

RESEARCH ARTICLE

Rethinking Anti-tobacco Health Education in an Eastern Mediterranean Country with Growing Tobacco Use

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Abstract

Background: In Jordan, a developing country with a high tobacco burden and where roughly 40% of cancers are tobacco-related, limited knowledge exists on public awareness regarding tobacco. This is a hindrance for experts seeking to strengthen anti-tobacco health promotion and counter growing tobacco use. We sought to evaluate public awareness regarding tobacco; to gauge exposure to anti-tobacco public messages; and to draw attention to the lay public's informational needs. **Materials and Methods:** A cross-sectional survey of lay public in the capital, Amman, capturing knowledge regarding tobacco harms and anti-tobacco laws, perceptions regarding tobacco use and control, and exposure to and recall of anti-tobacco messages, was conducted. Statistics on perceptions were generated and analyzed by smoking status and sociodemographic factors. Multivariate regression was performed to estimate independent associations of smoking and sociodemographic factors with knowledge. **Results:** Of 1,169 respondents, 17.8% could recall specific anti-tobacco messages. With regard to knowledge, despite high proportions of respondents exhibiting knowledge for individual statements regarding tobacco health harms, variables capturing breadth of knowledge showed that much lower proportions could correctly identify all the listed health harms of tobacco, and all listed Jordanian anti-tobacco regulations (47.5% and 36.2%, respectively). On multivariate analysis, breadth of knowledge varied by smoking status, age and educational level. **Conclusions:** There is need for more salient, evocative and multi-faceted anti-tobacco messages in Jordan, tailored to subgroups, given detected variability in knowledge across smoking status and sociodemographic characteristics.

Keywords: Tobacco - Jordan - community - knowledge - health promotion

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Introduction

There is ample evidence regarding the effectiveness of anti-tobacco public education (PE) in increasing both motivation to quit and quit rates among smokers, and deterring smoking initiation among non-smokers (Schar et al., 2006; Durkin et al., 2012; Centers for Disease Control and Prevention, 2013; World Health Organization, 2013). Thus, international guidelines have emphasized the need for PE (e.g. through health warnings and mass media campaigns) with regards to various tobacco control issues (World Health Organization, 2013; Centers for Disease Control and Prevention, 2014).

To be effective, PE efforts should exist within a larger structured and comprehensive tobacco control framework, and must be noticeable, persuasive, and recallable by audience (Snyder et al., 2004; Hammond, 2009). Unfortunately, in most Middle Eastern countries like Jordan, organized, large-scale PE regarding tobacco control is lacking (World Health Organization, 2013). In Jordan in particular, anti-tobacco mass PE campaigns have been fragmented and short-lived (King Hussein Cancer

Foundation and Center and Jordanian Ministry of Health, 2013; Ma'ayeh, 2003). Furthermore, while health warning labels exist and cover 40% of cigarette boxes (no warning labels exist for waterpipes), these are considered to be "missing...appropriate characteristics" (World Health Organization, 2011), do not appear to add information, and do not have a substantial impact in terms of motivating smokers to consider quitting (Hawari et al., 2011). This is troubling, given that prevalence of tobacco use in the country is increasing: 32% of the population reported being current regular tobacco users in 2011 (Jaghbir et al., 2014), a figure higher than the previous population estimate of 29% for tobacco use in 2007 (Al-Nsour et al., 2012). Within subgroups, tobacco use is particularly high among men: roughly 57% of 18-29 year-old men and 61% of 30-39 year-old men are tobacco users (Jaghbir et al., 2014). Smoking also is increasing among women: among 15-49 year-old women, national cigarette and waterpipe use rates rose from 8.7% and 5.5% (respectively) in 2009, to 10.8% and 10.3% in 2012 (Jordan Population and Family Health Survey, 2009; Jordan Population and Family Health Survey, 2012).

