13.50464
Working days						
2	1.733099	3.822391	0.45	0.662	-7.081351	10.54755
3	.2265334	3.983769	0.06	0.956	-8.960053	9.41312
Working hours						
2	.9134651	1.908467	0.48	0.645	-3.487468	5.314398
3	-1.668798	4.663004	-0.36	0.730	-12.4217	9.084108
Table catering at not busy days						
2	1.074899	2.498991	0.43	0.678	-4.687785	6.837582
3	5.442566	2.223688	2.45	0.040	.3147318	10.5704
4	-3.834489	3.959236	-0.97	0.361	-12.96451	5.295526
5	-1.23707	4.854304	-0.25	0.805	-12.43112	9.956975
Duration of hookah use in free time						
2	2.113526	2.328631	0.91	0.391	-3.256307	7.483358
3	1.821145	3.23812	0.56	0.589	-5.645973	9.288263
4	-.8065886	2.386909	-0.34	0.744	-6.310811	4.697634
How did they find the job						
2	20.67229	5.489972	3.77	0.006	8.012392	33.33219
3	-.384107	1.650885	-0.23	0.822	-4.191054	3.42284
2.smoking with family members						
	-.8650464	1.978849	-0.44	0.674	-5.428279	3.698187
2.job type						
	.8601459	1.817333	0.47	0.649	-3.330632	5.050923
_cons	16.15121	10.83629	1.49	0.174	-8.837333	41.13974

APPENDIX 1: Study Instrument in English

Qualitative research questions

Hello. I'm Tansholpan. I am conducting surveys about Knowledge about health risks and harms of hookah smoking among hookah servers. I'm conducting this as part of research for

master thesis at Nazarbayev University's School of Medicine. I'm inviting you to have an interview that will take for about 1 hour. The survey will ask you questions about: socio-demographic information, working process, knowledge on hookah contents and health effects. You do not need to answer questions that you do not want to answer or that make you feel uncomfortable. And you can withdraw at any time of the interview. I will keep the information you tell me during the interview confidential.

Do you have any questions?

Interview questions

I. Knowledge & Beliefs
II. Family acceptance
III. Health Problems
IV. Motive to work
V. Sanitization// Cleaning
VI. Desire to quit

1. How you describe your work?
2. How long have you been working?
3. Do you enjoy your work?
4. What are the reasons of working as HS?
5. Can you say about hookah set up process?
6. Is smoking hookah good/effective/bad? Why so?
7. Does it contain tobacco, nicotine? can it cause addiction?
8. Does it have negative or positive health consequences?
9. If yes: name the consequences you know.
10. What are your parents/relatives'/friends' attitude towards your profession?
11. Do they smoke? (hookah or/and cigarettes)
12. Do you smoke in front of them or maybe together?
13. Does it need to be cleaned? if yes: how do you clean it?
14. Do you smoke cigarettes and/or hookah (in your free time)?
15. Do the health effects/consequences of hookah differ from cigarettes?
16. Do you have health problems? (or did you)
17. What do you feel when you smoke hookah and when you smoke cigarettes?
18. After you have started to work as HS, does your health condition changed? (symptoms: insomnia, headaches, anxiety, etc.)
19. Do you want to quit the job now / or in future?
20. If you quit, would you smoke hookah in your free time?

Quantitative research questions

1.Gender

a) Male
b) female

2. Age _____

3. Ethnicity

a) Kazakh
b) Russian
c) Other: _____

4. Residence (current)

A) Astana
B) Almaty
C) Other: _____

5. City/town where you were born

A) Astana
B) Almaty
C) Other: _____
6. Education
A) Less than high school
B) High school graduate
C) College student
D) College student graduate
E) Undergraduate student
F) Graduate student
G) Post-graduate
H) Other:
7. Mother's education level
A) Less than high school
B) High school graduate
C) College student
D) College student graduate
E) Undergraduate student
F) Graduate student
G) Post-graduate
H) Other: _____
8. Father's education level
A) Less than high school
B) High school graduate
C) College student
D) College student graduate
E) Undergraduate student
F) Graduate student
G) Post-graduate
H) Other: _____
9. Marital status
A) Married
B) Single
C) Divorced
D) Widowed
E) Cohabiting
F) Other: _____
10. Employment
A) Full-time
B) Part-time
11. Age first introduced to hookah
_____
12. Employment history (length of time worked as hookah server)
_____
13. Working days on average per week
_____
14. Working hours on average per day
_____
15. What you put in hookah mostly?

