

Cancer Awareness Among Lebanese Adults, A Cross Sectional Study

Georges Hatem (✉ georges.hatem27@gmail.com)

Lebanese University, 14 Badaro, Beirut, Lebanon

Diana Ghanem

Lebanese University

Eliane Kellen

Centre for Cancer Detection

Ibrahim AlZaim

Lebanese University

Mathijs Goossens

Centre for Cancer Detection

Research Article

Keywords: cancer control, cancer prevention, health literacy, health policy, primary prevention

Posted Date: December 14th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-121707/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

Cancer burden in Lebanon is among the highest of countries in the Eastern Mediterranean Region, but around one third of cases could be avoided by reducing exposure to avoidable risk factors. We explored population awareness of cancer risk factors, predictors of higher awareness and to what extent awareness correlates with behaviour.

Methods

In 2019, we performed a cross-sectional study (N=726) that consisted of a questionnaire administered in face-to-face interviews.

Results

On spontaneous recall, pollution and smoking were the most mentioned causes of cancer. On average, 75% of risk factors were correctly recognized, 22% of non-carcinogenic factors, and 75% of protective factors. Woman and older people had better cancer risk awareness. Several non-carcinogenic factors are seen as more potent carcinogens than truly carcinogenic factors. There was a moderate correlation between awareness and behaviour for waterpipe, alcohol and physical activity. There was no such correlation for cigarette smoking.

Conclusion

Awareness campaigns are important, but need to be embedded into national behaviour change programs so that other barriers to behaviour change are also tackled.

Background

Lebanon has the highest cancer incidence rates of the countries in the Eastern Mediterranean Region and is in the top quartile of cancer incidence worldwide according to GLOBOCAN 2018. [1] The precise place in the ranking has been a source of debate, because compared to other countries in the region Lebanon was the first to have early detection programs in place and has a better case registration system.

Data from the Lebanese Cancer Registry 2016 show that the most common cancers among males are: prostate (17.0%), lung (14.4%), bladder (11.1%) and colorectal (10.1%). For females they are breast (39.1%), colorectal (9.0%), lung (6.4%), and non-Hodgkin lymphoma (4.6%). These five locations account for more than half of all cancers (52.7% for males, 59.0% for females).

Further increase in cancer burden in the coming years is likely as the proportion of the elderly within the Lebanese population is increasing. [2] However, this trend can be slowed down: it has been estimated that around 33% of all cancers in adults in the Eastern Mediterranean Region region are attributable to eight

avoidable lifestyle factors such as tobacco, alcohol, low physical activity, and high Body Mass Index (BMI). [3-5] Strategies to **change existing behaviour** are therefore essential to lower cancer burden. Unfortunately, the prevalence of these lifestyle risk factors is increasing rather than decreasing. [2,4,6]

To obtain a change in existing behaviour, increasing knowledge of risk factors and symptoms (summarized as “Cancer awareness”) is necessary [7]. In Lebanon, data on cancer awareness is scarce but points towards a lack of awareness. [8] The first objective of this paper is to analyse awareness of risk factors in the general Lebanese population and find predictors of increased awareness. Secondly, we will assess whether the awareness of four selected risk factors (physical activity, smoking cigarettes, smoking waterpipe and alcohol consumption) is correlated to behaviour for that factor.

Methodology

We performed a cross-sectional survey in the general adult population in 2019. The survey consisted of a questionnaire administered during face-to-face interviews. A non-probability sample (n=726) was frequency matched to national government estimates on age, level of education and gender. Sampling took place in sampling stations of varying socio-economic characteristics in the Beirut and Mount-Lebanon governates. Inclusion criteria were Lebanese nationality and age ≥ 20 years old. Exclusion criteria were severe hearing or speaking difficulties. All refusals were registered. No financial incentives were provided.

Ethical considerations

Informed consent was sought from every participant by explaining the objectives of the study, that participation was voluntary, that anonymity of the respondents was guaranteed and that withdrawal at any point was possible. The study was approved by the ethical committee of the University Hospital of Brussels.

