Research paper

Graphic health warnings and their best position on waterpipes: A cross-sectional survey of expert and public opinion

Aya Mostafa[1], *Heba Tallah Mohammed*[1, 2]

ABSTRACT

INTRODUCTION Our aim was to assess the visibility and efficiency of graphic health warnings (GHWs) on waterpipe tobacco packs (WTPs) and to explore other more effective places to display them for better impact. We also evaluated the visibility of GHWs when placed on the waterpipe device.

METHODS We conducted 3 cross-sectional study phases using face-to-face survey questionnaires in 2014-2015. Phase I surveyed 31 tobacco control experts, while Phase II surveyed 700 participants and Phase III surveyed 348 from the public in Cairo, Egypt.

RESULTS Approximately half of the experts and participants in Phases II and III thought that GHWs on WTPs are not adequately visible, and 68.9% and 79.6% in Phases II and III, respectively, suggested posting warnings also in other places. About one-third of experts and 69.1% of Phase II participants suggested posting GHWs inside cafés or in public places, while 46.9% of Phase III participants favored placing them on waterpipes. After viewing our suggested positions on a waterpipe, all experts, 80.6% of participants in Phase II, and 81.6% in Phase III acknowledged that GHWs would be more visible there. The mouthpiece was the location selected most often across all phases (31.1% in Phase I, 35.6% in Phase II and 36.3% in Phase III). Lung and throat cancers were similarly effective in raising participants' concern about waterpipe smoking health risks (24.7%).

CONCLUSIONS This is the first population-based study to explore the best location to place GHWs on waterpipes. Policymakers should consider enacting a regulatory framework for placing GHWs on waterpipe devices.

AFFILIATION
1 Ain Shams University, Department of Community, Environmental, and Occupational Medicine, Faculty of Medicine, Cairo, Egypt
2 School of Pharmacy, University of Waterloo, Ontario, Canada

CORRESPONDENCE TO
Aya Mostafa. Ain Shams University, Department of Community, Environmental, and Occupational Medicine, Faculty of Medicine, Cairo, Egypt. E-mail: aya.kamaleldin@med.asu.edu.eg
ORCID ID: http://orcid.org/0000-0002-2803-2608

KEYWORDS
Graphic health warnings, waterpipe smoking, tobacco packs, waterpipe device, visibility, health warning placement

Received: 10 November 2016
Revised: 26 April 2017
Accepted: 2 May 2017

Tob. Prev. Cessation 2017; 3(June):116 http://doi.org/10.18332/tpc/70873

INTRODUCTION

Waterpipe tobacco smoking (WPS) rates are increasing worldwide[1] and in the Middle East the practice is replacing cigarette smoking, especially among adolescents[2]. Egypt has high rates of WPS.[3] The latest Global Adult Tobacco Survey in 2009 found that 6.2% of males 15 years of age or older were current waterpipe smokers[4]. Rates were higher in rural (7.5%) than urban (4.9%) areas[4]. The Global Youth Tobacco Survey in 2009 found that 7.5% of adolescents in Egypt were current waterpipe smokers[5], and a 2014 World Health Organization (WHO) report found that 12.2% of university students were, with those aged 24 years or older having a WPS rate twice that of those between 18 and 20 years[6].

Although WPS is not safer than cigarette smoking[7] it is perceived as less harmful, which has increased its prevalence especially among younger adults and females[8, 9]. WPS poses risks to health because of the smoker's prolonged exposure to toxins while smoking[7]. The adverse health effects are similar to those of cigarette smoking[7], and include respiratory illnesses, various cancers, mouth and throat diseases, cardiovascular disease, and low birth weight[10-12]. Some waterpipe smokers use herbal products instead of tobacco[13, 14]. Irrespective of what is smoked, harmful chemicals, such as carbon monoxide, toxic trace metals, polyaromatic hydrocarbons, and carcinogens are released posing health risks like heart and lung diseases[7, 11, 13, 15]. Occasional WPS may not be less harmful than regular WPS[15, 16]. Despite these risks, the adverse health effects of WPS remain poorly conveyed to the public[17], and current cessation methods targeting waterpipe smokers are inadequate[18].

