





BMJ Open Current situation and future directions of lung cancer risk factor awareness in Palestine: a cross-sectional study

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ABSTRACT

Objectives To evaluate lung cancer (LC) risk factor awareness among Palestinians and identify factors associated with good awareness.

Design Cross-sectional study.

Settings Participants were recruited using convenience sampling from hospitals, primary healthcare centres (PHCs) and public spaces located at 11 governorates in Palestine.

Participants Of 5174 approached, 4817 participants completed the questionnaire (response rate=93.1%). A total of 4762 questionnaires were included: 2742 from the West Bank and Jerusalem (WBJ) and 2020 from the Gaza Strip. Exclusion criteria were working or studying in a health-related field, having a nationality other than Palestinian and visiting oncology departments or clinics at the time of data collection.

Tool A modified version of the validated LC Awareness Measure was used for data collection.

Primary and secondary outcomes The primary outcome was LC risk factor awareness level as determined by the number of factors recognised: poor (0–3), fair (4–7) and good (8–10). Secondary outcomes include the recognition of each LC risk factor.

Results Smoking-related risk factors were more often recognised than other LC risk factors. The most recognised risk factors were ‘smoking cigarettes’ (n=4466, 93.8%) and ‘smoking shisha (waterpipes)’ (n=4337, 91.1%). The least recognised risk factors were ‘having a close relative with LC’ (n=2084, 43.8%) and ‘having had treatment for any cancer in the past’ (n=2368, 49.7%).

A total of 2381 participants (50.0%) displayed good awareness of LC risk factors. Participants from the WBJ and the Gaza Strip had similar likelihood to display good awareness (50.6% vs 49.1%). Being ≥45 years, having higher education and monthly income, knowing someone with cancer and visiting hospitals and PHCs seemed to have a positive impact on displaying good awareness.

Conclusion Half of study participants displayed good awareness of LC risk factors. Educational interventions are warranted to further improve public awareness of LC risk factors, especially those unrelated to smoking.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The large sample size was a major strength of this study.
- ⇒ The wide coverage of the major geographical areas of Palestine and collecting data from different places within each area allowed for direct evaluation of the knowledge of lung cancer risk factors at various levels in the Palestinian population.
- ⇒ The use of convenience sampling does not guarantee the generalisability of the findings.
- ⇒ Visitors or patients in the oncology departments as well as those with medical backgrounds were all ineligible, which might have reduced the number of participants with a presumably good awareness.
- ⇒ Grouping unemployed women and housewives in the same category might be inappropriate, as this may include women with a whole range of socio-economic and educational background from highly educated women who chose to focus on family care to those with minimal skills who cannot find work and look after their family as the default option.

INTRODUCTION

Lung cancer (LC) is the leading cause of cancer-related deaths worldwide with 18.0% of cancer-related deaths and over 2.2 million newly diagnosed cases in 2020.¹ In the Middle East and North Africa, the estimated number of newly diagnosed LC cases was 79 887 in 2018 with a 5-year relative survival rate of 8.0%.² In Palestine, LC is the second most common cancer, accounting for 11.4% of all cancers with an incidence rate of 11.5 per 100 000 general population, and the leading cause of cancer-related mortality accounting for 17.3%.³

The most significant risk factor for LC is smoking tobacco products including cigarettes and shisha (waterpipes).⁴ Tobacco

smoking was reported to be prevalent among 47.7% of Palestinians in the West Bank. Men were found to smoke more than women and to begin smoking at an earlier age, where 74.4% of smokers started when they were 18 years old or younger. Cigarettes and shisha were found to be the most popular methods of smoking among Palestinian men and women.⁵

Besides smoking, there are LC risk factors for LC, such as exposure to radiation, occupational hazards such as asbestos, air pollution and family history of LC.^{6–8} However, previous studies showed that awareness of smoking-related risk factors of LC was higher than that of other LC risk factors.^{9–11}

One of the most important contributors to the low survival rates of LC is delayed presentation. This could be due to factors related to patients, healthcare providers, the healthcare system or the disease itself.¹² Awareness of LC risk factors is one of the patient-related factors. Recognition of LC risk factors can help stimulating the development of an active personal risk assessment, which in turn increases the ability to detect and react to related symptoms.¹³ Previous studies demonstrated that raising the public awareness of LC increased the number of individuals diagnosed at early stages.^{14–16} An early diagnosis of LC contributes to better prognosis.¹⁷ Given the limited resources in Palestine, such educational interventions could be an efficient strategy to mitigate the mortality associated with LC.

