


ORIGINAL ARTICLE

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

Zain Bin Afif^{1*}, Wesam al-Maqboul¹, Fotoon Abid¹, Saleh Al Mukhlis¹,
Yagoub Alyami¹ 

ABSTRACT

Background: Oral diseases are considered to be one of the most common public health diseases among the general population, which badly impacts their quality of life. Oral health enables a person to carry out his daily activities with high confidence. The current study aimed to assess the oral health knowledge and awareness among the population of Saudi Arabia and to explore the factors preventing them from visiting the dentist and affecting their oral health.

Methodology: A cross-sectional questionnaire-based study was carried out among 394 individuals living in the Western region, Saudi Arabia, to assess their oral health knowledge and awareness. A validated questionnaire (OHIP5-Ar) was used, and a pilot study was carried out. Statistical analysis was conducted using STATA 14.2 software. P-values of less than 0.05 were considered statistically significant.

Results: A total of 394 participants completed our online self-administered questionnaire. The majority of the sample respondents (68.5%) were female, while 31.5% were male, 91.9% were Saudi, and 8.1% were non-Saudi. Regarding marital status, 194 (49.3%) were single, and 160 (40.6%) were within the age range of 20-29. Approximately, 54.6% completed their bachelor's degree, and 38.3% of the participants did not have income. Most of the participants (64.7%) had insurance, and almost 80% had never smoked. Correlation of tests was carried out using the chi-square test; a p-value of less than 0.05 indicated an association between the two variables (questions), and vice versa when p-value was > 0.05.

Conclusion: The study indicated that most participants visit the dentist for aesthetic concerns and pain while chewing. Most of them reported being non-smokers and did not feel less flavor of food. Most of them reported less or no exposure to the dentist due to dental fair and money issues.

Keywords: Oral disease, oral health, Saudi Arabia, tooth appearance, psychological status.

Introduction

Oral diseases are considered to be one of the most common diseases that significantly impacts patients' quality of life [1,2]. Oral diseases could increase the difficulty of a person in chewing the food, biting, laughing, or speaking; consequently, it could affect their psychosocial status [2]. Therefore, oral health could be defined as a specific state that lacks all these diseases [2]. Thus, early treatment of these diseases would prevent more complex issues in speaking, eating, smiling, working, or any task of life [3,4]. Untreated oral diseases could harm social interaction [5] and disturb sleeping patterns [6]. Adolescents were found to have the highest rate of oral diseases and tooth decay, especially those with racial ethnicity and poor income according to the national results [3,4].

Dental caries and periodontitis are considered to be one of the most common oral diseases that might result in ulcerations and damage teeth supporting tissues, leading to discomfort, bleeding, and tooth decay [7,8]. Patients with severe dental caries have an increased risk of developing diabetes and cardiovascular diseases [9]. In Saudi Arabia, dental caries is one of the most common

Correspondence to: Zain Bin Afif

*Al Farabi College, Jeddah, Saudi Arabia.

Email: zainabinafif@gmail.com

Full list of author information is available at the end of the article.

Received: 10 November 2020 | **Accepted:** 12 February 2020

52 diseases among children and pregnant women [10].
53 Several factors lead to oral diseases, such as tobacco,
54 which is considered to be the most crucial factor, poor
55 nutrition, and the use of drugs [11]. Using toothbrush
56 among children in the Jazan region of Saudi Arabia
57 showed a good impact on oral health and increased their
58 awareness regarding oral hygiene [12].

59 In such cases of awareness of oral health, it is essential
60 to understand the relationship between oral health
61 disorders and people's daily activities and external
62 factors physical, social, and physiological functions that
63 affect their quality of life. Therefore, the current study
64 aimed to determine the preventive oral health awareness
65 in the Western region of Saudi Arabia, to establish their
66 knowledge about the factors affecting their oral health,
67 and to determine the factors that prevent them from
68 visiting the dentist regularly.

69 Subjects and Methods

70 A cross-sectional questionnaire-based study was
71 carried out among the general population in the western
72 region, Saudi Arabia, to assess oral health knowledge
73 and awareness. The study participants were selected
74 randomly using an online Google Forms survey. A
75 validated questionnaire (OHIP5-Ar) was used [13]. A
76 pilot study was carried out using the Statistical Package
77 for the Social Sciences program to ensure the validity of
78 the current questionnaire and to answer all the aims of
79 the study.

80 An online well-constructed questionnaire translated into
81 Arabic language (Persian) by an expert on this subject was
82 disseminated and self-administered by each participant.
83 The questionnaire included standard demographic
84 questions about gender, material status, age, educational
85 level, household income, and insurance. Also, oral health
86 issues such as pain and discomfort, difficulty to chew
87 and speak, mouth function, and esthetic satisfaction, any
88 physical, emotional, and psychological effects arising
89 from mouth condition were measured. Additionally, the
90 questionnaire included questions regarding global oral
91 health ratings.

92 Before data collection, both telephone and online surveys
93 were conducted to gather feedback from participants,
94 check responses, and update the survey as needed. The
95 final version of the questionnaire was deployed on
96 Wednesday October 30th. After obtaining permission
97 from the participant and assuring their confidentiality,
98 the participants were asked to fill out the questionnaire.
99 At the end of the questionnaire, an email was provided
100 for any inquiries about any unclear questions. Informed
101 consent was obtained before the commencement of data
102 collection.