Graphic health warnings (GHWs) are a cost-effective way to raise awareness of the hazards of tobacco smoking[17].They encourage smokers to quit, prevent nonsmokers from starting[17] and repeatedly expose smokers and nonsmokers alike to health messages and health risk information[19]. Indeed, evidence from

countries in Southeast Asia and Latin America supports that cigarette smokers in Malaysia[20], Brazil[21] and Mexico[22, 23] react effectively to warning labels in terms of risk perception and quit intentions.

In 2008, Egypt followed WHO recommendations and developed a set of 4 GHWs to control tobacco smoking. These warnings were designed to cover half of the main display areas on both cigarette and waterpipe tobacco packs[3] and are rotated every 2 years[3]. Although this complies with most recommended guidelines established by the WHO Framework Convention on Tobacco Control (FCTC)[24], some guidelines are still not addressed, such as the ban to depict flavours on the packs[3].

Placement of GHWs on waterpipes and their accessories is still substandard. In 2010 a study investigated health warning labelling practices on waterpipes and accessories (mouthpieces, filters, charcoal and aluminum foil) in different countries and found that only filters had health warnings, of which fewer than half had a clear GHW[25]. Most waterpipe users smoke at cafés and typically choose the flavour of tobacco from options offered on a menu. Waiters often prepare the tobacco for smoking, so waterpipe smokers do not see the tobacco packs and, hence, the GHWs.

To date, most of WPS studies conducted in Egypt were mainly assessing prevalence and WPS behaviour[26-29], but to our knowledge none has investigated the public's perception of GHWs on waterpipe tobacco packs, or the public's opinion on placement of GHWs on waterpipes and their accessories. Only one online study investigated waterpipe smokers' point of view of the best position to insert these warnings on waterpipes, but this study was conducted in the United States. The study's researchers reported equal visibility of health warning labels if they were placed on the base, mouthpiece and stem of the apparatus[30].

The main objective of our study was to assess the opinion of tobacco control experts (Phase I) and the public (Phase II) on the ideal location to place GHWs on waterpipes. We also sought to investigate the perception of GHWs on waterpipe tobacco packs, and to assess the visibility of GHWs when placed on waterpipes among smokers and nonsmokers (Phase III).

METHODS

We conducted a study consisting of 3 cross-sectional phases using face-to-face survey questionnaires and recruited tobacco control experts for Phase I, and adult smokers and nonsmokers in Cairo, Egypt for Phases II and III. The study received ethics approval from the Ethical Review Board of the Faculty of Medicine, Ain Shams University (FMASU R11/2015).

Study sample

For Phase I, a convenience sample of 40 tobacco control experts were invited to participate in the survey during the WHO's FCTC meeting at the Eastern Mediterranean Region (EMR) office, Cairo, Egypt in September 2014. They represented tobacco control organizations, ministries of health, academic institutions, and nongovernmental organizations from 19 EMR countries and other nations. After providing verbal consent, 31 tobacco control experts (response rate=77.5%) completed a 10-minute face-to-face interview questionnaire.

In Phases II and III, a convenience sample of the public was recruited. Participants were eligible to participate in the study if they were smokers or nonsmokers, 18 years of age or older. Individuals were considered smokers if they smoked either cigarettes or a waterpipe in the month preceding the survey[7-9]. Participants otherwise were identified as nonsmokers. Participants were approached by trained interviewers at Ain Shams University, and at several households, workplaces and cafés in Cairo, Egypt. They introduced the study as a research on the effectiveness of health warnings on waterpipe tobacco. Individuals were screened for their age eligibility. After obtaining verbal consent, participants were asked about their smoking status and completed a 10-minute face-to-face questionnaire. Data were collected from September 2014 to May 2015. A total of 1,251 participants were approached, of which 1,048 completed the survey (response rate=83.7%), 700 participants in Phase II and 348 in Phase III.