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In light of these figures, and given the fact that approximately 40% of incident cancers in Jordan are tobacco-related (Jordan National Cancer Registry, 2011), more needs to be done in terms of tobacco-related PE. This, in turn, requires a sound understanding of the state of knowledge of communities being targeted in such PE. Few studies have been able to provide compelling and detailed data applicable to the lay public. One national study covering general cancer control topics revealed that approximately 94% of Jordanians believed tobacco to be a risk factor for cancer (Ahmad et al., 2014) and that 50.6% of current smokers had never heard of smoking cessation clinics or quitlines (Jaghbir et al., 2014). No other tobacco-related perceptions were explored. A selection of community-based studies have explored tobacco-related knowledge and perceptions, but these are limited in their generalizability given they were conducted in universities (Madanat et al., 2009; Gharaibeh et al., 2011; Haddad et al., 2013; Obeidat et al., 2014). Thus, experts active in the field of tobacco control are currently unaware of the lay public's general perceptions with regards to broader tobacco control issues, making it difficult to propose steps towards promoting relevant anti-tobacco public messages. Given the wide theme of topics that may be used in PE (Langley et al., 2013), gauging the lay public's awareness of such topics is a critical step in shaping educational efforts, particularly now that Jordan faces one of the highest prevalence rates of smoking in the region.

In this study, we measured the Jordanian lay public's knowledge and attitudes with regards to key tobacco control issues. We were primarily interested in reporting overall knowledge regarding tobacco control laws and the consequences of tobacco use; and how such knowledge varied across subgroups in the community. We also were interested in gauging exposure to anti-tobacco messages. We speculated that awareness among Jordanians would vary by type of topic (e.g. conventional tobacco harms versus industry tactics), and by subgroups of age, gender, education and smoking status; given the scarcity of anti-tobacco mass media efforts, we also speculated that reported rates of exposure to public anti-tobacco messages would be low.

Materials and Methods

Setting and Sample

The interview-administered survey was conducted in the capital of Jordan, Amman between October and November of 2012. Using the following equation,

$$n = (Z^2 \times P(1 - P))/e^2$$

and assuming a 95% confidence level, a 3% margin of error (e), and the most conservative estimate of P (0.5) that would yield the largest sample size (since we were interested in measuring several parameters whose expected proportions would likely vary), a sample size of 1,068 individuals was sought.

Data collection was conducted through volunteers (employees at the Ministry of Health, Greater Amman Municipality, and King Hussein Cancer Center; and university students) who underwent thorough training

and were then allocated to various public locations to interview willing adult subjects. Locations were areas which primarily Jordanian residents frequented (and waited) to utilize miscellaneous services (e.g. issuing or renewing licenses, passports or IDs; public transportation; primary health care services in governmental clinics; and university campuses). Such locations also ensured that an age-, gender- and socioeconomically-diverse sample of the community could be accessed.

Questionnaire items and variables

An Arabic tool was developed focusing on tobacco control elements that had not been sufficiently studied in Jordan (public awareness of tobacco control laws; awareness with regards to various tobacco-related health effects and misperceptions; and smokers' perceptions with regards to tobacco use). In order to build on previously published public surveys, global tobacco-specific questionnaires were reviewed to identify relevant questions for use or adaptation in the tool (Starr et al., 2005; Department of Health and Human Services and Centers for Disease Control and Prevention, 2012).

The tool was pilot-tested, and included the following

i). Four items covering knowledge regarding smoking bans in public places; selling/serving tobacco to minors; and promotion of tobacco products (a 3-category response was allowed for all knowledge items: yes, no, don't know); *ii).* One item covering knowledge regarding Islam's stance on smoking; *iii).* Nine items covering knowledge statements about the consequences of smoking and exposure to secondhand smoke (SHS); and two knowledge items covering safety aspects of waterpipes and 'light' cigarettes; *iv).* Recall of a tobacco-related media message in the past year and level of receptivity (was able to recall and describe, recall seeing something but cannot describe details, did not see anything); *v).* Nine items covering level of agreement (5-scale, ranging from strongly agree to strongly disagree) with statements covering misconceptions or commonly held beliefs about tobacco; and the role of media and government in tobacco control

A section covering respondent demographics (age, gender, education) and smoking status (never smoked; ex-cigarette smoker; ex-waterpipe smoker; currently a social cigarette smoker; currently a regular cigarette smoker; currently a social waterpipe smoker; currently a regular waterpipe smoker; currently use another form of tobacco use) also was included.

