



# Determinants of oral health-related quality of life and its affecting factors in preschool children: Cross-sectional study

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## Abstract

**Background:** Oral health-related quality of life (OHRQoL) is the main aspect of children's oral health. In this study, it was intended to explore OHRQoL and its pertinent factors in pre-school children.

**Methods:** This cross-sectional study was directed on 352 mothers with children (aged 3–5 years) based on stratified random sampling in health centers in Tabriz, Iran. Data were collected using a self-report questionnaire completed by the caregiver, which includes socio-demographic data, OHRQoL (13 items), caregiver-reported children's oral health status, and tooth brushing. The one-way ANOVA, independent samples *t* test, and linear regression were applied to define the predictors of OHRQoL using SPSS 16 at 95% significance level.

**Results:** Mothers' mean age was 31.5 (SD=4.9). It was 4.1 (SD=0.82) for children. According to the results, the majority of the mothers (88%) were homemakers and 25% had higher education. The mean (SD) of OHRQoL was 18.8 (7.9) out of 65. The items most related to OHRQoL were feeling guilty (25%), dental pain (35%), and difficulty eating (14.8%). According to the results of multiple regression, OHRQoL had significant relationship with economic status ( $P=0.046$ ), caregiver-reported children's oral health status ( $P=0.0001$ ), children's frequency of tooth-brushing ( $P=0.001$ ), and their age ( $P=0.0001$ ). In total, these factors described 0.22% of the variance in children's OHRQoL. OHRQoL did not have a statistically significant relationship with mothers' education level and children's gender.

**Conclusion:** According to the findings, the key predictor of OHRQoL was children's oral health status, tooth brushing, and age. Effective educational interventions could be designed based on these predictors to improve the OHRQoL of children.

**Keywords:** Quality of life, Oral health-related quality of life, Dental caries, Child, Preschool, Oral health

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## Introduction

Oral health-related quality of life (OHRQoL) was raised as an important concept in dentistry about two decades ago.<sup>1</sup> This concept is vague and its recognition began when the World Health Organization (WHO) expanded the definition of health in 1948. According to the WHO, OHRQoL is a multidimensional construct which consists of the subjective evaluation of a person's oral health, his/her functional and emotional well-being, as well as his/her expectations, sense of self and satisfaction with care.<sup>2,3</sup>

Early childhood caries continues to be a globally ubiquitous disease that is still a thoughtful issue in many countries; whether developing or developed ones.<sup>4</sup> Based on the findings of a study conducted by Shaghaghian et al, the prevalence of tooth decay among preschool children was 70% in Shiraz.<sup>5</sup> In a recent study, the mean DMFT (Decayed, Missing, and Filled Teeth) score was  $3.9 \pm 4.1$ , and only 31.7% of children aged 3 to 6 years were caries free.<sup>6</sup>

Tooth decay affects the quality of life, well-being, and dental health status of children.<sup>6,7</sup> Dental diseases and its associated disorders might have negative impacts on children and their parents' physical and psychological health by leading to their poor OHRQoL.<sup>8,9</sup> Children's OHRQoL is related to oral health behaviors, tooth-brushing frequency, eating habits, and oral health status,<sup>6,10-12</sup> in addition to socio-economic status and parents' education.<sup>7,10,13</sup> Assessment of OHRQoL has been commonly done over the years. The reason is related to the standard clinical indicators, which cannot capture all of oral health traits.<sup>8</sup> Oral health traditional measurement methods mostly use clinical indices without evidence about people's oral well-being in terms of their feelings about their mouths; their ability to chew their food.<sup>9</sup> Measures of OHRQoL were developed to aid assessment of both psychosocial and physical impacts of oral health. OHRQoL is important in children, for it influences children's weight, learning ability, and confidence.<sup>14,15</sup> Not



only is OHRQoL essential to identifying high-risk groups of children at an early stage, but it can also be a risk factor for poor oral health in adolescence and adulthood. Understanding this subjects' importance can be helpful for designing more useful interventions to support oral health programs. The aim of this study was to explore OHRQoL and its pertinent factors among pre-school children.