Questionnaire

The questionnaire (supplementary file 1) was based on two existing English language validated measures of cancer awareness (the Cancer Awareness Measure and the Health Information National Trends Survey), with some adaptations for culture specific elements (such as the use of waterpipe). The questionnaire was translated to Modern Standard Arabic using forward-translation and back-translation, and then piloted on five persons after which some clarifications were made.

The questionnaire collected data on chronic health conditions, lifestyle behaviour (including physical activity, alcohol and tobacco consumption), socio-demographic characteristics, preferred source of healthcare advice (open question), and risk factor awareness. Risk factor awareness was evaluated as “risk factor recall” and “risk factor recognition”.

- *Recall* was evaluated with an open-ended question: ‘What do you think is the biggest risk factor for developing cancer?’.

- *Recognition* was measured by presenting 14 factors that increase cancer risk (see table 3), seven that have no influence on cancer risk (see table 3) and three factors that lower cancer risk (see table 4), according to the International Agency for Research on Cancer (IARC). We then asked, ‘Do you think any of these can influence someone’s risk of developing cancer?’ There were eight response options: ‘increases’ (three options: strongly, moderately, somewhat), ‘neither increases nor decreases’, ‘decreases’ (same three options) and ‘I don’t know’.

Sample size and power calculation

Epi-info was used to calculate the required sample size, using the following equation:

$$n = \frac{(Z_{1-\alpha/2})^2 p(1-p)}{d^2}$$

where Z is a standard normal variate ($Z_{1-\alpha/2} = 1.96$ at 95% confidence interval), d is the absolute accuracy or precision (5% marginal error), P is the expected proportion of the population with a specific outcome and was set at 0.5 (the advised value if the proportion in the population is not known). This yielded a necessary sample size of 385, which was doubled to compensate for a design effect.

Data analysis

Awareness of risk factor

For the factors that increased risk and the factors that have no effect on cancer risk, we calculated two indicators: Correct Recognition Percentages & Carcinogenic Strength Score. The first was the proportion of people that recognised that factor correctly (all three “increase” options were seen as correct for the risk factors, and the option “neither increases nor decreases” was seen as correct for the factors that do not influence risk). The Carcinogenic Strength Score quantified how **strongly** people thought that particular factor increased the cancer risk. The option ‘Strongly increases’ was given value 10, ‘Moderately increases’ got value 6.66, ‘Increases somewhat’ got value 3.33, all other options got value 0. The Carcinogenic Strength Score of a given factor was the arithmetic mean of the individual scores.

For the factors that decrease risk, we only calculated the Correct Recognition Percentages (by seeing all three “decrease” options as correct).

Predictors of awareness

To find predictors of awareness, we grouped the three types of factors (increasing, decreasing, no effect) so that each individual had a three *Grouped Correct Recognition Percentages*. We then ran multiple linear regressions to determine independent predictors of these three percentages. Variables were candidates for purposeful selection in a multivariate regression if their univariate correlation had p-values <0.2. We tested demographic variables (age, level of education, monthly income), chronic illness variables

(diabetes, hypertension, arthritis, chronic lung disease, heart condition) and variables on cancer experience (affected self, partner, family). Whether or not a variable was withheld in the model was based on the likelihood ratio test with significance set at $p < 0.05$ (age and gender were always included as adjusting variables).

Correlation between awareness and behaviour

For waterpipe, cigarette, alcohol and physical activity, we assessed the association between perception and behaviour. The behaviour answers for those four were categorised and used as dependant variables in an ordered logistic regression that had the Carcinogenic Strength Score as independent variable (significance set at $p < 0.05$). This regression was always adjusted for gender and age since these two variables have previously been shown to be associated with lifestyle behaviour. We tested the proportional odds assumption with the user-written command called *omodel*, which does a likelihood ratio test, with significance set at $p < 0.05$.

