Original Article

Association between Anxiety, Alcohol, Poly-Tobacco use and Waterpipe Smoking: A Cross-Sectional Study in Lagos, Nigeria

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Abstract

Background: Waterpipe smoking (WPS) has been reported to have a wide range of damaging health effects on pulmonary and cardiovascular systems. Studies suggest that waterpipe tobacco smoking is associated with reduced harm perceptions, mental health problems and the use of psychoactive substances. We investigate the patterns of use and the association of WPS with anxiety, poly-tobacco and alcohol use in Lagos, Nigeria. **Materials and Methods:** A cross-sectional study design was used to assess the data from 818 adolescents and adults in Lagos State, Nigeria. An online questionnaire obtained demographic information, waterpipe, e-cigarette, alcohol and other tobacco product use from respondents. Anxiety was assessed using the validated Generalised Anxiety Disorder 7-point scale. Bivariate and multivariate logistic regression analysis was used to identify the factors associated with waterpipe ever-use. $P < 0.05$ was considered statistically significant. **Results:** The mean (standard deviation) age of respondents was 23.43 (±3.96), over half were female (55.2%) and a majority had a college diploma or more (88.59%). Among study participants, 18.58% reported waterpipe ever-use. Among ever waterpipe users, 17.33% reported current use (past 30-days), with a majority having smoked waterpipe in a bar or pub. Alcohol use ($P < 0.001$), e-cigarette ever-use (P: 0.010) and poly-tobacco ever-use (P: 0.030) were significantly associated with higher odds of waterpipe use in the multivariate regression model. Further, there was a lower likelihood of waterpipe ever-use in the bivariate regression model among respondents with mild and moderate to severe anxiety levels than those with normal anxiety levels (P: 0.030); however, this association was no longer significant in the adjusted model. **Conclusions:** Our findings suggest a relatively high prevalence of WPS in Lagos, Nigeria. Concurrent alcohol consumption, e-cigarette and poly-tobacco use are associated with WPS, and most waterpipe smokers have normal anxiety levels. The Nigerian Government should consider surveillance measures for WPS and a more comprehensive smoke-free policy.

Keywords: Adolescents, anxiety, e-cigarettes, narghile, poly-tobacco, shisha, waterpipe tobacco, Youth

Introduction

The prevalence of combustible cigarettes smoking is generally declining globally, while waterpipe (also called shisha or hookah or narghile) smoking is rising.[1] In its most common form, waterpipe smoking (WPS) involves passing charcoal heated air through a perforated aluminium foil and across the flavoured tobacco to become smoke that bubbles through the water before inhalation by the smoker.[1] Although WPS started in the Middle East, its use has gained popularity in many countries outside the region over the years.[2-4]

Research has shown that WPS exposes users to clinically harmful levels of tobacco-specific nitrosamines, polycyclic aromatic hydrocarbons and other common toxicants found in tobacco, as well as three to ten times higher amounts of carbon monoxide (CO), compared with a cigarette after smoking sessions, due to charcoal combustion.[5-8] WPS has been reported to have a wide range of damaging health

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effects on pulmonary and cardiovascular systems, in addition to its strong association with bladder, nasopharyngeal and oral cancer, as well as infertility.[9-12] WPS has also been associated with mental health problems such as generalised anxiety disorders (GAD).[13] Despite the health risks of WPS, studies have shown that people engage in this habit for pleasure and relaxation as a result of peer influence, the appeal of flavours, distress and anxiety.[13-15] Further, prior research has demonstrated an association between the use of waterpipe tobacco, alcohol, combustible cigarettes and other tobacco products.[15-17] In addition, previous findings suggest that waterpipe, alcohol consumers and combustible cigarette smokers were more likely to be of the anxious type due to insecure attachment styles.[16,17] Nonetheless, these associations are not fully established, and there remains limited evidence to suggest these associations in developing countries, such as Nigeria.