103 A total of 394 persons responded and the filled
104 questionnaires were reviewed for completeness and
105 accuracy before data entry. The Persian translation
106 was subsequently translated into English. Statistical
107 analysis was conducted using STATA 14.2 software,

and continuous variables were presented as mean and 108
SD, and intergroup differences were compared using 109
t-test. Skewed numerical data were presented as median 110
and average. The rank between group differences was 111
compared using the Mann-Whitney U-test. Paired 112
numerical data were compared using the paired *t*-test. 113
Categorical variables were presented as numbers and 114
percentages, and differences between groups were 115
compared using the Pearson's chi-squared test or Fisher's 116
exact test. *P*-values < 0.05 were considered statistically 117
significant. 118

Results 119

A total of 394 participants completed the online self- 120
administered questionnaire; 372 participants (94.4%) 121
filled it in the Arabic language, while 22 participants 122
(5.58%) filled it in the English language. The majority of 123
our sample (68.5%) were female, while 31.5% were male, 124
91.9% were Saudi, and 8.1% were non-Saudi. Regarding 125
marital status, 194 (49.3%) were single, 192 (48.7%) were 126
married, and only 8 (2%) were divorced. The majority of 127
the participants (160) (40.6%) were aged between 20 and 128
29 years old, as shown in Figure 1. More than half of the 129
participants completed their bachelor's degree (54.6%), 130
followed by 38.8% who finished secondary school level. 131
Regarding participants' income, 38.3% did not have an 132
income, 28.7% had an income ranging between 5,000 and 133
15,000 Saudi Riyal (SAR), 18.8% reported their income 134
was less than 5,000 SAR, and 14.2% of the participants 135
had their income less than 15,000 SAR. Most of the 136
participants (64.7%) had insurance, and 35.3% did not 137
have insurance, as shown in Table 1. 138

Table 2 represents the questionnaire's answer, and it was 139
reported that 96% of the participants visited the dentist, 140
48% did not have any difficulty in chewing. Also, 44.9% 141
of the participants did not have any painful aching in 142
their mouth, 32% occasionally had painful aching in 143
the mouth, 35.8% had not felt uncomfortable about the 144
appearance of their teeth, mouth, dentures, or jaws, while 145
28.4% occasionally felt. The majority of the respondents 146
(71.1%) never felt less flavor of their food because of 147
problems with their teeth, mouth, dentures, or jaws. More 148
than half of the participants (58.4%) had never felt that 149
the general appearance of their teeth hinders them from 150
their social life, while 30% had felt this sometimes. 151

Also, the majority (60.4%) answered "No" when they 152
asked if they avoided laughing because of their teeth 153
appearance, while 22% had felt that they want to avoid 154
laughing because of their teeth appearance. Among 155
the participants, 54.1% did not suffer from bad breath, 156
21.8% suffered from bad breath, while 24.1% did not 157
know. Concerning participants who answered "Yes," 158
71.4% did not know why, while the minority (28.6%) 159
knew the reason. A total of 36% of the respondents did 160
not report factors that prevented them from visiting the 161
dentist, while 24.9% did not visit the dentist because of 162
the money, 21.1% was afraid, 15% did not have spare 163
time, and 3% due to transportation. Regarding smoking, 164

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

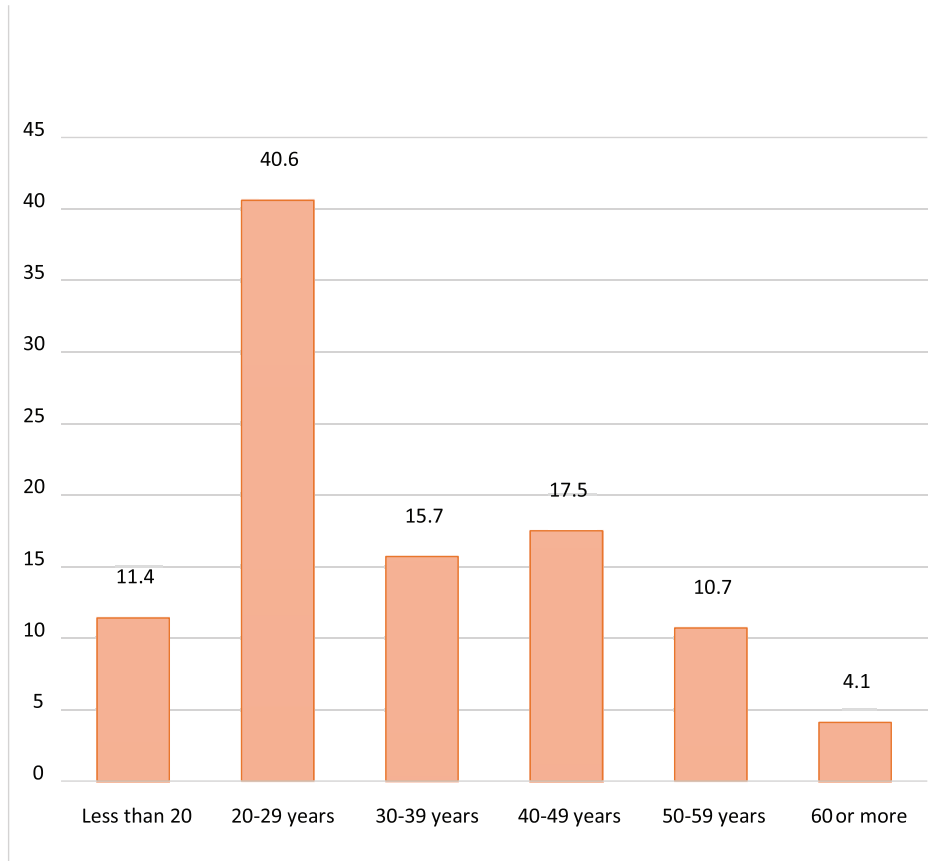


Figure 1. Participants' age group.