For the purpose of the analysis, the following variables were operationalized:

i). Independent variable and covariates: Smoking status (any use of tobacco versus no use at all) as the main independent variable of interest; Age (<25; 25-44; and >44 years of age); Gender; Level of education (primary or preparatory; secondary or diploma; bachelor's or higher), *ii).* Dependent variables; Knowledge of each of Jordan's four main anti-tobacco regulations and Islam's stance regarding smoking (yes versus no or don't know); We were specifically interested in evaluating the breadth of knowledge with regards to anti-tobacco regulations in

Table 1. Demographic Characteristics by Smoking Status among a Sample of the Lay Public in Amman, Jordan^a

	Currently non-smokers	Social WP smokers	Social cigarette smokers	Social dual smokers	Regular WP smokers	Regular cigarette smokers	Regular dual smokers	Total sample size (row total)
Gender								
Males	303 (41.7%)	39 (5.3%)	20 (2.8%)	4 (0.55%)	33 (4.5%)	292 (40.2%)	35 (4.8%)	726
Females	327 (74.8%)	52 (11.8%)	9 (2.1%)	6 (1.4%)	15 (3.4%)	22 (5.0%)	6 (1.3%)	437
Age								
<25	268 (55.9%)	56 (11.6%)	7 (1.4%)	7 (1.4%)	26 (5.4%)	96 (20.0%)	19 (3.9%)	479
25-44	230 (48.4%)	27 (5.6%)	18 (3.7%)	2 (0.42%)	19 (4.0%)	160 (33.6%)	19 (4.0%)	475
>44	130 (65.0%)	7 (3.5%)	4 (2.0%)	1 (0.50%)	2 (1.0%)	53 (26.5%)	3 (1.5%)	200
Education								
Preparatory or less	46 (48.9%)	0	4 (4.2%)	0	0	38 (40.4%)	6 (6.3%)	94
Secondary or diploma	211 (56.1%)	18 (4.7%)	11 (2.9%)	2 (0.53%)	13 (3.4%)	110 (29.2%)	11 (2.9%)	376
Bachelors or higher	368 (54.1%)	73 (10.7%)	13 (1.9%)	8 (1.2%)	33 (4.8%)	160 (23.5%)	24 (3.5%)	679

^aPercentages of row totals presented**Table 2. Perceptions of Respondents Regarding Various Tobacco Control Facts (by Smoking Status) among a Sample of the Lay Public in Amman, Jordan^{a,b}**

	Nonsmokers (N=634)	Smokers (N=535)
Knowledge regarding anti-tobacco laws in Jordan		
Smoking in public areas is banned, n (%) saying yes	501 (79.1%)	423 (79.1%)
Selling cig. to minors is banned, n (%) saying yes	516 (81.9%)	469 (87.7%)
Serving WP to minors is banned, n (%) saying yes ^c	450 (71.3%)	427 (79.8%)
Promoting tobacco is banned, n (%) saying yes	280 (44.5%)	222 (41.7%)
Smoking is forbidden in Islam, n (%) saying yes ^c	496 (78.4%)	363 (68.1%)
Knew of all anti-tobacco laws	228 (36.3%)	192 (36.0%)
Knowledge regarding consequences of smoking		
Smoking cig. leads to respiratory diseases, n (%) saying yes	627 (99.4%)	519 (97.4%)
Smoking WP leads to respiratory diseases, n (%) saying yes	624 (98.7%)	512 (96.1%)
Smoking cig. leads to heart attacks and cerebral strokes, n (%) saying yes ^c	580 (91.9%)	452 (84.8%)
Smoking WP leads to more than one kind of cancer, n (%) saying yes ^c	549 (87.0%)	411 (77.4%)
Smoking cig. aggravates or increases the severity of chronic conditions like hypertension and diabetes, n (%) saying yes ^c	493 (78.0%)	361 (67.9%)
Smoking limits exercise capacity, n (%) saying yes ^c	588 (93.6%)	469 (88.0%)
SHS can lead to cancer and other respiratory diseases in non-smokers, n (%) saying yes ^c	531 (84.3%)	409 (76.4%)
Exposure of children to SHS causes detrimental health effects, n (%) saying yes ^c	616 (97.5%)	493 (92.1%)
Children exposed to SHS have a greater risk of becoming smokers in future, n (%) saying yes	491 (77.9%)	405 (75.8%)
Water in body of WP does not purify the smoke from toxic substances, n (%) saying yes	400 (63.3%)	349 (65.6%)
"Light" or "low tar" cig. are harmful, n (%) saying yes	462 (73.2%)	410 (76.8%)
Knew of all listed consequences of smoking	322 (51.2%)	228 (43.0%)
Attitudes and opinions regarding tobacco use and control		
No harm in smoking cig. for a year or two, n (%) disagree ^c	508 (80.5%)	356 (66.9%)
No harm in social smoking of cig. over years, n (%) disagree ^c	469 (78.5%)	349 (65.4%)
Smoking helps reduce weight, n (%) disagree	238 (38.0%)	188 (35.7%)
Smoking helps improve one's concentration, n (%) disagree ^c	463 (73.6%)	272 (51.0%)
Smoker has right to smoke wherever they please, n (%) disagree ^c	16 (2.5%)	40 (7.5%)
Tobacco companies target minors more than others, n (%) agree	391 (62.2%)	288 (54.1%)
Smoking is an addiction, n (%) agree ^c	557 (88.7%)	438 (82.0%)
Media not doing enough to warn about smoking harms, n (%) agree	520 (82.8%)	402 (76.0%)
Government should do more to control smoking, n (%) agree ^c	589 (93.8%)	418 (78.6%)

