


# Knowledge, practices and beliefs of students regarding health effects of shisha use in Ouagadougou, Burkina Faso: A cross-sectional study

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**Background.** The tobacco epidemic is one of the biggest public health threats the world has ever faced. Shisha use has recently been gaining increased popularity in many developed and developing countries.

**Objective.** To determine the prevalence of shisha use among students in Ouagadougou, Burkina Faso, and associated knowledge, smoking practices and beliefs about health effects.

**Method.** A total of 443 students were selected for this cross-sectional study, using a stratified sampling method. Data on shisha use, knowledge about shisha, shisha smoking practices, and factors associated with use of shisha were collected via a questionnaire. The association between the independent variables and shisha use was assessed using a  $\chi^2$  test ( $p < 0.05$ ). Binary logistic regression analysis was used to determine variables that were independently associated with shisha smoking.

**Results.** Of the 421 respondents, 162 (38.5%) indicated that they had smoked shisha; 14.0% were regular smokers. We found that 183 students (43.5%) had poor knowledge about the health effects of shisha. The main reasons for shisha smoking were being in the company of friends who were users (57.4%), the pleasant flavour and fragrance of shisha (25.9%), and fashion (22.2%). Ninety-nine shisha smokers (61.1%) also consumed alcohol. Factors associated with shisha smoking included age  $< 20$  years ( $p < 0.001$ ), gender ( $p = 0.034$ ), and educational level of the respondent's father ( $p = 0.0001$ ) and mother ( $p = 0.0004$ ).

**Conclusion.** We found a relatively high prevalence of shisha smoking among the students, and that 43.5% of them had poor knowledge about its effects on health. Developing surveillance, intervention and regulatory/policy frameworks specific to shisha has become a public health priority.

**Keywords.** Prevalence, knowledge, practices, shisha smoking, university students, Ouagadougou, Burkina Faso.

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## Study synopsis

**What the study adds.** The study provides additional data from resource-poor settings such as Burkina Faso, where there is an overall high prevalence of Shisha smoking, and also among students who are poorly informed about the health effects of smoking.

**Implications of the findings.** The data informs advocacy and intervention strategies to combat smoking and decrease overall tobacco use in an African setting.

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing  $> 8$  million people a year.<sup>[1]</sup> Tobacco is used in various forms, including cigarettes, cigars, chewable tobacco, bidis, kreteks (also known as clove cigarettes), and shisha smoking, also known as hookah, waterpipe, goza, nargile and hubble-bubble.<sup>[2]</sup> The shisha is a traditional oriental pipe with a long,

flexible hose through which the user inhales smoke from a tobacco preparation, flavoured or unflavoured, burned by charcoal embers. The smoke is cooled through water before it is inhaled.<sup>[3]</sup>

According to the World Health Organization (WHO),  $> 100$  million people worldwide use shisha daily.<sup>[1]</sup> The WHO has taken up this problem, and reports that the use of shisha poses a serious

health risk for both active and passive smokers.<sup>[1]</sup> There is an erroneous perception that shisha is less hazardous than tobacco cigarettes,<sup>[4-6]</sup> although mounting evidence indicates that it is even more harmful.<sup>[4-6]</sup> Like tobacco cigarettes, shisha has been shown to be associated with a wide range of detrimental effects on health such as cancer, heart disease, lung disease, and many other illnesses.<sup>[4-6]</sup> Moreover, sharing of shisha pipes has been linked to the spread of infectious diseases such as hepatitis B, herpes, tuberculosis and influenza.<sup>[4-6]</sup>

Shisha has recently been gaining increased popularity in many developed and developing countries.<sup>[4,7]</sup> It has been documented that shisha smoking is common among young people, mainly high-school children and college and university students.<sup>[7]</sup> For example, according to a survey involving >100 000 students from 152 colleges and universities in the USA, current shisha smoking was reported by 8.4% of students, second only to cigarettes.<sup>[7]</sup> Two recent studies in 15 secondary schools in London, UK, and on the campus of the University of Florida in the USA have documented for the first time a higher prevalence of use of shisha than of cigarettes.<sup>[7]</sup> In Africa, shisha smoking has rapidly become increasingly popular in major cities. The vogue is pervading society, and smoking is commonly practised by university undergraduates, adolescents and the older population in restaurants and hotels and at social gatherings.<sup>[8-10]</sup> Lack and/or weakness of regulations have also contributed to its increased consumption. A high prevalence (36.4%) of shisha smoking and poor knowledge regarding its effects on health was reported in youths attending bars in Kampala, Uganda.<sup>[9]</sup> In Nigeria, the prevalence of shisha smoking in nightclubs was 7.1%.<sup>[10]</sup>

Burkina Faso has not escaped this trend, and despite the growing popularity of shisha, to date there has been no study on the prevalence of shisha consumption in a student environment. The present study aimed to determine the prevalence of shisha use among university students in Ouagadougou, Burkina Faso, and associated knowledge, practices and beliefs about health effects, to generate helpful information for interventions against shisha smoking.

