



# Disparities in Oral Cancer Awareness: a Population Survey in Tehran, Iran

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## Abstract

Oral cancer is a life-threatening disease with low survival rates, especially when diagnosed in an advanced stage. Lack of awareness about this cancer among the population is proposed as a possible reason for this diagnostic delay. The aim of this study was to evaluate oral cancer awareness, as well as the association of this with sociodemographic status in Tehran. In this cross-sectional population-based survey, 1800 self-administered questionnaires (collecting sociodemographic data, questions regarding oral cancer awareness and the source of information) were distributed through multistage stratified random sampling. Scores for questions ranged from 0 to 4, and totals were summed. The outcome of question responses was also analyzed separately. In total, 1312 questionnaires were available for analysis, from 788 females and 489 males ( $37.8 \pm 9.02$  years). Only 30% of the respondents were aware of oral cancer. The average score for awareness was  $1.09 \pm 1.6$  with no significant differences between age groups and genders. Almost 6.5% of participants had complete awareness about oral cancer. A significant difference was found between mean scores in different levels of education and occupation ( $p = 0.0001$ ). From 585 responses to the “source of information” question, “public media” was the most important source (almost 50%). Only 2% mentioned “dentists” as a source of information. This study indicated an alarming lack of oral cancer awareness and literacy in Tehran, Iran. Dentists should be obliged to practice their pivotal role in informing the public about oral cancer.

**Keywords** Awareness · Oral cancer · Public · Social status

## Introduction

Oral cancer, including malignancies of the tongue, floor of the mouth, buccal mucosa, gingiva, palate, and lips [1], represented more than 2% of all newly diagnosed cancers, and 1.8% of estimated cancer deaths in recent data [2]. In Iran, as a developing middle-income country, a recent WHO report (2012) showed oral cancer (CD00-08) incidence to be 2.2 and 1.8 age-standardized rate per population (ASR/P, per 100,000

population) for males and females respectively [3]. Consistent with global trends, previous research in Iran (based on national registry data), also reported an increasing age-standardized rate of head and neck cancer over time [4]. Squamous cell carcinomas (SCC) of the lip and oral cavity comprise 90–95% of all of these malignancies [5], and tobacco, alcohol, and betel use known risk factors.

Oral cancer is a major public health problem as a result of poor prognosis and little improvement in the 5-year survival [6]. In fact, it has been reported to have one of the lowest 5-year survival rates of all cancers [7]. Generally, survival rates are decreasing with the advancement of the stage, and metastasis to distant organs in late stages of squamous cell carcinomas leads to drastic lowering of survival rates [8, 9]. Although the easy visual access to the oral mucosa theoretically contributes to early detection, the proportion of cases diagnosed at an early stage is still lower than 50% [1, 10]. Sargeran (2015) estimated that diagnostic delay—the mean time from onset of symptoms to the final diagnosis—for oral cancer was 7.2 months in Iran which is high. This diagnostic delay might be due to general lack of awareness about this cancer, not only among the population, but also among health care professionals [11].

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Previous reviews reported that the greatest burden of oral cancer falls upon people from the most deprived communities [2], and oral cancer risk indicators included low occupational social class, lower income, and low educational attainment [12]. This disparity might be associated with less access to health care, less probability of being insured, and more advanced stages at presentation in patients of lower socioeconomic class. A lack of or insufficient knowledge of oral cancer could also be proposed as a possible reason for such outcome differences [11].

Public oral cancer literacy, especially awareness about the nature and the importance of early detection and prevention, is an important issue. People should be informed about small oral lesions pre-cursing oral cancer, and that early treatment of these lesions can prevent development into oral cancer, or improve the chances of cure [13, 14]. This awareness leads to seeking treatment at the early stages of the disease [9], reduces the rate of functional and cosmetic impairment of treatment, improve the prognosis, and reduce mortality and morbidity, and in turn has significant impact on the quality of life [9, 14].

There are multiple population-based and non-population-based studies assessing the levels of awareness and knowledge of symptoms and risk factors of oral cancer [8, 9, 14, 15]. Results of these studies vary widely, reflecting environmental, geographic, and sociodemographic differences. However, very few studies have examined the awareness of early detection and prevention as important elements of oral cancer literacy [14]. A review of the literature found that studies reporting oral cancer awareness and literacy in Iran are rare, and if available, were carried out among dental patients [16–19]. Although Tehran is the second-largest metropolitan area in the Middle East, no studies on this topic (carried out in this population) could be found. Only, in recent study, we surveyed the knowledge about oral cancer signs and symptoms and risk factors in Tehran, Iran [20].