165 Table 1. Demographic data of the participants.

Demographics	n	%
Gender		
Male	124	31.5
Female	270	68.5
Marital status		
Single	194	49.3
Married	192	48.7
Divorced	8	2
Age group		
Less than 20	45	11.4
20-29 years	160	40.6
30-39 years	62	15.7
40-49 years	69	17.5
50-59 years	42	10.7
60 or more	16	4.1
Nationality		
Saudi	362	91.9
Non-Saudi	32	8.1
Education level		
Secondary school	152	38.8
Bachelor's degree	214	54.6
Postgraduate degrees	26	6.6
Income		
None	151	38.3
Less than 5,000 SAR	74	18.8
5,000-15,000 SAR	113	28.7
More than 15,000 SAR	56	14.2
Insurance		
No	255	64.7
Yes	139	35.3

79.2% did not smoke, and 5.3% were ex-smokers, while the other participants were smokers, and 11.9% smoke less than 25 cigarettes per day, and 3.5% smoke more than 25 cigarettes per day, as shown in Figure 2. In terms of the participants' habits, 33.8% reported eating ice cubes and citrus, 25.9% clenching and bit their nails, 13.2% reported biting nails or pen, while 27.1% did not practice any habits.

Regarding the correlation of gender, 85 of females had insurance versus 54 of males, showing a significant difference (p -value = 0.02), while there was no association between males and females in visiting the dentist (p -value = 0.56). Females (132) did not have difficulty chewing any food because of problems with their teeth, mouth, dentures, or jaw more than males (57), showing a highly significant difference (p -value = 0.03). It was shown that there was an association between females and males in questions no. 18 (factors preventing them from visiting the dentist), and no. 19 (smoking), (p -value = 0.001 and p -value = 0.0001, respectively). There is no association between females and males in the other questions (12-17, 20, p value > 0.05), as shown in Table 3.

An association was reported between all age groups in all answers of the questionnaire questions (p -value < 0.05), except for questions 8, 12, 17, and 18, there was no association between all age groups in the answer of these questions (p -value > 0.05), as shown in Table 4.

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

195 **Table 2.** Details of the questionnaire answers.

Question			%
Have you ever visited the dentist?	No	16	4
	Yes	378	96
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?	Never	189	48
	Hardly ever	61	15.5
	Occasionally	91	23.1
	Fairly often	38	9.6
	Very often	15	3.8
Have you had painful aching in your mouth?	Never	177	44.9
	Hardly ever	64	16.2
	Occasionally	120	30.5
	Fairly often	26	6.6
	Very often	7	1.8
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?	Never	141	35.8
	Hardly ever	42	13.2
	Occasionally	112	28.4
	Fairly often	45	11.4
	Very often	44	11.2
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?	Never	280	71.1
	Hardly ever	46	11.7
	Occasionally	52	13.2
	Fairly often	10	2.5
	Very often	6	1.5
Have you ever felt that the general appearance of your teeth hinders you from your social life?	No	230	58.4
	Yes	164	41.6
Have you ever felt that you want to avoid laughing because of your teeth appearance?	No	238	60.4
	Yes	156	39.6
Do you suffer from bad breath?	No	213	54.1
	Yes	86	21.8
	I do not know	95	24.1
If yes, do you know the reason	No, I don't	177	71.4
	Yes, I know	69	28.6
What are the factors that prevent you from visiting the dentist?	None	142	36
	Fear	83	21.1
	Money	98	24.9
	Transportation	12	3
	No spare time	59	15
If you are a smoker, how many cigarettes do you smoke per day?	Non-smoker	312	79.2
	Ex-smoker	21	5.3
	Smoke less than 25 cigarettes	47	11.9
	Smoke more than 25 cigarettes	14	3.5
Do you make any of these habits?	None	107	27.1
	Clenching and nail bites	102	25.9
	Ice cubes and citrus	133	33.8
	Biting nails or pen	52	13.2