The prevalence and patterns of WPS across regions worldwide differ.[1,3] The highest rates have been reported in the Eastern Mediterranean region,[1] with the rate of ever-use, ranging from 15.8% in Aleppo, Syria, to 65.3% among college students in Lebanon.[18-20] In the United States, estimates range from 1.9% to 21.8%, whereas in the United Kingdom, the rate of waterpipe tobacco ever-use was 11.6% among adults in 2012.[21] Further, in South Africa, the ever-use of waterpipe tobacco was estimated at 63.0% among university students.[22] A review of global trends suggests WPS is most common among younger age groups (<30 years), males, the educated and individuals who smoke cigarettes.[1,3,16]

In Nigeria, a survey of nightclub patrons in Oyo State detailed a prevalence of 7.1%, among primarily middle-aged adults.[4] Similarly, Faloye *et al*.,[16] in a survey of college students with a mean age of 18 years, estimated a prevalence of 7.8% in Oyo State and identified the factors associated with WPS, such as cigarette smoking, other tobacco product use and having friends as smokers. While both studies[4,16] provide evidence of WPS in Nigeria, the prevalence reported may not give a complete picture of the burden of use among adolescents and adults who are at most risk of initiation. Further, there is a dearth of literature on the relationship between WPS and electronic cigarette (e-cigarette) use, which are becoming widespread in the country.[23] In addition, Lagos State is the country's commercial nerve centre and is the most populated city in sub-Saharan Africa,[24] serving as a hub for nightclubs, restaurants and social venues. WPS activities have been found to occur commonly at these venues.[4] Sampling the population domiciled in Lagos State may give a broader picture of the extent and pattern of use in a diverse and metropolitan city in Nigeria, the most populous country in Africa.[25]

We identify a gap in the literature on the pattern of WPS, especially among adolescents and young adults in Nigeria. Further, understanding the associated factors, particularly with novel products such as e-cigarettes, poly-tobacco use, alcohol and the link with anxiety is crucial to estimating the burden of use and designing public health intervention measures to reduce tobacco-induced diseases in the country. Therefore, this study investigates the patterns of use and factors associated with WPS among adolescents and adults in Lagos, Nigeria. In addition, we investigate the relationship between anxiety and WPS among adolescents and adults.

Materials and Methods

Study design and settings

This cross-sectional study was conducted between December 2020 and February 2021 in Lagos State, Nigeria. The study formed the part of the Lagos State Tobacco Survey (LSTS) led by researchers from the Lagos State University Teaching Hospital. The LSTS is a cross-sectional survey that assesses the pattern of tobacco products' use among adolescents and adults(15-35 years) in Lagos State, Nigeria. Lagos has 20 local government areas and 37 local council development areas with approximately 2000 communities with over 17 million people.[24,25]

Study participants and sampling method

We recruited an online convenient sample of in-school adolescents and adults within Lagos State aged between 15 and 35 years. A multi-stage sampling technique (a combination of simple random and cluster sampling techniques) was used for recruiting the study participants. We selected schools (secondary schools and Universities) within Lagos State using the simple random technique and employed the cluster sampling to choose class groups within the selected schools. Participants who provided informed consent and assent (<18 years) answered questions in the online survey. We contacted members of the class groups that had no access to the internet through phone calls. Following consent, we conducted a telephone interview in the English language because of the social distancing measures initiated by the Federal government to curb the spread of COVID-19.

Data collection tool

We used a validated questionnaire adapted from the 2014 Global Youth Tobacco Survey version.[26] The questionnaire had four sections [Appendix 1]: Section A obtained information on sociodemographic factors, alcohol and e-cigarette ever-use. Section B comprised 13 questions about WPS awareness, patterns of smoke, quit attempts, perceptions and other tobacco product use (except e-cigarette and waterpipe tobacco use). Section C comprised a GAD-7 scale that assessed questions on self-reported symptoms and severity of anxiety, with a total score ranging from 0 to 21. The GAD-7 score was categorised as normal (0–5), mild (6–10) and moderate-to-severe (≥11) anxiety. A previous study had validated the GAD-7 scale in a Nigerian population and demonstrated its validity with the current study population.[27] Poly-tobacco use, as defined in this study, refers to the use of two or more tobacco products-waterpipe AND e-cigarette or combustible cigarettes or smokeless tobacco. The term 'Shisha' was used throughout the paper to communicate 'waterpipe tobacco.'

