

Oral Health Status of 12- and 15-Year-Old Students in Qatar: Findings From the National Oral Health Survey

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Abstract

Introduction: The national oral health survey-Qatar (2011) was carried out to collect the baseline oral health information among youth. This article describes the oral health status of 12 and 15-year-old students in Qatar.

Methods: Cross-sectional survey data were analyzed for 12 (N=1060) and 15 (N=1064) year-old students. Caries status was determined based on decayed, missing, filled teeth (DMFT)=0 (no caries) & DMFT ≥1 (caries present). Mean indices among nationalities and sex were compared by Student's t test. Analysis of variance (ANOVA) was used to compare means by the type of the school. Logistic regression was used to examine associations among variables.

Results: About 53% (n=565) of 12-year-old and 55% (n=589) of 15-year-old had varying degrees of caries. The odds of caries were higher among girls vs. boys aged 12 years (OR [odds ratio] =1.3, P=0.05) and 15-years-old (OR=1.28, P=0.04). Qatari students had a higher mean DMFT value (1.3 ± 1.2) compared to non-Qataris (0.82 ± 1.1). The public/independent school students had higher mean DMFT (1.31 ± 1.2) vs. other two school categories. Fifteen-year-old students had lower odds (OR=0.81, P=0.02) of gingival bleeding and higher odds (OR=1.68, P<0.001) of calculus vs. 12-year-old. Dental fluorosis was found among 15% of 12-year-old and 16.6% of 15-year-old. The odds of fluorosis were higher (not statistically significant) among 15-years-old (OR=1.1, P=0.36). Lower odds of bleeding teeth (OR=0.81, P=0.02) and higher odds of calculus were found among 15-year-old (OR=1.68, P<0.001) compared to 12-year-old.

Conclusion: The results provide directions to further strengthen the oral health strategies through various evidence-based interventions.

Keywords: Qatar, Dental caries, DMFT, National survey, Oral health, Adolescents

Introduction

Oral health status is an important component of the overall well-being of an individual. Poor oral health during the early years of life can predispose someone not only to oral cavity pathologies but also to a number of systemic diseases affecting the heart, lungs, metabolic system, and immune system.^{1,2} The World Health Organization (WHO) reports a high prevalence of oral-health-related issues, especially dental cavities, among children as well as adults.³ It is evident that improper oral hygiene, dietary selection, and other behavioral factors, such as tobacco use, can directly impact oral health.³

The State of Qatar covers about 11,437

square kilometers in area, and has an estimated population of 2.6 million with around 17% of this being children and adolescents.⁴ In terms of dietary habits, with recent socioeconomic developments, changes have been observed among Qatari residents. This is important as increased dietary fiber intake and low refined carbohydrate and/or sugar use are known to be beneficial for oral health.^{5,6} A recently published study from Qatar indicates that adults consume less than the recommended levels of fruit and vegetables, and both of these are considered to be the main or most common sources of dietary fiber.⁷ Furthermore, another recent study reveals that the fiber contents of household

shopping baskets are lower than the recommended levels, while sugar content is higher in terms of nutrient energy density levels.⁸ These factors could predispose families in Qatar to adverse oral health outcomes.

The present manuscript shares selected findings from the National Oral Health Survey in Qatar (2011).⁹ The survey was part of a national oral health strategy to collect oral health information and use the data to support public health programs and policies. The survey was carried out during 2010 and 2011, with the main aim being to collect baseline oral health data for children and adolescents living in Qatar. The survey provides a snapshot of oral health issues, such as dental caries, periodontal problems (gingival bleeding, calculus), and fluorosis, and the treatment needs that were required by participants. The present article is an attempt to describe the oral health status of school-going adolescents aged 12 and 15 years and to provide selected highlights of findings from the survey.

Methods

Sample

Analysis for 12 and 15 years old students was carried out using the data from Qatar's National Oral Health Survey.⁹ Since it was not practical to include all the students from all schools and classes in the country due to the budgetary and resource-related limitations, a 10% probability sampling based on the 2010 population was carried out from 7 defined regions of Qatar (Doha, Al-Wakrah, Al-Khor, Al-Rayyan, Al-Dayyen, Madinat-al-shamal, and Umm-Slal).^{9,10} From each region, the schools were selected randomly. The students were then selected and stratified by types of schools (primary, preparatory, secondary) followed by nationality and sex. Under each stratum, the students were selected by systemic sampling approach i.e. 25 students were selected from each stratum, the first student was randomly selected and the rest of the students were systemically selected. All students were selected in situations where the number of students was less than 15 in a stratum. This provided the sample size of 4103 students out of which 3248 (~79%) participated in the survey from all three selected age groups (6, 12 and 15 years). Excluding 6 years old students, a total of 1060 of 12 years old and 1064 of 15 years old students who participated in the survey from 62 schools from the seven regions of Qatar were considered for further analysis in the present study.^{9,10} Ethical procedures were followed and informed consent was obtained from the parents for student participation since all students were under 18 years of age.