196

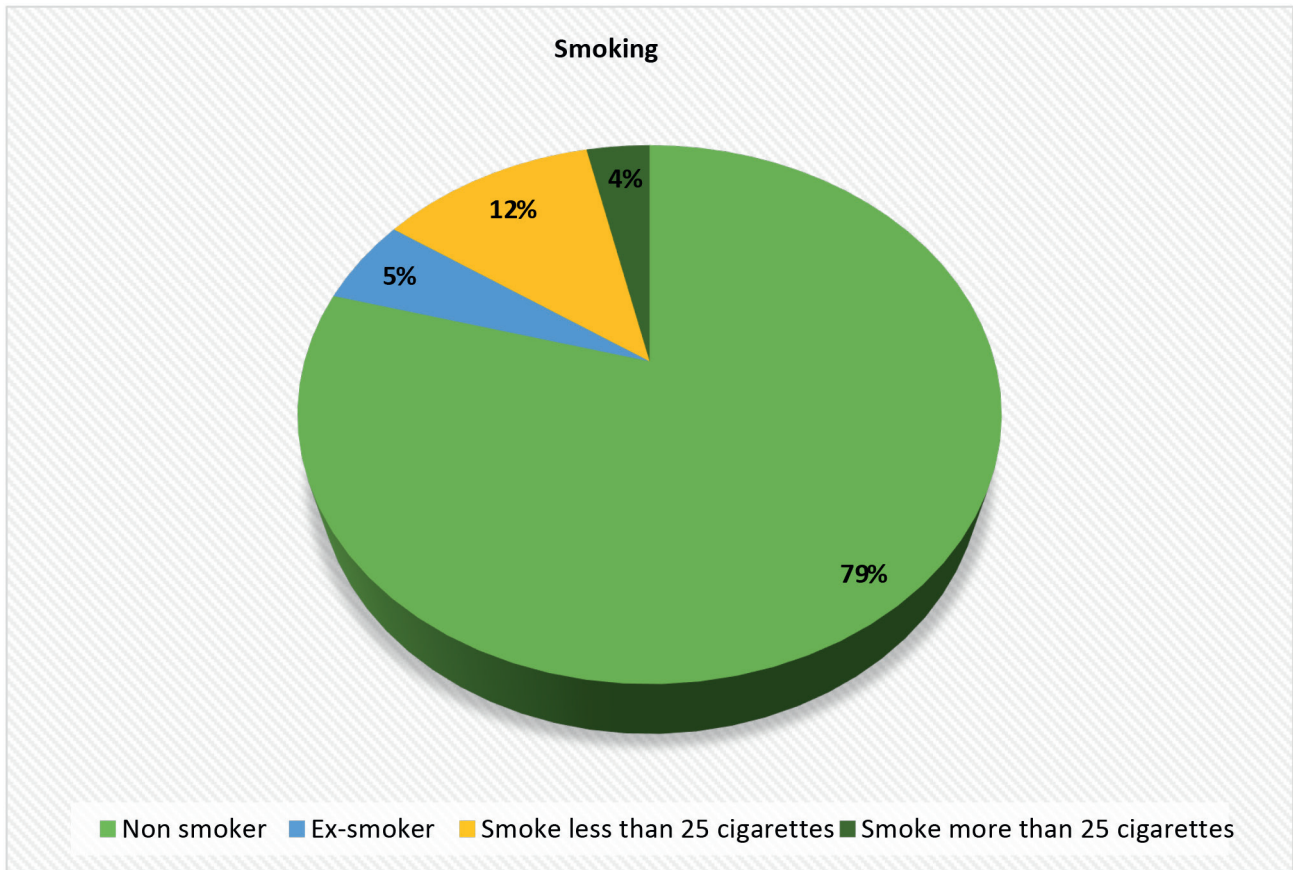


Figure 2. Smoking.

197 An association was reported between marital status and
198 the answers of all questions (p -value < 0.05), except the
199 answers to the questions regarding the insurance, their
200 teeth appearance hinders them from their social life and
201 laughing, bad breath, and question about preventing
202 factors from visiting dentists; there was no any association
203 between marital status in the answer of these questions
204 (p -value > 0.05), as shown in Table 5.

205 Table 6 represents no association between Saudi and
206 non-Saudi participants in the answer of all questions
207 ($P > 0.05$), except for issues related to insurance, there
208 was an association between them in the questions and
209 answers ($P < 0.05$).

210 Table 7 shows that there was no association between
211 education levels in the answer of all questions ($p > 0.05$)

212 Table 8 shows that there was no any association between
213 different income variables in the answer of all questions
214 ($p > 0.05$), except the answers to questions regarding
215 visiting the dentist, felt less flavor in their food, smoking,
216 and habits, there was an association between the variables
217 ($p < 0.05$).

218 Table 9 shows no association between smoker and non-
219 smoker groups in their answers to all questions ($p >$
220 0.05), except their answers regarding insurance question,
221 there was an association ($p < 0.05$).

Table 10 shows that there was no any association between
222 habits' variables of the participants in their answers
223 to all questions ($p > 0.05$), except their answers to the
224 questions regarding avoiding laughing due to their teeth
225 appearance, there was an association between habits'
226 variables of the participants ($p < 0.05$).
227

228 Discussion

The oral health issue is considered to be one of the
229 most significant public health issues that significantly
230 impacts social contact and all daily activities [14].
231 The present study aimed to determine the preventive
232 oral health awareness in the Western region of Saudi
233 Arabia, to establish their knowledge about the factors
234 affecting their oral health, and to determine the factors
235 that prevent them from visiting the dentist regularly. It
236 was reported that the majority of the participants were
237 female (68.5%), Saudi (91.9%), aged between 20 and 29
238 years, and approximately half of the participants (194)
239 (49.3%) were single and the other half (192) (48.7%)
240 were married. This is similar to the results of Alrumyyan
241 [15], who reported an increased number of females than
242 males and attributed this to the fact that females have
243 higher demands and expectations than males. Also,
244 Goiato [16] reported that married people were more
245

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

246 **Table 3.** Correlations of gender.

Item	Males	Females	p-value
Insurance No Yes	70 54	185 85	0.02
Have you ever visited the dentist? No Yes	4 120	12 258	0.56
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw? Never Hardly ever Occasionally Fairly often Very often	57 25 22 11 9	132 36 69 27 6	0.03
Have you had painful aching in your mouth? Never Hardly ever Occasionally Fairly often Very often	60 22 34 5 3	117 42 86 21 4	0.47
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws? Never Hardly ever Occasionally Fairly often Very often	44 23 28 14 15	97 29 84 31 29	0.18
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws? Never Hardly ever Occasionally Fairly often Very often	84 15 18 61	196 31 34 45	0.29
Have you ever felt that the general appearance of your teeth hinders you from your social life? No Yes	71 53	159 111	0.76
Have you ever felt that you want to avoid laughing because of your teeth appearance? No Yes	80 44	158 112	0.25
Do you suffer from bad breath? No Yes I do not know	74 23 27	139 63 68	0.3
What are the factors that prevent you from visiting the dentist? None Fear Money Transportation No spare time	52 14 37 0 21	90 69 61 12 38	0.001
If you are a smoker, how many cigarettes do you smoke per day? Non-smoker Ex-smoker Smoke less than 25 cigarettes Smoke more than 25 cigarettes	63 14 33 14	249 7 14 0	0.0001
Do you make any of these habits? None Clenching and nail bites Ice cubes and citrus Biting nails or pen	38 30 42 14	69 72 91 38	0.68

247

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

248 **Table 4.** Correlations of age groups.