Statistical analysis

Demographic data of study participants were analysed using the descriptive statistics. We used the Chi-squared test to assess the bivariate associations between perceptions of waterpipe and non-waterpipe smokers. Bivariate and multivariate logistic regression analysis using all the sociodemographic variables, alcohol, e-cigarette, poly-tobacco use and anxiety levels (measured using the GAD-7 scale) as independent variables to identify the factors associated with WPS. $P<0.05$ was considered statistically significant. Data analysis was performed using STATA 15.0 software (StataCorp LLC Lakeway Drive, College Station, Texas).

Ethics

The Health Research Ethics Committee of the Lagos State University Teaching Hospital (LREC/06/10/1456) approved the study protocol as part of the LSTS. The study questionnaires did not collect any identifying information (name, address and national identification card number) to maintain the confidentiality of respondents. Furthermore, to ensure voluntariness, respondents were informed that they were free to discontinue participation at any time, even after giving consent.

Results

A total of 818 respondents completed the study. The study participants had a mean (standard deviation) age of 23.43 years (±3.96), with 55.2% being female [Table 1]. A majority of respondents had a college diploma or more (88.59%) and 28.22% reported a positive history of alcohol consumption [Table 1]. The majority (95.60%) of the study respondents had heard of waterpipe tobacco. However, the prevalence of WPS was 18.58%. About 12.48% reported smoking waterpipe tobacco only, whereas 6.12% reported concurrent WPS and use of other tobacco products. A vast majority of waterpipe smokers initiated its use after 15 years of age (98.68%), and among waterpipe smokers, 24 (17.33%) respondents had a positive history of past 30-day smoking [Table 1].

Table 1: Descriptive variables and sociodemographic distribution of participants

Variable	*n* (%)
Overall mean age±SD	23.43±3.96
Sex (*n*=817)	
Male	366 (44.80)
Female	451 (55.20)
Participant educational level (*n*=815)	
College diploma and above	722 (88.59)
Secondary school diploma or less	93 (11.42)
Current history of alcohol consumption (*n*=815)	
Yes	230 (28.22)
No	585 (71.78)
Ever heard of waterpipe tobacco? (*n*=816)	
Yes	782 (95.60)
No	36 (4.40)
Ever used waterpipe tobacco (*n*=818)	
Yes	152 (18.58)
No	666 (81.42)
Tobacco products use (*n*=817)	
Waterpipe only	102 (12.48)
Waterpipe and other tobacco products	50 (6.12)
Other tobacco products only (excluding waterpipe)*	41 (5.02)
No history of tobacco product use	624 (76.38)
Age of initiation (years) (*n*=151)	
<14	0
14-15	2 (1.32)
>15	149 (98.68)
History of waterpipe tobacco use (*n*=150)	
Current user (past 30 days use)	26 (17.33)
Former user (>30 days since use)	124 (82.67)

[#]Other tobacco products: Combustible cigarettes, electronic cigarettes and smokeless tobacco. SD: Standard deviation

The pattern of use and quit attempt among E-cigarette users

Most (60.38%) past 30-day waterpipe smokers reported smoking at bars or pubs [Table 2]. Of the waterpipe ever-smokers, only 15 (9.87%) indicated a current intention to quit, while 32 (21.05%) reported an actual quit attempt within the last 12 months [Table 2]. Table 3 shows a Chi-square comparison of anxiety levels and perceptions between waterpipe smokers and non-waterpipe smokers. There was a significant relationship (*P*: 0.015) between anxiety levels and WPS, with a higher proportion of waterpipe smokers having normal anxiety levels than non-waterpipe smokers (84.44% vs. 70.66%, respectively). A majority (66.67%) of waterpipe smokers indicated a perception that quitting would not be difficult (*P*: 0.000). Further, a higher proportion of non-waterpipe smokers than waterpipe smokers (20.86% vs. 6.85%, respectively) believed that WPS makes people feel less comfortable at celebrations, parties, or other social gatherings (*P*: <0.001). In addition, a majority of non-water pipe smokers (60.83%) disagreed with the statement, 'I think I might enjoy smoking shisha.'