Therefore, the primary aim of this national study was to evaluate the overall LC risk factor awareness among Palestinians. Secondary aims were to examine if there is a difference in the LC risk factor awareness between the two main areas of Palestine (the West Bank and Jerusalem (WBJ) and the Gaza Strip) and to identify the sociodemographic factors associated with good awareness.

METHODS

Study design and population

This was a national cross-sectional study conducted from July 2019 to March 2020. Palestinian adults (≥ 18 years) were the target population. Participants were recruited from governmental hospitals, primary healthcare centres (PHCs) and public spaces, such as malls, markets, restaurants, mosques, churches, parks, downtowns, transportation stations and others. Exclusion criteria were working or studying in a health-related field, having a nationality other than Palestinian and visiting oncology departments or clinics at the time of data collection.

Sampling methods

Eligible participants were recruited to the study using a convenience sampling technique from governmental hospitals, PHCs and public spaces located in 11 governorates (out of 16) across Palestine between July 2019 and March 2020. This was intended to create a diverse study cohort resembling the Palestinian community.^{18–20} In 2019, the estimated Palestinian population (≥ 15 years)

was 3 109 063. With a confidence level of 95.0%, a type I error rate of 5.0% and an absolute error of 2.0%, the minimum required sample size to detect a good overall LC risk factor awareness of 50% was 2401 participants.

Questionnaire and data collection

A modified version of the LC Awareness Measure (LCAM) was used for data collection. The LCAM is a validated tool that was designed to evaluate the public awareness of LC.¹³ The original LCAM was first translated into Arabic by two bilingual healthcare professionals and then back translated into English by another two different bilingual healthcare professionals. The Arabic version of the LCAM was then assessed for content validity and accuracy of translation by three experts in the field of thoracic oncology, public health and survey design. This was followed by a pilot study ($n=68$) to assess the clarity of questions in the Arabic version of the LCAM. The questionnaires of the pilot study were not included in the final analysis. The Cronbach's Alpha was used to assess the internal consistency of the Arabic LCAM and it reached an acceptable value of 0.784.

The Arabic LCAM included two sections. The first section described the sociodemographic factors of study participants. The second section evaluated the awareness of 10 LC risk factors using a 5-point Likert scale (1=strongly disagree, 5=strongly agree). Of the 10 risk factors, 9 were mentioned in the original LCAM.¹³ 'Smoking shisha' was added to the questionnaire as it was deemed important to assess the awareness of this risk factor in the Palestinian community due to its high prevalence.⁵

The electronic tool 'Kobo Toolbox' was used in the data collection.²¹ This safe tool can be used both offline and online on mobile devices. Data collectors completed the questionnaire in a face-to-face interview with the participant using Kobo Toolbox. The data collectors had medical background and received special training on the use of Kobo Toolbox, recruitment of potential study participants, gaining informed consent and facilitation of completion of the questionnaires.

Statistical analysis

The percentage of new LC cases increases substantially starting from the age of 45.²² Therefore, participants' age was categorised into two categories using this cut-off: 18–44 years and ≥ 45 years. The monthly income was also categorised into two categories (<1450 NIS and ≥ 1450 NIS) since 1450 NIS (about US\$450) is the minimum wage in Palestine.²³

The median and IQR were used to describe continuous, non-normally distributed variables and the Kruskal-Wallis test was used for baseline comparisons. Frequencies and percentages were used to describe categorical variables and Pearson's χ^2 test was used for baseline comparisons.