## Methods

### Study design and population

This cross-sectional study was conducted on 352 parents of 3–5 years old children who were referred for routine preventive children's care (checking child growth, development, and immunization) in health centers in Tabriz, from August 2019 to November 2019. Tabriz is located in the north-west of Iran, in the center of East Azerbaijan.

### Sample size estimation

To estimate the sample size, based on a previous study<sup>7</sup>, the prevalence of impact on OHRQoL was considered as 40.9% of the children, with a type one error of 0.05 ( $\alpha=0.05$ ) and acceptable error of 0.05 ( $d=0.05$ ), the required sample size was calculated as 370 participants based on the following formula:  $n = z^2p(1 - p)/d^2$ .

The multi-stage stratified method was used for sample selection. Two health centers were randomly selected from the ten districts of Tabriz. In each center, random sampling was applied to select eligible participants according to the proportion of children  $\leq 5$  years old in each center. Finally, 352 representative eligible parent-child pairs from 20 centers were recruited for this study. Participating parents anonymously completed the self-administered questionnaire of the study. Trained health workers completed the questionnaires for illiterate participants through face-to-face interviews.

### Validity and reliability of the measurement tools

The research questionnaire was composed of two sections: the socio-demographic characteristics section; and the OHRQoL and caregiver-reported oral health status sections. Demographic characteristics included mother and child age, occupation status and educational level of parents, child's gender, and number of children in the family.

### Caregiver-reported oral health status (C-ROHS)

The C-ROHS was measured with a single item asking "How would you describe the health of your children's teeth and mouth?" using a five-point Likert scale (1=very poor, 2=poor, 3=fair, 4=good, 5=very good).<sup>16</sup> The possible score range was 1–5 and higher scores indicated higher oral health status.

### Oral health-related quality of life

The OHRQoL was judged based on a previous tool developed by Jabarifar et al.<sup>17</sup> The Persian version of OHRQoL cultural adaptation by Jabarifar et al reported the alpha reliability coefficient 0.93. The OHRQoL consisted of 13 items in two parts: the child impact section (9 items) and the family impact section (4 items). The responses of each item ranged from 1="never" to 5="very often" on a five-point Likert scale. The total QHRQoL score ranged from 13 to 65, and a lower score indicated higher oral health status.

### Oral health behavior

Children's frequency of tooth-brushing was examined through one question (never/ rarely/2–4 times a week/ once a day /twice-daily).<sup>16</sup>

### Statistical analysis

SPSS version 16 (SPSS, Inc., Chicago, IL, USA) statistical software was used to analyze the data. One-way ANOVA, Tukey's test, independent samples *t* test, multiple linear regression, and descriptive statistics were used to compare the scores of OHRQoL in categorical variables. The significance level of  $\alpha$  was considered 0.05 for all data.

## Results

The mean age was 31.5 (SD=4.9) for mothers and 4.1 (SD=0.82) for children. According to the results, the majority of the mothers (88%) were homemakers, and 25% had higher education. The mean (SD) of OHRQoL was 18.8 (7.9) out of 65. [Table 1](#) shows the association between socio-demographic characteristics and the mean score of children's OHRQoL. Economic status and children's age were statistically associated with OHRQoL. There was no statistical association between OHRQoL and mothers' education and children's gender ( $P=0.36$ ).

Results of Tukey's post hoc tests in [Table 2](#) show that children's OHRQoL, which was significantly and positively, associated with tooth-brushing, economic status and oral health status in a way those children with higher economic status and good oral health status are more likely to have better OHRQoL. In children with twice-daily brushing the OHRQoL was higher as compared to children who never/ rarely brushed their teeth.