Table 2: Pattern of use and quit attempt among e-cigarette users

Variable	*n* (%)
Most common location of WPS in the past 30 days (*n*=26)	
At home	5 (19.23)
At a bar or club	17 (65.38)
Other	1 (3.85)
No response	3 (11.54)
Intention to quit (*n*=152)	
Yes	15 (9.87)
No	29 (19.08)
No response	108 (71.05)
Actual quit attempt in last 12 months (*n*=152)	
Yes	32 (21.05)
No	37 (24.34)
No response	83 (54.61)

WPS: Waterpipe smoking

Association between waterpipe tobacco use and other factors

Table 4 demonstrated that increasing age, male gender, alcohol consumption, e-cigarette use, poly-tobacco use was associated with higher odds of WPS (ever-use), using a logistic regression model. For every increase in age by year, respondents had significantly higher odds of WPS (ever-use) (odds ratio [OR]: 1.09, 95% confidence interval CI: 1.04, 1.13; *P*: <0.001). Similarly, female respondents had significantly lower odds of WPS (ever-use) than males (OR: 0.51, 95% CI: 0.36, 0.73; *P*: <0.001). Similarly, alcohol use (OR: 8.38, 95% CI: 5.67, 12.37), e-cigarette use (OR: 25.72, 95% CI: 12.07, 54.81)

Table 3: Perceptions of waterpipe use and association with generalised anxiety disorder

Variable	History of waterpipe tobacco, *n* (%)	No history of waterpipe tobacco, *n* (%)	*P*
Anxiety	*n*=108	*n*=502	
Normal	91 (84.40)	355 (70.66)	0.015*
Mild	11 (10.09)	89 (17.76)	
Moderate to severe	6 (5.50)	58 (11.58)	
Perceived difficulty of quitting	*n*=150	*n*=651	
Yes	50 (33.33)	469 (72.00)	<0.001*
No	100 (66.67)	182 (28.00)	
Perception of waterpipe as a means of social relaxation[#]	*n*=146	*n*=628	
No difference whether smoking shisha or not	81 (55.8)	294 (46.82)	<0.001*
Less comfortable	10 (6.85)	131 (20.86)	
More comfortable	55 (37.67)	203 (32.32)	
Perception of the statement 'I think I might enjoy smoking shisha'	*n*=150	*n*=651	
Strongly agree	15 (10.0)	15 (2.30)	<0.001*
Agree	56 (37.33)	54 (8.29)	
Disagree	42 (28.00)	186 (28.57)	
Strongly disagree	37 (24.67)	396 (60.83)	
Intention to use, if offered by a friend	*n*=151	*n*=648	
Yes	73 (48.34)	38 (5.86)	<0.001*
No	78 (51.66)	610 (94.14)	

*P<0.05, [#]Do you think smoking shisha helps people feel more comfortable or less comfortable at celebrations, parties, or in other social gatherings? GAD-7 Scale: Normal (0-5), mild (6-10), moderate to severe (>11) anxiety. GAD-7: GAD: Generalised anxiety disorder

Table 4: Factors associated with waterpipe smoking

Variable	OR (95% CI)	*P*	aOR (95% CI)	*P*
Age	1.09 (1.04-1.13)	<0.001*	1.01 (0.94-1.08)	0.81
Sex				
Male	1 (reference)		1 (reference)	
Female	0.51 (0.36-0.73)	<0.001*	0.83 (0.47-1.48)	0.54
Participant educational level				
College and above	1 (reference)		1 (reference)	
Secondary school or less	0.55 (0.29-1.06)	0.07	0.39 (0.14-1.14)	0.08
History of alcohol consumption				
No	1 (reference)		1 (reference)	
Yes	8.38 (5.67-12.37)	<0.001*	5.54 (3.12-9.84)	<0.001*
History of e-cigarette use				
No	1 (reference)		1 (reference)	
Yes	25.72 (12.07-54.81)	<0.001*	6.41 (2.15-19.11)	0.01*
History of poly-tobacco use[§]				
No	1 (reference)		1 (reference)	
Yes	7.46 (4.70-11.85)	<0.001*	2.49 (1.11-5.58)	0.03*
Anxiety levels (GAD-7)				
Normal	1 (reference)		1 (reference)	
Mild	0.48 (0.24-0.93)	0.03*	0.53 (0.21-1.33)	0.18
Moderate to severe	0.40 (0.17-0.95)	0.03*	0.54 (0.18-1.65)	0.28