Against the background of recent recommendations to identify vulnerable groups in Iran (in order to reduce the burden of oral cancers) [4], the aim of this study, following our previous study about oral cancer signs and symptoms and risk factors' knowledge, was to assess the general awareness of oral cancer and associations with sociodemographic status in the Tehran population.

## Methods

### Sampling and Design

This cross-sectional study was conducted in the capital city of Iran, Tehran, in 2016–2017 using self-administered questionnaires. A multistage stratified random sampling approach was used to select a representative sample of the target

population. The target population was the parents' of primary school students. This group of the community has been selected due to the even distribution of public primary schools in the city and is also seen as an important target group as they are parents of young children, and oral health awareness is vital. Firstly, the 22 municipal regions in Tehran were stratified according to geographical location (South, North, East, and West), and then 4 regions (1 from each geographical area) were randomly selected. Secondly, one or two schools were then randomly selected from each of the four regions. In each school, a grade was randomly selected and the invitation letter sent for all the parents in that grade. Resulting from this selection, a total of 1800 parents were invited to participate in the study. One invitation letter sent home with each student, so, both parents had a chance to see the letter.

### Study Protocol

Participants answered a self-completed questionnaire. The purpose of the study was fully explained in the questionnaire. All participants were assured of anonymity and confidentiality and completion of questionnaires was on a voluntary basis. Included were questions on sociodemographic factors (age, gender, education, and occupation) as well as question about family history of cancer and four questions on oral cancer awareness (adopted from previous studies) [13, 14, 18]. A panel of experts in oral medicine and community dentistry confirmed the clarity of questions in the local language, prior to the onset of the study. The overall awareness of oral cancer was assessed by the responses to the following questions (with a dichotomous outcome, yes or no): "Have you ever heard of oral cancer?"; and "Is oral cancer a contagious disease?" We used two questions (also with a dichotomous outcome) to measure oral cancer literacy: "Are you aware that a small lesion in your mouth can develop into oral cancer?" and "Are you aware that early treatment of oral lesions can prevent them from developing into oral cancer?" An open-ended question about the source of information was also added. Participants were requested to return all completed questionnaires on the same day, and were to answer all questions without seeking information from online resources. A pilot study was conducted before finalizing the questionnaire, on a random sample of 60 patients attending a dental school clinic, to ensure clarity and practicability of the questions. Measuring scale reliability of questionnaire showed Cronbach's alpha coefficient was 0.81 (reliability coefficient of 0.70 or higher is considered "acceptable"). Participants mentioned the previous history of cancer excluded from the study (2 people).

### Outcome Variables

Scores were allocated to responses: for three questions, a score of 1 was allocated for “yes” and zero for “no.” However, the question on the contiguous nature of oral cancer had reverse scoring, with a score of 1 for “no” and zero for “yes.” These outcome variables were analyzed through a numerical scale. We summed the scores of all questions for each participant (ranging from 0 to 4.) The outcome of each question was also analyzed separately.

### Explanatory Variables

Socioeconomic status, including educational attainment and occupation, was the explanatory variable. Educational attainment was recorded as years of study successfully completed. Occupation was recorded as unemployed, employed, or others (including students, housewives, and retired). The employed groups were further subdivided into labor and related, employed (public or private), self-employed, and managerial/professionals.

### Covariates

Covariates included were gender and age. Age was recorded as year of birth.

The source of information was also determined through an open-ended question, and based on responses, the following categories were created: public media, family and friends, medical group, dentists, self-study and others.

### Statistical Analysis

Firstly, descriptive data analyzed and tabulated for demographic information and positive responses to outcome variables. Then, statistical tests, including chi-square test, ANOVA and independent sample *t* test, post hoc test, and general linear model regression were used for analysis of variables in different sociodemographic group. *P* < 0.05 was considered statistically significant in the survey. To investigate the hypotheses of the regression model, the studentized residual was calculated and it was found that its values are in the range of - 3 to + 3, which indicates that there is no outlier in the data. The Q-Q plot graph was plotted for studentized residual values indicating the approximate normality of the residuals. SPSS (version 22) software was used for data processing.