The recognition of each LC risk factor was assessed using a question based on a 5-point Likert scale with 'strongly agree' or 'agree' as a correct answer, and 'strongly disagree', 'disagree' or 'not sure' as an incorrect

answer. For each correctly recognised LC risk factor, one point was given. LC risk factors were further categorised into two categories: (1) smoking-related and (2) other risk factors. Recognition of LC risk factors was described using frequencies and percentages with comparisons performed by Pearson's χ^2 test. This was followed by running univariable and multivariable logistic regression analyses to examine the association between recognising each LC risk factor and participant characteristics. The multivariable analysis adjusted for age group, gender, educational level, monthly income, occupation, place of residency, marital status, having a chronic disease, knowing someone with cancer, smoking history and site of data collection. This model was determined a priori based on previous studies.^{13 24–27} The results of the univariable analyses are presented in online supplemental table 1–3, please see online supplemental file 1.

A scoring system was used to evaluate the participants' awareness level of LC risk factors. Similar scoring systems were also used in previous studies.^{18 27 28} For each correctly recognised LC risk factor, one point was given. The total score (ranging from 0 to 10) was calculated and categorised based on the number of recognised LC risk factors into three categories: poor (0–3), fair (4–7) and good awareness (8–10). The awareness level of LC risk factors exhibited by participants from the Gaza Strip was compared with the awareness level exhibited by participants from the WBJ using Pearson's χ^2 test. Univariable and multivariable logistic regression analyses were used to test the association between participant characteristics and having a good awareness level.

For all multivariable analyses, the likelihood ratio test was used to calculate the overall p value for each independent variable. Missing data were hypothesised to be missed completely at random and thus, complete case analysis was used to handle them. Data were analysed using Stata software V.16.0 (StataCorp, College Station, Texas, USA).

Patients and public involvement

There was no patient or public involvement in the design, conduct, reporting or dissemination plans of this study. However, results will be disseminated among the professional communities of Palestine and to policy-makers, with the intent to inform future health policy decisions.

RESULTS

Participant characteristics

Of 5174 approached, 4817 participants completed the questionnaire (response rate=93.1%). In total, 4762 questionnaires were included in the analysis (24 were ineligible and 31 had missing data): 2742 from the WBJ and 2020 from the Gaza Strip. The median age (IQR) for all participants was 32.0 years (24.0–44.0) (table 1). Participants living in the WBJ were more likely to be older, have higher monthly income but lower level of education and

suffer more often from chronic diseases than participants living in the Gaza Strip.

Recognition of LC risk factors

Smoking-related risk factors were more often recognised than other LC risk factors. The most frequently identified risk factors were 'smoking cigarettes' (n=4466, 93.8%) and 'smoking shisha' (n=4337, 91.1%) (table 2). These risk factors were the most identified in both the WBJ and the Gaza Strip. The least recognised risk factors were 'having a close relative with LC' (n=2084, 43.8%) and 'having had treatment for any cancer in the past' (n=2368, 49.7%). These risk factors were also the least identified in both the WBJ and the Gaza Strip.

Good awareness and its associated factors

A total of 2381 participants (50.0%) displayed good awareness (prompt recognition of more than 7 out of 10 LC risk factors) (table 3). Participants from the WBJ and the Gaza Strip had a similar likelihood to display good awareness (50.6% vs 49.1%). On the multivariable analysis, being ≥ 45 years, having higher education and monthly income, knowing someone with cancer and visiting hospitals and PHCs were all associated with an increase in the likelihood of having a good awareness level of LC risk factors (table 4).