*P<0.05, [§]Poly-tobacco use: Concurrent WPS and combustible cigarette or e-cigarette or smokeless tobacco use. : GAD-7: Normal (0-5), mild (6-10), moderate to severe (>11) anxiety. Pseudo R^2 0.26 for the multivariate logistic regression model. OR: Odds ratio. aOR: Adjusted odds ratio, CI: Confidence interval, GAD: Generalised Anxiety Disorder Scale, WPS: Waterpipe smoking

and poly-tobacco use (OR: 7.46, 95% CI: 4.70, 11.85) were significantly associated with higher odds of WPS (ever-use). Further, respondents who had mild and moderately severe anxiety levels had lower odds of WPS compared to respondents with normal anxiety levels ($P < 0.05$) [Table 4]. On the multivariate logistic regression model, alcohol use (P: <0.001), e-cigarette (P: 0.01) and poly-tobacco use (P: 0.03) remained significantly associated with a higher likelihood of WPS [Table 4].

Discussion

This study aimed to assess the pattern of use, investigate the association of alcohol, poly-tobacco, anxiety with WPS. Our findings detail a prevalence of 18.58% waterpipe tobacco ever-use in Lagos State, Nigeria. We also report a significant relationship between WPS and older age, a history of alcohol consumption, e-cigarette ever-use, poly-tobacco use and normal anxiety levels. A higher prevalence of WPS was found in the present study compared to the 7.1% and 7.8% earlier reported by two authors in Oyo State, Nigeria.[4,16] The difference in findings could be attributed to the population studied. Lasebikan *et al*.[4] studied an older population (mean age: 45 years) in Oyo state Nigeria, while Faloye *et al*.[16] studied only college students (mean age: 18 years) in the same state. On the other hand, the current study examined a broad demographic group (15–35 years) domiciled in Lagos State. Lagos State is the commercial nerve centre of Nigeria, with an estimated population of 12 million.[24] An association has been established between WPS and increased urbanisation, and proximity to waterpipe sales outlets.[28] The higher level of urbanisation and commercial activity in Lagos State with its bars, lounges and pubs may explain the higher rate of WPS in this study than reported by other authors in Nigeria.[4,16] Furthermore, the relatively high prevalence of WPS in the present study may also be explained by the novelty of the product and the ease with which peers can share it in social meetings.[4,14,29] Similarly, perceptions of reduced health risks associated with this form of tobacco[14,16,29-31] and misconceptions reported in the news media may further explain the common use.[32]

An overwhelming majority reported being above 15 years of age at the time of initiation into WPS, similar to earlier reports from Nigeria.[4] This finding on the pattern of use may be attributed to the existing national tobacco control regulation being enforced in Nigeria, prohibiting tobacco sale and consumption by individuals <18 years.[33] Furthermore, the relatively high cost of smoking waterpipe in the country (N1000 ($2.7) to N50000 ($138.9)) may explain why the age of initiation is mostly above 15 years.[32] Current waterpipe tobacco smoking was defined as past 30-day use, of which 26 respondents were identified. Of the current users, most smoked waterpipe tobacco at bars or restaurants, which have been reported as hubs for WPS and socialisation among the youth.[4,34] The National Tobacco Control Act and the National Tobacco Control Regulations currently restrict smoking in outdoor spaces, including restaurants and bars in Nigeria.[33] A possible next step to strengthening the regulation in Nigeria may be to incorporate a complete smoking ban in all indoor public places such as restaurants and bars, as seen in Ethiopia.[35]

Concerning perceptions, respondents who smoked waterpipe tobacco indicated quitting would be less difficult compared to non-smokers of waterpipe (66.67% vs. 28%, respectively). Furthermore, when posed with the question '*Do you think smoking shisha helps people feel more comfortable or less comfortable at celebrations, parties, or in other social gatherings,'* a higher proportion of waterpipe smokers reported 'more comfortable' compared to non-smokers. Similarly, a higher proportion of waterpipe smokers agreed with the statement '*I think I might enjoy smoking shisha*' compared to non-smokers. Several studies among young adults have shown users perceive waterpipe tobacco use to be more socially acceptable, with a majority of these populations using them to socialise.[1,3,12,16,19,20] Other studies have also shown that WPS is commonly used as a form of relaxation, and the concurrent use with alcohol is suggested to enhance the relaxation effects.[20,32] The responses from waterpipe smokers in our study population suggest perception of the habit as a form of relaxation, which can be found to be enjoyable.

