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Characteristics of waterpipe smokers who want to quit population-based findings from Syria

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Abstract

Background: Many waterpipe users want to quit but have difficulty doing so. Little is known about characteristics of those who want to quit.

Methods: We conducted a secondary analysis of a population-based household survey of 2038 adults in Aleppo, Syria, using two-stage cluster sampling. We examined prevalence of, and reasons for, wanting to quit, and compared users who wanted vs. did not want to quit on sociodemographic, psychosocial-, tobacco- and health-related characteristics.

Results: Twelve percent of adults smoked waterpipe (n=248), and of these, 56% wanted to quit and 25% had made a quit attempt in the past year. Friends/socializing (69%) and boredom/free time (16%) were the most reported obstacles to quitting. Those who wanted to quit walked more frequently (OR= 1.85; 95% CI= 1.24-2.77), ate less fruit (OR = 0.56; CI= 0.42-0.73), and were more likely to experience sneezing/blocked nose (OR= 2.55, CI= 1.22-5.34). Compared to users who did not also smoke cigarettes, dual users who wanted to quit cigarettes were more likely to want to quit waterpipe (OR= 2.32; CI= 1.24-4.34), whereas dual users who did not want to quit cigarettes were less likely to want to quit waterpipe (OR= 0.24; CI= 0.10-0.58).

Conclusion: Many waterpipe users want to quit and perceive the loss of positive social functions to be a major obstacle. Very few sociodemographic, tobacco-related, psychosocial, or health-related characteristics are associated with wanting to quit. However, cessation efforts may benefit from targeting dual users who are motivated to quit use of all tobacco products.

Keywords: Tobacco; Waterpipe; Cessation

Introduction

Tobacco smoking using a waterpipe originated several centuries ago in Southeast Asia and the Middle East and had virtually disappeared until about thirty years ago when it enjoyed a resurgence and quickly spread globally.[1,2] Its popularity has continued largely unabated despite growing evidence that it damages health[3,4] and causes dependence[5,6]. The Eastern Mediterranean region (EMR) has the highest prevalence of waterpipe use among adults across all global regions[7]. Prevalence of waterpipe smoking is especially high in Lebanon, where 33% of men and 46% of women are current users[8].

Despite its health-damaging and dependence-causing effects, many waterpipe users in the EMR, similar to those in other regions, are not interested in quitting. A systematic review[9] identified five studies from EMR countries (Egypt, Iraq, Lebanon, Syria, and Turkey) that assessed interest in quitting among adults, which ranged from 21% among university students in Turkey to 64% among Lebanese university students. A study of adult waterpipe smokers recruited from cafés and other public places in Qatar found that 54% intended to quit[10]. Two studies of adult waterpipe smokers recruited from cafés in Bahrain and Syria found that only 40% and 28%, respectively, were interested in quitting[11,12]. Several studies indicate that waterpipe users are less interested in quitting than cigarette smokers[12-16].

Several factors are associated with wanting to quit waterpipe[17,18]. In Syria, beginning waterpipe smokers (university students) were more likely to be interested in quitting compared to older, established smokers (49.7% vs. 28.4%, respectively)[19]. Similarly, those who had not increased the frequency of smoking over time and had smoked for fewer years were more likely to want to quit[12], although frequency of use was not associated with interest in quitting[11,12]. Across several studies, health concern was cited as the major motivator to quit[9,12], and boredom, socializing with friends who smoke, and addictiveness were reported as barriers[9,12,19]. Other factors associated with interest in quitting included not believing oneself to be addicted[11], having family or friends disapprove of its use[12], being married[12], and having no family members who smoke waterpipe[11,12].