## Methods

### Design and study population

Burkina Faso is a landlocked country located in the heart of West Africa. Ouagadougou, the capital city, has a population of 2 637 303.<sup>[11]</sup> We conducted a cross-sectional study from October to December 2019 at Université Saint Thomas d'Aquin (USTA) in Ouagadougou. USTA is the biggest private university in the country, with 2 442 students during the 2019/2020 academic year. It currently has five faculties (Legal and Political Sciences, Economics and Management, Health Sciences, Science and Technology, Human Sciences and Society), one institute (Higher Institute of Tertiary Trade) and one doctoral school (Graduate School of Science, Health and Technology).

The study population was students from different faculties at USTA enrolled during the 2019/2020 academic year, who consented to participate in the study.

### Sample size and sampling technique

A stratified sampling method was used, as students were stratified into faculties. The number of students per stratum was proportionally allocated. Students were selected by simple random sampling

using a student list made available by each department on request. Students were approached in lecture rooms shortly before or after a class.

We determined the minimum sample size ( $n_0=385$ ) using the Cochran formula for estimating a single proportion:

$$n \geq \frac{Z_{1-\alpha/2}^2 p(1-p)}{e^2}$$

where  $p$  is the anticipated shisha prevalence in the population,  $Z_{1-\alpha/2}$  is the percentage of the standard distribution corresponding to the two-sided significance level (for the significance level of 5%,  $Z_{1-\alpha/2}=1.96$ ), and  $e=0.05$  is the level of precision.

A 10% non-response rate gives a total sample size of  $N=424$  for data collection.

### Data collection

The questionnaire was adapted from previous studies on the prevalence of shisha use conducted in Kampala, Uganda, and Kigali, Rwanda.<sup>[8,9]</sup> We used CSpro software, version 7.1 (US Census Bureau and ICF International, USA), through CAPI (Computer Assisted Personal Interviewing) using a mobile phone for data collection. This software allows administration of a face-to-face questionnaire in which the interviewer uses a tablet on an Android system to conduct the interview. The questions were closed, open or dichotomous.

### Dependent variable

The dependent variable was shisha smoking. The information sought on prevalence was based on the participants' response to the question 'Have you ever smoked shisha?' We defined three types of smokers: regular (an individual who smoked daily or at least once a week), occasional (an individual who smoked less than once a week), and experimenter (an individual who had smoked only once or twice during their lifetime).

### Independent variables

Our independent variables included sociodemographic characteristics (including age, sex, marital status, level of education and place of residence), smoking status of the parents and youths, educational level of the parents, and knowledge about and attitudes of the youths towards shisha smoking.

We defined knowledge about the health effects of shisha smoking as the respondent's ability to identify diseases associated with the practice based on a list of eight diseases, knowledge about the harmfulness of shisha to health, and knowledge about the harmfulness of shisha compared with cigarettes. Correct responses to questions were allocated 1 point, giving a possible total of 10 points for the questions. Participants were then categorised as having satisfactory knowledge, with a score  $\geq 5$ , or poor knowledge, with a score of 0 - 4.

### Data analysis

The data generated were entered into the system and analysed using SPSS Statistics software for Windows, version 25.0 (IBM Corp., USA). At the univariate level, we calculated proportions for categorical variables and summarised age using means and standard deviations (SDs). A forward stepwise-ordered logistical regression model established the factors independently associated with shisha smoking

at the multivariable level. A binary logistic regression analysis was also performed to determine the independent factors accounting for the participants' knowledge. We set the significance level ( $\alpha$ ) at 5%.

### Ethical considerations

The study was carried out with respect for the anonymity and confidentiality of the information collected. It was authorised by the board of USTA (ref. no. 2019-202/CNEC/SN/USTA/R/VR). We obtained informed consent from all participants before enrolment.