According to the results shown in [Table 3](#) the items most related to OHRQoL were feeling guilty (25%), dental pain (35%), and difficulty eating (14.8%). According to the results of multiple regressions, the four factors described 0.22% of the variance in children's OHRQoL. These factors were economic status ( $P=0.046$ ), caregiver-reported children's oral health status ( $P=0.0001$ ), children's frequency of tooth-brushing ( $P=0.001$ ), and their age ( $P=0.0001$ ) ([Table 4](#)). Children's age also had a significant inverse relationship with OHRQoL, which showed a decrease in OHRQoL with the increase in

**Table 1.** Distribution of Socio-demographic characteristics, mean and SD of OHRQoL and their associated factors (n=352)

Variables	Category	Number (%)	ECOHis		(df) f
			Mean (SD)	P value*	
Mother's education	Primary/illiterate	34 (9.7%)	18.3 (8.1)	0.16 <sup>a</sup>	
	Middle & high school diploma	230 (65.3%)	19.4 (9.5)		
	College or university	88 (25%)	17.3 (8.8)		
Father's education	Primary/illiterate	35 (9.9%)	22.8 (13)	0.21 <sup>a</sup>	
	Middle & High school diploma	207 (58.9%)	18.4 (8.3)		
	College or university	109 (31.2%)	18.3 (7.9)		
Child's gender	Male	179 (50.9%)	18.1 (9.1)	0.36 <sup>b</sup>	
	Female	173 (49.1%)	19.3 (8.6)		
Maternal employment	Employed	40 (11.4%)	17 (5.6)	0.53 <sup>b</sup>	
	Unemployed	312 (88.6%)	19 (9.1)		
Number children	Single child	135 (38.3%)	17 (6.8)	0.009 <sup>b</sup>	
	Two or more	217 (61.7%)	19.9 (8.1)		
Economic Status	Week	96 (27.3%)	20.9 (10.9) <sup>c</sup>	0.021 <sup>a</sup>	(2,349) 3.9
	Average	194 (55.1%)	18.2 (8)		
	Good	62 (17.6%)	17.3 (7.2)		
children's oral health status	Very poor /poor	42 (11.9%)	24.1 (11.5)	0.0001 <sup>a</sup>	(3,348) 19
	Fair	99 (28.1%)	21.9 (10.4)		
	Good	137 (38.9%)	17.2 (6.8) <sup>c</sup>		
	Very good	74 (21%)	14.4 (4.1) <sup>c</sup>		
Tooth brushing frequency children	Never/ rarely	125 (35.9%)	21.7 (11.6) <sup>c</sup>	0.0001 <sup>a</sup>	(3,348) 7.7
	2-4 times per week	54 (15.3%)	18 (5.6)		
	Once a day	138 (38.9%)	17 (6.8)		
	Twice daily	35 (9.9%)	16.6 (5.7)		

<sup>a</sup> one-way ANOVA; <sup>b</sup> Independent samples *t* test; <sup>c</sup> Tukey's post hoc test.

**Table 2.** Results of Tukey's post hoc tests to compare the means of variables in various Categories

Variables	Category I	Category J	Mean Difference (I-J)	SE	p	95% CI	
						Lower bound	Upper bound
Economic status	Poor	Fair	2.6	1.0	0.043	0.06	5.2
		Good	3.5	1.4	0.038	0.14	6.9
Oral health status	Very good	Fair	-7.5	1.2	0.0001	-10	-4.2
		Poor	-9.7	1.5	0.0001	-13	-5.6
	Good	Fair	-4.6	1.0	0.0001	-7.4	-1.8
		Poor	-6.8	1.4	0.0001	-10.6	-3.1
Tooth brushing frequency	Never/ rarely	Two	5	1.6	0.01	0.91	9.4
		Once a day	4.7	1.0	0.0001	2.0	7.5
		2-3 times per week	3.7	1.4	0.042	0.09	7.3

CI, confidence interval; SE, standard Error.

children's age ( $R=0.263$ ,  $P<0.001$ ).

## Discussion

This study probed OHRQoL and its effective impact factors among preschool children covered by primary health care centers. According to our findings, economic status and oral health behavior (tooth-brushing) had a relationship with OHRQoL of children.

In the current study, the mean (SD) score of OHRQoL

was 18.8 (7.9%) out of 65, which indicates children's OHRQoL was at an appropriate level. The findings are consistent with previous studies by Golkari et al<sup>13</sup> in Shiraz, Tamjid Shabestari et al in Zanjan,<sup>18</sup> and Ghanghas et al in India.<sup>19</sup> According to a similar study by Pakkhesal et al in Iran, the average OHRQoL score among preschool children was 11.81 out of 52, 9.6 for children and 2.3 for parents, in 2021.<sup>6</sup> Improving OHRQoL should be given more attention in health promotion programs.