There are several limitations to the literature, however. Despite the seriousness of the waterpipe epidemic in the EMR, only a limited number of studies from this region have examined factors associated with interest in quitting waterpipe. These studies have all utilized relatively small and non-representative samples such as university students or café customers, and the results may not generalize to the wider population of waterpipe users. Lastly, existing studies have examined only a limited number of potentially important determinants of interest in quitting. For example, interest in quitting may track with engagement in other health-promoting behaviors (e.g., diet, physical activity, and alcohol use), with the diagnosis of smoking-related health conditions, utilization of healthcare services which provides an opportunity for detection of smoking-related health conditions and encouragement to quit from healthcare professionals, and psychosocial indicators such as depression, anxiety, social support, and religious participation. Indeed, these factors are associated with stronger motivation to quit cigarette smoking[14,20], but have not been assessed adequately in waterpipe smokers.

The purpose of this study is to examine correlates of wanting to quit waterpipe among a large, representative sample of adults in the EMR, a region that has a very high burden of waterpipe use. We conducted a secondary analysis of data from the Aleppo Household Survey, which enrolled adults in Aleppo, Syria and examined a much wider number and range of potentially important determinants of interest in quitting waterpipe than has been studied previously, including sociodemographic factors, tobacco use history, patterns and attitudes, exposure to others' tobacco use, health status, healthcare utilization, health behaviors, religious participation, and psychosocial status.

Methods

Sample and procedures

The Aleppo Household Survey (AHS) aimed to characterize major health problems and risks among adults in Syria and is described in detail elsewhere[21,22]. In 2004, AHS recruited a representative sample of adults, 18-65 years of age, in Aleppo, Syria. Two-stage, stratified, cluster sampling with probability proportional to size was used for the selection of residential neighborhoods. Two strata of neighborhoods were sampled, including formal and informal residential neighborhoods based on the official enumeration of the municipal registry. From each stratum, residential neighborhoods were selected with probability proportional to size (PPS). Households were selected within each neighborhood with equal probability and an adult, 18-65 years of age, was randomly selected from each household. Informed written consent was obtained from all participants before the survey was administered. Surveys and physical measurements were administered by two-person, mixed gender teams using a computer-based interface for the recording of responses and measurements. Overall, 2038 adults participated in the survey (45.2% male, mean age 35.3 years, response rate 86%). The missing data rate was very low (<0.5%) for all variables assessed in this study.

Measures

For this study, the outcome variable was wanting to quit waterpipe ("Do you want to quit smoking narghile?" (yes, no)). "Narghile" is the local term for waterpipe; the question was asked of all respondents who reported smoking narghile occasionally or daily. All waterpipe smokers also indicated whether any of several factors were reasons they did (or might in the future) want to quit waterpipe, including to protect one's own health, protect family's health, cost, religion, and "other." Several categories of explanatory variables were assessed, as follows:

Sociodemographics: Age, sex, marital status, education level (≤9 years, >9 years), neighborhood type (formal, informal), and density index (DI). Informal neighborhoods represent about half of Aleppo's population and were characterized by residences that were built illegally or on

land that was not designated for housing. Residing in an informal zone was used as a proxy for poverty status. DI was used as a proxy measure for socioeconomic status and was calculated by dividing the number of household members by the number of rooms in the house[23,24].

Religion: Religious affiliation (Muslim, non-Muslim), importance of religious beliefs (None or a little, moderate, much, very much), and frequency of attending religious services (never, 1-2 times/year, 1-2 times/month, once/week, more than once/week) were collected.

Tobacco use history, patterns, and attitudes: Variables included age at which waterpipe use began, number of years smoking waterpipe, frequency of waterpipe use (daily vs. less than daily), attempt to quit waterpipe made in past year (yes, no), current cigarette smoking status (occasionally or daily vs. not at all), number of cigarettes smoked daily, interested in quitting cigarettes (yes, no), attempted to quit cigarette smoking in past year (yes, no), and longest period without smoking any tobacco product (in days).