^aColumn totals presented; ^bCig: cigarettes; WP: waterpipe; SHS: secondhand smoke; ^c Chi-square tests significant (p<0.002)

Jordan. Thus, a compound variable was created to capture whether or not a respondent knew of all the regulations; Knowledge (yes versus no or don't know) of each of the listed consequences of smoking and SHS), and the danger of waterpipes and 'light' cigarettes; We were specifically interested in evaluating the breadth of knowledge with regards to the listed tobacco harms. Another compound variable was created to capture whether or not a respondent knew the nine consequences of smoking and SHS listed in the questionnaire; Agreement (agree versus indifferent or disagree) with each of the listed misconceptions or commonly held beliefs about tobacco; and the role of media and government in tobacco control; Recall of any anti-tobacco message in the past year (yes versus cannot recall or can vaguely recall but not describe)

Statistical analysis

Descriptive statistics were generated for each of the operationalized variables described above, and variation of knowledge and attitudes by smoking status was then evaluated. We hypothesized that smokers would exhibit significantly different knowledge levels and perceptions. Smoking status was specifically cross-tabulated across 28 items (knowledge regarding tobacco control laws and the consequences of smoking; attitudes towards the various statements regarding tobacco control; and recall of anti-tobacco messages). As a result of conducting multiple simultaneous tests in our primary analysis (28 hypotheses were tested to determine association between smoking status and each item), we used a Bonferroni-adjusted p-value of 0.002 to assess statistical significance.

Two multivariable logistic regression models were run to determine if smoking status as well as other

sociodemographic covariates (age, gender, level of education) were independently associated with having a more comprehensive knowledge of the consequences of tobacco use, and a more comprehensive knowledge of Jordan's tobacco control laws.

Results

Data survey:

1,259 surveys were collected but after data quality checks, incomplete surveys were deleted, resulting in an analytic sample of 1,169 surveys. The average age of respondents was 31.9 years. Roughly, 38% of the sample was female, and most had at least completed secondary school. Roughly 46% currently used tobacco, the two most common tobacco use modes being regular cigarette use (27%) and social waterpipe use (7.8%). Most regular cigarette users were males. Table 1 describes the distribution of our sample with regards to specific forms as well as types of smoking.

Knowledge regarding tobacco control laws:

With regards to knowledge of tobacco control laws (Table 2), knowledge about most of these laws was relatively high (at least 75%). However, the lowest knowledge level observed was for the statement "promotion of tobacco products in Jordan is illegal" - which only 43% of respondents knew. When knowledge items by smoking status were analyzed, the following significant associations were found: a lower proportion of nonsmokers knew that serving waterpipes to minors was illegal; and a significantly higher proportion of nonsmokers knew that smoking was considered a sin in Islam.