Results

Of the 861 people that were approached, 123 refused to participate (14.3%) and 738 completed the survey (85.7%). Of these 738, inclusion and exclusion criteria were met by 726 (98.5%). Table 1 shows socio-demographic characteristics of the sample besides national data. The distribution of gender, age, civil status, and education is similar between sample and general population. The sample has a higher proportion of employed people (62.3% versus 48.7%).

Awareness of risk factors on recall

In the recall question, pollution (40.0%, N=289) and smoking (35.0%, N=253) were perceived as the most important causes of cancer (see table 2). There were no significant differences between age, gender, or education status.

Awareness of risk factors on recognition

The *Grouped Correct Recognition Percentages* were: 75% for carcinogenic factors, 22% for the factors without influence on cancer risk, and 75% for the protective factors. The highest *Correct Recognition Percentages* were attained for cigarette smoking, waterpipe smoking and air pollution (97.5%, 96.6%, and 94.6% respectively, see table 3).

The highest *Carcinogenic Strength Score* (table 3) was measured for smoking waterpipe (8.2), closely followed by smoking cigarettes (8.1) and air pollution (8.0). The factors without influence (marked between "" in table 3), had *Carcinogenic Strength Scores* as high as 6.1 (Food colouring), which was higher than some of the truly carcinogenic factors: sedentary lifestyle (2.4) and HPV infection (2.3).

Predictors of correct recognition

We found four factors that were correlated with higher *Grouped Correct Recognition Percentages*: being a women (OR 1.60, 95% CI 1.05-2.43), increasing age in years (OR 1.03, 95% CI 1.01-1.04), having had cancer (OR 1.74, 95% CI 1.09-2.77), and being treated for a chronic heart condition (OR 2.19, 95% CI 1.12-4.27).

The correlation between awareness and behaviour

Table 4 shows the results of the regression of awareness on behaviour. Each step of seeing waterpipe as more harmful was associated with a lower frequency of waterpipe use (OR up 5.51, $p=0.001$). The same was found for alcohol (OR up to 3.66, $p=0.020$) and the benefits of physical activity (OR up to 3.26, $p=0.008$). There was no such correlation for cigarette smoking.

Discussion

Eight avoidable lifestyle factors are responsible for a third of all cancers in Lebanon. In order for people to change their behaviour (stop smoking, drink less alcohol, become more physically active, etc) they need to be aware of the risks of these lifestyle factors.

The most often correctly classified factors were smoking cigarettes (97.5%), waterpipe (96.6%) and air pollution (94.6%), while the least known factors were HPV (32.6%), sedentary lifestyle (48.6%), alcohol (63.4%), and being overweight (65.8%). This order in awareness of factors is similar to the one obtained in a WHO survey. [12]

Recognition is highest for protective factors and for factors that increase cancer risk, while factors that *not* influence cancer risk were often falsely seen as carcinogenic by a large percentage of people (food colouring: 93.7%; tap water: 83.9%; depression and anxiety: 76.6%). Food colouring, depression and tap water also had high carcinogenic perception score (6.1, 4.5 and 3.9 respectively), which means they were perceived as more carcinogenic than half of the surveyed factors that truly are carcinogenic. These results may reflect the success of past Lebanese awareness raising campaigns, but also the fact that such campaigns often fail to sufficiently address cancer myths. Attributing a carcinogenic effect to neutral factors (believing in cancer myths) has also been observed in other countries. In the UK, exposure to stress is seen as carcinogenic by 43% of adults, food additives by 42%, and mobiles phones by 26%. [27] It seems likely that new media such as social media are partly to blame for this. [27]

We found young adults and men to have lower awareness, which confirms results from previous studies. [9,10] Somewhat unexpectedly, neither income nor education were correlated with awareness, although these have been shown to be correlated in other countries. [10] A possible explanation could be that cancer is still considered a taboo in Lebanon, in every layer of society. [11]

There was a moderately strong correlation between awareness and behaviour for waterpipe, alcohol and physical activity, indicating that raising awareness might change behaviour for these factors. There was

no such correlation for cigarette smoking, meaning other strategies than awareness building must be used to change behaviour.