Data Extraction

The data were categorized into age, sex, nationality and grades categories. For the present study, preparatory and secondary school students were selected for further analysis. A survey based on the WHO assessment tool

was used to collect periodontal status (Community Periodontal Index modified), dentition status, dental fluorosis, enamel opacities/hypoplasia, denture wearing, oral mucosal lesions, tooth wear condition, traumatic dental injuries, any other condition, and need for immediate care and referral. The data were collected as per accordance with the WHO methodology and criteria⁹⁻¹¹ By adopting this well-recognized approach (by WHO) to collect randomized data, the sample sufficiently represented the target population.¹¹ Dental caries was defined on the basis of decayed, missing and filled teeth or DMFT score.

Statistical Analysis

Dental caries status was presented by mean \pm standard deviation. The caries status was classified into categories DMFT = 0 (no caries) & DMFT \geq 1 (caries present). All continuous variables were checked for normality using Kolmogorov-Smirnov test. Mean indices among nationalities and sex were compared by independent sample student's *t* test. Analysis of variance (ANOVA) was used to compare means by the type of the school followed by Bonferroni post-hoc test. Prevalence of dental indicators was presented using frequencies and percentages. Logistic regression was used to compute odds ratio (OR) and 95% CI to explain the impact of assumed predictors such as sex and nationality on the presence of dental caries and dental indicators among adolescents. A *P* value less than 0.05 was considered as statistically significant.

Results

For the permanent dentition, around half of the students in both age groups were affected by dental caries i.e. 53.3% ($n = 565$) of 12-year-old and 55.4% ($n = 589$) of 15-year-old had varying levels of dental caries (i.e. decayed, missing, and filled teeth) (Table 1). Among both sexes, a higher prevalence of girls suffered from caries (12-year-old = 56.8%, 15-year-old = 58.3%). Further analysis showed that the odds of dental caries were higher among girls compared to boys aged 12 years (OR = 1.3, CI = 1.0-1.6, $P = 0.05$) as well as 15-year-old (OR = 1.28, CI = 1.01-1.6, $P = 0.04$) respectively.

Table 2 shows the dental caries status defined by the decayed, missing, and filled teeth index (DMFT). The values showed the mean number of teeth with dental caries (DMFT), decay (D), missing permanent teeth (M), and filled permanent teeth (F), respectively. Overall, among 12-year-old students, the mean DMFT value was 1.03 higher among girls (1.1 ± 1.2) compared to boys (0.96 ± 1.2) but this difference was not statistically significant ($P = 0.06$). By nationality, Qatari students had a higher mean DMFT value (1.3 ± 1.2) compared to non-Qataris (0.82 ± 1.1 , $P < 0.001$). Furthermore, public/independent school adolescents had higher mean DMFT values (1.31 ± 1.2) compared to the other two school

Table 1. Caries Status Among Students by Sex

Parameters	DMFT = 0 (No Caries)	DMFT ≥1 (Caries of Any Level)	Odds Ratio (95% CI)	P Value
12 Years Old				
Overall (N = 1060)	495 (46.7)	565 (53.3)		
Sex				
Male	308 (49.1)	319 (50.9)	Reference	
Female	187 (43.2)	246 (56.8)	1.3 (1.0- 1.6)	0.05
15 Years Old				
Overall (N = 1064)	475 (44.6)	589 (55.4)		
Sex				
Male	238 (48.0)	258 (52.0)	Reference	
Female	237 (41.7)	331 (58.3)	1.28 (1.01- 1.6)	0.04

Table 2. Mean Dental Caries, Decayed, Missing & Filled Teeth by Sex, Age and Nationality With Standard Deviations

