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The social context of tobacco products use among adolescents in Lebanon (MedSPAD-Lebanon)

Naim Bejjani *, Charbel El Bcheraoui, Salim M. Adib

Department of Public Health, Faculty of Medicine, Saint-Joseph University (USJ), Beirut, Lebanon

Received 29 October 2011; received in revised form 22 January 2012; accepted 4 February 2012
Available online 3 April 2012

KEYWORDS

Cigarettes;
Water pipe;
Narguileh;
Arabs;
Addiction

Abstract *Background:* Current data from the Middle East suggest a rapid increase in the incidence of smoking water-pipes (narguileh in Lebanon) in parallel with cigarettes. The social context in which these two behaviors are initiated and associated has not been studied.

Methods: Data from a standardized questionnaire to measure the prevalence and practices related to cigarettes and narguileh consumption in a representative sample of 1097 children in grade 9 were extracted and analyzed for elements of the social context in which consumption occurs.

Results and discussion: Among surveyed children (mean age 14.6), 3.9% were “frequent” cigarette smokers (more than nine times ever). Presence of parents and/or siblings who smoke is a key factor for initiation. Narguileh use is a social phenomenon, rarely smoked alone (<4%) with 19% of the surveyed children being “frequent” narguileh smokers (more than nine times ever). Almost half of these students (42%) have all their friends smoking narguileh.

Conclusions: Further analysis confirmed that narguileh use is now an accepted familial and social phenomenon, with restrictions apparently decreasing. These results necessitate drawing strategies to address this public health concern that is becoming more prevalent in Lebanon and elsewhere in the Middle East.

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1. Introduction

1.1. Rationale and background

Despite global efforts for control and prevention, the use of different tobacco products remains an important subject in developing countries. In parallel with the relatively high incidence of cigarette

* Corresponding author. Address: Bejjani bldg. Jamhour, Beirut, Lebanon. Tel.: +961 3 853699.

E-mail addresses: naim.bejjani@gmail.com (N. Bejjani), charbelbcheraoui@yahoo.com (C. El Bcheraoui), salimadib@hotmail.com (S.M. Adib).

initiation among adolescents [1], use of other tobacco products is growing rapidly. Specific to the Middle Eastern cultural context is the use of the water-pipe, often referred to as shisha or narguileh (in Lebanon) [2]. With the increase of tobacco use among the young generations and its well-known impact on public health, many Lebanese researchers have attempted recently to measure the magnitude of tobacco initiation in all its forms and define its parameters [3–5]. The health risks of narguileh use are always underestimated, although it presents a danger at least as important as cigarette smoking [6]. The volume of smoke inhaled during a one-hour session of narguileh is believed to equal the heavy metals and other components of as many as 100 cigarettes. Sharing the same narguileh with others may pose a risk of transmitting serious infections, such as hepatitis and tuberculosis. Less harsh and fragranced brands of narguileh tobacco make its use even more attractive to adolescents of both genders [7].

Several recent studies have documented an increase in narguileh use faster than that of cigarettes, whose uptake appears to be stabilizing in adolescents. As early as 2002, a non-representative Rapid Survey Assessment (RSA) conducted in Lebanon under the auspices of the United Nations Office on Drugs and Crime (UNODC) did not consider the use of the narguileh as a behavior worthy of assessment [8]. However, a subsequent study conducted between 2003 and 2004 among 2443 secondary and complementary students from 10 private and three public schools in Beirut revealed the uptake gap with a prevalence of cigarette smoking at 11.4% and that of narguileh use at 29.6%. With regard to differences in gender, boys smoked cigarettes significantly more than girls, whereas there were no gender differences in narguileh use. Public schoolchildren were 3.2 times and 1.7 times more likely to be smokers of cigarettes and of narguileh, respectively, compared with those from private schools [5]. This trend was further confirmed in the Global Youth Tobacco Survey 2005 [1] with respect to adolescents 13–15 years old. GYTS-2005 noted that among approximately 3400 students, 10% were cigarette smokers compared with nearly 59% who were narguileh smokers. The prevalence of narguileh smoking among adolescents was higher than previously found between 2001 and 2002 in 1400 teenagers (average age 15) from the socially-deprived southern suburbs of Beirut; that earlier study had shown that 24% of participants smoked a narguileh at least once a week. The average age of initiation was 13 years, and 28% had smoked their first narguileh with a member of the immediate family [4]. This last result indicated

the larger social acceptance for adolescents' narguileh use which is not found with regard to cigarette smoking.