Study tools

Literature examining GHWs on tobacco packages were reviewed[31-36], from which relevant survey questions were adjusted to develop an instrument to address this study's goals. The survey's content validity was determined through multiple separate reviews and discussions among the study's authors. The GHWs used in the survey were those employed in Egypt and Gulf countries at that time. GHW placement was tested on 5 locations on the waterpipe (Figure 1).

The survey was originally developed in English, and then translated to Egyptian Colloquial Arabic and pilot tested by 5 medical student volunteers at the Community Medicine Department, Ain Shams University. The survey was modified based on their feedback.

Methodology and Study Tools for Phase I

The tobacco control experts' survey consisted of three sections. The first assessed the experts' opinion on social customs of waterpipe smoking — i.e. asking whether people usually smoke

Figure 1. Placement of GHW was tested on 5 spots on the waterpipe and accessories: (A) Glass body, (B) Metal holder, (C) Mouthpiece, (D) Hose, and (E) Waterpipe tobacco menu

Source: https://de.wikipedia.org/wiki/Shisha. Labelled for reuse with modification

alone or with others, and whether smoking mostly happens at homes, cafés, or at social gatherings in private places.

The second section assessed their opinion on the visibility of the existing health warnings on waterpipe tobacco packs. Experts viewed a sample of 5 GHWs — 3 generic from Egypt and 2 waterpipe-specific from Gulf countries. Experts were asked whether waterpipe smokers in their country would notice these health warnings, and whether the GHWs would be more visible if placed elsewhere. They were also asked to indicate the most conspicuous location to place these warnings, and to justify their response.

The third section assessed the experts' opinion on the prominent place(s) on waterpipes to insert health warnings. Experts were shown a diagram with 5 placement sites on waterpipes: the (A) glass body (base), (B) metal holder, (C) mouthpiece, (D) hose, and (E) menu (Figure 1). Experts were asked to examine the diagram for a minute, then pick the positions they think health warnings would be more visible to the public if placed on those spots. They were also asked to provide justification for their choices.

Methodological Approach for Phase II

This phase of the survey assessed demographic characteristics of participants, including their age, gender, level of education, employment status, and smoking status. Participants were also asked whether they usually see waterpipe userssmoke alone or with others, and where smokers usually smoke waterpipes.

The study assessed participants' opinion on the effectiveness of 6 GHWs — 4 from Egypt (lung, throat, and face cancer, and aging pictures) and 2 from Gulf countries (smoking is dangerous and heart disease) — in preventing or discontinuing tobacco smoking (Figure 2). Participants were also invited to provide their opinion on the visibility of GHWs to waterpipe smokers and where warnings would be more perceptible if they were placed elsewhere. The last section of the survey assessed the best location of GHWs on waterpipes using the same diagram (Figure 1) shown to the tobacco control experts.

Methodological Approach for Phase III

Phase III of the survey used the same questions as those in Phase II to assess demographic characteristics of participants. Questions related to WPS behaviour were added to Phase III, including the number of times the participants smoked a waterpipe in the last month and the number of sessions.

The survey also assessed participants' opinion on the visibility of the same 6 GHWs as in Phase II. In addition, questions assessing participants' perception of some measures of GHWs' effectiveness were added to Phase III. Participants were asked which warning was the most visible, understandable, believable, frightening, and would make them more concerned about health risks from WPS.

Phase III, as in Phase II, also assessed the best placement of GHWs on waterpipes using the same diagram as in the other phases. Additionally, in Phase III, based on preliminary data from Phase II, a health warning consisting of a lung cancer picture was formulated on 4 spots on the waterpipe (mouthpiece, glass body, metal holder, and hose). A Likert scale, ranging from 1 to 10, was used in Phase III to rate the visibility of each position, where 1 indicated not visible at all, and 10 indicated extremely visible.