Respondents reported whether they had a person to support them in quitting waterpipe use such as a spouse, relative, or friend (yes, no), their main reason for wanting to quit waterpipe (own health, family's health, cost, religion, other), perceived difficulty of quitting waterpipe (not difficult vs at least a little difficult), and perceived challenges of quitting waterpipe (having friends who smoke/social atmosphere, boredom/free time, addiction/habit/stress).

To help understand how, among dual users, decisions to quit cigarettes and waterpipe may be linked, we created a 3-category variable indicating whether the participant did not smoke cigarettes, smoked cigarettes and was not interested in quitting them, or smoked cigarettes and was interested in quitting them. For analyses, two dummy-coded vectors were created comparing willing to quit cigarette smokers to non-smokers, and not willing to quit cigarette smokers to non-smokers.

Exposure to others' tobacco use: Respondents indicated whether they had a spouse who smoked waterpipe at least weekly (yes, no), the total number of waterpipes smoked daily in the house, whether one or more household members other than participant smoked waterpipe in the home (yes, no), and the total number of cigarettes smoked daily in the house.

Health status: Obesity (body mass index <30 vs. $\geq$ 30) was assessed objectively by measuring respondents' height and weight. Self-rated overall health status was reported as excellent, good, normal, bad, or very bad. Respondents also reported whether they had ever (unless another time frame is noted) been diagnosed by a physician (yes, no) with several health conditions which may be caused or exacerbated by tobacco use, including heart disease, chest pain, hypertension, stroke, hypercholesterolemia, diabetes, peptic ulcer disease, asthma, chest wheezing during past year, chronic bronchitis or emphysema, sneezing and blocked nose during past year, sinusitis during past year, or acute respiratory infection during past year.

Healthcare utilization: Respondents indicated (yes, no) whether they used government-sponsored primary healthcare centers (yes, no), received a medical check-up during past year, utilized healthcare during the past year specifically for respiratory problems, asthma, nose allergy, sinusitis, or other respiratory problems, and whether they used medication in the past month for respiratory problems, asthma, or other respiratory problems.

Health behaviors: Respondents indicated whether they drank alcohol ever and in the past month (yes, no), frequency of alcohol use (daily, 1-2 times/week, only occasionally), frequency of eating vegetables, fruits, and chips (none or little, 1-2 times/week, 3 or more times/week, more than once daily), whether they practiced sports regularly (yes, no), frequency of sports practice per week during past month (none or little, 1-2 times/week, 3 or more times per week), frequency of walking at least 10 minutes during past month (none or little, 1-2 days per week, 3 or more days per week), whether their work involved mainly sitting or required exertion for more than 10 minutes (yes, no). They also reported the number of hours spent daily in front of a screen (< 1 hour, 1-3 hours, 3-5 hours, > 5 hours).

Psychosocial status: Respondents reported (yes, no) whether they had a source of social support ("Someone is available who supports and helps you"), have received treatment for depression, felt blue or depressed in the past year, and suffered from anxiety and stress in the past year.

Statistical analysis

Interest in quitting waterpipe was regressed on independent variables in logistic regression models. As a first step, bivariable associations were assessed and those variables associated with interest in quitting at the p<0.10 level were included in a multivariable model. Pearson and deviance residual plots were evaluated and model fit was judged to be good. Multicollinearity was assessed by examining variance inflation factors in a regression model. Means (SD) or percentages and p-values from logistic models are reported for bivariable models. Odds ratios and 95% confidence intervals are reported for the multivariable model.

Results

Sample characteristics

Of the 2038 respondents, 248 (12.2%) currently smoked waterpipe daily or occasionally; of these, 73% were men and 27% women. The average age of waterpipe smokers was 32 years (SD=XX), ranging from 18-65, 91.5% of participants were Muslim while the rest were Christian, and 66.9% were married. The majority of participants reported smoking waterpipe occasionally (92.7%) as opposed to daily. Mean number of years of smoking waterpipe was 6.0 (SD=6.3).