1.2. Objectives

A need was found to better understand the social context in which smoking cigarettes and narguileh use were initiated among Lebanese adolescents, and to measure the degree to which these two behaviors were associated. Secondly, data could be updated and completed at a national level regarding narguileh and cigarette use in schoolchildren in the final year of the "complementary" educational cycle (grade 9).

2. Methods

2.1. Target population

The target population consisted of all schoolchildren in grade 9 in Lebanon. The reasons for this choice are two-fold:

- A considerable proportion of students completing the complementary cycle subsequently join technical/occupational schools or enter the job market, making grade 9 more representative of all adolescents than secondary classes.
- While exposure to tobacco starts early in Lebanon, running a survey among relatively older children was seen as avoiding the social reluctance to address "non-normal" behaviors in younger children.

The number of students in the primary and complementary cycles is estimated yearly at 115,000 children [10], distributed in nine grades, for about 12,000 per grade. The schoolchildren's distribution is about 60% in the public school system and 40% in private schools. Regionally, 10% are found in the province (*mohafazat*) of Beirut, 40% in Mount-Lebanon, 20% in North-Lebanon, 20% in South-Lebanon, and 10% in the province of Bekaa [3].

2.2. Sample size

The sample size needed for this survey was calculated based on an estimation of 11% of direct or indirect contact with drugs and/or alcohol among schoolchildren [8,11]. The alpha error tolerated was 0.05 and the projected sampling error was 2%. With these figures, the needed number of children for this survey was 940. Since children were to be drawn from all five districts of the country, it was decided that an equal number of 200 participants would be selected from each, and prevalence rates would be weighted for proportional

distribution during analysis. Thus the projected number of students to be selected was 1000.

2.3. Sampling

A two-stage stratified cluster sampling procedure was used for sampling. In each district, all schools with at least one 9th grade class were listed and given weights according to the number of classes. Schools were then randomly selected, those having more weights having higher chances of being selected. Assuming that each class includes about 20 students, and that only one class could come from any one school, 10 schools had to be selected in each of the five Lebanese districts. In fact 15 were selected to accommodate smaller classes and/or refusal to participate. Then, in each selected school, one class was then randomly selected for the survey.

2.4. Questionnaire

The standardized European School Survey Project on Alcohol and Other Drugs (ESPAD) [12] questionnaire was translated into Arabic and adapted to the Lebanese context. The questionnaire contained a detailed section on contact with and use of tobacco products: cigarettes and narguileh, alcohol, hashish and Ecstasy. Another section included a more general overview about other addictive substances. A final section looked for demographic data of participants. This essay will focus mainly on the section related to cigarettes and narguileh smoking.

A pilot test was conducted in one urban and one rural class, and the first version of the questionnaire was modified accordingly. The questionnaire was self-completed by students during class over 20 minutes, in the presence of a formally trained assistant. The completed questionnaire was placed in a sealed envelope in the presence of the students. Data collection occurred in the fall–winter of academic year 2008–2009. Data integrity was evaluated while being entered, in terms of logical and scale validity. The errors found were corrected by reviewing the corresponding hard copy.

2.5. Variables

The following detailed variables were obtained on cigarettes and narguileh:

- Knowing of someone who uses that substance among friends and family.
- Frequency of self-reported lifetime consumption and weekly or daily use.

- Place and persons with whom substance has been used.
- Availability of the substance in the student's environment.

Socio-demographic data obtained included:

- Age and sex.
- Socio-economic status (SES) indicated by the household crowding index measured in persons/room. Higher crowding indicates lower SES [13].

2.6. Ethical considerations

Prior to administering the questionnaire, a consent form was sent to all parents to be signed if they did not want their child to participate. The first page of the questionnaire assured the children that their participation was free and that they could return empty copies. They were also assured that their answers would remain anonymous and would not be shared with anyone at school or elsewhere, and that there were no correct or incorrect answers. At the end of the survey, each participant received brochures and pamphlets describing substances mentioned in the survey and highlighting the harm which they can cause. Their science teacher received a booklet and a DVD which included materials to be used in preparing class presentations on issues of drugs and addiction.

2.7. Plan of analysis

All variables were described as frequencies and percentages for categorical variables, and as means and standard deviations (SD) for continuous ones. Differences by age, sex, school affiliation and regions were drawn and tested using X-square or *t*-tests depending on the situation. Significance was considered at a *p*-value ≤ 0.05 . Data were analyzed using SPSS-16 software.