Association between recognising smoking-related risk factors and participant characteristics

Our data suggested an association between education level and recognition of smoking-related risk factors, where participants with higher education level (above secondary) seemed to be more likely than other participants to recognise all smoking-related risk factors (online supplemental table 4). In addition, there seemed to be an impact of visiting hospitals and PHCs on recognising 'smoking cigarettes' as an LC risk factor. Similarly, participants from the WBJ seemed to be more likely than participants from the Gaza Strip to recognise 'smoking shisha' and 'exposure to another person's cigarette smoke' as LC risk factors. In contrast, participants who ever smoked cigarettes and/or shisha seemed to be less likely than participants who never smoked to recognise all smoking-related risk factors.

Association between recognising other LC risk factors and participant characteristics

Our data suggested an association between knowing someone with cancer and recognising most other LC risk factors, where participants who knew someone with cancer were more likely to recognise 'exposure to chemicals', 'exposure to radiation', 'air pollution', 'having a previous history of cancer' and 'having had treatment for any cancer in the past' as LC risk factors (online supplemental table 5). In addition, there seemed to be an impact of visiting hospitals and PHCs on recognising 'exposure to chemicals', 'air pollution', 'having a previous history of lung disease', 'having a previous history of cancer' and

Table 1 Characteristics of study participants

Characteristic	Total (n=4762)	Gaza Strip (n=2020)	WBJ (n=2742)	P value
Age, median (IQR)	32.0 (24.0–44.0)	30.0 (24.0–40.0)	34.0 (24.0–47.0)	<0.001
Age group, n (%)				
18–44	3572 (75.0)	1634 (80.9)	1938 (70.7)	<0.001
45 or older	1190 (25.0)	386 (19.1)	804 (29.3)	
Female gender, n (%)	2618 (55.0)	1086 (53.8)	1532 (55.9)	0.15
Educational level, n (%)				
Secondary or below	2375 (49.9)	955 (47.3)	1420 (51.8)	0.002
Post secondary	2387 (50.1)	1065 (52.7)	1322 (48.2)	
Occupation, n (%)				
Unemployed/housewife	2003 (42.1)	970 (48.0)	1033 (37.7)	<0.001
Employed	2160 (45.4)	814 (40.3)	1346 (49.1)	
Retired	111 (2.3)	46 (2.3)	65 (2.4)	
Student	488 (10.2)	190 (9.4)	298 (10.8)	
Monthly income ≥1450 NIS, n (%)	3241 (68.1)	683 (33.8)	2558 (93.3)	<0.001
Marital status, n (%)				
Single	1480 (31.1)	641 (31.7)	839 (30.6)	0.07
Married	3117 (65.5)	1323 (65.5)	1794 (65.4)	
Divorced/widowed	165 (3.5)	56 (2.8)	109 (4.0)	
Having a chronic disease, n (%)	1032 (21.7)	313 (15.5)	719 (26.2)	<0.001
Knowing someone with cancer, n (%)	2571 (54.0)	1045 (51.7)	1526 (55.7)	0.007
Ever smoked, n (%)				
Cigarettes	1127 (23.7)	417 (20.6)	710 (25.9)	<0.001
Shisha (waterpipes)	499 (10.5)	142 (7.0)	357 (13.0)	<0.001
Site of data collection, n (%)				
Public spaces	1920 (40.3)	784 (38.8)	1136 (41.4)	<0.001
Hospitals	1628 (34.2)	651 (32.2)	977 (35.7)	
Primary healthcare centres	1214 (25.5)	585 (29.0)	629 (22.9)	

n, number of participants; NIS, New Israeli Shekel; WBJ, West Bank and Jerusalem.

‘having had treatment for any cancer in the past’ as LC risk factors.

DISCUSSION

Half of the study participants demonstrated good awareness of LC risk factors, defined as recognising more than seven out of the 10 LC risk factors. Participants from the WBJ and the Gaza Strip demonstrated a similar likelihood of having a good awareness level. The factors that seemed to have an impact on displaying good awareness levels of LC risk factors were being ≥45 years, higher levels of education and monthly income, knowing someone with cancer and visiting hospitals and PHCs. Smoking-related risk factors were more often recognised than other risk factors. The most frequently recognised LC risk factor was ‘smoking cigarettes’ followed by ‘smoking shisha’. Interestingly, participants who ever smoked seemed to be less likely to recognise smoking-related risk factors than those who never smoked.