Information material of IARC (www.euro.who.int, European Code against Cancer) is already available in Modern Standard Arabic and could be used by local projects with minimum need for funds. These materials could be altered centrally to include information on cancer myths. However, raising awareness is not enough. A national behaviour change *program* should be designed, with multifaceted interventions that are sustained for many years. We also found this in our results: although better understanding of the dangers of waterpipe, physical activity and alcohol were correlated with more beneficial individual behaviour for those factors, this was not the case for cigarette smoking. Previous research also found a large gap between knowledge, intention and behaviour, and concluded awareness is not sufficient to change behaviour. [14,29,30] In 2011, Michie proposed a framework named *the Behaviour Change Wheel*, which includes eight intervention categories and 7 policy categories that need to accompany awareness campaigns. [7]

Smoking

Prevalence of this risk factor among Lebanese adults is 38.0% (cigarettes) and 36.9% (waterpipe). [13] Cigarette smoking is more common for men (47.6%) than for women (29.0%). Cigarettes are responsible for 24.4% of cancers in men and 5.2% in women. [3]

Cigarettes and waterpipe were identified as harmful by over 95% of respondents and were given the highest carcinogenic perception scores. [8] Although water pipe smoking has similar health effects as cigarette smoking, its harmful effect is still neglected in anti-smoking campaigns. [15] In neighbouring Jordan, a similarly high awareness was found (68.4% of women see smoking as the most important risk factor for ovarian cancer, 78.4% of Syrian refugees see smoking as a major risk for cancer). [16,17]

Air pollution

Lebanon has an average PM_{2.5} concentration of 24.3 µg/m³ (PM_{2.5} should not exceed 10 µg/m³ annual mean), while in urban areas air pollution can go up to 30.3 µg/m³. More than 93% of this is due to road traffic [18]. PM_{2.5} air pollution is responsible for 1.7% of cancers in men and 0.7% in women. [3]

It is therefore reassuring that air pollution was identified as harmful by over 95% of respondents, but slightly troubling that it is seen as the number one cause of cancer in the recall question, and was given the same Carcinogenic perception score as Tobacco consumption. Tobacco accounts for 15.1% of all cancers in Lebanon, and its relative risk is considerably higher than that of 24.3 µg/m³ PM_{2.5} air pollution [3]. This means the individual effect of smoking cessation is much bigger than that of avoiding air pollution.

HPV

Prevalence of high-risk HPV type 16-18 in Lebanese women is estimated to be around 3% (95% CI 2.1%-4.3%). Among Lebanese women in 2016, 1.9% of cancers are cervical cancers, which are nearly all caused by HPV. This means at least 2% of cancers among Lebanese women are attributable to HPV, not considering other locations of HPV related cancers. [19]

It is therefore a concern that HPV is hardly known as a cause of cancer: 32.6% of respondents correctly identified HPV as a cause of cancer, with a Carcinogenic Perception score of 2.3, the lowest score, even lower than all the harmless factors. This confirms findings of previous studies, that found that 34% of adults were aware of the cancer risks of HPV, and 18.2% of adults were sufficiently educated concerning HPV infection. [20-22]

Sedentary lifestyle

Prevalence sedentary lifestyle among Lebanese adults is high: 60.7% of men and 61.3% of women do not meet WHO recommendations on physical activity. [13] Physical inactivity is responsible for 0.6% of cancers in men and 3.2% in women. [3] This percentage is likely to be higher since the prevalence of physical inactivity used in that study (36.0%), has since been adjusted upwards (61.0%).[23]

Only 48.6% of people correctly identified physical inactivity as harmful. Previous Lebanese research (n=371, self-administered questionnaire) found similar results: 36.5% identified a sedentary lifestyle as a risk factor for colorectal cancer. [24] Knowledge about this risk factor is better than in certain other settings (only 16.6% of refugees in Jordan identify sedentary lifestyle as a risk factor), but still insufficient [16].