3. Results

3.1. Socio-demographic characteristics of participants

A total of 1097 children completed the questionnaires in 59 various classes, with a mean capacity of 19 in each class. Students selected were distributed between the public (65%) and private schools (35%), which slightly over-represents the former (normally 60% of students attend public schools). The sample included slightly more girls (54%) than boys. Ages ranged from 12 to 19 years, with a mean of 14.6 years (SD = 1.1). There were no differences

in mean age between sexes, in opposite to a significant difference ($p < 0.01$) between public (14.9 ± 1.3) and private schools (14.1 ± 0.7). Similarly, students were significantly younger in the more urbanized districts of Beirut (14.3 ± 1.0) and Mount Lebanon (14.5 ± 1.0) and older in the more rural districts of South Lebanon (14.7 ± 1.0) and North Lebanon (15.0 ± 1.2).

Nearly 45% of mothers and fathers of students received a secondary education. Based on the crowding index [13], the sample indicated a socio-economic status (SES) slightly skewed toward less affluent levels. A crowding rate of 1 person/room is generally considered the limit from upper-middle to lower-middle class. The average crowding in this sample was 1.6 persons/room ($SD = 0.7$). Details are presented in Table 1.

3.2. Cigarette consumption

Only one quarter of the participants lived in households without smokers. More fathers (56%) than mothers (39%) were smokers. Thirty-eight percent of participants noted no smokers among their friends, against 21% with all friends smoking. Ten percent of respondents admitted to having tried smoking and 3.9% were already “frequent” (more than nine times in their lifetime) smokers. In this group of frequent smokers ($n = 43$), 60% smoked at least one cigarette per day, with an average of eight cigarettes per day. Of the 154 students who smoked at least one cigarette in their life, this occurred most often in their home (43%), followed by the house of a friend (39%). Almost 25% smoked alone while most (60%) did so with their friends or neighbors. The average age of initiation of cigarettes was 13 years. The weighted prevalence of frequent smokers was 5.1% (3.8–6.4), the highest prevalence found in Mount Lebanon (8.2%) followed by Beirut (4.9%) (Table 2). Only 20% of surveyed adolescents admitted that most of their friends were in that habit. Boys were more frequent smokers than girls. There were more smokers in public schools (6.4%) than in private schools (2.9%) (Table 3). The prevalence increased rapidly with age, ranging from 2.7% at 14 years to 17.4% at 16 years and over (Table 4).

3.3. Narguileh use

Only 36% of participants reported no narguileh use at home. There were slightly more fathers (27%) than mothers (23%) smoking narguileh. Only 19% of participants reported no narguileh users among their friends and 42% said all their friends were users. Over 25% of participants admitted having

tried the narguileh and 19% were already “frequent” (more than nine times ever) users. In this group of frequent smokers ($n = 198$), 69% smoked the narguileh at least once a week, with an average of 4 per week. Of the 465 students who smoked at least one narguileh in their lives, this occurred most often in their home (58%), followed by restaurants or cafes (50%) and the house of a friend (46%). Very few children (4%) smoke alone, while most do it with their friends, neighbors or siblings. Almost 42% of all adolescents stated that most of their friends were narguileh users. The average age for initiation was 14 years. The weighted prevalence of frequent narguileh smoking was 16.6% (14.4–18.8), the highest prevalence found in South Lebanon (24.1%) followed by Mount Lebanon (16.4%) (Table 2). Boys were more frequent users than girls. There were more smokers in public schools (21.0%) than in private schools (8.2%) (Table 3). The prevalence increased rapidly with age, ranging from 9.7% at 14 years to 32.5% at 16 years and over (Table 4). Tobacco “mouassal” (fruit fragrance), more chemically toxic than pure tobacco or “ajami”, was nevertheless the preferred type of tobacco used for 79% of frequent smokers.

4. Discussion

4.1. Study rationale and limitations

Several previous surveys focused more on cigarettes [1,9] and alcohol [11] and much less on narguileh use, despite evidence of the rapid increase in the incidence of the latter [4]. MedSPAD-Lebanon updated knowledge about the prevalence of such behaviors and allowed the analysis of their social context among school adolescents throughout all the Lebanese regions. The procedures were expected to select a representative sample of 9th graders from across the country. However, several upscale private schools refused to open their doors to the surveyors, despite the total backing of the Ministry of Education and of the Association of Private Schools in Lebanon, who provided letters of support. Schools which refused to participate were generally replaced by neighboring ones with a similar student body when possible. Nevertheless, none of those replacements were at par socio-economically with the refusing institutions. This unavoidable selection bias has resulted in a slight over-representation of the public sector. Based on previous findings [5,11], this may have led to an over-estimation of tobacco use among adolescents. This over-estimation, however, may have been inadvertently offset by

Table 1 Socio-demographic characteristics of participants (*N* = 1097).