	N	DMFT* Mean ± SD	Decayed Permanent Teeth Mean ± SD	Missing Permanent Teeth Mean ± SD	Filled Permanent Teeth Mean ± SD
12 Years Old					
Overall	1060	1.03 ± 1.2	0.61 ± 1.0	0.04 ± 0.23	0.38 ± 0.72
Sex					
Male	627	0.96 ± 1.2	0.57 ± 0.96	0.04 ± 0.22	0.34 ± 0.71
Female	433	1.1 ± 1.2	0.67 ± 1.1	0.05 ± 0.25	0.42 ± 0.73
<i>P</i> value		0.06	0.11	0.49	0.07
Nationality					
Qatari	462	1.3 ± 1.2	0.73 ± 1.1	0.06 ± 0.27	0.52 ± 0.81
Non-Qatari	598	0.82 ± 1.1	0.53 ± 0.95	0.04 ± 0.19	0.26 ± 0.62
<i>P</i> value		<0.001	0.002	0.15	<0.001
Type of school					
Public/independent	521	1.31 ± 1.2	0.83 ± 1.1	0.06 ± 0.74	0.43 ± 0.74
Private	94	0.98 ± 1.4 ^a	0.43 ± 0.92 ^a	0.03 ± 0.17	0.52 ± 0.18
Foreign/international	445	0.71 ± 1.0 ^{ab}	0.40 ± 0.81 ^a	0.03 ± 0.18	0.29 ± 0.64 ^{ab}
<i>P</i> value		<0.001	<0.001	0.90	0.0006
15 Years Old					
Overall	1064	0.89 ± 1.2	0.50 ± 1.0	0.05 ± 0.21	0.34 ± 0.62
Sex					
Male	496	0.89 ± 1.3	0.53 ± 1.1	0.04 ± 0.21	0.32 ± 0.64
Female	568	0.88 ± 1.1	0.47 ± 0.97	0.05 ± 0.21	0.36 ± 0.59
<i>P</i> value		0.89	0.34	0.43	0.29
Nationality					
Qatari	478	1.2 ± 1.4	0.72 ± 1.3	0.07 ± 0.25	0.42 ± 0.68
Non-Qatari	586	0.63 ± 0.93	0.32 ± 0.74	0.03 ± 0.17	0.28 ± 0.54
<i>P</i> value		<0.001	<0.001	0.002	<0.001
Type of school					
Public/independent	625	1.17 ± 1.3	0.71 ± 1.2	0.06 ± 0.24	0.40 ± 0.67
Private	97	0.67 ± 1.0 ^a	0.29 ± 0.92 ^a	0.01 ± 0.10 ^a	0.37 ± 0.56
Foreign/international	342	0.44 ± 0.71 ^{ab}	0.18 ± 0.50 ^a	0.02 ± 0.16 ^a	0.24 ± 0.51 ^{ab}
<i>P</i> value		<0.001	<0.001	0.004	<0.001

Abbreviation: DMFT, decayed, missing, filled teeth.

For the type of school, ^a indicates mean is different from the mean of public/ independent school, ^b indicates mean is different from the mean of private schools.

categories ($P < 0.001$, Table 2). Among 15-year-old students, the overall mean DMFT was 0.89, with almost identical values for boys and girls ($P = 0.89$). Qatari students (1.2 ± 1.4) and those who were attending public/independent schools (1.17 ± 1.3) had higher mean DMFT values versus their counterpart groups ($P < 0.001$), (Table 2). Among both age groups, the public school students had significantly higher mean DMFT values compared to private schools.

Overall, 37.3% of 12-year-old and 32.7% of 15-year-old had gingival bleeding. Furthermore, calculus was found among 21.6% of 12-year-old and 31.8% of 15-year-old. Fifteen-year-old students had lower odds ($OR = 0.81$, $CI = 0.68-0.97$, $P = 0.02$) of gingival bleeding and higher odds ($OR = 1.68$, $CI = 1.4-2.1$, $P < 0.001$) of calculus compared to 12-year-old (Table 3). Dental fluorosis was found among 15% of 12-year-old and 16.6% of 15-year-old. (Table 3). Figure 1 shows the prevalence of fluorosis by different levels of severity and age groups. The figure shows that the prevalence of severe fluorosis was low but students in both age groups suffered from mild or very mild fluorosis.