The association between alcohol and WPS has been established in other studies and shares similarities with combustible cigarettes.[15,17] We found that respondents who consumed alcohol had five times higher odds of being waterpipe smokers. Other studies have reported an association between WPS and alcohol consumption and cigarette smoking.[16,17,36] Alcohol decreases anxiety. Thus, it can potentially complement the perceived relaxing effect from waterpipe or cigarette smoking, which can lead to addiction over time.[15] While this association is relatively established in the literature, there is still a gap in knowledge regarding the sequence of first use of other substance stimulants or WPS. Future research could explore if WPS encourages combustible cigarette initiation or poly-tobacco use or vice versa.

A unique finding in our study is the association between WPS and e-cigarette use. This finding has not been previously reported in our population. We found that e-cigarette use was independently associated with WPS, and the association though reduced, was still significant after adjusting for sociodemographic factors, poly-tobacco use and self-reported anxiety levels. E-cigarette users had six times higher odds of smoking waterpipe tobacco compared with non-e-cigarette users. Our findings were corroborated by Ramji *et al*.,[30] who conducted a study among adolescents in Sweden and detailed three times higher odds of WPS among e-cigarette users. Similarly, other studies have reported this finding.[37,38] The concurrent use of these novel products may be attributed to perceptions of reduced harm compared to combustible cigarettes and the reduced smoke smell as well as a variety of flavours.[29,39,40] Nonetheless, further study is needed to

disaggregate drivers of concurrent WPS and e-cigarette use, especially among adolescents and young adults in our population.

The relationship between WPS and mental health status has been studied widely among different populations. However, this study presents early evidence to suggest significantly lower odds of WPS among respondents with mild and moderate to severe anxiety levels on a bivariate regression model. However, the relationship was no longer significant after adjusting for sociodemographic factors and the use of other stimulants (alcohol, e-cigarettes, poly-tobacco). Contrary to our findings, Amin *et al*.[13] reported significantly higher levels of stress among adolescent waterpipe smokers, although Goodwin *et al*. corroborate our findings and detail no significant association with anxiety.[37] The concept that WPS is widely perceived as a social activity[1,3,28] capable of reducing anxiety,[15,17] while anti-social activities are more associated with mental health conditions such as anxiety may explain this finding.[41] In addition, the higher proportion of normal levels of anxiety among waterpipe smokers compared to non-smokers may be attributed to the concurrent use of alcohol. Alcohol works in the brain by increasing the effects of γ-aminobutyric acid or GABA, which temporarily reduces social anxiety.[17]

The present study has several limitations. First, we enrolled a convenient sample of a school-based population that may not be representative of the general population. Furthermore, data collection was done using an online survey; hence, the chance of a social-desirability bias for some of the questions that relate to the age of initiation and use of other substances (for example, stimulants: Alcohol, combustible cigarettes and smokeless tobacco) cannot be overlooked. Further, a combination of telephone interviewer and online self-administered method of data collection may have resulted in a response bias. Finally, potential respondents who lack access to the internet or telephone lines may have been excluded, thus limiting the generalizability of our study findings. Nonetheless, we provide early evidence on the extent of WPS in a diverse population in Lagos State, Nigeria. We also identify the factors associated with WPS, as well as perceptions and patterns of use.

Conclusions

Our findings suggest a relatively high prevalence of WPS in Lagos, Nigeria. The factors independently associated with WPS are older age, male gender, alcohol consumption, e-cigarette and poly-tobacco use. Alcohol, e-cigarette and poly-tobacco use remained significantly associated with WPS. Further, study participants with mild and moderate to severe anxiety levels had significantly lower odds of being waterpipe smokers compared to those with normal anxiety levels. However, this relationship was not significant after adjusting for potential confounders such as sociodemographic factors and other stimulant use.

Based on the link between WPS and poor health outcomes,[9-12] investigating the pattern of waterpipe tobacco use in Nigeria is crucial in controlling the burden of tobacco-induced diseases. Further, understanding the associated factors and relationship with anxiety provides a broader insight into the impact of WPS on adolescents and adults in Nigeria.