Socio-demographic characteristics	<i>n</i> (%)
Sex	
Boys	500 (45.6)
Girls	597 (54.4)
AGE (mean = 14.6 years; ET = 1.1; interval 12–19)	
≤13	72 (6.6)
14	526 (47.9)
15	312 (28.4)
16	120 (10.9)
>16	67 (6.1)
Districts («Mohafazats»)	
Beirut	225 (20.5)
Mount-Lebanon	232 (21.1)
North Lebanon	215 (19.6)
South Lebanon	212 (19.3)
Bekaa	213 (19.4)
School system	
Public	716 (65.3)
Private	361 (34.7)
Mother's educational level	
Has never been to school	53 (4.8)
Primary	240 (21.9)
Complementary	203 (18.5)
High School	211 (19.2)
College	203 (18.5)
Do not know	187 (17.0)
Employment status of mother^a	
Full-time	99 (9.0)
Part-time	104 (9.5)
Housewife	893 (81.5)
Father's educational level	
Has never been to school	47 (4.3)
Primary	241 (22.0)
Complementary	174 (15.9)
High School	148 (13.5)
College	239 (21.8)
Do not know	248 (22.6)
	<i>Mean (ET)</i>
	<i>[min–max]</i>
CROWDING INDEX (persons/room)	1.6 (0.7) [0.2–7.0]

^a Total varies due to missing data.

the non-inclusion in this survey of adolescents who dropped out of school. In that subgroup of children, risky behaviors may be assumed to be more prevalent than among children still in school. The proportion of drop-outs in Lebanon is currently unknown.

4.2. Importance of the problem of consumption of tobacco products

The use of the narguileh has been growing since the 1990s [4,14–15] at rates far exceeding the levels of initiation and use of cigarettes. Beyond this major difference in prevalence, patterns of use shown in this survey were quite similar for both tobacco products. The age of initiation of narguileh was 14 years on average, although the initial contact occurred for some at as early as age 8. Among “frequent” users, 69% used the narguileh at least once weekly. The age of initiation for cigarette smokers was slightly lower (13 years), although some adolescents have had their first cigarette as early as 6 years old. Among “frequent” smokers, 60% smoked daily.

4.3. Socio-demographic determinants of consumption of tobacco products

As already noted in previous studies, the age of 15 seemed to mark the boundary of the rapid increase in cigarette consumption [9]. The age initiation on average was even younger – 13 for cigarettes and 14 for narguileh. Younger age of initiation raises concerns as it is associated with higher chances of becoming a regular smoker, lower probability of cessation and higher risk for developing irreversible health lesions. The prevalence of adolescents at risk of becoming regular smokers was higher among boys than girls, confirming previous results [9,11]. The higher prevalence of cigarette consumption in public schools compared with private ones could be explained partly by a higher average age of students in public schools, and partly by a lack of adherence to anti-tobacco regulations by public schools staff. Teachers are role models, in addition to parents and siblings [15,16]. If evidence can be built indicating adverse modeling, rigorous inspections should be implemented in public schools to enforce anti-smoking regulations already in the books.

4.4. Contextual factors and synergies

The behavioral model represented by teachers and friends of the same age who smoke plays a role in the initiation of smoking [16]. In groups of adolescents, peer pressure is implicit and leads to regular use. Other sociological factors encourage consumption of tobacco products. In this sample, almost three of four students live in “smoking” households. The presence of parents and/or

Table 2 Patterns and distribution of cigarette and narguileh smoking among participants ($N = 1097$).