Discussion

The survey results and analysis revealed that there are differences in dental caries between Qatari and non-Qatari students. We found that the Qatari adolescents were suffering more with caries compared to non-Qataris. A similar pattern was also observed for younger students (6 years old) in Qatar.^{9,10} Furthermore, the burden of dental caries was higher among adolescents attending public schools compared to those who were attending private or international schools. This is consistent with the findings observed among 6-year-old students in Qatar, the data of which has not been described in this article.^{9,10} The mean value of DMFT among 12-year-old students was 1.03, similar to the results seen in a 2002 Chinese study where in the same age group the mean DMFT was 1.0.¹² The mean DMFT for 15-year-old children in the same Chinese study was slightly higher (1.4) than we found in our study (0.89). By sex, 12-year-old girls (1.1) had a higher mean DMFT versus boys (0.96), similar to the

results from the Chinese study (boys = 0.9, girls = 1.2).¹² In our study, we found that in terms of the mean DMFT values, the differences between boys and girls were not significant among both age groups. This is similar to the results from a Malaysian study in which the girls had higher mean DMFT compared to boys but this difference was not statistically significant.¹³

Dental fluorosis prevalence was relatively low among students. Around 84% of students were fluorosis free, which is higher than what has been seen in a Malaysian study in which 54% of 12-13-year-old students did not have any fluorosis.¹³ Our results demonstrated that 8%-10% of students presented with mild to moderate levels of fluorosis among both age groups. This is slightly higher than what we noticed in a Kuwaiti study where only 6% of 12 and 15-year-old students presented with mild to moderate levels of fluorosis.¹⁴

Some of the strengths of this study are that the data were collected using a well-recognized and tested tool, i.e. the WHO oral health survey approach. Furthermore, the sampling methods were appropriately applied during actual survey execution. This includes the estimation of reasonable sample size, using random and systematic sampling approaches, defining clusters and frames. Hence, the results may sufficiently represent the characteristics of the target population at the country level during 2010 to 2011. The data, however, are limited only to the outcomes based on the dental examinations of students and do not provide any information on the risk factors that might have caused these problems. WHO oral health survey methodology used in this study does not collect information on the certain risk factors. Only demographic indicators were examined as possible confounders while carrying out analysis.

The National Oral Health Survey and this publication provides the fundamentals for future trends for oral health status in the school children of Qatar. The surveillance highlights the necessity for routine evaluation of oral health status, for example, every five years, in school children. Follow-up epidemiological studies can be conducted to observe the findings and comparative trends over the years. The findings from these surveys

Table 3. Periodontal Health Status and Fluorosis

	12 Years Old ^a	15 Years Old	Odds Ratio (95% CI)	P Value
Periodontal Health Status	1060	1064		
Bleeding teeth (zero)	665 (62.7)	716 (67.3)		
Bleeding teeth ≥ 1	395 (37.3)	348 (32.7)	0.81 (0.68, 0.97)	0.02
Calculus teeth (zero)	831 (78.4)	726 (68.2)		
Calculus ≥ 1	229 (21.6)	338 (31.8)	1.68 (1.4, 2.1)	<0.001
Fluorosis				
Dental fluorosis (normal)	899 (84.8)	887 (83.4)		
Dental fluorosis (all degrees & conditions)	161 (15.2)	177 (16.6)	1.1 (0.88, 1.4)	0.36

^a Reference group.

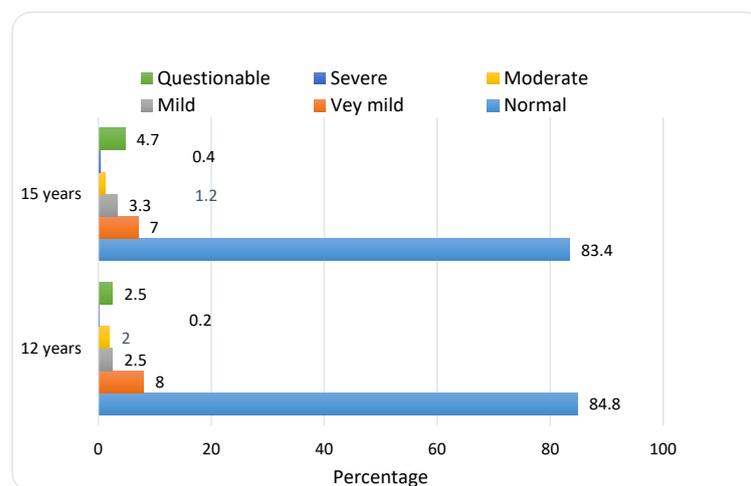


Figure 1. Prevalence (%) of Fluorosis by Severity and Age Groups.

and studies would be of further help in the identification of essential indicators for a national oral surveillance system in Qatar, in addition to those indicators specified by the WHO.