Statistical analyses

To maintain confidentiality, participants were de-identified and

Figure 2. Different GHWs on waterpipe tobacco packs from the market (1–4 from Egypt, 5–6 from Gulf countries)

assigned numbers. Data were analyzed using the Statistical Package for Social Sciences (SPSS) (SPSS; IBM Corp, Armonk, NY. Version 22; 2013). Descriptive analyses were conducted. Bivariate analyses including the Student's t-test were used to compare continuous variables. Homogeneity of variances was assessed by Levene's test for equality of variance. Homogeneity of variances was met when p-values were not significant. The chi-squared test was used to examine the association between categorical variables based on smoking status and behaviour (smokers and nonsmokers, waterpipe smokers and waterpipe-nonsmokers, daily vs non-daily waterpipe smokers). ANOVA was used to compare means between different smoking groups. The multiple comparison test using Tukey adjusted p values was used to identify significant associations among different smoking statuses. A p-value <0.05 was considered statistically significant.

RESULTS

Phase I

GHWs' visibility on waterpipe tobacco packs & suggestions of alternate placement locations

The majority (87.1%) of the experts thought that waterpipe smokers usually smoke with others and in cafés. Less than two-thirds of participants (61.3%) believed that the GHWs on waterpipe tobacco packs would be seen by smokers in their countries. However, almost all participants (96.8%) were convinced that GHWs would be recognized better by waterpipe smokers if placed elsewhere and 30.0% recommended posting the GHW at places where smoking occurs. Almost one-quarter of experts (23.3%) thought that GHWs would be more visible if added to the waterpipe or accessories and suggested modifying the GHW position and mode of presentation (Table 1). The suggested modification included placing the GHW closer to the top of the pack, increasing the warning's size, changing its colour and contrast, and using waterpipe-specific warnings instead of the currently used generic ones.

GHWs' suggested placement on waterpipes

When showing experts our suggested placement of GHWs, all experts agreed that GHW placement on the waterpipe or its accessories would be more visible to waterpipe smokers

Table 1. Tobacco control experts' opinion on GHW visibility and their suggestions of alternate placement locations (n=31), WHO's FCTC meeting in Cairo, Egypt, 2014

Interview questions	N (%)
In your country, people usually smoke waterpipe	N=30*
Alone	3 (10)
With others	27 (90)
Do you see people usually smoke waterpipe at	N=30 *
Home	3 (10)
Cafés	19 (63.3)
Social gatherings at private places	8 (26.7)
In your opinion, will waterpipe smokers in your country notice this GHW (Figure 2 shown)	**N=31**
No	19 (38.7)
Will the GHW be more noticed if placed differently	**N=31**
Yes	30 (96.8)
If yes, please indicate where (open ended question)	N=30
Different placement on the pack itself	7 (23.3)
On the waterpipe or its accessories	7 (23.3)
Inside cafés or restaurants	9 (30.0)
Other places	7 (23.3)
Do you think any of the following placement methods will be more noticed by a waterpipe smoker (Figure 1 shown)	**N=31**
Yes	31 (100)
If yes, which one (more than one option allowed)	**N=31****
Glass body	13 (28.8%)
Metal holder	12 (26.6%)
Mouthpiece	14 (31.1%)
Hose	5 (11.1%)
Menu	1 (2.2%)

***Mauritius has a ban on waterpipe tobacco products**
**** Options don't add to 31 as more than one option was included**

(Table 1). The spot chosen most often was the mouthpiece (31.1%). Experts chose this location, as the mouthpiece is not hidden under the table and is closest to smokers. As smokers hold this part in their hands and regularly put it into their mouth when smoking, experts believed it to be the most visible piece not only to smokers, but to others nearby. Given that some smokers share a waterpipe and sometimes the same mouthpiece, experts thought that GHWs on the mouthpiece would be seen by more than one person. The glass body was the experts' second choice (28.8%), as it has the largest surface area and a GHW there would be more visible. The body is also the part frequently checked for water level and condition. They also thought it practical to add GHWs to the least frequently replaced part of the waterpipe rather than to the hose and mouthpiece, which are often disposable. One expert noted that the glass body is displayed in many houses because it is decorative, calling it "folkloric". The metal holder was chosen by 26.6% of experts, who chose it because it is at eye level when smokers are seated. The hose (11.1%) and the menu (2.2%) were the least chosen options to place a GHW (Table 1).