## Results

### Sociodemographic characteristics of the respondents

A total of 443 students were approached for an interview, of whom 421 consented to participate (response rate 95.0%). The mean (SD) age of the respondents was 20.9 (2.3) years, and 213/421 (50.6%) were aged <21 years. Females represented 243/421 (57.7%) of the respondents. Most respondents (97.1%) were single, and 57.0% did not live with their parents. Of the participants' fathers, 312 (74.1%) had secondary or tertiary education, and more than half of the participants' mothers (64.6%) had secondary or tertiary education (Table 1).

**Table 1. Sociodemographic characteristics of the respondents (N=421)**

Variable	n (%)
Faculty	
Health Sciences	97 (23.0)
Legal and Political Sciences	85 (20.2)
Economics and Management	99 (23.5)
Science and Technology	80 (19.0)
Human Sciences and Society	60 (14.3)
Gender	
Male	178 (42.3)
Female	243 (57.7)
Age (years)	
<21	213 (50.6)
21 - 24	170 (40.4)
≥25	38 (9.0)
Marital status	
Single	409 (97.1)
Married	12 (2.9)
Lives with parent(s)	
Yes	181 (43.0)
No	240 (57.0)
Educational level of father	
None	84 (20.0)
Primary	25 (6.0)
Secondary	52 (12.3)
Tertiary	260 (61.7)
Educational level of mother	
None	117 (27.8)
Primary	32 (7.6)
Secondary	138 (32.8)
Tertiary	134 (31.8)

### Prevalence of shisha use

Of the 421 respondents, 162 (38.5%) indicated that they had smoked shisha. Of the 162 shisha users, 14.2% were regular smokers, 77.2% were occasional smokers, and 8.6% were experimenter smokers. Legal and Political Sciences (54.1%) and Economics and Management (42.4%) were the most affected faculties. There was a significant difference in prevalence between faculties ( $p=0.0042$ ).

Table 2 shows the sociodemographic characteristics of the respondents stratified by shisha use and the association with shisha use. Age ( $p=0.0001$ ), gender ( $p<0.001$ ), educational level of father ( $p=0.0001$ ) and educational level of mother ( $p=0.0004$ ) were significantly associated with shisha smoking. Students aged <20 years had 2.63 times higher odds of smoking shisha than those aged ≥20 years, while males were 3.5 times more likely to use shisha than females. Students whose fathers and mothers had at least secondary education had 2.60 and 2.20 higher odds of shisha use, respectively, than students with less educated parents.

### Knowledge about shisha smoking and beliefs about health effects

Nearly all the respondents (95.2%) stated that shisha is harmful to health, and more than half (67.5%) thought that shisha is less hazardous than tobacco cigarettes. Responses to the questions about diseases associated with shisha smoking were as follows: bronchopulmonary cancers 24.5%, tuberculosis 19.5%, hepatitis 18.5%, cancers of the larynx 16.1%, cardiovascular disease 15.4%, chronic bronchitis 14.0%, labial herpes 5.5%, and peptic ulcer 5.5%. On further classification of knowledge into poor and satisfactory, less than half of the students ( $n=183$ ; 43.5%) had poor knowledge about the health effects of shisha smoking. There was no significant difference in knowledge between shisha smokers and non-smokers ( $p=0.213$ ). However, there was a significant difference in knowledge between faculties ( $p=0.017$ ) (Table 3). Students from the Health Sciences faculty had 80% increased odds of having satisfactory knowledge.

### Shisha smoking practices

The mean (SD) age of initiation of shisha smoking was 18.15 (2.40) years, and the mean (SD) duration of shisha use was 18.03 (17.06) months. The main reasons for shisha smoking were being in the company of friends who were users (57.4%), the sweet and pleasant flavour and fragrance of shisha (25.9%), and fashion (22.2%). Shisha was consumed with alcohol in the tank by 21% of smokers. Nearly all shisha smokers (90.7%) smoked over the weekend, and the mean (SD) time spent smoking shisha on a day when it was used was 42.60 (10.20) minutes. The majority ( $n=155$ ; 97.5%) of the respondents smoked shisha in the company of friends, and 100 respondents (61.7%) shared a shisha pipe. Mean (SD) monthly expenditure on shisha was USD6.6 (10.1). More than half ( $n=99$ ; 61.1%) of shisha consumers also consumed alcohol, 6.8% smoked other forms of tobacco, and 4.3% also used drugs. Table 4 shows the shisha smoking practices reported by the students.