Alcohol

Regular alcohol consumption (at least once in the last month) has a prevalence of 23.4% among Lebanese adults (28.1% among men and 18.9% among women). [13] Alcohol is responsible for 1.1% of cancers in men and 1.5% in women. [3] This percentage is likely to be higher since the prevalence of alcohol consumption used in that study has since been adjusted upwards (60.2% of adults used alcohol at some point in life versus a previous estimate of 9.9%). [23]

Alcohol was known to be carcinogenic by 63.4% of people, with a Perceived Carcinogenic Score of 3.5. This makes alcohol one of the lesser known carcinogenic factors in Lebanon. Previous research had similar results: in a self-administered questionnaire in Lebanon 52.8% identified alcohol as risk factor for colorectal cancer, and in a population-based survey in Iran 56% identified alcohol as a risk factor. [24,25]

High-BMI

Being overweight ($\geq 25\text{kg/m}^2$) has a prevalence of 64.9% among Lebanese adults (71.3% among men and 58.9% among women). [13] High BMI is responsible for 2.7% of cancers in males and 8.1% in females. [3] This puts high BMI as the second most important avoidable cause of cancer for women in Lebanon.

High BMI was identified as a risk for cancer by 65.8% of respondents, with a Carcinogenic perception score of 3.7. In comparison to other factors, that is much lower. A previous study in Lebanon showed that 51.4% consider high BMI a risk factor for cancer. [26] Obesity is also poorly recognised as a risk factor in England. [27]

Strengths And Limitations

Our population-based sample was frequency matched to important demographic variables. This method is more likely to give representative results compared to a non-random sampling method that does neither check nor adjust for population distribution. We used a modified validated measure of cancer awareness, managed to also reach the lower socio-economical groups and had very few missing data except for the variable personal income.

Our study also has limitations. Recall and recognition are different methods of measuring cancer awareness, recall is thought to underestimate awareness, while recognition is thought to overestimate it. [10,28] Of the 8 Lebanese governorates, our sample strategy included only two (mainly urban). Therefore, it cannot be guaranteed that our results are generalisable to Lebanon as a whole, although our sample was matched to national data on socio-economic variables.

Conclusion

The potential for cancer prevention is high in Lebanon: one third of all cancers could be avoided by changing behaviour. Several conditions need to be met to achieve the necessary behaviour changes. The population needs to be aware of the risks of their own behaviour and also be informed about cancer myths. However, such awareness campaigns need to be embedded into national behaviour change programs so that other barriers to behaviour change can also be tackled, this seems especially true for cigarette smoking.

Abbreviations

BMI (Body Mass Index)

IARC (International Agency for Research on Cancer)

Declarations

Ethics approval and consent to participate

The study was approved by the ethical committee of the University Hospital of Brussels with reference number CAL-3.1. All procedures performed involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was sought

from every participant by explaining the objectives of the study, that participation was voluntary, that anonymity of the respondents was guaranteed and that withdrawal at any point was possible.

Consent for publication

Consent for publication was not be required since we do report on individuals in the manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have no competing interests that might be perceived to influence the results and/or discussion reported in this paper.

Funding

The authors have not received funding for this study.

Authors' contributions

All authors contributed to the design of this study, the analysis of it's data and the writing of the manuscript. All authors reviewed the final version of the submitted manuscript and approved it for publication. Georges Hatem, Diana Ghanem and Ibrahim AlZaim oversaw data collection and Georges Hatem prepared the tables together with Mathijs Goossens.

Acknowledgements

The authors would like to thank Jon Shelton, Brigitte Boonen and Sacha Hatem for their valuable contributions.