Prevalence and reasons for wanting to quit waterpipe use

Overall, 55.6% of waterpipe users (n=138) wanted to quit. Among dual (waterpipe and cigarette) smokers (n= 165), most of those interested in quitting waterpipe also reported interest in quitting cigarettes (90.5%).

Main reasons for wanting to quit waterpipe now or in the future, perceived challenges of quitting, and perceived difficulty of quitting did not differ according to whether the person now wanted to quit (all p-values > .63; see Table 1); as such, results for these variables are presented for the entire sample of waterpipe smokers (n=248). Among these 248 waterpipe smokers, 82.2% and 11.5% wanted to quit to protect their own health or their family's health, respectively. Cost, religious proscription, and "other" reasons were reported by only small numbers of respondents. The main challenges of quitting included friends and the social atmosphere surrounding its use (68.9%) and free time/boredom (16.1%). Only 4.4% reported addiction or habit as a challenge for quitting. The vast majority of waterpipe smokers (90%) considered quitting to be not difficult and only 3.2% considered it to be at least a little difficult.

Determinants of interest in quitting waterpipe use

As shown in bivariable models (Table 1), several variables differentiated those who wanted vs. did not want to quit waterpipe. In terms of sociodemographic and religious factors, those who wanted to quit were more likely to be men, have fewer years of education, live in informal zones, be Muslim, and cite religious beliefs as being less influential on them. Waterpipe use characteristics did not differ by desire to quit, except that those wanting to quit were more likely to have made a quit attempt in the past year. Among dual (waterpipe/cigarette) smokers (n=165), most of those who wanted to quit waterpipe (90.5%) also wanted to quit smoking cigarettes and were more likely to have tried to quit cigarettes in the past year. No differences were found between those who wanted to quit vs. did not want to quit waterpipe in terms of exposure to others' tobacco use (e.g. having a spouse who smokes, number of smokers in the household, and total number of waterpipes and cigarettes

smoked in the house). For health conditions, those who wanted to quit were more likely to be diagnosed with hypertension and to have experienced sneezing/blocked nose during the past year. Those who wanted to quit ate less fruit, played more sports, and engaged in more walking during the past month.

Four variables that were significant in bivariable models remained significant in a multivariable logistic regression analysis (Table 2). Compared to waterpipe smokers who did not smoke cigarettes, dual users who did not want to quit cigarettes were less likely to want to quit waterpipe (OR= 0.24, 95% CI= 0.10-0.58) while dual users who wanted to quit cigarettes were more likely to want to quit waterpipe (OR= 2.32, 95% CI= 1.24-4.34). Those wanting to quit waterpipe walked more frequently (OR= 1.85; 95% CI= 1.24-2.77), ate less fruit (OR = 0.56; CI= 0.42-0.73) and were more likely to experience sneezing/blocked nose in the past year (OR= 2.55, CI= 1.22-5.34).

Discussion

This is the first population-based study to examine factors related to interest in quitting waterpipe in the EMR. We examined several domains that plausibly could motivate users to quit, including sociodemographics, tobacco use history, patterns and attitudes, exposure to others' tobacco use, having smoking-related health problems, healthcare utilization, health behaviors, religious participation, and psychosocial factors. Surprisingly, very few variables were associated with interest in quitting. In multivariable analyses, being a dual user who also wanted to quit cigarettes, experiencing sneezing and blocked nose over the past year, walking more, and consuming less fruit were associated with wanting to quit waterpipe. Thus, contrary to expectations, wanting to quit waterpipe smoking did not cluster with most other health behaviors or track with sociodemographic characteristics, chronicity of tobacco use, being exposed to others' smoking, psychosocial factors, healthcare access and utilization, or (other than sneezing/blocked nose) having any of several tobacco-related health conditions. The lack of association of interest in quitting with most tobacco-related

health conditions is especially notable given that in the present study, as well as several others[9-12,25], avoiding health problems is the most common reason given for wanting to quit[26]. Thus, smokers worry that they will develop health problems, but once manifest, these problems do not appear to motivate them to quit.