The findings of this study, along with the available adult data, provide a comprehensive epidemiological overview of oral health in Qatar. Qatar's national STEPwise survey of 2012 examined the oral health situation of adults.¹⁵ A recent STEPwise-based study showed that around 40% of survey respondents had average or poor oral health. Furthermore, oral health issues were higher among women, older age groups, individuals who had a low educational status, individuals who were diabetic, and tobacco users.¹⁶ The adult behavior in Qatar could provide an idea about the mechanisms behind oral health status of children and adolescents. As evident from the recent studies, the households in Qatar do not have an optimal oral health and follow certain dietary habits e.g. low fiber and high sugar intake etc. That could impact on the oral health of children and adolescents since they are more likely to follow the footsteps of their elder household members in terms of behavior and dietary patterns.^{7,8,17} For future oral health studies targeting children and adolescents, it would be beneficial to include information pertaining to the exposures and risk factors that might be associated with poor oral health outcomes in the country.

Conclusion

This study indicates that the oral health status especially the dental caries is a significant public health issue among adolescents in Qatar. We found that by nationality, Qatari, and by sex female students had a higher prevalence of oral health issues and predisposed to associated complications. The results and methodology of this article could be useful for local, regional and international professionals in medicine, dentistry, and public health field. Furthermore, the findings can help in the related policy making and project implementation processes.

Ethical Approval

Ethical procedures were followed and informed consent was obtained from the parents for student participation.

Competing Interests

There is no conflict of interest to declare.

References

- Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clin Microbiol Rev.* 2000;13(4):547-558.
- Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann Periodontol.* 1998;3(1):51-61. doi:10.1902/annals.1998.3.1.51
- World Health Organization, Media Center. Oral Health. 2012. <http://www.who.int/mediacentre/factsheets/fs318/en/>.
- Ministry of Development Planning and Statistics, Population. <http://www.mdps.gov.qa/en/statistics1/pages/topicslisting.aspx?parent=Population&child=Population>. 2017.
- Konig KG, Navia JM. Nutritional role of sugars in oral health. *Am J Clin Nutr.* 1995;62(1 Suppl):275S-282S; discussion 282S-283S.
- Scardina GA, Messina P. Good oral health and diet. *J Biomed Biotechnol.* 2012;2012:720692. doi:10.1155/2012/720692
- Al-Thani MH, Al-Thani AA, Al-Chetachi WF, et al. Dietary and nutritional factors influencing obesity in Qatari adults and the modifying effect of physical activity. *J Obes Weight Loss Medicat.* 2015;1:1-7. doi:10.5281/zenodo.160202
- Al-Thani MH, Al-Thani AA, Al-Mahdi N, et al. An Overview of Food Patterns and Diet Quality in Qatar: Findings from the National Household Income Expenditure Survey. *Cureus.* 2017;9(5):e1249. doi:10.7759/cureus.1249
- Al-Thani MH, Al-Thani AA, Al-Emadi AA, Al-Chetachi WF, Akram H, Poovelil BV. Oral health status of six-year-old children in Qatar: findings from the national oral health survey. *Int J Dent Hyg.* 2018;16(2):225-232. doi:10.1111/idh.12258
- World Health Organization. Oral Health Surveys – Basic

- Methods. 4th Edition. Geneva: WHO; 1997.
11. Wang HY, Petersen PE, Bian JY, Zhang BX. The second national survey of oral health status of children and adults in China. *Int Dent J*. 2002;52(4):283-290.
 12. Esa R, Razak IA. Dental Fluorosis And Caries Status Among 12-13 Year-old School Children In Klang District, Malaysia. *Ann Dent*. 2001;8(1):20-24. doi:10.22452/adum.vol8no1.4
 13. Vigild M, Skougaard M, Hadi RA, al-Zaabi F, al-Yasseen I. Dental caries and dental fluorosis among 4-, 6-, 12- and 15-year-old children in kindergartens and public schools in Kuwait. *Community Dent Health*. 1996;13(1):47-50.
 14. Ministry of Public Health, Qatar STEPwise Report 2012, Chronic Disease Risk Factor Surveillance. 2012. <http://www.moph.qa/home-en>.
 15. Cheema S, Maisonneuve P, Al-Thani MH, et al. Oral health behavior and factors associated with poor oral status in Qatar: results from a national health survey. *J Public Health Dent*. 2017;77(4):308-316. doi:10.1111/jphd.12209
 16. Epstein LH, Valoski A, Wing RR, McCurley J. Ten-year follow-up of behavioral, family-based treatment for obese children. *JAMA*. 1990;264(19):2519-2523.