### Results

A total of 1800 questionnaires were distributed. Of these, 1312 were available for analysis. The study population consisted of 788 female and 489 male participants with the

average age of 37.8 ± 9.0. The sociodemographic characteristics of respondents are summarized in Table 1. The majority of participants had education up to high school diploma level. Although only 26 people were unemployed at the time of study, 469 (40%) of them had a history of unemployment in their career journey (Table 1).

Table 2 summarized the response to each question separately. Only 30% of the respondents heard about oral cancer, and gender and age had no significant associations with this awareness (*p* = 0.11 and *p* = 0.59 respectively). Almost 30% of participants had a misconception about the non-communicable nature of the disease, with significant differences between genders and age groups: higher in females and age group 35–45 (*p* = 0.02, *p* = 0.01 respectively). Almost 85% of participants were not aware of the possibility of small oral lesions developing into oral cancer, but there was no significant difference between genders and age groups (*p* = 0.283, *p* = 0.336 respectively). However, around 60% of the study population stated that early treatment of oral lesions could prevent these from development into oral cancer, and there were no significant differences between male and female participants (*p* = 0.12), but significant difference has been found in age group 35–45 (*p* = 0.01). More educated participants had higher awareness levels (*p* = 0.0001). Also, response to the four questions was significantly different between employed and unemployed participants (*p* = 0.0001).

The mean score for awareness was 1.62 ± 1.09. Almost 15% of participants did not answer correctly to any questions

**Table 1** Distribution of knowledge score among sociodemographic groups

Variables	Frequency N (%)	Knowledge score Mean (SD)	<i>P</i> value
<b>Gender (n = 1277)</b>			
Male	489 (38.2%)	1.60 ± 1.09	<i>p</i> = 0.52
Female	788 (61.7%)	1.64 ± 1.09	
<b>Age (n = 1127)</b>			
25–35	318 (28.2%)	1.60 ± 1.07	<i>p</i> = 0.41
35–45	644 (57.1%)	1.68 ± 1.12	
> 45	165 (14.6%)	1.59 ± 1.01	
<b>Education (n = 1172)</b>			
Less than high school diploma	373 (31.8%)	1.36 ± 0.97	<i>p</i> = 0.001
High school diploma	411 (35.1%)	1.57 ± 1.07	
More than high school diploma	388 (33.1%)	1.97 ± 1.17	
<b>Occupation (n = 1251)</b>			
Self-employed	495 (39.6%)	1.59 ± 1.00	<i>p</i> = 0.001
Employed (public/private)	370 (29.6%)	1.77 ± 1.13	
Labor and related	125 (10%)	1.34 ± 1.07	
Managerial and professional	80 (6.4%)	2.11 ± 1.20	
Unemployed	26 (2.1%)	1.15 ± 1.00	
Others	155 (12.4%)	1.46 ± 1.16	

**Table 2** Distribution of response rate to each awareness question

Outcome variables	Frequency	Percentage
Heard about oral cancer ( <i>n</i> = 1280)		
Yes	394	30.7
No	886	69.2
Is oral cancer contagious ( <i>n</i> = 1132)		
Yes	362	32.0
No	770	68.0
Awareness about lesions developing oral cancer ( <i>n</i> = 1259)		
Yes	187	14.8
No	1072	85.1
Awareness of early treatment prevent oral cancer development ( <i>n</i> = 1288)		
Yes	776	60.2
No	512	39.7

and had no knowledge about oral cancer; only 6.4% of participants had complete awareness about oral cancer. There was no significant difference in mean score in gender and age groups; however, statistical tests indicated significant differences between mean scores in different levels of education and occupation ( $p = 0.0001$ ) (Table 1). The post hoc test (Duncan) results for education showed the more the education the higher the score of oral cancer awareness. Also, the post hoc test showed people with managerial/professional jobs had more awareness about oral cancer, and unemployed and labor and related groups had significantly lower knowledge. Using a general linear model demonstrates the significant effect of education and occupation (Table 3). The regression coefficient has been shown in Table 4. It is obvious that people with a university degree and employment (public private) and managerial/professionals had more information about oral cancer after controlling other factors (Table 4). Summarized data about source of information indicated that more than half

of participants stated that they do not have any information or left this question blank. From 585 responses to this question, public media with 315 (51%) responses were most important source of information, followed by self-study (14.5%) and family and friends (12.3%). Only 5.8% mentioned to medical group and 2.5% mentioned to dentists as a source for their information.