More encouragingly, more than half (56%) of users in this population-based study wanted to quit waterpipe, which is in line with estimates from other studies that mostly used convenience samples. A systematic review reported that 21-64% of waterpipe users in the EMR and Middle East were interested in quitting[9]. In Saudi Arabia, only 17% of waterpipe smokers were interested in quitting[14]. Our estimate is higher than a previous study from Syria that randomly sampled adult waterpipe café customers and found that only 28% wanted to quit[12]. Although prior studies suggested that younger people, and those with less chronic smoking histories, are more likely to want to quit[19,27,28], the present population-based study did not replicate these findings; thus, the fact that café customers tend to be older, "established" users compared to the general population may not account for their lower interest in quitting. Instead, this discrepancy may reflect the highly reinforcing social features of waterpipe smoking. Indeed, in the present study, the two most reported challenges to quitting waterpipe were friends/socializing and boredom/free time, which were reported by 69% and 16% of waterpipe users, respectively. These findings parallel other studies that reported socializing being a barrier to quitting waterpipe[9,10,12] and are also consistent with findings in the U.S. that waterpipe users are less likely to report addiction as a barrier to cessation compared to cigarette smokers[29,30].

Although the vast majority of waterpipe smokers perceived quitting to be "not difficult," the reality is far different. In the Aleppo Household Survey, more than half (58%) of current waterpipe smokers had tried unsuccessfully to quit in the past year and the overall quit rate (former smokers divided by ever smokers) was only 28%[15]. Waterpipe cessation intervention is still in its infancy[31-33]. Interventions to date have used individualistic approaches that are typically used in cigarette cessation programs, and which do not directly address the strong social component of waterpipe use[16,31,34].

Although waterpipe use produces dependence[5,35], the few trials which have treated dependence pharmacologically (using Varenicline or Buproprion) have not been successful[31]. There is some evidence that behavioral cessation approaches using standard stimulus control and contingency management strategies increase waterpipe quit rates, but acceptability, retention, and quit rates have been modest[31]. Our results are consistent with another study from Bahrain[11] indicating that dual users who want to quit all tobacco use (both waterpipe and cigarettes) may be especially amenable to cessation efforts. However, in the context of these reported treatment failures, it is likely that successful treatment will require addressing not only dependence but the strongly reinforcing social features of waterpipe use. Doing so may require less focus on individualistic treatment in favor of more complex involvement of social networks, such as family and/or friends, as treatment facilitators or recipients. This is especially important in the Middle East where waterpipe use is highly normative and there is not yet a "culture of quitting" (e.g., cessation efforts are not yet widely available or supported)[33,36].

This is the first large-scale, population-level analysis of determinants of interest in quitting waterpipe. As such, our findings will be useful to guide waterpipe cessation efforts, but important limitations should be noted. The cross-sectional design prevents us from making causal inferences about observed associations. Additionally, we performed a secondary analysis of data collected several years ago and factors related to interest in quitting may have changed over time. We cannot rule out such changes, but the likelihood of such bias seems remote given the continuing high prevalence of waterpipe use in the Eastern Mediterranean region[8,34] and consistency of reported determinants of its use over time[37-39]. Lastly, we assessed a large number of associations which increases the probability of Type I error. However, given the exploratory nature of this study, we judged Type II error to be a more serious concern than Type I.

In conclusion, a comprehensive population-based examination of factors related to interest in quitting waterpipe found very few associations. The strongly reinforcing social nature of waterpipe use presents formidable barriers to cessation which must be addressed in cessation interventions. It

may be useful to focus intervention efforts especially on dual users who are highly motivated to quit use of all tobacco products.