The findings from this study can inform targeted health promotion and regulatory measures aimed at waterpipe smokers in the population. For example, measures to support targeted anti-smoking information to those with a history of alcohol, e-cigarette and poly-tobacco use. Policy-makers may also consider extending smoke-free policies to all indoor public places including restaurants and bars. Future studies could also explore the relationship between WPS and concurrent poly-tobacco use using a longitudinal design.

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Conflicts of interest

There are no conflicts of interest.

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Appendix 1: Data Collection Tool

Section A: Demographic information

A.1. Age in years (at last birthday): ----------

A.2. Sex: a) M [ ] b) F [ ]

A.3. Do you consume Alcohol (in the last 90 days) a) Yes [] b) No []

A.4. What is your highest level of Education?

a) Primary school [ ]
b) Secondary school [ ]
c) University [ ]
d) Post-graduate [ ]

Section B: The next questions ask about electronic cigarettes

B1. Have you ever used an electronic cigarettes or e-cigarettes?

a. Yes [ ]
b. No [ ]

B2. Before today, had you ever heard of shisha (also called waterpipe tobacco)?

a. Yes [ ]
b. No [ ]

B3. Have you ever tried shisha smoking, even one or two puffs?

a. Yes [ ]
b. No [ ]

B4. How old were you when you first tried smoking shisha?

a. less than 12 years old [ ]
b. 12 or 13 years old [ ]
c. 14 or 15 years old [ ]
d. 16 years old or older [ ]

B5. During the past 30 days, on how many days did you smoke shisha?

a. 0 days [ ]
b. 1 or 2 days [ ]
c. 3 to 5 days [ ]
d. 6 to 9 days [ ]
e. 10 to 19 days [ ]
f. 20 to 29 days [ ]
g. All 30 days [ ]

B6. Do you want to stop smoking shisha now?

a. I don't smoke shisha anymore.
b. Yes [ ]
c. No [ ]

B7. During the past 12 months, did you ever try to stop smoking shisha?

a. I did not smoke shisha during the past 12 months.
b. Yes [ ]
c. No [ ]

B8. The last time you smoked shisha during the past 30 days, where did you smoke it? (SELECT ONLY ONE RESPONSE)

a. I did not smoke shisha during the past 30 days.
b. At home [ ]
c. At a restaurant [ ]
d. At a bar or pub [ ]
e. Other [Please specify: ……..]

B9. If one of your best friends offered you shisha, would you smoke it?

a. Definitely not [ ]
b. Probably not [ ]
c. Probably yes [ ]
d. Definitely yes [ ]

B10. Once someone has started smoking shisha, do you think it would be difficult for them to quit?
   a. Definitely not [ ]
   b. Probably not [ ]
   c. Probably yes [ ]
   d. Definitely yes [ ]

B11. Do you think smoking shisha helps people feel more comfortable or less comfortable at celebrations, parties, or in other social gatherings?
   a. More comfortable [ ]
   b. Less comfortable [ ]
   c. No difference whether smoking shisha or not []

B12. Do you agree or disagree with the following: 'I think I might enjoy smoking shisha.'
   a. Strongly agree [ ]
   b. Agree [ ]
   c. Disagree [ ]
   d. Strongly disagree [ ]

B13. Have you ever used any tobacco product (e.g cigarettes, smokeless tobacco) asides electronic cigarettes and shisha?
   a. Yes [ ]
   b. No [ ]

B13b. If Yes to E1. Please specify the tobacco product (s): ……..

Section C: General Anxiety Depression (GAD-7) Scale

C1: Total GAD Score

C1: Total general anxiety depression score				
Over the last 2 weeks, how often have you been bothered by the following problems? (use 'X' to indicate your answer)	**Not always**	**Several days**	**More than half the days**	**Nearly every day**
1. Feeling nervous, anxious or on edge				
2. Not being able to stop or control worrying				
3. Worrying too much about different things				
4. Trouble relaxing				
5. Being so restless that it is hard to sit still				
6. Becoming easily annoyed or irritable				
7. Feeling afraid as if something awful might happen				

C1b. Category: normal (0-5), mild (6-10), moderate to severe (>11) anxiety