Item	<20	20-29	30-39	40-49	59-59	>60	p-value
Insurance							
No	32	104	39	45	26	9	0.9
Yes	13	56	23	24	16	7	
Have you ever visited the dentist?							
No	3	12	0	0	1	0	0.03
Yes	42	148	62	69	41	16	
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?							
Never	27	99	26	19	13	5	0.0001
Hardly ever	7	27	9	12	3	3	
Occasionally	10	21	21	23	14	2	
Fairly often	1	9	4	11	9	4	
Very often	0	4	2	4	3	2	
Have you had painful aching in your mouth?							
Never	27	89	25	18	14	4	0.001
Hardly ever	12	22	9	13	7	1	
Occasionally	5	35	24	31	16	9	
Fairly often	1	10	3	6	5	1	
Very often	0	4	1	1	0	1	
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?							
Never	14	64	17	25	17	4	0.09
Hardly ever	9	22	6	11	3	1	
Occasionally	9	46	25	17	11	4	
Fairly often	2	17	7	10	5	4	
Very often	11	11	7	6	6	3	
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?							
Never	38	133	42	34	25	8	0.0001
Hardly ever	3	15	7	14	6	1	
Occasionally	3	8	13	13	9	6	
Fairly often	0	3	0	5	1	1	
Very often	1	1	0	3	1	0	
Have you ever felt that the general appearance of your teeth hinders you from your social life?							
No	17	107	37	35	25	9	0.013
Yes	28	53	25	34	17	7	
Have you ever felt that you want to avoid laughing because of your teeth appearance?							
No	18	104	39	40	29	8	0.04
Yes	27	56	23	29	13	8	
Do you suffer from bad breath?							
No	18	88	32	41	24	10	0.28
Yes	14	39	10	15	7	1	
I don't know	13	33	20	13	11	5	
What are the factors that prevent you from visiting the dentist?							
None	18	62	16	18	18	10	0.1
Fear	8	27	19	15	13	1	
Money	11	39	19	22	5	2	
Transportation	2	6	0	4	0	0	
No spare time	6	26	8	10	6	3	
If you are a smoker, how many cigarettes do you smoke per day?							
Non-smoker	39	135	41	53	33	11	0.01
Ex-smoker	1	12	4	3	1	0	
Smoke less than 25 cigarettes	5	10	13	12	4	3	
Smoke more than 25 cigarettes	0	3	4	1	4	2	
Do you make any of these habits?							
None	3	37	17	27	15	8	0.0001
Grinding teeth	21	50	11	11	6	3	
Ice cubes and citrus	14	53	26	25	11	4	
Biting nails or pen	7	20	8	6	10	1	

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

250 **Table 5.** Correlations of marital status.

Item	Single	Married	divorced	p-value
Insurance				
No	130	119	6	0.48
Yes	64	73	2	
Have you ever visited the dentist?				
No	13	3	0	0.03
Yes	181	181	8	
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?				
Never			2	0.0001

252 **Table 6.** Correlations of nationality.

Item	NonSaudi	Saudi	p-value
Insurance			
No	13	242	0.003
Yes	19	120	
Have you ever visited the dentist?			
No	0	16	0.22
Yes	32	346	
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?			
Never	16	173	0.74
Hardly ever	4	57	
Occasionally	9	82	
Fairly often	3	35	
Very often	0	15	
Have you had painful aching in your mouth?			
Never	16	161	0.57
Hardly ever	2	62	
Occasionally	11	109	
Fairly often	2	24	
Very often	1	6	
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?			
Never	11	130	0.33
Hardly ever	3	49	
Occasionally	7	105	
Fairly often	4	41	
Very often	7	37	
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?			
Never	24	256	0.63
Hardly ever	2	44	
Occasionally	5	47	
Fairly often	0	10	
Very often	1	5	
Have you ever felt that the general appearance of your teeth hinders you from your social life?			
No	20	210	0.62
Yes	12	152	
Have you ever felt that you want to avoid laughing because of your teeth appearance?			
No	16	222	0.2
Yes	16	140	
Do you suffer from bad breath?			
No	17	196	0.1
Yes	11	75	
I do not know	4	91	
What are the factors that prevent you from visiting the dentist?			
None	10	132	0.23
Fear	8	75	
Money	12	86	
Transportation	0	12	
No spare time	2	57	
If you are a smoker, how many cigarettes do you smoke per day?			
Non-smoker	26	286	0.56
Ex-smoker	3	18	
Smoke less than 25 cigarettes	2	45	
Smoke more than 25 cigarettes	1	13	

Continued

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

Item	NonSaudi	Saudi	p-value
Do you make any of these habits?			
None	7	100	0.21
Clenching and nail bites	10	92	
Ice cubes and citrus	14	119	
Biting nails or pens	1	51	

255 **Table 7.** Correlations of education levels.