Acknowledgement

Conflicts of Interest

All authors have declared no conflicts of interest

Table 1. Bivariable associations of wanting to quit waterpipe smoking

	Does not want to quit (%)	Wants to quit (%)	Odds Ratio	95% CI	p value
	N=110	N=138			
Sociodemographic					
Age (years)	33.4 (11.5)	31.6 (9.8)	1.02	0.99-1.04	0.197
Gender (% male)	64.5	80.4	0.44	0.25-0.79	0.005
Married (% yes)	63.6	69.6	0.77	0.45-1.30	0.324
Total years of education	10 (3.7)	8.8 (4.0)	1.09	1.02-1.16	0.016
Zone (% formal)	77.3	51.4	Ref		
(% informal)	22.7	48.5	3.21	1.84-5.60	<.0001
Density Index[1]	1.6 (1.18)	1.9 (1.15)	0.83	0.66-1.056	0.130
Religion					
Religious Affiliation					
Non-Muslim	12.8	5.1	Ref		
Muslim	87.2	94.9	2.76	1.07-7.09	0.035
Influence of religious beliefs on you (%)					
None or a little	4.6	7.3	Ref		
Moderate	33.6	44.2	0.44	0.13-1.49	0.185
Much	40	33.3	0.52	0.17-1.62	0.269
Very Much	21.8	15.2	0.82	0.26-2.60	0.742
Frequency of attending religious meetings (%)			1		
Never	34.5	19.6	Ref		
1-2 times per year	10	12.3	2.05	1.00-4.20	0.049
1-2 times per month	6.4	8.7	2.23	1.13-4.39	0.020
Once weekly	26.4	33.3	2.41	0.84-6.93	0.102
More than once weekly	21.8	25.4	2.18	0.88-5.38	0.092
Tobacco Use history, patterns, and attitudes					
Age (years) of initiation of narghile	27.2 (10.3)	25.8 (8.9)	1.02	0.99-1.04	0.262
Number of years smoking	6.2 (6.7)	5.8 (6.1)	1.01	0.97-1.05	0.606
Frequency of smoking (%)					
Daily	10	5.1	Ref		
Occasionally	90	94.9	2.08	0.78-5.56	0.144
Attempted to quit waterpipe in past year					
No	89.1	63.8	Ref		
Yes	10.9	36.2	4.64	2.32-9.28	<.0001
Current cigarette smoking status					
Not at all	36.4	31.2	Ref		
Daily	50.9	55.8	1.28	0.74-2.20	0.382
Occasionally	12.7	13.0	1.20	0.53-2.72	0.669
Number of cigarettes smoked daily[2]	23.84 (20.34)	21.55 (14.72)	1.01	0.99-1.03	0.449