**Table 3.** Score and distribution of each item and OHRQoL of participants (n=352)

		Never No. (%)	Hardly No. (%)	Occasionally No. (%)	Very often or often No. (%)	Mean (SD)	Median (Q1-Q3)
<b>Child impacts</b>							
Child function	Pain in the teeth, mouth or jaws	215 (61.1%)	49 (13.9%)	41 (11.6%)	47 (13.4%)	1.8 (1.2)	1 (1-2.7)
	Difficulty in drinking hot or cold	281 (79.8%)	37 (10.6%)	17 (4.8%)	17 (4.9%)	1.3 (0.88)	1 (1-1)
Child symptoms	Difficulty in pronouncing words	306 (86.9%)	31 (8.8%)	5 (1.4%)	9 (2.8%)	1.2 (0.67)	1 (1-1)
	Avoided talking	326 (92.6%)	11 (3.1%)	9 (2.6%)	6 (1.7%)	1.1 (0.51)	1 (1-1)
	Difficulty in eating	244 (69.3%)	56 (15.9%)	23 (6.5%)	29 (8.2%)	1.5 (1)	1 (1-2)
Missed school	Missed pre-school	325 (92.3%)	14 (4%)	8 (2.3%)	5 (1.5%)	1.1 (0.53)	1 (1-1)
Child psychology	Trouble sleeping	297 (84.4%)	21 (6%)	19 (5.4%)	15 (4.2%)	1.3 (0.8)	1 (1-1)
	Irritable or frustrated	267 (75.9%)	47 (13.4%)	20 (5.7%)	18 (5.1%)	1.4 (0.85)	1 (1-1)
Self-image/social interaction	Avoided smiling or laughing	297 (84.4%)	33 (9.4%)	10 (2.8%)	12 (3.4%)	1.2 (0.74)	1 (1-1)
<b>Family impact</b>							
	Felt guilty	237 (67.3%)	27 (7.7%)	33 (9.4%)	55 (15.6%)	1.8 (1.3)	1 (1-2.7)
	Been upset	245 (69.6%)	36 (10.2%)	28 (8%)	53 (15.2%)	1.6 (1.2)	1 (1-2)
	Time off from work	279 (79.3%)	19 (5.4%)	19 (5.4%)	35 (9.9%)	1.5 (1.1)	1 (1-1)
	Financial	276 (78.4%)	23 (6.5%)	20 (5.7%)	33 (9.4%)	5 (1.1)	1 (1-1)

**Table 4.** Regression analysis of predictor factors and Pearson correlation with children's ECOHIS

Variable	Unstandardized coefficients		Standardized coefficients	t	P	Pearson Correlation	
	B	SE	Beta			r	P
Tooth brushing frequency	-0.97	0.28	-0.17	-3.4	0.001	-0.208	0.0001
Oral health status	-2.3	0.41	-0.27	-5.6	0.0001	-0.364	0.0001
Economic status	-0.93	0.46	-0.09	-2	0.046	-0.182	0.001
Number of children	1.1	0.66	0.082	1.6	0.09	0.132	0.014
Child age	2.7	0.52	0.25	5.2	0.0001	0.263	0.0001

F (5,346)=20.9,  $P<0.001$ ,  $R=0.482$ , Adjusted  $R^2=0.22$ , SE: standard error

The findings of this study showed that the oral health status of the children influenced their OHRQoL. As shown, the mean score of quality of life among children with poor oral health status was significantly higher than that of children with very good oral health status (24.1 vs 14.4). It can be said children who had a good level of oral and dental hygiene had a better OHRQoL. This finding confirms a previous study by Abbasi-Shavazi et al<sup>15</sup> in 2020 in Iran and another study by Zaror et al in 2018 in Chile on preschool children.<sup>20</sup> It is also in line with the findings of a study in 2015 by Braun et al, which showed the relationship between QHRQoL and the number of decayed teeth in Navajo children.<sup>11</sup> There are also similar studies conducted in Turkey in 2020 and in Zanjan, Iran, in 2018, which showed children with a higher DMFT index and dental caries had lower quality of life.<sup>12,18</sup> Poor oral health status is a risk factor for QHRQoL. Children who suffer from poor oral health are likely to be more limited in daily activities than other children. Oral health can also influence children's school performance and activities. Thus, children's oral health status in health care programs should be given more attention as a priority issue.