Table 3. Odds of Having More Comprehensive Knowledge of Consequences of Tobacco Use and of Existing Anti-Tobacco Regulations in Jordan, Generated by Multivariable Logistic Regression

	Relative odds of correctly identifying all listed consequences of tobacco use (95% CI)	Relative odds of correctly identifying all listed anti- tobacco regulations (95% CI)
Age		
<25 (n=476)	Reference	Reference
25-44 (n=468)	1.38 (1.06 – 1.80)*	2.29 (1.71 – 3.05)*
>44 (n=198)	1.65 (1.16 – 2.36)*	2.73 (1.88 – 3.95)*
Gender		
Female (n=431)	Reference	Reference
Male (n=719)	0.98 (0.76 – 1.26)	1.92 (1.44 – 2.54)*
Highest educational level attained		
Preparatory or less (n=93)	1.09 (0.69 – 1.72)	2.34 (1.47 – 3.72)*
Secondary or diploma (n=368)	0.94 (0.73 – 1.23)	1.28 (0.97 – 1.69)
Bachelors or higher (n=676)	Reference	Reference
Smoking status		
Any use (n=528)	Reference	Reference
No current use (n=628)	1.43 (1.11 – 1.84)*	1.24 (0.95 – 1.63)

*Significant odds ratio

Despite high proportions of respondents reporting knowledge of most of the listed anti-tobacco regulations, 36.2% knew all the listed regulations. In a multivariable logistic analysis, it appeared that older age groups, males, and those at the lowest educational level were significantly more likely (than the youngest age group, females and the highest educational level, respectively) to know all the listed regulations (Table 3).

Knowledge regarding the negative effects of tobacco:

Overall, proportions reporting knowing the respiratory harms of cigarette and waterpipe smoking, and the negative effects of passive smoking on pediatric health, were very high (at least 95%, Table 2). Knowledge levels were also reasonably high (80% to 90% approximately) for the effects of cigarette smoking on cerebral strokes and heart attacks, the carcinogenic effect of waterpipe, the effects of smoking on exercise capacity, and the effects of passive smoking on respiratory disease in nonsmokers. The lowest knowledge level observed was for the statement "the water in the waterpipe purifies the smoke from toxicants" - which 64% of respondents knew (Table 2).

While overall knowledge rates were reasonably high, comparisons between smokers and nonsmokers showed that a significantly lower proportion of smokers knew the following health harms (relative to nonsmokers): smoking cigarettes causing cerebral strokes and heart attacks; waterpipe carcinogenicity; cigarette smoking aggravating chronic diseases; smoking limiting exercise capacity; and the harms of SHS.

When analyzing the proportion of respondents who were capable of correctly identifying all the health harms of tobacco listed in the survey, approximately 47.5% of respondents could do so (43% of smokers and 51.2% of nonsmokers). In the multivariable logistic analysis, it appeared that older age groups and nonsmokers were significantly more likely (than the youngest age group and smokers, respectively) to correctly identify all the listed harms (Table 3).

Tobacco misconceptions:

Areas where relatively higher proportions of respondents reported perceptions that could be improved included (Table 3): smoking helping to reduce one's weight, smoking helping improve mental concentration, and tobacco industry tactics (who tobacco companies target). Generally, significantly lower proportions of smokers held favorable attitudes towards the statements presented to them, such as it not being harmful to smoke intermittently or for a short period of time; smoking 'improving' mental concentration; and the need for more governmental efforts in tobacco control.

Recall of anti-tobacco public messages:

Some 17.8% of respondents were able to recall and try to describe an anti-tobacco message they had seen. This result did not vary by smoking status (16.7% of non-smokers and 19.2% of smokers).

Discussion

Due to the limited information about the lay public's general knowledge and awareness of tobacco control in Jordan, a country with a growing tobacco burden, we sought to fill this gap from a broad community perspective. Our findings reveal that despite high proportions of respondents reporting knowledge of specific tobacco harms as well as existence of tobacco control laws, the breadth of this knowledge was low, and that the community likely does not have a comprehensive or multi-faceted impression of the true impact of tobacco use. This impression is further reinforced by the very low rates of exposure to salient and receptive anti-tobacco messages we also report. Our findings finally confirm that variability in breadth of knowledge exists by sociodemographics and smoking status, and point to where more targeted efforts to provide anti-tobacco education will be needed.