References

- 1) Kulhánová I, Bray F, Fadhil I, et al. Profile of cancer in the Eastern Mediterranean region: The need for action. *Cancer Epidemiol.* 2017;47:125–32
- 2) Rahim H, Sibai A, Khader Y, et al. Non-communicable diseases in the Arab world. *Lancet.* 2014; 383: 356-67.
- 3) Kulhánová I, Znaor A, Shield K, et al. Proportion of Cancers Attributable to Major Lifestyle and Environmental Risk Factors in the Eastern Mediterranean Region. *Int J Cancer.* 2020; 146: 646-656

- 4) Naja F, Nasreddine L, Awada S, et al. Nutrition in the Prevention of Breast Cancer: A Middle Eastern Perspective. *Front Public Health*. 2019; 7:316.
- 5) Charafeddine M, Olson S, Mukherji D, et al. Proportion of cancer in a Middle eastern country attributable to established risk factors. *BMC Cancer*. 2017; 17:337
- 6) Musaiger A, Al-Hazzaa H, Takruri H, Mokhatar N. Change in Nutrition and Lifestyle in the Eastern Mediterranean Region: Health Impact. *Journal of Nutrition and Metabolism*. 2012; 1: 1-2.
- 7) Michie S, van Stralen M, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci*. 2011; 6:42.
- 8) Souaid T, Hindy J, Eid R, et al. Bladder cancer knowledge in the Lebanese population: When ignorance could be harmful. *Bull Cancer*. 2018; 105:857-861.
- 9) Elshami M, Elshami A, Alshorbassi N, et al. Knowledge level of cancer symptoms and risk factors in the Gaza Strip: a crosssectional study. *BMC Public Health*. 2020; 20:414
- 10) Robb K, Stubbings S, Ramirez A, et al. Public awareness of cancer in Britain: a population-based survey of adults. *Br J Cancer*. 2009;101: S18–S23.
- 11) Temraz S, Hammoud M, Saleh A, et al. Perceptions of Cancer Status Disclosure in Lebanon. *J Cancer Educ*. 2019; 34:874-881.
- 12) World Cancer Day 2020: International Public Opinion Survey on Cancer
<https://ecancer.org/en/news/17274-world-cancer-day-2020-international-survey-reveals-unacceptable-cancer-awareness-divide>
- 13) WHO STEPwise Approach for Non-Communicable Diseases Risk Factors Surveillance – Lebanon. Beirut: Ministry of public health; 2017.
- 14) Haddad C, Lahoud N, Akel M, et al. Knowledge, attitudes, harm perception, and practice related to waterpipe smoking in Lebanon. *Environmental Science and Pollution Research*. 2020; 27; 17854–17863
- 15) Akl E, Gaddam S, Gunukula S, et al. The effects of waterpipe tobacco smoking on health outcomes: a systematic review, *Int. J. Epidemiol*. 2010;39: 834–857.
- 16) Al Qadire M, Aljezawi M, Al-Shdayfat N. Cancer Awareness and Barriers to Seeking Medical Help Among Syrian Refugees in Jordan: a Baseline Study. *J Cancer Educ*. 2019; 34:19-25. 1
- 17) Freij M, Al Qadire M, Khadra M, et al. Awareness and Knowledge of Ovarian Cancer Symptoms and Risk Factors: A Survey of Jordanian Women. *Clin Nurs Res*. 2018; 27:826-840.