Awareness of LC risk factors among Palestinians was higher than knowledge of other types of cancer.^{18–20} Only 17.4% of Palestinians displayed good knowledge of ovarian cancer symptoms,²⁰ 23.7% had good knowledge of cervical cancer risk factors¹⁹ and 27.4% demonstrated good knowledge of cervical cancer warning signs.¹⁸

The majority of LC cases are diagnosed late, which may be in part due to a lack of awareness of LC symptoms, fear of cancer diagnosis, worries about what might be found and lack of time to visit a doctor.^{28 29} Educational interventions that raise the knowledge about various aspects of LC awareness are critical to develop behaviours that lead to the prevention and early diagnosis of LC.³⁰ The high mortality rate of LC, especially in low-resource settings such as Palestine³¹ and the high smoking rates, ranging from 30.0% to 47.7%,^{5 32 33} necessitate finding approaches to increase awareness of LC risk factors. Although there are tobacco control policies in Palestine,³⁴ there is a substantial need to monitor their outreach and

Table 2 Recognition of lung cancer risk factors

Factor	Total (n=4762) n (%)	Gaza Strip (n=2020) n (%)	WBJ (n=2742) n (%)	P value
Smoking-related risk factors				
Smoking cigarettes	4466 (93.8)	1892 (93.7)	2574 (93.9)	0.77
Smoking shisha	4337 (91.1)	1822 (90.2)	2515 (91.7)	0.07
Exposure to another person's cigarette smoke	3867 (81.2)	1621 (80.2)	2246 (81.9)	0.15
Other risk factors				
Air pollution	3838 (80.6)	1543 (76.4)	2295 (83.7)	<0.001
Exposure to chemicals (eg, asbestos)	3802 (79.8)	1582 (78.3)	2220 (81.0)	0.024
Exposure to radiation	3788 (79.6)	1598 (79.1)	2190 (79.9)	0.52
Having a previous history of lung disease (eg, COPD)	3216 (67.5)	1382 (68.4)	1834 (66.9)	0.27
Having a previous history of cancer such as head and neck cancer	2778 (58.3)	1165 (57.7)	1613 (58.8)	0.43
Having had treatment for any cancer in the past	2368 (49.7)	1020 (50.5)	1348 (49.2)	0.36
Having a close relative with lung cancer	2084 (43.8)	832 (41.2)	1252 (45.7)	0.002

COPD, chronic obstructive pulmonary disease; n, number of participants; WBJ, West Bank and Jerusalem.

implementation more closely. This is especially important given the widespread availability of tobacco products on all premises in public and to all ages. Such monitoring of the implementation of government tobacco control policies was shown to discourage people from smoking, which could reduce both active and passive smoking and, thus, LC morbidity and mortality.^{35 36} There are several barriers to implementing tobacco control policies in Palestine. The lack of enforcement of these policies is a major barrier. It is common to see someone smoking in a public place or to see a child who is under 18 years going to a store to buy a pack of cigarettes for their own use or for the use of one of their family members. The law also did not specify the penalties for violating these policies, which limits the adherence of the public. In addition, to the best of our knowledge, there are no specialised centres to help smokers quit smoking. Finally, the poor economic circumstances could be a contributing factor for the inability to implement tobacco control policies as their enforcement requires allocation of a special budget for that purpose.

Awareness of LC risk factors

Smoking cigarettes was the most recognised LC risk factor in this study followed by smoking shisha and exposure to another person's cigarette smoke (passive smoking),

respectively. In a previous study from Oman, smoking cigarettes was the most recognised LC risk factor (79.8%) and passive smoking was the third (55.7%).⁹ Similarly, in a previous study from Jordan, the majority believed that active cigarette smoking, shisha smoking and passive smoking were all linked to cancer.³⁷

Musmar reported that 34.7% of university students in Palestine were current smokers.³³ Students in the arts and humanities were found to have a considerably greater risk of smoking than students in the sciences or in healthcare.³³ The fact that health sciences students were found to be less likely to smoke might be partly due to the influence of smoking-related health education.³³ This is also supported by the findings of this study, where participants who had never smoked seemed to be more likely to demonstrate good awareness of smoking-related risk factors than ever smokers, highlighting the potentially empowering influence of health education on smoking behaviour.