We observed a generally high overall proportion of respondents who knew specifically about tobacco's respiratory harms as well as the harms of SHS. Our values are comparable to various countries, where respiratory harms of smoking and the ill effects of SHS are well-known (Siahpush et al., 2006; Evans et al., 2012; ITC Project, World Health Organization and World Heart Federation, 2012; Radwan et al., 2012; Gupta and Kumar, 2014). Furthermore, while Jordanian smokers reflect lower levels of knowledge than nonsmokers in certain areas (impact of tobacco use on non-communicable diseases; impact of exposure to SHS on a child's risk of becoming a future smoker; the inability of waterpipes to filter out toxicants from smoke; and the harmful effects of light cigarettes), such levels remain relatively high in comparison to knowledge of smokers in other countries about other tobacco harms such as cerebral stroke and heart attacks (ITC Project, World Health Organization and World Heart Federation, 2012). A third of smokers did not perceive the risks of intermittent or short-term smoking; and a relatively low proportion of respondents were knowledgeable enough to disagree about the 'benefits' of smoking (e.g. weight control, improved mental concentration). These results can thus be used to guide the content development of educational messages, which - for the Jordanian community - must strive to be more exhaustive in conveying the harms and consequences of tobacco use. The fact that less than 20% of sampled respondents could clearly describe any tobacco-related message they had seen in the past year adds to the urgency of the anti-tobacco PE situation (and given the variability in detail provided when respondents attempted to recall the specific message, this number is likely an overestimate).

Other noteworthy results include the finding that roughly a third of smokers did not know that smoking was forbidden in Islam (Dar Ifta, 2013), Jordan's predominant religion; the country's Ministry of Awqaf and Islamic Affairs can thus increase efforts to reiterate this message publicly, given that religion plays a strong role in Jordan's sociocultural norms (Shoup, 2006). Furthermore, relatively lower proportions of respondents were unsure or unaware that tobacco company tactics targeted youth specifically, and that tobacco product promotion was

illegal, highlighting another viable platform (industry tactics) for PE in Jordan.

Multivariable analyses reveal discrepancies in breadth of knowledge across (largely) age, gender and smoking status that anti-tobacco health experts and advocates must recognize. Accordingly, educational initiatives that effectively target such subgroups (e.g. tobacco users, younger age groups, and women) can ensue, especially within local educational activities which target such demographic strata (e.g. women's community centers; university or college PE efforts; and outreach activities targeting the media).

In summary, the findings of this study are important in highlighting gaps in community awareness regarding tobacco control in Jordan, and can be used to change the current approach to anti-tobacco PE. For example, two of Jordan's four current pictorial warning labels refer to smoking's effect on pediatric health, while one refers to tobacco's addictiveness. However, our results indicate that at least 85% of the Jordanian community is well-aware of these messages. Whether or not this knowledge was acquired as a result of Jordan's pictorial warnings is beyond the scope of this discussion (although it is unlikely given our results regarding low exposure to tobacco-related messages), but our findings should encourage health experts to begin promoting less circulated messages and correcting misconceptions that thus far have not been addressed in the Jordanian mass media; and encourage researchers to further study the potential content and approach of anti-tobacco messages, and how PE messages can be tailored to fill existing knowledge gaps in an impactful way. Beyond the local context, our findings are of value in understanding communities whose behaviors ultimately contribute to global disparities in non-communicable disease and tobacco use burden in the developing Arab World (Mokdad et al., 2014).

It is important to note some limitations to our study: the sample was not a probabilistic random sample; rather, it captured a broad segment of the community that was mobile and frequented public locations. Nevertheless, it reflects a diverse group within the Jordanian community which has not been previously studied. Furthermore, practicality limited the length of our survey, which thus could not capture all the potential tobacco control issues. Despite these limitations, our study was able to add new information about tobacco control awareness in the Jordanian community.

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