Phase II and III

Demographics

The mean age of participants in Phase II was 30.5 years (SD 12.6 years), 63.1% were male, 44.8% were students, and 43.1% had a university degree (Table 2). For Phase III, the mean age of participants was 29.3 years (SD 10.6 years), 82.2% were male, 30.9% of participants were unemployed or retired, and 38.1% had a university degree (Table 2).

Smoking behaviour

Fewer than half were smokers (41.6%). Of those, 40.5% smoked cigarettes, 19.9% smoked waterpipes, and 39.6% smoked both. Most participants (87.1%) saw waterpipe userssmoke with others at cafés (82.7%). In Phase III, more than half of participants were smokers (54.3%) of which 78.8% smoked only waterpipes or waterpipes and cigarettes. Almost half of waterpipe smokers reported daily smoking (43.6%), with an average of 2 to 3 sessions per day (51.0%). Similarly to those in Phase II, most participants saw waterpipe userssmoke with others (86.8%) at cafés (86.2%) (Table 2).

Perception of GHWs

In Phase II, participants were asked to pick from available GHWs the warning that was most effective in their view. Overall, the GHW representing throat cancer was selected most by

Table 2. Demographic characteristics, smoking status, and waterpipe smoking behavior of participants in Phases II and III (n=1048), in Cairo, Egypt, 2015

	Phase II N=700	Phase III N=348
Age, Mean (SD)	30.5 ± 12.6	29.3 ± 10.7
Gender, N (%)		
Male	442 (63.1)	286 (82.2)
Female	258 (36.9)	62 (17.8)
Occupation, N (%)		
Employed professional	183 (26.6)	79 (22.6)
Employed Nonprofessional	145 (21.0)	99 (28.4)
Students	309 (44.8)	63 (18.1)
Non-employed (non-employed, retired, house-wife)	52 (7.5)	108 (30.9)
Education, N (%)		
No school education, elementary, and middle school	69 (10.0)	62 (17.8)
High school	38 (5.5)	75 (21.5)
College degree	72 (10.4)	16 (4.6)
Higher education candidate	297 (43.1)	63 (18.1)
University degree	213 (30.9)	133 (38.1)
Current smokers, N (%)	**291 (41.6)**	**189 (54.3)**
Cigarettes	118 (40.5)	40 (21.2)
Waterpipe	58 (19.9)	74 (39.2)
Both	115 (39.6)	75 (39.6)
See people usually smoke, N (%)		
Alone	90 (12.9)	46 (13.2)
With others	610 (87.1)	302 (86.8)
Place where people usually smoke, N (%)		
Home	46 (6.6)	30 (8.6)
Cafés	579 (82.7)	300 (86.2)
Social gatherings in private places	75 (10.7)	18 (5.2)
Times smoked waterpipe in past month, N (%)		**N=149**
Monthly		45(30.2)
Weekly		39(26.2)
Daily		65(43.6)
Number of sessions per day in past month, N (%)		**N=149**
1		30 (20.1)
2 to 3		76 (51.0)
More than 3		65 (28.9)

participants (36.0%), followed by face cancer (29%), then lung cancer (15.9%). No statistical difference was detected between smokers and nonsmokers regarding these choices.

In Phase III, when asked to assess different warning labels on their believability, understandability, ability to grab attention, to raise participants' concern of risk, and to stimulate affective reaction, the GHW representing face cancer grabbed attention the most (22.7%), lung cancer was the most believable (39.4%) and the most understandable (37.9%), whereas throat cancer was the most frightening. Both lung cancer and throat cancer GHWs were similar in raising participants' concern about WPS risks (24.7%).