Item	Secondary	Bachelor	Postgrad	p-value
Insurance				
No	97	141	141	0.69
Yes	55	73	73	
Have you ever visited the dentist?				
No	9	7	0	0.25
Yes	143	207	26	
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?				
Never	73	106	10	0.06
Hardly ever	19	32	10	
Occasionally	37	46	6	
Fairly often	16	22	0	
Very often	7	8	0	
Have you had painful aching in your mouth?				
Never	73	90	14	0.52
Hardly ever	22	38	2	
Occasionally	46	65	9	
Fairly often	10	16	0	
Very often	1	5	1	
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?				
Never	54	71	14	0.39
Hardly ever	22	27	3	
Occasionally	42	65	5	
Fairly often	13	30	2	
Very often	21	21	2	
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?				
Never	109	149	20	0.78
Hardly ever	16	29	1	
Occasionally	19	28	5	
Fairly often	5	5	0	
Very often	3	3	0	
Have you ever felt that the general appearance of your teeth hinders you from your social life?				
No	84	127	19	0.22
Yes	68	87	7	
Have you ever felt that you want to avoid laughing because of your teeth appearance?				
No	85	132	21	0.051
Yes	67	82	5	
Do you suffer from bad breath?				
No	79	117	17	0.3
Yes	40	40	4	
I do not know	33	57	5	
What are the factors that prevent you from visiting the dentist?				
None	59	73	10	0.89
Fear	33	44	6	
Money	36	57	5	
Transportation	5	5	0	
No spare time	19	35	5	
If you are a smoker, how many cigarettes do you smoke per day?				
Non-smoker	119	174	17	0.44
Ex-smoker	7	11	3	
Smoke less than 25 cigarettes	19	24	4	
Smoke more than 25 cigarettes	7	5	2	
Do you make any of these habits?				
None	44	55	8	0.56
Clenching and nail bites	39	56	5	
Ice cubes and citrus	54	72	7	
Biting nails or pens	15	31	6	

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

257 **Table 8.** Correlations of income.

Item	None	<5,000	5,000-15,000	>15,000	p-value
Insurance					
No	103	45	78	29	0.09
Yes	48	29	35	27	
Have you ever visited the dentist?					
No	6	9	1	0	0.0001
Yes	145	65	112	56	
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?					
Never	76	44	48	21	0.12
Hardly ever	24	13	12	12	
Occasionally	32	13	31	15	
Fairly often	15	2	15	6	
Fairly often	15	2	15	6	
Very often	4	2	7	2	
Have you had painful aching in your mouth?					
Never	67	46	41	23	0.054
Hardly ever	23	13	19	9	
Occasionally	44	13	42	21	
Fairly often	13	1	10	2	
Very often	4	1	1	1	
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?					
Never	51	34	34	22	0.25
Hardly ever	20	12	13	7	
Occasionally	41	17	41	13	
Fairly often	16	5	16	8	
Very often	23	6	9	6	
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?					
Never	114	61	66	39	0.007
Hardly ever	13	10	16	7	
Occasionally	18	3	23	8	
Fairly often	2	0	7	1	
Very often	4	0	1	1	
Have you ever felt that the general appearance of your teeth hinders you from your social life?					
No	82	48	68	32	0.47
Yes	69	26	45	24	
Have you ever felt that you want to avoid laughing because of your teeth appearance?					
No	82	47	71	38	0.23
Yes	69	27	42	18	
Do you suffer from bad breath?					
No	72	41	63	37	0.32
Yes	40	14	22	10	
I do not know	39	19	28	9	
What are the factors that prevent you from visiting the dentist?					
None	47	31	39	25	0.32
Fear	37	14	24	8	
Money	39	17	30	12	
Transportation	8	3	1	0	
No spare time	20	9	19	11	
If you are a smoker, how many cigarettes do you smoke per day?					
Non-smoker	132	62	81	37	0.001
Ex-smoker	8	4	5	4	
Smoke less than 25 cigarettes	11	8	18	10	
Smoke more than 25 cigarettes	0	0	9	5	
Do you make any of these habits?					
None	29	25	31	22	0.013
Clenching and nail bites	50	22	20	10	
Ice cubes and citrus	55	20	41	17	
Biting nails or pens	17	7	21	7	

258

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

259 **Table 9.** Correlations of smoking.

Item	None	Ex-smoker	<25	>25	p-value
Insurance No Yes	214 98	9 12	23 24	9 5	0.009
Have you ever visited the dentist? No Yes	14 298	1 20	1 46	0 14	0.74
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw? Never Hardly ever Occasionally Fairly often Very often	155 46 73 30 8	7 7 4 1 2	20 8 9 6 4	7 0 5 1 1	0.15
Have you had painful aching in your mouth? Never Hardly ever Occasionally Fairly often Very often	144 49 92 22 5	8 6 6 1 0	19 8 16 2 2	6 1 6 1 0	0.84
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws? Never Hardly ever Occasionally Fairly often Very often	118 42 89 31 32	4 2 5 6 4	16 8 11 6 6	3 0 7 2 2	0.18
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws? Never Hardly ever Occasionally Fairly often Very often	226 34 39 7 6	14 6 1 0 0	31 6 7 3 0	9 0 5 0 0	0.08
Have you ever felt that the general appearance of your teeth hinders you from your social life? No Yes	182 130	14 7	26 21	8 6	0.85
Have you ever felt that you want to avoid laughing because of your teeth appearance? No Yes	188 124	12 9	30 17	8 6	0.94
Do you suffer from bad breath? No Yes I do not know	168 73 71	13 4 4	27 7 13	5 2 7	0.26
What are the factors that prevent you from visiting the dentist? None Fear Money Transportation No spare time	112 69 73 12 46	5 5 5 0 6	19 5 17 0 6	6 4 3 0 1	0.32
Do you make any of these habits? None Clenching and nail bites Ice cubes and citrus Biting nails or pens	86 84 101 41	4 5 9 3	12 10 18 7	5 3 5 1	0.96

260

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

261 **Table 10.** Correlations of habits.

Item	None	grinding	Ice & citrus	Biting nail or pen	p-value
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaw?					
Never	47	52	61	29	0.67
Hardly ever	16	13	25	7	
Occasionally	28	23	26	14	
Fairly often	11	11	15	1	
Very often	5	3	6	1	
Have you had painful aching in your mouth?					
Never	47	46	55	29	0.44
Hardly ever	19	14	20	11	
Occasionally	34	30	45	11	
Fairly often	6	8	11	1	
Very often	1	4	2	0	
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?					
Never	50	34	42	15	0.18
Hardly ever	9	12	25	6	
Occasionally	26	31	38	17	
Fairly often	14	14	12	5	
Very often	8	11	16	9	
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?					
Never	76	79	87	38	0.53
Hardly ever	14	8	16	8	
Occasionally	14	10	24	4	
Fairly often	2	2	4	2	
Very often	1	3	2	0	
Have you ever felt that the general appearance of your teeth hinders you from your social life?					
No	68	52	83	27	0.15
Yes	39	50	50	25	
Have you ever felt that you want to avoid laughing because of your teeth appearance?					
No	75	50	85	28	0.01
Yes	32	52	48	24	
Do you suffer from bad breath?					
No	61	47	78	27	0.53
Yes	21	25	29	11	
I do not know	25	30	26	14	

263 aware and concerned about oral health and differ in their
264 social attitudes.

265 Regarding factors that effect oral health, family, or
266 individual income, it was reported that most of the
267 participants (38.3%) did not have an income, and 18.8%
268 had a poor income that might have affected their oral
269 health. Alrumyyan [15] found that higher income might
270 have a major role in affording better oral health and a
271 good quality of life. About 54.6% of the participants
272 completed their bachelor's degree, followed by 38.8%
273 who finished secondary school level. A higher level of
274 education might help in improving oral health through
275 increasing the populations' cultural level about their oral
276 healthcare, as reported by Motallebnejad [17]. He found
277 that subjects with academic education had a better oral
278 health status due to the higher cultural level and better
279 care of oral health.

The current study showed that 96% of the participants
visited the dentist due to dental pain or their higher
education that allowed them to consult and visit the
dentist. In comparison, the other individuals did not visit
because of money issues (24.9%), 21.1% was afraid, 15%
did not have spare time, and 3% due to transportation.
These results are in line with another study [18], which
indicated that 75% of the participants visited the dentist.
The others who did not visit the dentist attributed it to
their dental fear (12%).

In the present study, the majority of the participants never
had any difficulty in chewing, aching pain, never felt
less flavor in their food because of problems with their
teeth, mouth, dentures or jaws, and had never felt that
the general appearance of their teeth hinders them from
social contact or prevent their laughing. This might be
attributed to their routine visit to the dentist and did not
suffer from pain. The current study showed that almost

298 80% of the participants never smoke, which agreed with
 299 the result of another study [18], and which reported that
 300 97% of participants were non-smokers. This might return
 301 to the impact of environmental and socio-behavioral
 302 factors [19,20].

303 The present study showed no significant association in
 304 age, nationality, social status, and level of education,
 305 smoking groups, habits regarding their answer to the
 306 questionnaire questions. This result was similar to
 307 Fischer [21], who reported that there was no significant
 308 association between age, social status, nationality, and
 309 level of education toward improving oral health and
 310 improve the quality of life.

311 Conclusion

312 The study indicated that most participants visit the dentist
 313 for aesthetic concerns and pain while chewing. Most of
 314 them reported being non-smokers and did not feel less
 315 flavor of food. Most of them reported less or no exposure
 316 to the dentist due to the dental fair and money issues.

317 Conflict of interest

318 The authors declare that there is no conflict of interest
 319 regarding the publication of this article.

320 Funding

321 None.

322 Consent to participate

323 Informed consent was obtained from all the participants.

324 Ethical approval <AQ1>

325 Ethical approval was granted by the Institutional Review
 326 Board (IRB) of via reference/letter number ___ dated: -----.

327 Author details

328 Zain Bin Afif¹, Wesam al-Maqboul¹, Fotoon Abid¹, Saleh Al
 329 Mukhlis¹, Yagoub Alyami¹

330 1. Al Farabi Dental College, Jeddah, Saudi Arabia

331 References

332 1. Tsakos G, Crol CG, O'Connor R, Wildman J, Steele JG, Allen
 333 PF, Explaining time changes in oral health-related quality
 334 of life in England: a decomposition analysis. *J Epidemiol*
 335 *Community Health*. 2017;71(12):1203–9.
 336 2. Petersen PE. The World Oral Health Report 2003:
 337 Continuous improvement of oral health in the 21st
 338 century-the approach of the WHO Global Oral Health
 339 Programme. *Community Dent Oral Epidemiol*. 2003;31:3–
 340 24. <https://doi.org/10.1046/j..2003.com122.x>
 341 3. Centers for Disease Control and Prevention, National
 342 Center for Health Statistics. (2011). Health, United States,
 343 2011: Table 76: Untreated dental caries, by selected
 344 characteristics: United States, selected years 1971–1974
 345 through 2005–2008.
 346 4. Dye B, Thornton-Evans G, Li X, Iafolla T. Dental caries
 347 and tooth loss in adults in the United States, 2011–2012.
 348 *NCHS Data Brief*. 2015;197(197):197.