A) Water
B) Alcohol
C) Milk
D) Other: _____
16. Average number of tables you cater per working session at busy days?
_____
17. Average number of tables you cater per working session for not busy days?
_____
18. How many puffs per 1 table?
_____
19. How many times on average you re-prepare hookah to a table?
_____
20. Beside job hookah use, do you smoke hookah in your free-time?
A) Yes
B) No
If yes:
21. Duration of hookah use in your free time on average:
_____
22. Where do you smoke it?
A) Outside home
B) Home
C) Both
23. Do you own hookah?
A) Yes
B) No
24. Do you use waterpipe tobacco with other aims?
A) Yes
B) No
25. Do you smoke cigarettes?
A) Yes
B) No
26. Do you use smokeless tobacco?
A) Yes
B) No
27. What is your monthly income?
A) <150,000 tg
B) 150,000< tg
28. How did you find the job?
A) Self-search
B) Friends
C) Relatives
D) Other: _____
29. Reasons to work as hookah-server
A) Because of salary
B) Because of colleagues and clients
C) Comfort conditions of work
D) Other: _____
30. Do your friends smoke hookah?
A) All of them

B) Most of them
C) Some of them
D) None
31. Number of people who smoke hookah in your family?
A) 0
B) 1
C) 2
D) 3
E) 4<
32. Number of people who smoke cigarettes in your family?
A) 0
B) 1
C) 2
D) 3
E) 4<
33. Do you smoke hookah with your family members?
A) Yes
B) No
34. Hookah contains high amounts of tobacco
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
35. Hookah contains nicotine
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
36. Hookah contains same contents of smoke as cigarette
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
37. Hookah smoking can cause cardiovascular diseases
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
38. Hookah smoking can cause respiratory problems
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
39. Hookah smoking can cause addiction

A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
40. Hookah smoking is a safe alternative to smoking cigarettes
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
41. Liquid in water jar (hookah) filtrates toxicants from smoke
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
42. Hookah smoking does not cause any harm
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
43. Hookah preparing does not cause any harm
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
44. Do you think you are at risk of any other medical conditions?
A) strongly agree
B) agree
C) neutral
D) disagree
E) strongly disagree
45. How often you clean hookah?
a) After every guest
b) Once a day
c) More than once a day
d) Once at 2-3 days
e) Once a week
f) Other:_____

APPENDIX 2: Consent form in English

Title: Knowledge about health risks and harms of hookah smoking among hookah servers. A mixed-method study.
Researcher: Tansholpan Yakhiyayeva
Introduction:

Hello. I'm Tansholpan. I am conducting surveys about Knowledge about health risks and harms of hookah smoking among hookah servers. I'm conducting this as part of research for master thesis at Nazarbayev University's School of Medicine.
I found your name by searching for persons working in the area of hookah sales, hookah cafes.
Study procedures:
I'm inviting you to do a survey that will take about 1 hour. The survey will ask you questions about: socio-demographic information, working process, knowledge on hookah contents and health effects, such as:
-age first introduced to hookah
- how many times on average you re-prepare hookah to a client?
- beside job hookah use, do you smoke hookah in your free-time?
Risks:
You do not need to answer questions that you do not want to answer or that make you feel uncomfortable…. And you can withdraw (stop taking part) at any time. I describe below the steps I am taking to protect your privacy.
There are no risks involved in the study greater than you would encounter in your everyday life. Data will be reported in aggregated form without any potential hazard to reveal the personal information. If you feel uncomfortable answering any question in the provided questionnaire, feel free to skip it. If at any time you think you would like to withdraw from the study, please, let me know and I'll exclude your answers from the study. No personal information, such as name, address, date of birth, e-mail, phone number, photos, will be collected (in surveys and in interviews). We will remove face sheets containing identifiers (e.g., names and addresses) from survey instruments containing data after receiving from study participants; Securely store data documents within locked locations; and/or assign security codes to computerized records.
Benefits:
It is unlikely that there will be direct benefits to you, however, by better understanding 'knowledge of hookah smoking risks among hookah servers' researchers and others may be able to contribute to health policies by assessing the levels of knowledge about hookah's health effects.
I will keep the information you tell me during the interview confidential. Information I put in my report that could identify you will not be published or shared beyond the research team unless we have your permission. Any data from this research which will be shared or published will be the combined data of all participants. That means it will be reported for the whole group not for individual persons. Neither your name, nor other personally identifying information would be recorded and the strongest effort would be made in order to maintain privacy of participants.
Voluntary participation:
Your participation in this study is voluntary.
You can decide to stop at any time, even part-way through the questionnaire for whatever reason.
If you decide to stop participating, there will be no consequences to you.
If you decide to stop we will ask you how you would like us to handle the data collected up to that point.
This could include returning it to you, destroying it or using the data collected up to that point.
If you do not want to answer some of the questions you do not have to, but you can still be in the study.

If you have any questions about this study or would like more information you can email Tansholpan at tansholpan.yakhiyayeva@nu.edu.kz.
This study has been reviewed and cleared by the Nazarbayev University Institutional Research Ethics Committee. If you have concerns or questions about your rights as a participant or about the way the study is conducted, you may contact:
Nazarbayev University Institutional Research Ethics Committee
E-mail: resethics@nu.edu.kz
Consent questions:
Do you have any questions or would like any additional details?
Do you agree to participate in this study knowing that you can withdraw at any point with no consequences to you?