Chapple *et al* found that LC patients felt unjustly blamed for their disease. LC patients felt particularly stigmatised regardless of their smoking status, because the condition is closely linked to smoking, which negatively impacted their interaction with family, friends and physicians.³⁸ Such stigma may drive individuals who have

Table 3 Awareness level of lung cancer risk factors among study participants

Level	Total n (%)	Gaza Strip n (%)	WBJ n (%)	P value
Poor (0–3 risk factors)	203 (4.3)	111 (5.5)	92 (3.4)	0.001
Fair (4–7 risk factors)	2178 (45.7)	918 (45.4)	1260 (46.0)	
Good (8–10 risk factors)	2381 (50.0)	991 (49.1)	1390 (50.6)	

n, number of participants; WBJ, West Bank and Jerusalem.

Table 4 Univariable and multivariable logistic regression analysing factors associated with having a good awareness of lung cancer risk factors

Characteristic	Good awareness			
	COR (95% CI)	P value*	AOR (95% CI)†	P value*
Age group				
18–44	Ref	<0.001	Ref	0.026
45 or older	1.33 (1.17 to 1.52)		1.20 (1.02 to 1.42)	
Gender				
Male	Ref	0.014	Ref	0.36
Female	1.15 (1.03 to 1.29)		1.08 (0.91 to 1.28)	
Educational level				
Secondary or below	Ref	0.016	Ref	<0.001
Post secondary	1.15 (1.03 to 1.29)		1.25 (1.09 to 1.42)	
Occupation				
Unemployed/housewife	Ref	0.011	Ref	0.17
Employed	0.98 (0.87 to 1.11)		1.16 (0.99 to 1.36)	
Retired	1.49 (1.01 to 2.19)		1.34 (0.87 to 2.04)	
Student	0.79 (0.64 to 0.95)		0.98 (0.77 to 1.24)	
Monthly income				
<1450 NIS	Ref	0.027	Ref	0.041
≥1450 NIS	1.15 (1.02 to 1.30)		1.19 (1.07 to 1.411)	
Marital status				
Single	Ref	0.001	Ref	0.97
Married	1.25 (1.11 to 1.41)		1.01 (0.87 to 1.17)	
Divorced/widowed	1.30 (0.95 to 1.80)		1.05 (0.74 to 1.49)	
Residency				
Gaza Strip	Ref	0.27	Ref	0.53
WBJ	1.07 (0.95 to 1.20)		0.95 (0.81 to 1.11)	
Having a chronic disease				
No	Ref	<0.001	Ref	0.09
Yes	1.32 (1.16 to 1.52)		1.15 (0.98 to 1.35)	
Knowing someone with cancer				
No	Ref	<0.001	Ref	<0.001
Yes	1.52 (1.35 to 1.70)		1.61 (1.43 to 1.81)	
Ever smoked cigarettes and/or shisha				
No	Ref	0.043	Ref	0.12
Yes	0.88 (0.78 to 1.00)		0.88 (0.75 to 1.03)	
Site of data collection				
Public spaces	Ref	<0.001	Ref	<0.001
Hospitals	1.37 (1.20 to 1.56)		1.46 (1.27 to 1.68)	
Primary healthcare centres	1.79 (1.55 to 2.07)		2.04 (1.73 to 2.40)	

*P value of likelihood ratio test.

†Adjusted for age group, gender, educational level, occupation, monthly income, marital status, residency, having a chronic disease, knowing someone with cancer, smoking history and site of data collection.