Interested in quitting cigarettes (% yes)[2]	51.4	90.5	0.11	0.05-0.25	<.0001
Past year quit attempt (cigarettes) (% yes)[2]	47.1	63.2	0.52	0.28-0.98	0.041
Longest period without smoking in days	80.2 (93.1)	72.9 (93.9)	1.00	0.99-1.01	0.684
Person to help in quitting (% yes)	53.6	61.6	0.72	0.43-1.19	0.207
Main reason for willing to quit (%)					
Other	2.8	2.2	Ref		
Religion	2.8	1.4	1.31	0.131-13.06	0.819
Cost	2.8	2.2	1.33	0.11-16.48	0.823
Family's health	11.1	11.6	1.00	0.04-24.55	1.000
Own's health	80.6	82.6	0.68	0.03-18.06	0.809
Perceived difficulty of quitting waterpipe (%)					
At least a little difficult	9.9	10.1	Ref		
Not difficult	90	89.9	1.02	0.44-2.34	0.970
Perceived challenges for quitting waterpipe (%)					
Addiction/habit/stress	10.9	6.5	Ref		
Friends and social atmosphere	65.5	71.7	3.67	0.94-14.30	0.061
Boredom/free time	20	13	2.18	0.50-9.45	0.297
Exposure to others' tobacco use					
Spouse weekly waterpipe smoking	0.81 (1.57)	1.88 (2.20)	0.71	0.47-1.09	0.118
Total number of waterpipe smoked daily in the house					
>1	24.5	21.7	Ref		
0	75.4	78.3	1.30	0.70-2.41	0.401
Number of household members who smoked waterpipe					
>1	40	29	Ref	1.05-2.58	0.069
No one other than subject	60	71	1.63	0.96-2.76	0.069
Total number of cigarettes smoked daily in the house					
0 cigarettes	17.3	24.6	Ref		
1-5 cigarettes	18.2	17.4	0.67	0.29-1.52	0.338
5-10 cigarettes	18.2	19.6	0.75	0.34-1.70	0.493
11-20 cigarettes	18.2	15.2	0.59	0.26-1.35	0.209
>20 cigarettes	28.2	23.2	0.58	0.27-1.22	0.149
Health Status					
Heart Disease					
No	97.27	97.10	Ref		
Yes	2.73	2.90	1.64	0.23-4.86	0.936
Chest Pain					
No	57.27	50.72	Ref		
Yes	42.73	49.28	1.30	0.79-2.16	0.305
Hypertension					
No	88.18	94.20	Ref		
Yes	11.82	5.80	0.46	0.18-1.16	0.097
Stroke[3]					
No	100.00	99.28	Ref		
Yes	0.00	0.72	--	--	--
Hypercholesterolemia					
No	97.27	95.65	Ref		

Yes	2.73	4.35	1.62	0.39-6.63	0.502
Diabetes[3]					
No	100.00	98.55	Ref		
Yes	0.00	1.45	--	--	--
Peptic Ulcer					
No	87.27	89.13	Ref		
Yes	12.73	10.87	0.84	0.39-1.82	0.651
Obesity					
BMI < 30	68.18	72.46	Ref		
BMI >=30	31.82	27.54	1.23	0.71-2.13	0.462
Self-rated overall health					
Very bad	3.6	2.2	Ref		
Bad	4.5	3.6	1.52	0.31-7.46	0.615
Normal	31.8	31.9	1.86	0.39-8.74	0.432
Good	39.1	43.5	1.68	0.35-7.99	0.517
Excellent	20.9	18.8	1.33	0.19-9.31	0.772
Asthma diagnosed by a doctor					
No	89.1	90.6	Ref		
Yes	10.9	9.4	0.85	0.37-1.94	0.699
Past year wheezing (%)					
No	89.1	84.8	Ref		
Yes	10.9	15.2	0.74	0.45-1.21	0.224
Diagnosed chronic bronchitis or emphysema (%)	2.7	6.5	0.40	0.11-1.52	0.179
Past year sneezing and blocked nose (% yes)	14.5	29.7	0.40	0.21-0.77	0.005
Past year suffering from sinusitis (%)					
No	90	84.1	Ref		
Yes	9.9	16.0	0.67	0.43-1.04	0.076
Past year suffering from acute respiratory infection (%)					
No	91.8	92.7	Ref		
Yes	8.2	7.2	3.94	0.63-24.73	0.144
Healthcare Utilization					
Uses government primary health centers (% yes)	14.5	20.3	0.67	0.34-1.31	0.241
Past year medical checkup (% yes)	12.7	10.9	1.19	0.55-2.60	0.651
Utilized healthcare in the past year for:					
Respiratory problems (%)	10	10.9	0.91	0.40-2.07	0.825
Asthma (%)	18.2	13.3	1.44	0.17-12.2	0.735
Nose allergy (%)	9.1	13.3	0.65	0.05-8.22	0.739
Sinusitis (%)	18.2	46.7	0.25	0.04-1.60	0.144
Other respiratory problems (%)	18.2	0	--	-	--
Used medication in past month for:					
Respiratory problems (%)	2.7	8.7	0.29	0.08-1.07	0.063
Asthma (%)	33.3	16.7	2.5	0.15-42.80	0.527
Other respiratory problems (%)	33.3	25	1.5	0.10-23.07	0.771
Health Behaviors					
Drank alcohol in past month (% yes)	20.9	14.5	1.56	0.81-3.02	0.186
Frequency of alcohol drinking					
Daily	17.4	10	Ref		
1-2/ week	13	30	4.00	0.45-35.78	0.215
Only occasionally	69.6	60	1.50	0.24-9.59	0.668
Frequency of vegetable intake (%)					