## Discussion

### Prevalence

The prevalence of shisha use varies across countries. In the present study, 38.5% of the respondents had smoked shisha at least once.

This finding is similar to those of Aanyu *et al.*<sup>[9]</sup> in Uganda and Sutfin *et al.*<sup>[12]</sup> in North Carolina, USA, who reported prevalences of 36.4% and 40.3%, respectively.

Our prevalence of shisha use was higher than rates reported by Omotehinwa *et al.*<sup>[8]</sup> in Rwanda (26.1%) and Wachinou *et al.*<sup>[13]</sup> in Cotonou, Benin (13.8%). Burkina Faso has a higher prevalence of smoking than Benin and Rwanda, which may explain the higher prevalence of shisha use. However, the prevalence of shisha use in our study was lower than that in the United Arab Emirates (44.9%),<sup>[14]</sup> Saudi Arabia (44.1%)<sup>[15]</sup> and Pakistan (53.6%).<sup>[16]</sup> The high prevalence rates in these countries could be explained by the cultural and social acceptance of shisha.

We found that the prevalence of regular shisha consumption in our study (14.0%) was higher than that of tobacco smoking in Burkina Faso.<sup>[17]</sup> The WHO has declared shisha to be a real public health problem, because of the increase in consumption among young people.<sup>[18]</sup> Shisha could be a gateway to smoking for many young people who would otherwise never have started smoking.<sup>[18]</sup> These figures should challenge public health practitioners to implement an intervention strategy to reduce shisha consumption among young people.

### Knowledge about the health harms of shisha and associated factors

Most of the respondents in our study (95.2%) stated that shisha was harmful to health. This figure is similar to those reported from Uganda (86.7%)<sup>[9]</sup> and South Africa (91.0%).<sup>[19]</sup> More than half of our respondents (67.5%) thought that shisha was less harmful than cigarettes. According to the literature, the aerosol of shisha smoke contains higher concentrations of carbon monoxide, nicotine, tar and heavy metals than those in cigarette smoke. A shisha session exposes the user to ~100 times the volume of harmful substances compared with smoking a cigarette.<sup>[2,20]</sup>

Many of our respondents (56.5%) had satisfactory knowledge. Students in the Health Sciences faculty were 1.80 times more likely to have satisfactory knowledge than those in other faculties. The same finding was reported by Jawaid *et al.*<sup>[16]</sup> in Pakistan. These observations could be explained by the fact that medical students have better knowledge about the health effects of tobacco use than students in other fields.

### Shisha consumption practices

Reports indicate that shisha is usually consumed with water in the tank. Young

people sometimes replace the water with alcoholic beverages out of curiosity and in search of excitement.<sup>[21]</sup> This practice was also

**Table 2. Association of sociodemographic characteristics with shisha use (N=421)**

Variable	n	Shisha users, n (%)	OR (95% CI)	p-value
Age (years)				
≥20	109	25 (22.9)	Ref.	
<20	312	137 (43.9)	2.63 (1.6 - 4.3)	0.0001*
Gender				
Female	243	65 (26.7)	Ref.	
Male	178	97 (54.5)	3.5 (2.3 - 5.4)	<0.001*
Study faculty				
Other faculties	324	129 (39.8)	Ref.	
Health Sciences	97	33 (34.0)	0.79 (0.5 - 1.3)	0.382
Lives with parent(s)				
No	240	86 (35.8)	Ref.	
Yes	181	76 (42.0)	1.48 (0.9 - 2.3)	0.073
Educational level of father				
None or primary	109	25 (22.9)	Ref.	
Secondary or tertiary	312	137 (43.9)	2.60 (1.6 - 4.3)	0.0001*
Educational level of mother				
None or primary	149	40 (26.8)	Ref.	
Secondary or tertiary	272	122 (44.9)	2.2 (1.4 - 3.4)	0.0004*

OR = odds ratio; CI = confidence interval; Ref. = reference category.

\*Significant (p<0.05).