GHWs' visibility on waterpipe tobacco packs & suggestions of alternate placement locations

Slightly more than half of participants in Phase II (52.0%) and Phase III (53.4%) thought that waterpipe smokers would find GHWs hard to notice. However, more than two-thirds of participants in Phase II (68.9%) and three-quarters in Phase III (79.6%) agreed that GHWs would be more visible if they were placed elsewhere. Regarding suggested places to insert GHWs, only 411 participants in Phase II and 277 in Phase III responded to this question. Of those, only 11.9% in Phase II

Table 3. Public opinion on the noticeability of graphic health warnings and their suggestions of alternate placement locations among adults (n=1048) in Cairo, Egypt, 2015

	Phase II N=700 N (%)	Phase III N=348 N (%)
In your opinion, will waterpipe smokers notice GHW		
No	**364 (52)**	**186 (53.4)**
Non-WPS	273 (75.0)	109 (58.6)
WPS	91 (25.0)	77(41.4)
p-value*	>0.05	>0.05
Will the GHW be more noticed if placed differently		
Yes	**482 (68.9)**	**277 (79.6)**
Non-WPS	369 (76.6)	156 (56.3)
WPS	113(23.4)	121 (43.7)
p-value*	>0.05	>0.05
If yes, please indicate where	**N=411**	**N=277**
Different placement on the pack itself	**78 (19.0)**	**119 (43.0)**
Non-WPS	62(80.9)	72 (60.5)
WPS	16(15.0)	47 (39.5)
On the waterpipe device or its accessories	**49 (11.9)**	**130 (46.9)**
Non-WPS	29 (59.1)	66(50.8)
WPS	20 (40.8)	64(49.2)
Other (e.g., inside cafés, in public places)	**284 (69.1)**	**28 (10.1)**
Non-WPS	185 (65.1)	18(64.3)
WPS	99 (34.9)	10(35.7)
p-value*	>0.05	>0.05
Do you think any of the following placement methods will be more noticed by a waterpipe smoker (Figure 1 shown)		
Yes	564 (80.6)	284 (81.6)
If yes, which one (more than one option allowed) **	**N=564**	**N=284**
Glass body	136 (24.1)	64 (22.5)
Metal holder	148 (26.2)	93 (32.7)
Mouthpiece	201 (35.6)	103 (36.3)
Hose	68 (12.1)	19 (6.7)
Menu	67 (11.9)	5 (1.8)

***P-value determines significant difference between WPS and non-WPS in each phase.**
****Total doesn't add up to total number of participants as they were invited to choose all that apply for placement spots.**

Table 4. Comparison of visibility and suggested change to current position of waterpipe tobacco graphic health warnings between daily and non-daily waterpipe smokers in Phase III (n=149), in Cairo, Egypt, 2015

	Non-daily waterpipe smokers N=84 N (%)	Daily waterpipe smokers N=65 N (%)	P-value
In your opinion, will waterpipe smokers notice GHW			
Yes	32 (38.1)	40 (61.5)	**0.004***
No	52 (61.9)	25 (38.5)	
Will the GHW be more noticed if placed differently			
Yes	70 (83.3)	51 (78.5)	>0.05
No	14 (16.7)	14 (21.5)	
If yes, please indicate where	**N=70**	**N=51**	
Different placement on the pack itself	29 (41.4)	18 (35.3)	>0.05
On the waterpipe device or its accessories	35 (50)	29 (56.9)	
Other (e.g. inside cafés, in public places)	6 (8.6)	4 (7.8)	

***Significant difference after Post hoc analysis using Bonferroni correction.**

suggested placing the GHW on the waterpipe or its accessories. Conversely, 46.9% of respondents in Phase III suggested placing the GHW on the waterpipe or its accessories. Moreover, more than two-thirds of respondents in Phase II (69.1%), but only 10.1% in Phase III suggested posting health warnings inside cafés and in public places as posters or running ads displayed on screens (Table 3). Non-daily waterpipe smoker respondents were significantly more likely than their daily smoker counterparts to report difficulty in noticing GHWs (61.9% non-daily vs 38.5% daily smokers, p=0.004) (Table 4). No statistical difference was detected between smokers and non-smokers regarding these choices in both phases. Also, no statistical differences were detected between different smokers' groups in both phases.