Another finding of the present study was the effect of regular tooth brushing on OHRQoL. Children who

brushed once a day or more had a better OHRQoL than those who never or irregularly brushed their teeth, which confirms the findings by Buldur et al and Braun et al. in Turkey and among the Navajo, respectively.<sup>11,12</sup> Also a study in Iran (2020) by Abbasi Shavazi et al showed that OHRQoL had a relationship with brushing behavior and nutrition habits.<sup>15</sup> Mechanical methods (flossing and brushing) are the most common ways of controlling dental caries and maintaining good oral hygiene. Despite the necessity of oral health behaviors, they are not adequate in children. Tooth brushing twice daily as a part of the suggested children's oral health behaviors should start as soon as their teeth erupt.

This study showed the positive effect of economic status on OHRQoL. This finding showed that children with good oral health quality came from families with higher economic status, which confirms the findings of other studies in this field.<sup>12,13</sup> One of the important social determinants of health indicators is economic status, which can be a risk factor for dental caries and oral hygiene. Hence, to improve OHRQoL and oral hygiene, these social determinants of health factors – economic status or income – need to be considered much more seriously in prevention programs and public health

practice by health care organizations.

According to the findings of this study, there was a relationship between age and the score of children's QHRQoL. Older children had an unfavorable quality of life compared to younger children, which is in line with the findings of Pakkhesal et al, Golkari et al, and Tamjid Shabestari et al in Iran, which showed the decrease in quality of life while increasing in the age of children.<sup>6,13,18</sup>

According to our findings, there was no significant relationship between parents' educational status and OHRQoL, which is confirmed by the findings of other studies by Gomes et al in Brazil and Martins-Júnior et al in 2013.<sup>10,21</sup> This finding is in contrast with some studies in this field.<sup>6,18</sup> This contrast may be due to the participants' educational status. For example, in the study by Pakkhesal et al<sup>6</sup> in Iran, 63% of the participants had university education while this was 23% in our study. These differences may be due to the study design, sample size, and sampling method. Other findings of this study were indicating of a none significant relationship between gender and OHRQoL, which is in line with a previous study by Al-Shamrani in Saudi Arabia.<sup>22</sup>

Based on this study, the number of children was effective on OHRQoL in a way that the score of quality of life related to oral health becomes more undesirable with the increase in children's number, which is in line with a study in Iran by Golkar et al in 2014.<sup>13</sup> However, this is not in line with the findings of the research by Tamjid Shabestari et al.<sup>18</sup> The difference may be due to the sampling method because in the study of Tamjid Shabestari et al, 62% of children were first children.

This study had some limitations. First, the information was self-reported, which may possibly be subject to recall and response bias. Second, there was no clinical examination, such as dental caries or plaque index, for the outcome variable (OHRQoL). Despite the limitations, self-assessment is a cost-effective method of data collection according to WHO recommendations. Self-assessed oral health information is essential for documentation of suitable approaches in oral health promotion.

## Conclusion

According to the findings of this study, children's OHRQoL was associated with demographic characteristics (age and economic status), tooth-brushing, and oral health status. Also, parents are directly responsible for children's health and can play a vital role in preventing childhood oral health complications. Promotional activities seem necessary for parents to improve the OHRQoL of their children.

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## Authors' Contribution

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## Competing Interests

The authors declare that there is no conflict of interest.

## Data Availability Statement

The datasets analyzed for the current study are available from the corresponding author upon reasonable request.

## Ethical Approval

The study protocol was approved by the Ethical committee of Tabriz University of Medical Sciences (ID number: IR.TBZMED.REC.1397.339). Participants were fully informed about the purpose of the study. A written consent was obtained from participating parents who voluntarily participated in this study.

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