## Discussion

In the current study, we evaluated oral cancer general awareness in a defined population in Iran. Results indicated that general awareness of oral cancer is unsatisfactory. Only a minority of the population had complete awareness of oral cancer and only one third of this population had heard about oral cancer. Most importantly, only 15% of the population were aware of the development of oral cancer from small oral lesions, that in turn could result in late diagnosis. One third of respondents had misconceptions about the non-communicable nature of oral cancer that might affect the quality of life of cancer patients. Education and occupation had a positive effect on oral cancer awareness. Medical and dental group had a small role in providing information to people based on the results.

Although this study used methodology that could identify areas needing more attention from public dental health professionals, it has some limitations. The parents of private primary school students were not included in the sampling. However, around 85% of students in Tehran are in public schools; therefore, sampling from these schools is quite representative of this target population. Also, private schools are not homogeneously distributed in the city (there are quite a few private school in limited area), and we believe that these are not a good representation of the community, due to the

**Table 3** General linear model results of explanatory variables effect

Tests of between-subjects effects					
Dependent variable: total awareness					
Source	Sum of squares	df	Mean square	<i>F</i>	Sig.
Corrected model	79.15 <sup>a</sup>	10	7.91	6.70	.0001
Intercept	838.69	1	838.69	710.80	.0001
Age	5.53	2	2.76	2.34	.09
Sex	3.57	1	3.57	3.03	.08
Education	30.83	2	15.41	13.06	.0001
Occupation	13.44	5	2.69	2.28	.04
Error	1172.83	994	1.18		
Total	4057.00	1005			
Corrected total	1251.98	1004			

<sup>a</sup> *R* squared = .063 (adjusted *R* squared = .054)

**Table 4** Predictors of awareness of oral cancer among participants in Iran

Parameter estimates						
Dependent variable: total awareness						
Parameter	<i>B</i>	Std. error	<i>t</i>	<i>P</i> value	95% confidence interval	
					Lower bound	Upper bound
Intercept	1.83	.14	12.27	.0001	1.53	2.12
Age 25–35	-.14	.12	-1.20	.23	-.38	.09
Age 35–45	.02	.10	.23	.81	-.18	.23
Age > 45*	0 <sup>a</sup>	.	.	.	.	.
Male	-.13	.07	-1.74	.08	-.28	.01
Female*	0 <sup>a</sup>	.	.	.	.	.
Less than high school	-.46	.10	-4.63	.0001	-.66	-.26
High school graduate	-.37	.08	-4.31	.0001	-.54	-.20
University degree*	0 <sup>a</sup>	.	.	.	.	.
Self-employed	.14	.11	1.31	.19	-.07	.36
Public/private employed	.24	.12	2.00	.04	.00	.48
Labor and related	.13	.15	.87	.38	-.164	.42
Professional	.56	.17	3.23	.001	.221	.90
Unemployed	.02	.28	.07	.94	-.53	.57
Others*	0 <sup>a</sup>	.	.	.	.	.

<sup>a</sup> This parameter is set to zero because it is redundant

\*Reference

different socioeconomic status. We did not include adults who do not have primary school children, and those more at risk for oral cancer would be older adults, as this cancer is strongly associated with age. It should be noted that accessing a representing sample of adults for these kinds of studies is very hard. However, the sampling design somewhat allowed the generalizability of the results to Tehran middle-aged adults, and middle-aged people are the majority of the population in Iran [21] and parents having children have a more influential effect on community health. They not only influence their own health, but also that of their children. The other limitation of the present study was the exclusion of illiterate people as a result of using self-administered questionnaires. However, only 11 people did not participate due to illiteracy. Also, there is no information about non-responders considering the volunteer-based design of study.