None or little	2.7	2.2	Ref		
1-2 times/week	12.7	17.4	1.71	0.30-9.68	0.542
3 or more times a week	20.9	23.9	1.44	0.27-7.75	0.675
More than once /day	63.6	56.5	1.11	0.22-5.70	0.897
Frequency of fruit intake (%)					
None or little	10	23.2	Ref		
1-2 times/week	28.2	34.1	0.52	0.23-1.19	0.120
3 or more times a week	18.2	22.5	0.53	0.22-1.29	0.164
More than once /day	43.6	20.3	0.20	0.09-0.46	0.0001
Frequency of chips intake					
None or little	75.4	70.3	Ref		
1-2 times/week	12.7	18.1	1.53	0.75-3.1.	0.246
3 or more times/week	5.4	5.1	0.99	0.32-3.09	0.998
More than once/day	6.4	6.5	1.10	0.40-3.08	0.856
Practice sports regularly (% yes)	28.2	33.3	0.78	0.45-1.35	0.384
Past month frequency of sport practice per week (%)					
None or little	6.5	21.7	Ref		
1-2 times/week	22.6	34.8	0.46	0.08-2.65	0.383
3 or more times/week	70.9	43.5	0.18	0.04-0.93	0.041
Past month frequency of 10 minutes walking					
None or little	19.1	9.4	Ref		
1-2 days/week	17.3	10.9	1.28	0.49-3.36	0.622
3 or more days/week	63.6	79.7	2.54	1.19-5.39	0.015
Work involves mainly sitting (% yes)	33.8	37.9	1.19	0.63-2.26	0.591
Work required exertion for more than 10 minutes (% yes)	77.8	79.7	0.89	0.35-2.26	0.809
Hours spent in front of screen (%)					
Less than an hour	18.2	21.7	Ref		
1-3 hours	39.1	37.7	0.81	0.40-1.62	0.544
3-5 hours	18.2	15.9	0.73	0.32-1.68	0.463
more than 5 hours	24.5	24.6	0.84	0.40-1.79	0.651
Psychosocial Status					
Someone who supports and helps you (% yes)	75.5	84.8	0.55	0.29-1.04	0.066
Treatment for depression (% yes)	0.9	0.7	1.23	0.08-20.33	0.872
Past year feeling blue and depressed					
No	29.1	31.2	Ref		
Yes	70.8	68.8	1.11	0.90-1.36	0.331
Past year suffering from anxiety and stress					
No	22.7	26.1	Ref		
Yes	77.2	73.9	1.00	0.81-1.24	0.968

[1] Density index defined as rooms in the household, excluding kitchen and bathrooms, divided by the number of people living there

[2] Current cigarette smokers, n= 165

[3] Unable to calculate odds ratio due to empty cell.

Table 2. Multivariable correlates of wanting to quit waterpipe smoking (n=248)

Variable	Odds Ratio	95% Confidence Interval	p-value
Not interested in quitting cigarettes	0.24	0.09, 0.58	0.0017
Interested in quitting cigarettes	2.32	1.24, 4.34	0.0085
Non-cigarette smoker	REF		
Past year sneezing and blocked nose	2.55	1.22, 5.34	0.0129
Frequency of fruit intake	0.56	0.42, 0.73	<.0001
Past month frequency of 10 minutes walking	1.85	1.24, 2.77	0.0027

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