GHWs' suggested placement on waterpipes

When showing participants our suggested placement of GHWs on waterpipes and accessories, 80.6% of participants in Phase II and 81.6% in Phase III thought that placing the warning on the suggested locations would be more noticed by waterpipe smokers than if the warning was placed on the tobacco pack (Table 3). No statistical significant differences were detected between smokers and nonsmokers. The order of selected locations for GHWs was similar across the two phases, with the mouthpiece being the most often selected spot (35.6% in Phase II and 36.3% in Phase III), followed by the metal holder (26.2% in Phase II and 32.7% in Phase III), then the glass body (24.1% in Phase II and 22.5% in Phase III). The hose (12.1% Phase in II and 6.7% in Phase III) and the menu (11.9% Phase in II and 1.8% in Phase III) were the spots chosen least often for the GHW (Table 3).

Rating of GHWs' visibility

In Phase III, we assessed participants' opinion of the visibility of a formulated lung cancer GHW on different parts of the waterpipe and accessories. The mouthpiece and metal holder scored higher in visibility ratings, with mean scores of 6.9 and 6.7, respectively. The hose followed, with a mean score of 6.1, while the glass body scored lowest with an average of 5.2.

The mean scores for smokers on GHWs' visibility on the glass body (5.7) were significantly different (p<0.000) from those of nonsmokers (4.5). Other differences in position scores based on smoking status were not statistically significant. Visibility scores for the glass body also showed statistically significant differences between smoking groups (waterpipe only, cigarettes only, and both waterpipe and cigarettes smokers) F=3.260, p<0.05. Mean scores of visibility of the glass body among smokers were higher among waterpipe-only smokers (mean=6.27, SD=2.7), then among both waterpipe and cigarette smokers (mean=5.59, SD=2.4), and the lowest among cigarettes smokers (mean=4.98, SD=3.0). Tukey post hoc analysis revealed that the difference in mean scores between waterpipe only and cigarette smokers was statistically significant (p=0.03), but no other group differences were significant. Mean visibility scores for the glass body also showed statistically significant differences (p<0.001) between WPS groups (mean=4.61, SD=2.7) vs non-smoking group (mean=5.93,SD=2.6), but no other differences in position scores were significant between both groups. Differences in position mean scores based on waterpipe smoking behaviour (daily vs non-daily) were not statistically significant.

DISCUSSION

This study explored expert and public opinion on GHWs' visibility on waterpipe tobacco packs when placed on waterpipes and their accessories, and investigated the most visible location to place GHWs. The study also assessed public opinion on the effectiveness of GHWs used in Egypt and the Gulf area. All experts in Phase I, and the majority of participants in Phases II and III agreed that they would be more visible when placed on waterpipes and their accessories.

The majority of participants in all phases reported noticing users smoke with others most often at cafés, as would be expected given that waterpipe smoking is central to many social interactions. Businesses around the world have taken advantage of the increasing popularity of waterpipe smoking by opening shisha cafés to encourage this habit[8]. This has happened despite a ban on tobacco smoking in public places[37], highlighting a discrepancy between regulations and their enforcement[8]. To help curb rates of WPS, certain product- and venue-related requirements of waterpipe serving cafés should be enforced — within a waterpipe-specific regulatory and operational framework[38]. These requirements can be imposed on café owners while obtaining or renewing their café's operating licence.

As in many countries, Egypt has adopted the practice of placing health warnings on waterpipe tobacco packs in an attempt to control tobacco smoking. However, most of participants in all phases agreed that GHWs would be more visible if they were placed somewhere other than on tobacco packs, largely because smokers do not see the packs in the venues where waterpipe smoking typically occurs. A qualitative study conducted in London, UK examined the impact of health warning labels on waterpipe packs. The researchers found that participants perceived health warnings on waterpipe tobacco packages as ineffective and suggested exposing smokers to warnings during consumption to enhance their effect[39].

The tobacco control experts and the public in Phase II were more inclined to place GHWs in smoking venues and in public places as posters or running ads on billboards or screens, while the public in Phase III suggested placing the GHWs on waterpipes and their accessories. Policymakers should consider enacting legislation that requires shisha cafés and producers of tobacco packs to display GHWs prominently, as this would both promote awareness of the harms of waterpipe tobacco smoking as well as deter smoking initiation among smokers and nonsmokers.