In a recent study in the central part of Iran in 2015, more than half of patients were aware about mouth cancer, which is higher than the current study. However, they included adult patients who had attended public and private dental clinics, and that might affect the results [22]. In addition, they reported that 34% learned from mass media and almost 8% reported doctors and dentists as the sources of information, which is almost similar to our study [22]. In another study in Iran, results indicated that 69% believed that early detection and diagnosis of oral cancer would lead to better prognosis or improvement, that is comparable with our results. Pakfetrat

et al. also asked about contagiousity of oral cancer, but unfortunately, they did not report separate results for this question [18]. In a large study with almost 800 participants attending a dental school in the southern part of Iran, results revealed only 32% of participants had heard about oral cancer, similar to our results. They also reported 54% of those aware of oral cancer, learned from public media, the same as the current study. They reported around 15% learned from their dentist, that is very different from this study. It seems that the close-ended nature of this question in Andishe Tadibar study versus open-ended question in this study affects the results [17]. However, medical and dental group altogether were about 9% of source of information. The reason why dentists did not inform their patients might be due to low levels of knowledge about oral cancer in Iranian dentists [23]. Razavi et al. reported that only 34% of dentists in the central part of Iran were knowledgeable about oral cancer [24]. Sarabadani et al. reported around 60% of dentists in the northeast of Iran believed that they had acquired the essential skills for oral cancer screening, and only about half of them claimed that their knowledge of oral cancer is up to date [25].

Al-Maweri et al. in 2015 in the neighbor country of Saudi Arabia used four questions for assessing general awareness of oral cancer, almost the same as the current study, and reported 53% of participants heard about oral cancer, which is better results than our study, but still showed a low level of awareness. Also, regarding misconceptions about the contagious

nature of oral cancer, they reported only 43% of the population know oral cancer is non-communicable. In addition, their results showed that more than half of participants learned from the media, which is the same as our study. Dentists were as low as 12% of source of information in Al-Maweri study [13].

In a multicultural deprived area in East London Al-Kabbi et al. in 2015, surveyed oral cancer literacy in an adult population through multistage stratified random sampling and revealed that around 26% of the population were aware that a small lesion in the mouth can develop into oral cancer. They confirmed the significant association between educational attainment and socioeconomic position and level of awareness, even after adjusting for age, gender, and ethnicity [14]. Also, they reported around 40% were aware that early treatment could prevent a lesion from developing oral cancer. Those in professional and managerial job were more informed, even after adjustment for other demographic items. In the current study, results showed that only 15% of participants were aware about oral lesions developing into cancer, that showed less awareness in our population [even compared to people in a deprived area in London]. However, almost 60% of the population had awareness about early treatment, and that is comparable with the UK study. Also, occupation and education were associated with this awareness in the current study, confirming the findings from the UK [14]. However, the results of regression analysis were shown. R square and adjusted R square are very small, so the model should be used with caution for prediction.

In a study in Australia in 2016, low levels of awareness [around 50%] have been reported (among people attending a dental hospital) [9]. Although some studies around the world reported higher levels of awareness in their populations [26], these low levels of awareness of oral cancer in developed countries like the UK and Australia, as well as developing countries like Iran, emphasize the importance of the British Dental Association's guidelines to increase awareness as a cost-effective approach to reducing the population burden of oral cancer [14, 27].

Media was reported as the most important source of information in most studies [9, 13, 21]. These findings give special importance to mass media in education of health issues to public. Although the evidence from this study might not sufficient to arrive at a strong conclusion about the role of dentists in oral cancer awareness, due to open-ended design of the question as well as frequency of participants dental visit, the low influential role of dentists should be addressed with emphasis to improvement in professional knowledge and awareness of oral cancer. Also, detection of oral cancer should be a highly recommended on continuing education topic for professionals accordingly [9].

## Conclusion

With the limit of this study, an alarming lack of oral cancer awareness in the capital of Iran indicated and provides

valuable baseline information despite the limitations. Considering the increasing trend of head and neck cancer cases in recent reports and high diagnostic delay in oral cancer in this country [11], efforts should be made, not only for enhancement of the awareness (through freely accessible displayed oral cancer education material in public places), but dentists should be obliged to practice their pivotal role in informing the public about oral cancer.

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## Compliance with Ethical Standards

The research project was approved by Shahid Beheshti University of Medical Sciences, Tehran, Iran Ethics Committee.

**Conflict of Interest** The authors declare that they have no conflict of interest.

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