- 18) Wehbeh F, Nakhle M, Maher A, et al. Analysis of the continuous measurements of PM10 and PM2.5 concentrations in Beirut, Lebanon. *Environmental engineering and management journal*. 2014; 17:1693-1700.
- 19) Human Papillomavirus and Related Diseases Report. 7 June 2019. <https://hpvcentre.net/>
- 20) Mroueh A, Seoud M, Kaspar H, Zalloua P. Prevalence of genital papillomavirus among Lebanese women. *European journal of gynaecological oncology*. 2002;23:429-32.
- 21) El-Ola M, et al. Low rate of human papillomavirus vaccination among schoolgirls in Lebanon: barriers to vaccination with a focus on mothers' knowledge about available vaccines. *Therapeutics and Clinical Risk Management* 2018;14:617–626
- 22) Abi Jaoude J, Saad H, Farha L, et al. Barriers, Attitudes and Clinical Approach of Lebanese Physicians Towards HPV Vaccination; A Cross- Sectional Study. *Asian Pac J Cancer Prev*. 2019;20:3181-3187.
- 23) World Health Organization. (2018). Noncommunicable diseases country profiles 2018. World Health Organization. <https://apps.who.int/iris/handle/10665/274512>.
- 24) Tfaily M, Naamani D, Kassir A, et al. Awareness of Colorectal Cancer and Attitudes Towards Its Screening Guidelines in Lebanon. *Ann Glob Health*. 2019;85:75.
- 25) Azimi S, Ghorbani Z, Tennant M, Kruger E, Safiaghdam H, Rafieian N. Population Survey of Knowledge about Oral Cancer and Related Factors in the Capital of Iran. *J Cancer Educ*. 2019;34(1):116-123. 7
- 26) Mallat S, Geagea A, Jurjus R, et al. Obesity in Lebanon: A National Problem. *World Journal of Cardiovascular Diseases*. 2016; 6: 166-174
- 27) Shahab L, McGowan JA, Waller J, Smith SG. Prevalence of beliefs about actual and mythical causes of cancer and their association with socio-demographic and health-related characteristics: Findings from a cross-sectional survey in England. *Eur J Cancer*. 2018; 103:308-316.
- 28) Richards R, McNoe B, Iosua E, et al. Changes in awareness of cancer risk factors among adult New Zealanders (CAANZ): 2001 to 2015. *Health Educ Res*. 2017; 32:153-162.
- 29) Bowen D, Alfano C, McGregor B, Robyn Andersen M. The Relationship Between Perceived Risk, Affect, and Health Behaviours. *Cancer Detect Prev*. 2004; 28:409-17
- 30) National Research Council (US) Panel on Race, Ethnicity, and Health in Later Life; Anderson NB, Bulatao RA, Cohen B, editors. *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life*. Washington (DC): National Academies Press (US); 2004. 17, Behavioural Health Interventions: What Works and Why?

Tables

Table 1. Distribution of socio-demographic characteristics among respondents and the general population (Lebanon 2019)

	Respondents (age 20+)		National data 2009* (age 20+)		p-Value
Lebanese nationals aged 20+, % (N)	100.0	(726)	100.0	(35,681)	
Gender, % (N)					0.890
Male	49.4	(359)	49.0	(17,476)	
Female	50.6	(367)	51.0	(18,205)	
Mean age in years (SD)	42.7	(15.8)			
Age in years, % (N)					0.082
20 – 29	26.0	(189)	26.0	(9,289)	
30 – 39	20.1	(146)	19.8	(7,076)	
40 – 49	20.2	(147)	19.9	(7,115)	
50 – 59	16.2	(118)	16.9	(6,023)	
60 – 69	12.0	(87)	9.6	(3,413)	
70+	5.4	(39)	7.7	(2,765)	
Civil status, % (N)					<0.001
Never married	37.3	(264)	30.5	(10,892)	
Married	47.8	(338)	62.0	(22,113)	
Widowed	5.4	(38)	6.2	(2,209)	
Divorced	6.4	(45)	1.0	(3,74)	
Separated	3.1	(22)	0.2	(73)	
Missing	-	(19)	-	(20)	
Work status, % (N)					<0.001
Employed (including self-employed)	62.3	(444)	48.7	(17,376)	
Unemployed	10.1	(72)	5.5	(1,967)	
Student	12.9	(92)	6.3	(2,249)	
Retired	2.0	(14)	2.8	(1,011)	
Inactive (occupied with housework...)	11.9	(85)	32.4	(11,555)	

Unable to work for health reasons	0.8	(6)	4.2	(1,516)	
Missing	-	(13)	-	(7)	
Highest level of education, % (N)					0.491
Cannot read and write	10.1	(73)	10.2	(3,596)	
Can read and write, max. kindergarten	5.1	(37)	3.6	(1,281)	
Elementary school	21.7	(157)	22.2	(7,818)	
Intermediate	23.8	(172)	23.9	(8,419)	
Secondary	16.9	(122)	17.1	(6,030)	
University	22.5	(163)	23.0	(8,112)	
Missing	-	(2)	-	(425)	
Personal monthly income in USD**, % (N)					
<500	22.9	(137)			
500-999	34.8	(208)			
1000-1499	29.1	(174)			
>1500	13.2	(79)			
Missing	-	(128)			
* Central Administration of Statistics (http://www.cas.gov.lb), most recent for 2009 (accessed on 01/05/2019).					
** National data on income were not available.					