Some studies have suggested that GHWs should be placed on the waterpipe device itself[25, 40]. Turkey has gone a step further, requiring that health warnings be placed on the waterpipe's glass bowl[41]; however, little is known about the acceptability and effectiveness of this placement. Waterpipes come in different shapes and sizes, so enforcement of this requirement could be challenging. Both tobacco control experts and the public in Phases II and III thought that the mouthpiece was the best position for GHWs, followed by either the metal holder or glass body. These findings are mostly consistent with those of a study conducted among university students in the United States by Islam and colleagues, who found that GHWs were comparably more visible when added to the waterpipe's base, mouthpiece and metal holder[30].

We found that the perceived visibility of GHWs on the waterpipe's glass body differed significantly between waterpipe smokers and cigarette smokers. This suggests that if GHWs were to be placed on the glass body, the warnings could impact waterpipe smokers the most. This is supported by the recommendation of exposing waterpipe smokers to health warnings at the point of consumption[38], and repeating these exposures to enhance the warning's effect[35, 42]. However, further studies are still required to thoroughly investigate this observation.

Participants thought that the GHW representing throat cancer was the most effective, followed by the warning depicting face cancer, then the warning depicting lung cancer. Respondents believed and understood the lung cancer graphic warning the most, but were more frightened by the throat cancer warning. Both of these GHWs raised participants' concern about the risks of WPS and are consistent with evidence that suggests the strongest reactions are those to cancer warnings, usually expressed as fear and concern[43]. Understanding the types of pictorial warnings that are most recognized by smokers and nonsmokers and that raise their concerns about the health risks of smoking is crucial. Moreover, cognitive and behavioural indicators should be included in health warnings, as they are essential in eliciting quit intention and quit attempts[44]. Policymakers should consider applying all of these factors in their marketing plans for GHWs on waterpipes and in mass media campaigns.

Study limitations

Our study was cross-sectional, thus its findings are exploratory and preliminary. Moreover, opting for a convenience sample makes it difficult to generalize our findings to different settings and contexts. However, our study's sample size was considerable, which served to increase statistical power. Randomized controlled trials would help determine the most effective GHWs and their most effective locations on waterpipe devices. Although we targeted smokers and nonsmokers to examine the

effect that smoking status might have on the effectiveness of GHW location, our study did not aim to test different subgroups such as women and young adults. As WPS rates are increasing and attracting more youth and women, the effectiveness of the design, content, and position of GHWs needs to be assessed in these groups[1, 17, 25, 45].

Our study focused mainly on the visibility of GHWs, but it did not investigate quit intention and quit attempts as a result of seeing the warnings. Also, the study did not assess factors that might affect health warning salience, such as the effect of GHW rotation and whether a given GHW message diminishes in effectiveness over time. However, our findings can serve as a baseline for future studies that address these points.

CONCLUSIONS

Although GHWs are effective in conveying health risks from cigarette smoking in low and middle income countries[44], more evidence is needed to better understand which warning designs, placements and methods are most effective in communicating risks of WPS to different population groups. More detailed pre- and post-marketing studies of the effectiveness of GHW on waterpipe tobacco products are needed. To our knowledge, this is the first population-based study that assesses whether GHWs on waterpipe tobacco packs are visible and investigates participants' opinions in Egypt on the best location to place GHWs on waterpipes. Policymakers should consider enacting legislation related to warning labels and their placement on waterpipe devices and accessories to enhance their intended effects.

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ACKNOWLEDGEMENTS

We thank the tobacco control experts who participated in Phase I of this study. The tobacco control experts who agreed to participate in this study from the EMR are from (in alphabetical order): Afghanistan, Bahrain, Djibouti, Islamic Republic of Iran, Egypt, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Sudan, and Tunisia. Other countries (in alphabetical order): Brazil, Canada, France, Mauritius, Switzerland, South Africa, and Turkey. We also thank the participants who shared their opinions for Phases II and III. We greatly appreciate the efforts of the volunteer medical students who helped collect data. We thank Joe Petrik for his efforts in editing and proofreading this manuscript.

CONFLICT OF INTERESTS

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

FUNDING

There was no source of funding for this research.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed