

## Assessment of Oral Health-Related Quality of Life Among a Sample of Yemeni Population

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### Abstract

The study aimed to assess the oral health condition and its impact on the quality of life (QoL) among a sample of Yemeni population. The study including 256 individuals who responded to the Oral Health Impacts Profile (OHIP) through completing a face-to-face survey of the OHIP-14 Arabic version. The data were collected by one dentist trained in the terms

of oral health-related quality of life (OHRQoL). The study revealed that the impact of OHRQoL among the study sample was found with a weighted OHIP-14 score of 1.1 ( $\pm 0.9$ ). Physical pain ( $3.7 \pm 2.3$ ), followed by physical disability ( $2.4 \pm 2.2$ ), and psychological disability ( $2.1 \pm 2.3$ ) were the highest scoring. A significantly higher effect ( $p < 0.05$ ) was found for the adults (18-44 years old) compared to those elderly individuals ( $> 64$  years). The OHRQoL was better in male than in female and in employees than in both pensioners and un-employees. Females had a significantly higher effect when compared to males in the OHRQoL ( $p < 0.05$ ). The unemployed subjects were significantly higher than those pensioners and employees in the OHRQoL ( $p < 0.05$ ). The OHRQoL was also better in subjects with higher income and education than those participants with low. However, there were no significant differences for OHRQoL with respect to the educational level and monthly income of participants ( $p > 0.05$ ). Conclusion, the quality of life is greatly affected by the oral health conditions of the elderly. This impact of oral health on quality of life has an association with individual and contextual variables.

## Introduction

The health significantly impacted on individuals' everyday practices and activities leading to probably reducing their functionality and psychological well-being. Recently, Health-Related Quality of Life (HRQoL) has been emerged as an important issue due to the scientifically accepted fact that the disease or condition has more dispersedly effect than just having a strict effect on a certain organ or system. Therefore, clinical measures cannot be solely used to fully determine the outcomes of a disease or condition because subjective experiences, personal values, attitudes and beliefs are not considered when using such measures [1,2]. The overall HRQoL can be affected by several factors; one of which is the individual's oral health, whose effects are far reaching, leading to reductions in individuals' daily functions and well-being, thus may lead to their physical or psychological incapacitation. Moreover, such conditions and their complications require great costs to be determined not only for individuals but also for the entire community[3].

Various studies have shown that the impacts of oral diseases and disorders on Oral Health-Related Quality of Life (OHRQoL) are high worldwide [4,5]. In national surveys and epidemiologic studies, collecting patient-based outcome measures have been too extensive [1-5], due to the importance of obtaining data of individuals' health and feeling about their oral health condition. These data can help in directing suitable health strategies and providing rehabilitation of the tooth loss or therapy of the oral diseases. In order to measure OHRQoL, some instruments were developed to collect these data [6]. Oral Health Impact Profile (OHIP) was developed as one of the OHRQoL instruments, which provides fully measures of self-reported discomfort, disability and dysfunction associated with oral conditions. OHIP originally includes 49 questions sorted in 7 groups based on the oral health model of Locker adapted from the WHO's International Classification of Impairments, Disabilities, and Handicaps. The OHIP-49 shorter and developed version was OHIP-14 [17], which has been

widely used for the assessment of oral health effect on the individual's quality of life (QoL) [8].

Yemen country is one of the developing countries, which is located at South West of Arabian Peninsula. For most Yemeni people, dental care has a less intuitive QoL dimension than health care in general. Moreover, Yemeni dental patients and their family do not believe that dental care is essential. They are ready for to spend on medical treatment of all diseases other than dental care on which they are reluctant to spend. Furthermore, Yemen governorate does not consider oral health as a high priority because it has been dealing with other main problems of health including tuberculosis and malnutrition, which have caused a high rate of mortality [9-13]. Consequently, essential dental healthcare has not been accessible by Yemeni population who also has not been provided with any dental educational/ preventive programs. Basic information about the condition of oral health in Yemen are sparse. As for this problem in Yemen, it has not been studied at all. When researching and investigating research related to dentistry in Yemen, we found that it was research that dealt with the characterization and sensitivity of antibiotics to bacterial dental infections such as *Aggregatibacter actinomycetemcomitans*, *S. aureus*, *S. mutans*, the incidence of *Candida albicans* in denture wearers; and association of biofilm formation in dental caries, antibiotic resistance and malocclusions, and tested the appropriate of the Tanaka-Johnston analysis for Yemeni adults [14-27]. However, there is not even a single study to assess to assess the OHRQoL in a group of male and female Yemeni adults. In conjunction with the increasing need for dental healthcare in Yemen, the number of dental colleges and private dental clinics in Yemen has been also increasing. However, no data has been available so far on the OHRQoL among the Yemeni population. Such data are required for the assistance of the appropriate measures' design in the oral healthcare planning stage of Yemeni population. The current study, therefore, aimed to assess the OHRQoL in a group of male and female Yemeni adults aged between 18 and 80 years old in terms of their demographic and

socioeconomic status.

## Materials and Methods

This study is cross-sectional in design. It was conducted in the Dental Clinics of the Faculty of Dentistry at the University of Science and Technology, Yemen (USTY), which was selected because it is the oldest Yemeni university offering almost free dental care services. This makes such services accessible to most of Yemeni dental patients, coming from Sana'a city and its suburbs. Sana'a is the capital of Yemen and considered the Yemeni largest city, with a total number of 3 million residents; the majority of which are migrants from all the other Yemeni cities. From the Medical Research Ethics Committee of the Faculty of Medicine and Health Sciences at USTY, the study obtained the medical ethics approval (MECA No.: 2017/14). Written consent forms were distributed to the study sample preceded by explaining the study objectives to them. Those who accepted to participate were only included in the study, provided with being residents of Sana'a city with the age between 18-80 years. The sample who agreed to participate were 256 participants.

Data collection was performed between November 2017 and September 2018. The Oral Health Impact Profile in its short form (OHIP-14) was used as a study tool to assess the OHRQoL. The OHIP-14 had been validated for the Arabic language [28]. It was used for conducting individually face-to-face interviews with participants by one dentist (the examiner), who was previously trained in OHRQoL terms, and explained the questionnaire's structure and content to his interviewees. The participant was asked to evaluate on one of the 5 Likert-scale points (0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often, and 4 = very often); the low values represent good QoL.

The total OHIP-14 scores were recorded according to the sum of Likert-type responses for the 14 questions ranging from 0-56 divided by the number of questions (i.e., 14). Regardless of the general score, the outcomes were divided into 7 subscales that explored the impact of oral health through its seven dimensions, namely: "functional limitation, physical pain, psychological

discomfort, physical disability, psychological disability, social disability, and handicap". An addition of OHIP-14 scores was also recorded based on the total of Likert-type responses for the seven dimensions of the oral health impact.

Data regarding the participant's socio-demographic profile were also recorded. The study sample was divided according to age (i.e., 18-44 years, 45-64 years, and > 64 years), occupation (i.e., employees, un-employees and retirees), monthly income (e.g., high, medium and low income), educational level (e.g., illiterate, primary, elementary, secondary, and university).

## Data Analysis

The data analysis was performed using SPSS, version 21.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were performed to obtain frequencies, means, medians, and standard deviations of the different variables. Mann-Whitney or Kruska-Wallis test was performed to assess the association of socio-demographic factors with the OHRQoL. The multiple linear regression analysis for total scores of OHIP-14 responses was finally performed to analyze the independent impact of impact of oral health status and its variables on the QoL. The significance level was set at  $p < 0.05$ .

## Results

Table 1 presents the study sample characteristics. For age of the participants, 43.80% aged 18-44 years old, and 46.12% aged 45-64 years old. However, the minority of respondents aged over 64 years old (10.08%). Regarding gender, 46.51% were male and 53.49% were female. For the occupation, most of the study sample were un-employees (60.08%), followed by pensioners (36.05%). However, the small minority of respondents were employees (3.88%). With respect to the monthly income factor, respondents with a medium income represented (58.53%), followed by those with a low income (27.52%), then those with a high income (13.95%). Regarding the educational level, the participants who have no formal education respondents represented 35.27% of the study sample, followed by those holding university degrees (28.29%), while those

Table 1. Demographic and socioeconomic characteristics of the studied sample

Sample characteristics		Total (%)	
Demographic	Age (years)	18-44	43.80%
		45-64	46.12%
		>64	10.08%
	Gender	Male	46.51%
		Female	53.49%
Socioeconomic	Occupation	Employees	3.88%
		Unemployees	60.08%
		Retirees	36.05%
	Monthly income	High	13.95%
		Medium	58.53%
		Low	27.52%
	Educational level	Illiterate	35.27%
		Primary	20.16%
		Elementary	7.36%
		Secondary	8.91%
	University	28.29%	

who had primary, secondary and elementary education were 20.16%, 8.91% and 7.36%, respectively.

The total, specific (seven subscales), and additive dimensions of the OHIP-14 tool are shown in Table 2. There was an oral health low impact on the entire QoL shown by the respondents' overall weighted OHIP-14 score of 1.1 ( $\pm 0.9$ ). For the total, specific and additive scores, the subjects aged 18-44-years-old reported a higher score followed by those individuals aged 45-64 and over 64 years old, respectively. While for the total and additive scores, a significantly higher impact ( $p < 0.05$ ) was found for the adults (between 18-44-years-old) compared to the elderly individuals (>64 years old). The female had a significantly higher effect when compared to the male for the total and additive dimensions of the OHIP-14 ( $p < 0.05$ ). 5 of the 7 subscales (i.e., social disability, psychological disability, handicap, physical pain and psychological discomfort) were found to be higher in females than males. The unemployed subjects reported the highest impact, followed by pensioners and employees. The overall weighted and additive OHIP-14 scores of unemployed subjects were significantly higher than those of the employed ( $p < 0.05$ ). All subscales of the OHIP-14 tool were found to be higher in the unemployed than they

are in either the retired or employed. The lower income subjects had a higher score when compared to the medium and higher income. All subscales of the OHIP-14 tool were found to be higher in lower income than they are in either the medium or higher incomes. However, there were no significance differences for the total and additive dimensions of the OHIP-14 with respect to the monthly income of participants ( $p > 0.05$ ). Elementary educated subjects showed the highest score, while secondary educated individuals reported the lowest score. However, there were no significance differences regarding educational level of subjects ( $p > 0.05$ ).

Table 3 displays the results of the multiple regression analysis for the overall sample. According to the multiple linear regression models, the total OHIP-14 was significantly associated with two variables. There were statistically significant associations between the total scores of OHIP-14 and the demographic (age and gender) factors ( $p > 0.05$ ). Adults followed by females were more likely to have impacts on OHRQoL. No socioeconomic variable was independently related to the outcomes in the final model. There were no statistically significant associations between OHRQoL and socioeconomic factors ( $p > 0.05$ ).

Table 2. The Mean OHIP-14 ( $\pm$ SD) for the subscales, total and additive scores according to contextual variables

Sample characteristics		Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap
Age (years)	18-44	1.2 $\pm$ 1.8	3.8 $\pm$ 2.4	1.9 $\pm$ 2.0	2.5 $\pm$ 2.1	2.6 $\pm$ 2.5	2.3 $\pm$ 2.4	2.4 $\pm$ 4.0
	45-64	1.2 $\pm$ 1.7	3.7 $\pm$ 2.3	1.6 $\pm$ 1.7	2.4 $\pm$ 2.2	2.1 $\pm$ 2.2	1.6 $\pm$ 2.2	1.8 $\pm$ 2.1
	>64	0.9 $\pm$ 1.6	3.4 $\pm$ 2.3	0.8 $\pm$ 1.3	1.8 $\pm$ 2.0	0.6 $\pm$ 1.1	0.3 $\pm$ 0.8	0.9 $\pm$ 1.9
Gender	Male	1.1 $\pm$ 1.8	3.2 $\pm$ 2.3	1.2 $\pm$ 1.5	2.1 $\pm$ 2.2	1.5 $\pm$ 1.9	1.2 $\pm$ 1.8	1.4 $\pm$ 1.9
	Female	1.3 $\pm$ 1.7	4.1 $\pm$ 2.2	2.1 $\pm$ 1.9	2.6 $\pm$ 2.2	2.7 $\pm$ 2.6	2.3 $\pm$ 2.5	2.4 $\pm$ 3.7
Occupation	Employees	1.0 $\pm$ 1.7	3.2 $\pm$ 2.3	1.3 $\pm$ 1.5	1.9 $\pm$ 2.0	1.6 $\pm$ 1.9	1.2 $\pm$ 1.9	1.4 $\pm$ 1.8
	Unemployees	1.3 $\pm$ 1.7	4.1 $\pm$ 2.3	1.9 $\pm$ 1.9	2.6 $\pm$ 2.3	2.4 $\pm$ 2.6	2.1 $\pm$ 2.4	2.3 $\pm$ 3.6
	Retirees	1.7 $\pm$ 2.4	2.6 $\pm$ 1.4	1.2 $\pm$ 1.8	2.7 $\pm$ 1.7	2.1 $\pm$ 2.1	1.2 $\pm$ 1.6	1.9 $\pm$ 2
Monthly income	High	1.2 $\pm$ 1.7	3.7 $\pm$ 2.1	1.6 $\pm$ 1.6	2.3 $\pm$ 2.1	2.1 $\pm$ 2.1	1.5 $\pm$ 2.1	2.1 $\pm$ 2.3
	Medium	1.1 $\pm$ 1.7	3.6 $\pm$ 2.3	1.6 $\pm$ 1.8	2.1 $\pm$ 2.1	2.1 $\pm$ 2.3	1.7 $\pm$ 2.3	1.9 $\pm$ 3.6
	Low	1.3 $\pm$ 1.8	3.9 $\pm$ 2.4	1.9 $\pm$ 1.9	2.8 $\pm$ 2.3	2.2 $\pm$ 2.5	1.9 $\pm$ 2.3	1.9 $\pm$ 2.2
Education level	Illiterate	1.4 $\pm$ 1.6	3.9 $\pm$ 2.4	1.7 $\pm$ 1.9	2.8 $\pm$ 2.2	2.3 $\pm$ 2.5	1.8 $\pm$ 2.3	2.0 $\pm$ 2.3
	Primary	1.4 $\pm$ 2.2	3.6 $\pm$ 2.3	1.8 $\pm$ 1.6	2.4 $\pm$ 2.1	2.1 $\pm$ 2.2	1.8 $\pm$ 2.3	1.7 $\pm$ 2.1
	Elementary	1.6 $\pm$ 1.9	4.2 $\pm$ 2.6	1.9 $\pm$ 2.3	2.9 $\pm$ 2.6	2.1 $\pm$ 2.3	1.9 $\pm$ 2.4	2.3 $\pm$ 2.2
	Secondary	1.0 $\pm$ 1.9	3.4 $\pm$ 1.9	1.5 $\pm$ 2.0	1.5 $\pm$ 1.6	1.4 $\pm$ 2.3	1.1 $\pm$ 1.8	1.3 $\pm$ 2.1
	University	0.7 $\pm$ 1.3	3.5 $\pm$ 2.4	1.5 $\pm$ 1.6	1.9 $\pm$ 2.01	2.2 $\pm$ 2.3	1.8 $\pm$ 2.3	2.1 $\pm$ 4.6
<b>Total</b>		1.2 $\pm$ 1.7	3.7 $\pm$ 2.3	1.7 $\pm$ 1.8	2.4 $\pm$ 2.2	2.1 $\pm$ 2.3	1.74 $\pm$ 2.2	1.9 $\pm$ 3.1

Mann-Whitney or Kruskal-Wallis test were performed as appropriate. \*Significance level is p value < 0. 05.

Table 3. Multiple regression analyses results evaluating negative impact on total OHIP according to contextual variables

Predictors	B	OR	(95% CI)	P-value
Age	-0.176	0.839	(-0.318, -0.034)	0.015
Gender	3.814	45.331	(0.443, 7.185)	0.027
Occupation	1.624	5.073	(-1.473, 4.722)	0.303
Monthly income	0.165	1.179	(-2.157, 2.488)	0.888
Educational level	-0.530	0.589	(-1.635, 0.574)	0.345

B: Beta coefficients, OR: Odds ratio, CI: Confidence interval, Significance level is p value < 0. 05

## Discussion

The present study showed that the oral health for the Yemeni studied sample had a low impact with a weighted OHIP-14 score of 1.1. This result is in agreement with that of Papaioannou *et al.*, [29], who found a low (1.1) medium (2.1) impact of oral health for Greek population. However, it is lower than that found for Norwegian elders (3.4) [30] and for South Australians (4.8) [31]. This variation in the outcome measures of the oral health for different populations may be due to the differences in the outcomes related to the associations of self-perceived oral health with the socioeconomic variables. Some studies reported that those with better self-rated oral health had higher educational levels, were elderly [32], or related to gender [33]. On the contrary, some others indicated that self-rated oral health had no association with gender, age or educational level [1-5]. The present study showed that females had worse reports of oral health condition than males. This result is in agreement with that of Cohen-Carneiro *et al.* [34] and Lahti *et al.* [35] who found that women had higher poor oral health perception.

Adults aged 18-44 years have been shown to have poor self-rating of oral health compared to other age groups of older adults. This result is inconsistent with the results of some studies that found that the elderly were more likely to self-assess their oral health than the young [36]; this can be attributed to the habit of chewing khat that is more common among the majority of Yemeni adults than the elderly). This poor self-rating of oral health among Yemeni adults is considered to be a significant negative impact that could be from the increase in severe periodontal disease and tooth loss in the adult population due to khat chewing, leading to a significant impact on their lives. QoL. The current study found that the participants who noticed a low level of oral and dental health had a low educational level as well as a low monthly income. This result is consistent with those of Makhija *et al.* [37] who found that OHRQoL can be influenced by income and educational level. In addition, other studies have also indicated that the impact of poor oral health conditions is significantly perceived by populations with low incomes and education [38]. It has

also been shown that the living environment of individuals is significantly correlated with exposure to risk, suggesting that those with lower levels of education and income have poorer perceptions of oral health [38] and the idea that the higher an individual's standard of living, the fewer dental problems they face. This may be because low class participants seek for satisfying their primary needs, including food, transportation, and clothing prior to addressing the quality of their oral health, which is also considered a relatively low priority among such participants. Moreover, healthcare services may not be accessible by such participants who could not receive dental care on time for detecting their oral complications early; however, they seek dental care services when their oral pathological process arrived at an advanced level. Although protective treatment modalities are expensive in general, participants with low income and low educational level normally choose options of dental extractions, causing a step-by-step tooth loss which is ultimately indicated to have association with poor OHRQoL.

The physical problems were related to OHRQoL in the overall sample of the present study. Individuals with lower psycho-social impact have lesser chances of reporting poor oral health, indicating that the elder participants were less upset by psycho-social problems than functional problems. Irrespective of sociodemographic and other oral health factors, dental appearance, as a psycho-social dimension's component, can be the best indicator of self-perceived oral health [33]. The oral health perception is associated with both functional limitations and psychological discomforts which were measured by the OHIP [39]; however, the present study considered the best predictor of oral health self-perception is the measure's physical pain since all participants were assessed and no analysis was separately conducted for dentate and edentulous participants. This could be attributed to the well documentation of the association of Khat chewing habit with both gingival recessions and periodontal problems [40]. In addition, people do not pay more importance to dentures because they are overwhelmed with their medical treatments' expenses of other chronic diseases, and therefore, they are often

unaffordable of spending on dentures. On contrary, they believed that losing teeth is one of the ageing process's inevitable parts. Besides, the negative attitudes regarding dentalcare as well as lacking the oral health culture could also prevent them from visiting the dentists. One of the key reasons of this result is that the Yemeni population lacks the perceived knowledge of dentures and dentalcare. Consequently, the Yemen society should have awareness and be enlightened with the importance of healthcare and dentalcare in order to put ends to such misconceptions. Finally, oral health condition can be resulted from a historical combination of a person's behaviors, experiences, culture, and attitudes as well as his/her own oral health [41].

The present study has some limitations that should be taken into account. The study design (i.e., cross-sectional) is only used at the association level; however, it does not set up any cause-effect relationships that underscore the demand for prolonged individuals' follow-ups. Besides, the unavailability of clinical variables may influence the study outcomes, which is because the socio-demographic and socio-economic indicators were independently occurred and the clinical condition has associations with the variations in the impacts' perceptions, including on QoL. Finally, the inexistence of significant associations between some socio-demographic or socioeconomic factors and OHIP can be attributed to the participants' small number included in the study. Future studies on socioeconomic factors for quality of life including oral cavity are needed [42].

## Conclusions

From the study results, it can be concluded that that age and gender factors are associated with the oral health impacts on the QoL, which is essential to assist in planning, establishing and developing oral healthcare services for reducing the inequalities of oral health and meeting the population needs. More research should be conducted on the association and cause-effect relationships between the individuals' OHRQoL and the clinical and behavioral factors in order to provide effective assessments of population's healthcare demands and

come up with holistic and comprehensive approaches to addressing oral health services. In addition, further investigations addressing the OHRQoL among individuals with present or past significant signs of diseases should be performed. Findings from such studies would help in an efficient advocating for the establishment of an appropriate profile for dentists to manage aging populations and emphasize on the needs to provide the necessary resources and public or private funds for dentistry.

## Ethics Consideration

The study ethics approval was attained from by the Medical Research Ethics Committee, Faculty of Medicine and Health Sciences, University of Science and Technology, Yemen (USTY) (MECA No.: 2017/14). Written consents were taken from individuals accepted to participate in the study.

## List of Abbreviations

QoL: Quality of Life; HRQoL: Health-Related Quality of Life; OHRQoL: Oral Health-Related Quality of Life; OHIP: Oral Health Impact Profile; WHO: World Health Organization's; USTY: University of Science and Technology, Yemen; MEC: Medical Ethics Committee; SPSS: Statistical Package for the Social Sciences; SD: standard deviation; GOHAI: General Oral Health Assessment Index; OI DP: Oral Impacts on Daily Performances Index.

## Conflict of Interest

No competing interests are declared by the authors.

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