AOR, adjusted OR; COR, crude OR; NIS, New Israeli Shekel; WBJ, West Bank and Jerusalem.

a possible LC symptom accompanied by risk factors to seek medical advice late, and thus, lead to diagnoses at advanced stages. Health practitioners who have contact

with current and former smokers must be well trained to offer a safe and non-judgmental environment for people who arrive with symptoms suggestive of LC.²⁶

Chawla *et al* showed that having benefitted from post-secondary education was a main factor associated with good awareness of LC risk factors,³⁹ which comes in concordance with this study. Educational levels in Palestine are good and the illiteracy rate is low at only 2.5%,⁴⁰ which could contribute to the fair awareness of LC risk factors found in this study, compared with the lower levels in other regional studies.^{37–41} Participants who benefitted from higher education appear to be more concerned about their health and more likely to avoid risky behaviours such as smoking.^{42–43} Future educational interventions aiming to raise awareness of LC risk factors should be tailored to match the level of health literacy among individuals with low education.

While many similarities existed in the LC awareness of participants in the Gaza Strip compared with those in the WBJ, such as the likelihood to have good awareness of LC risk factors and recognition of smoking cigarettes as a risk factor, there were a few differences. Among these were that participants in the WBJ seemed to be more likely to recognise ‘passive smoking’, ‘shisha smoking’, ‘air pollution’ and ‘having a close relative with cancer’ as risk factors than participants from the Gaza Strip. Residents of the Gaza Strip are not allowed to travel to the WBJ and likewise are residents from the WBJ not allowed to travel to the Gaza Strip. These movement restrictions hinder the exchange of ideas, knowledge and health beliefs among people of both areas. However, the overall greater number of similarities might be encouraging, when considering the delivery of educational interventions to the whole population. The unified school curriculum might be one such way of content delivery and health education and, hence, increasing awareness of LC risk factors among the Palestinian population.

Future directions

Public health interventions that aim to promote the recognition of LC risk factors may have a major potential to improve LC outcomes for those most at risk in an attempt to reduce patient-related delays to diagnosis. The creation of widespread public education programmes and enriching school curricula with subjects outlining important symptoms and risk factors of LC may also play a role. However, this might need to be complemented by effective implementation of tobacco control regulations to achieve the greatest impact. This is especially important in low-income and middle-income countries, such as Palestine, where access to treatment might otherwise be delayed and outcomes are poorer.

Strengths and limitations

The major strengths of this study include the large sample size and the wide geographical coverage of data collection from different places within each main area, which allowed direct evaluation of the knowledge of LC risk factors at various levels in the Palestinian population. This study has some limitations though. The use of convenience sampling does not guarantee the generalisability

of the findings. However, the large number of participants, the diversity of geographical areas included and the high response rate may mitigate this. Another limitation could be that visitors or patients in the oncology departments as well as those with medical backgrounds were all ineligible, which might have reduced the number of participants with a presumably good awareness. Nevertheless, this was intended to make the measured awareness more relevant to the overall public awareness, as people being treated in oncology departments and those visiting such departments were presumed to have better knowledge, compared with the general public without the same contact with healthcare professionals. A further limitation in our questionnaire could be grouping unemployed women and housewives in the same category, while women not in employment may include a whole range of socio-economic and educational background from those with minimal skills who cannot find work and look after their family as the default option to highly educated women who choose to focus on family care. Finally, the results of the multivariable analyses in this study are exploratory and need further validation.

CONCLUSION

Awareness of LC risk factors was relatively good with half of the participants displaying good awareness. Smoking-related risk factors were the most recognised risk factors. Older age, higher education, higher monthly income, knowing someone with cancer and visiting healthcare facilities seemed to have a positive impact on displaying good awareness. Formulation and effective implementation of tobacco control policies are essential to change smoking behaviour and increase awareness. This should be complemented by educational initiatives to improve public understanding of LC and the perception of smoking danger. Such interventions are especially useful in low-resource settings, such as Palestine, where access to diagnosis and treatment is limited.

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