Variables	Cigarette n (%)	Narguileh n (%)
<i>Consumption among household members</i>		
No one	291 (26.5)	388 (36.3)
Father	613 (55.8)	294 (27.5)
Mother	432 (39.3)	249 (23.3)
Siblings	183 (16.6)	418 (39.1)
<i>Consumption among friends^a</i>		
No one	421 (38.3)	206 (18.7)
Few	154 (14.0)	116 (10.6)
Some	237 (21.6)	270 (24.6)
Almost everyone	228 (20.8)	458 (41.8)
<i>Personal consumption</i>		
Never	943 (86.0)	580 (55.5)
Few (<10 times)	111 (10.1)	267 (25.6)
Frequently (≥ 10 times)	43 (3.9)	198 (18.9)
<i>Place of consumption</i>		
Home	67 (43.5)	272 (58.5)
Friend's	60 (38.9)	214 (46.0)
Public places	55 (35.7)	107 (23.0)
School	12 (7.8)	0
Restaurants or coffee shops	54 (35.1)	233 (50.1)
Other (store, car, etc...)	4 (2.6)	0
<i>Consumption companions^b</i>		
Alone	39 (25.3)	17 (3.7)
Cousins	34 (22.1)	250 (53.8)
Friends or neighbors	92 (59.7)	290 (62.3)
Siblings	12 (7.8)	203 (43.7)
<i>Among those who smoke frequently^c</i>		
	<i>Mean (SD) [min–max]</i>	
Frequency	8/day (11) [<1–40]	4/week (5) [<1–30]
Starting age	13 (2) [6–16]	14 (2) [8–17]
Time since they started smoking (months)	23 (23) [2–96]	23 (19) [1–153]
<i>District</i>		
	<i>Prevalence (95% CI)^d</i>	
Beirut	4.9 (2.1–7.7)	15.1 (10.4–19.8)
Mount-Lebanon	8.2 (4.7–11.7)	16.4 (11.6–21.2)
North Lebanon	1.9 (0.1–3.7)	12.1 (7.7–16.5)
South Lebanon	1.9 (0.1–3.7)	24.1 (18.3–29.9)
Bekaa	2.3 (0.3–4.3)	15.5 (10.6–20.4)
National gross prevalence	3.9	16.6
National weighted prevalence	5.1 (3.8–6.4)	16.6 (14.4–18.8)

^a Fifty seven participants answered: «I do not know» for cigarettes and 47 for narguileh.

^b Among those who had smoked at least once during their lifetime.

^c In this category, 39.5% do not smoke daily, while 60.5% do on different frequencies for cigarettes; 31.3% and 68.7% respectively for narguileh.

^d Prevalence based on those who had smoked frequently (at least 10 times during their lifetime).

siblings who smoke in the home environment of these adolescents facilitates access to cigarettes. It is therefore not surprising that among teenagers aged 14–15, 12.8% had tried their first cigarette often at home or at a friend's. This finding should drive anti-smoking awareness campaigns focusing on parents in Lebanon.

While social modeling is essential in cigarette smoking initiation and maintenance, one quarter of smokers admit to smoking alone. In contrast, narguileh use is a social phenomenon par excellence. Many more students tried narguileh as opposed to cigarettes, and they rarely used the narguileh alone (<4%). This is a clear indication of

Table 3 Distribution of tobacco consumption by gender, school system and district (N = 1097).

Districts	Gender		School type	
	Boys (%) (95% CI)	Girls (%) (95% CI)	Public (%) (95% CI)	Private (%) (95% CI)
<i>Cigarettes^a</i>				
Beirut	8.2 (2.8–13.6)	2.4 (0.0–5.1)	6.3 (1.8–10.8)	3.5 (0.1–6.9)
Mount-Lebanon	15.6 (8.3–22.9)	2.9 (0.1–5.7)	10.2 (5.3–15.1)	4.7 (0.2–9.2)
North Lebanon	4.0 (0.2–7.8)	0	1.8 (0.0–3.8)	2.1 (0.0–6.2)
South Lebanon	3.6 (0.2–7.0)	0	2.9 (0.1–5.7)	0
Bekaa	5.6 (0.9–10.3)	0	3.3 (0.5–6.1)	0
<i>Prevalence</i>				
(Gross)	7.4	1.1	4.9	2.1
(Weighted)	9.6 (7.0–12.2)	1.6 (0.6–2.7)	6.4 (4.6–8.2)	2.9 (1.2–4.6)
<i>Narguileh^a</i>				
Beirut	16.3 (9.0–23.6)	14.3 (8.2–20.4)	17.1 (10.1–24.1)	13.2 (7.0–19.4)
Mount-Lebanon	20.8 (12.7–28.9)	13.2 (7.5–18.9)	23.8 (16.9–30.7)	3.5 (0.0–7.4)
North Lebanon	14.0 (7.2–20.8)	10.6 (5.0–16.2)	13.8 (8.6–19.0)	6.2 (0.0–13.0)
South Lebanon	28.6 (20.3–36.9)	19.2 (11.4–27.0)	26.1 (18.8–33.4)	20.3 (11.1–29.5)
Bekaa	21.1 (12.8–29.4)	11.8 (6.0–17.6)	20.9 (14.5–27.3)	1.7 (0.0–5.0)
<i>Prevalence</i>				
(Gross)	20.2	13.8	20.3	9.0
(Weighted)	20.1 (16.6–23.6)	13.8 (11.0–16.6)	21.0 (18.0–24.0)	8.2 (5.4–10.9)