**Table 3. Association of sociodemographic characteristics with a satisfactory knowledge about the health effects of shisha smoking (N=421)**

Variable	n	Satisfactory knowledge, n (%)	OR (95% CI)	p-value
Gender				
Female	243	148 (60.9)	Ref.	
Male	178	90 (50.6)	0.68 (0.5 - 1.0)	0.056
Age (years)				
≥20	109	68 (62.4)	Ref.	
<20	312	170 (54.5)	0.79 (0.4 - 1.3)	0.390
Study faculty				
Other faculties	324	173 (53.4)	Ref.	
Health Sciences	97	65 (67.0)	1.80 (1.1 - 2.9)	0.017*
Lives with parent(s)				
No	240	133 (55.4)	Ref.	
Yes	181	105 (58.0)	1.11 (0.7 - 1.6)	0.615
Educational level of father				
None or primary	109	68 (62.4)	Ref.	
Secondary or tertiary	312	170 (54.5)	0.83 (0.5 - 1.3)	0.450
Educational level of mother				
None or primary	149	91 (61.1)	Ref.	
Secondary or tertiary	272	147 (54.0)	1.3 (0.9 - 2.0)	0.190
Shisha smoking				
Yes	162	81 (50.0)	Ref.	
No	259	157 (60.6)	0.76 (0.5 - 1.2)	0.213

OR = odds ratio; CI = confidence interval; Ref. = reference category.

\*Significant (p<0.05).

**Table 4. Practices with regard to shisha smoking among students (N=162)**

Variable	n (%)*
Age of initiation (years)	
≤15	16 (9.9)
16 - 20	106 (65.4)
≥20	40 (24.7)
Reasons for smoking shisha	
Being with friends who are users	93 (57.4)
Shisha is sweet and pleasantly flavoured	42 (25.9)
Fashion	36 (22.2)
Curiosity	16 (9.9)
To manage stress	10 (6.2)
Media influence	4 (2.5)
Consumption habits	
With water in tank	137 (84.6)
With alcohol in tank	34 (21.0)
Smoking venue	
Friend's home	88 (54.3)
Bars/restaurants	59 (36.4)
Own home	26 (16.0)
Shisha smoking partner	
Friends	158 (97.5)
Alone	5 (3.1)
Family	1 (0.6)
Sharing shisha pipe	
Yes	100 (61.7)
No	62 (38.3)

\*Totals are sometimes more than 162, because some students gave more than one response to the question.

observed in the present study, with 21.0% of respondents stating that alcohol was used in the tank.

Respondents in the present study reported that they smoked most often at their friends' homes (54.3%), in bars and restaurants (36.4%) and at home (16.0%). Other studies report similar smoking venues.<sup>[19,22]</sup> The majority (97.5%) of our respondents smoked in the company of their friends. The above observations testify to the social and recreational aspect of shisha use and illustrate that it has become a way of identifying with peers. In a sense, shisha has become an object of affiliation rather than filiation.

We found that the primary motivations for smoking shisha were spending time with friends (57.4%), flavour and fragrance (25.9%), fashion (22.2%), curiosity (9.9%), stress management (6.2%) and media influence (2.5%). Our review of the literature found additional reasons that motivate young people to use shisha, including boredom, lack of alternative leisure activities, and an expression of cultural identity for people in the Middle East.<sup>[21,23]</sup>

Simultaneous use of shisha and other tobacco products (cigarettes 3.7%, cigars 2.5%, pipes 0.6%), alcohol (61.1%) and narcotics (4.3%) was found in our study. Other studies have made the same observation. Van der Merwe *et al.*<sup>[19]</sup> found that 11.0% of shisha users also smoked cigarettes, and that 30.0% smoked drugs and consumed alcohol. These findings could indicate that participating in risky behaviour increases the likelihood of experimenting with other risky behaviours. As a

springboard to smoking alone, shisha would increase health risks for its users.

## Conclusion

This study found a relatively high prevalence of shisha smoking among university students, while knowledge about its effects on health was relatively satisfactory, although more than half of the respondents (67.5%) thought that shisha was less harmful than cigarettes. Regular medical education and health promotion targeting young people could improve their knowledge about shisha use and hence their practices. In addition, laws and regulations should be enacted, such as banning the shisha bars in Ouagadougou or throughout Burkina Faso, and even the importation of shisha equipment and material.

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**Author contributions.** ARO conceptualised the study, and participated in its design, performance and co-ordination, in statistical analysis, and in drafting and revising of the manuscript. KB and JCRPO participated in the study design and co-ordination, in statistical analysis, and in drafting and revising of the manuscript. AS and GAO participated in the study design, and in revising of the manuscript. GB, EB and GO participated in the study design and performance, in data collection and statistical analysis, and in drafting and revising of the manuscript. GB and MO conceptualised the study, and participated in its design and co-ordination and in revising of the manuscript. All authors read and approved the final manuscript.

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