5. Smith JM, Sheiham A. How dental conditions handicap the 349
 elderly. *Community Dent Oral Epidemiol*. 1979;7(6):305– 350
 10. <https://doi.org/10.1111/j.1600-0528.1979.tb01238.x> 351
 6. Oral Health in America. A report of the surgeon general. 352
 Rockville, MD: US Department of Health and Human 353
 Services, National Institute of Dental and Craniofacial 354
 Research, National Institutes of Health; 2000. 355
 7. Monse B, Heinrich-Weltzien R, Benzian H, Holmgren C, 356
 van Palenstein Helderma W. PUFA-an index of clinical 357
 consequences of untreated dental caries. *Community* 358
Dent Oral Epidemiol. 2010;38(1):77–82. [https://doi.](https://doi.org/10.1111/j.1600-0528.2009.00514.x) 359
[org/10.1111/j.1600-0528.2009.00514.x](https://doi.org/10.1111/j.1600-0528.2009.00514.x) 360
 8. Herrera D, Roldán S, González I, Sanz M. The periodontal 361
 abscess (I). Clinical and microbiological findings. *J* 362
Clin Periodontol. 2000;27(6):387–94. [https://doi.](https://doi.org/10.1034/j.1600-051x.2000.027006387.x) 363
[org/10.1034/j.1600-051x.2000.027006387.x](https://doi.org/10.1034/j.1600-051x.2000.027006387.x) 364
 9. Committee on Health Care for Underserved Women. Oral 365
 health care during pregnancy and through the lifespan. 366
Obstet Gynecol. 2013;122(2 Pt 1):417–22. [https://doi.](https://doi.org/10.1097/01.AOG.0000433007.16843.10) 367
[org/10.1097/01.AOG.0000433007.16843.10](https://doi.org/10.1097/01.AOG.0000433007.16843.10) 368
 10. El-Khateeb SM, Jaber S, Hemdan B, Gafar A, Dar-Odeh 369
 N. Prevalence of dental caries among young women in 370
 central western region of Saudi Arabia. *Int J Adv Dent* 371
Med Sci. 2015;1(2):46–9. 372
 11. Griffin SO, Jones JA, Brunson D, Griffin PM, Bailey 373
 WD. Burden of oral disease among older adults and 374
 Implications for public health priorities. *Am J Public* 375
Health. 2012;102:411–8. [https://doi.org/10.2105/](https://doi.org/10.2105/AJPH.2011.300362) 376
[AJPH.2011.300362](https://doi.org/10.2105/AJPH.2011.300362) 377
 12. Zwiri A. Knowledge, attitudes, practices and effectiveness 378
 of an oral hygiene program among Saudi male children 379
 in Aljouf. *British Biomed Bull*. 2015;3(2):253. [https://doi.](https://doi.org/10.12816/0017371) 380
[org/10.12816/0017371](https://doi.org/10.12816/0017371) 381
 13. Alhaji MN, Halboub E, Khalifa N, Amran AG, Reissmann 382
 DR, Abdullah AG, et al. Translation and validation of the 383
 Arabic version of the 5-item Oral health impact profile: 384
 OHIP5-Ar. *Health Qual Life Outcomes*. 2018;16(1):218. 385
<https://doi.org/10.1186/s12955-018-1046-0> 386
 14. World Health Organization. World Health Report 387
 2003-Shaping the Future, World Health Organization, 388
 Geneva, Switzerland, 2016. [cited 2020 March]. Available 389
 from: <http://www.who.int/whr/2003/en/> 390
 15. Alrumyyan A, Quwayhis S, Meaigel S, Almedlej R, Alolaiq 391
 R, Bin Nafesah R, et al. Oral health-related quality 392
 of life and oral hygiene practice of adults with fixed 393
 dental prostheses in Riyadh, Saudi Arabia. *J Int Soc Prev* 394
Community Dent. 2020;10(1):62–8. 395
 16. Goiato MC, Torcato LB, Dos Santos DM, Moreno A, 396
 Antenucci RM, de Carvalho Dekon SF. Quality of life and 397
 satisfaction of patients wearing implant-supported fixed 398
 partial denture: a cross-sectional survey of patients 399
 from Araçatuba city, Brazil. *Clin Oral Implants Res*. 400
 2015;26(6):701–8. <https://doi.org/10.1111/clr.12372> 401
 17. Motallebnejad M, Mehdizadeh S, Najafi N, Sayyadi F. 402
 The evaluation of oral health-related factors on the 403
 quality of life of the elderly in Babol. *Contemp Clin* 404
Dent. 2015;6(3):313–7. [https://doi.org/10.4103/0976-](https://doi.org/10.4103/0976-237X.161867) 405
[237X.161867](https://doi.org/10.4103/0976-237X.161867) 406

Effect of oral health among Saudi Arabian people living in the Western region on their physical, psychological, and social status

- 407 18. Al Subait AA, Alousaimi M, Geeverghese A, Ali A, El 419
408 Metwally A. Oral health knowledge, attitude and behavior 420
409 among students of age 10–18 years old attending 421
410 Jenadriyah festival Riyadh; a cross-sectional study. The 422
411 Saudi Journal for Dental Research. 2016;7(1):45–50. 423
- 412 19. Murphey C. Oral health experiences of pregnant and 424
413 parenting adolescent women: a qualitative descriptive 425
414 study. *Int J Nurs Stud*. 2013;50(6):768–75. <https://doi.org/10.1016/j.ijnurstu.2012.07.010>
- 416 20. Prakash P, Subramaniam P, Durgesh BH, Konde S. 426
417 Prevalence of early childhood caries and associated risk 427
418 factors in preschool children of urban Bangalore, India: 428
a cross-sectional study. *Eur J Dent*. 2012;6(2):141–52. <https://doi.org/10.1055/s-0039-1698943>
21. Fischer KR, Lindner I, Fickl S. Implant treatment in 421
periodontally compromised subjects-quality of life and 422
patient satisfaction. *Clin Oral Investig*. 2016;20(4):697– 423
702. <https://doi.org/10.1007/s00784-015-1561-x> 424

Author Query 426

AQ1 Please provide the date and letter number for 427
this article. 428