^a Prevalence based on those who had smoked at least 10 times during their lifetime.

Table 4 Distribution of tobacco consumption by age and district (N = 1097).

Districts	≤13 years (%) (95% CI)	14 years (%) (95% CI)	15 years (%) (95% CI)	≥16 years (%) (95% CI)
<i>Cigarettes^a</i>				
Beirut	3.6 (0.0–10.5)	1.7 (0.0–4.0)	7.0 (0.4–13.6)	19.0 (2.2–35.8)
Mount-Lebanon	0	4.5 (0.6–8.4)	8.3 (1.9–14.7)	29.6 (12.4–46.8)
North Lebanon	0	1.0 (0.0–3.0)	0	4.9 (0.0–10.3)
South Lebanon	0	2.0 (0.0–4.7)	0	5.1 (0.0–12.0)
Bekaa	0	1.0 (0.0–3.0)	4.8 (0.0–10.1)	2.6 (0.0–7.6)
National mean	0.7	2.0	4.0	12.2
Weighted mean	0.7 (0.0–2.7)	2.7 (1.3–4.1)	5.2 (2.7–7.7)	17.4 (12.0–22.8)
<i>Narguileh^a</i>				
Beirut	3.6 (0.0–10.5)	10.9 (5.3–16.5)	28.1 (16.4–39.8)	19.0 (2.2–35.8)
Mount-Lebanon	8.7 (0.0–20.2)	8.2 (3.1–13.3)	22.2 (12.6–31.8)	40.7 (22.2–59.2)
North Lebanon	0	4.2 (0.2–8.2)	8.8 (1.4–16.2)	27.9 (16.6–39.2)
South Lebanon	22.2 (0.0–49.4)	20.8 (12.9–28.7)	28.6 (17.4–39.8)	25.6 (11.9–39.3)
Bekaa	9.1 (0.0–26.1)	5.0 (0.7–9.3)	15.9 (6.9–24.9)	43.6 (28.0–59.2)
National mean	8.7	9.8	20.7	31.36
Weighted mean	8.4 (2.0–14.9)	9.7 (7.2–12.2)	21.7 (17.1–26.3)	32.5 (25.8–39.2)

^a Prevalence based on those who had smoked at least 10 times during their lifetime.

wider social acceptability of this behavior [2]. A greater share of narguileh users (54%) than cigarette smokers (22%) admitted smoking with adult members of their families. Twice as many surveyed adolescents had all their friends smoking narguileh as compared to cigarettes. Differences by gender found in the use of cigarettes disappear in narguileh smoking, suggesting that social acceptability

does not exclude women. Narguileh may be the acceptable substitute in many communities when the other common social drug—alcohol—is not accepted as a component of meals and festive and friendly meetings. This appears through the rise of the prevalence of the use of narguileh in parallel with the decrease in alcohol use in the various Lebanese regions (survey results not shown).

5. Conclusions

This analysis confirms the pervasive presence of tobacco products, cigarettes and narguileh, in the environment of adolescents, the high frequency of trial and its early initiation virtually all over the Lebanese territory and at an early age. The greater social exposure to narguileh imposes a deeper discussion of this continuously growing issue. Narguileh use is now an accepted familial and social phenomenon, with restrictions apparently decreasing. The adverse health effects of narguileh should be hammered relentlessly in all awareness messages in the Middle-East, similar to the message now widely accepted associated with cigarettes. Anti-tobacco education in Lebanon has to start while children are still in primary school, perhaps as early as 9 years old. More pressure should be brought upon parents and teachers to reverse their negative role modeling and/or their facilitation role in smoking initiation.

Conflict of interest

There are no competing interests.

Acknowledgement

This research was supported by Pompidou Group, Council of Europe; 67075 STRASBOURG Cedex, France.

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