Table 2. Factors that are *recalled* as the most important causes of cancer (Lebanese adults, Lebanon 2019)

	n	%
Pollution (air and/or water)	289	(40.0)
Smoking cigarettes or waterpipe	253	(35.0)
Depression or stress	55	(7.6)
A variety of foods	49	(6.8)
Sun and UV	46	(6.4)
Genetics	15	(2.1)
Other	16	(2.2)

Table 3. Perception of factors that either increase cancer risk or do not influence it (Lebanese adults, Lebanon 2019)

Lifestyle factor*	Correct Recognition Percentages		Carcinogenic Strength Score
	n	%	
Smoking cigarettes	708	(97.5)	8.1
Smoking waterpipe	701	(96.6)	8.2
Air pollution	687	(94.6)	8.0
“Food colouring”	49	(6.7)	6.1
Sun	636	(87.6)	6.0
Processed meats	658	(90.6)	5.9
Second-hand smoke	660	(90.9)	5.7
Insufficient fruit & vegetables	535	(73.7)	4.8
E-cigarettes	570	(78.5)	4.9
“Depression or anxiety”	170	(23.4)	4.5
“Tap water”	117	(16.1)	3.9
Drinking hot liquid	460	(63.4)	3.8
Being overweight	478	(65.8)	3.7
Red meats	480	(66.1)	3.7
Alcohol	460	(63.4)	3.5
“Deodorant”	220	(30.3)	3.2
“Lack of sleep”	212	(29.2)	3.2
“Using mobile phone”	211	(29.1)	3.1
Sedentary lifestyle	353	(48.6)	2.4
HPV-infection	237	(32.6)	2.3
“Poultry”	144	(19.8)	2.0

* * "" indicate this factor neither increases nor decreases cancer risk according to current scientific evidence

Table 4. Correlation between awareness and behaviour. (Lebanese adults, Lebanon 2019)

	N	OR*	p-value	(95% CI)
Waterpipe, Odds Ratio for less likely use				
Perceived effect of waterpipe smoking				
Decreases risk	0	-		
Neither increases nor decreases	16	Ref		
Somewhat increases	67	2.69	0.077	(0.90-8.06)
Moderately increases	174	2.62	0.070	(0.92-7.44)
Strongly increases	460	5.51	0.001	(1.97-15.4)
Cigarettes, Odds Ratio for less likely use				
Perceived effect of cigarette smoking				
Decreases risk	0	-		
Neither increases nor decreases	11	Ref		
Somewhat increases	65	0.82	0.764	(0.21-3.05)
Moderately increases	222	1.00	0.997	(0.28-3.51)
Strongly increases	421	1.14	0.837	(0.33-3.97)
Alcohol, Odds Ratio for less likely use				
Perceived effect of alcohol consumption				
Decreases risk	14	Ref		
Neither increases nor decreases	225	3.04	0.030	(1.12-8.29)
Somewhat increases	227	2.86	0.039	(1.05-7.78)
Moderately increases	154	3.84	0.010	(1.37-10.74)
Strongly increases	79	3.66	0.020	(1.23-10.88)
Physical activity, Odds Ratio for higher activity				
Perceived effect of physical activity				
Increases risk	29	Ref		
Neither increases nor decreases	79	2.32	0.086	(0.89-6.05)
Somewhat decreases	94	2.03	0.140	(0.79-5.19)
Moderately decreases	244	3.07	0.013	(1.27-7.40)

Strongly decreases	266	3.26	0.008	(1.36-7.83)
--------------------	-----	------	-------	-------------