*Original Article*

# A survey on DMFT index of the first permanent molar in 12-year-old students of Larestan, Iran, in 2014

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**Abstract** **Received**: October 2017, **Accepted**: April 2017

**Background:** One of the most important epidemiologic indices for the assessment and measurement of dental caries is the Decayed, Missing, and Filled Teeth (DMFT) index which is used as an important criterion for the evaluation of the oral and dental health status of individuals. Therefore, the present study was conducted to determine DMFT6 (DMFT of the first permanent molar) index and the related factors with the caries free status in students of 12 years of age in Larestan, Iran, in 2014.

**Materials and Methods:** The present cross-sectional survey was conducted on 2436 students. Data were collected using the National Oral Health Promotion Plan Checklist. If the features of decayed, missing, and filled were observed in any of the first permanent molars, they received a score of 1. Data were analyzed using *chi*-square test, *chi*-squared test for trend, independent two-sample *t*-test, and multiple logistic regression model.

**Results:** The mean and standard deviation of DMFT6 in all students was 1.00 ± 1.36. It was 1.07 ± 1.39 and 0.93 ± 1.33 in girls and boys, respectively, and this difference was statistically significant (P = 0.0080). In addition, more than half of the students (51.5%) were caries free. The variables of gender (P = 0.0007), mothers' education (P < 0.0001), and fathers' occupation (P = 0.0045) were determined as the related factors of the caries free variable in the logistic regression model.

**Conclusions:** It seems that the amount of the DMFT6 index in students of 12 years of age in Larestan was high compared to the World Health Organization (WHO) standards in 2010. Therefore, it is recommended that efficient plans be made to promote the oral and dental health of students.

**Keywords:** DMF, Dental Caries, Students, Iran

## Introduction

The most important demographic indicator for the evaluation and measurement of dental caries is the decayed, missing, and filled teeth (DMFT) index. This index evaluates the number of permanent teeth, decayed teeth, missing teeth due to decay, and filled teeth due to decay. The DMFT index is used as an important criterion for the assessment of oral health status. This index does not illustrate the true prevalence of tooth decay in a community. Thus, the report of the percentage of caries free individuals is used as a complementary index for the prevalence of caries in epidemiologic studies (1).

The World Health Organization (WHO) considers children of 12 years of age as one of the most important target groups, because, in most countries, children are in school at this age

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and they have most of their teeth except the third molar (2). Since more than half of the population in Iran consist of youth and adolescents, planning for the identification, treatment, and prevention of oral and dental diseases is necessary. The first step in this regard is the preparation of a report on oral and dental health indicators (3).

One of the goals of the WHO until 2010 was to reduce the DMFT index in children of 12 years of age to less than 1 (4). The new goals of the WHO until 2020 regarding oral and dental health are to assess its previous goals and emphasize the importance of oral and dental health as an essential component of public health (5). Moreover, this organization suggests that, if possible, each country evaluate its status of oral and dental health once every 5 years (6).

Numerous studies have assessed the prevalence of dental caries among school-age children in Iran. The first national survey in this regard was conducted by the Research Deputy of the Ministry of Health, Treatment, and Medical Education with the cooperation of all medical universities during 1990-1992 (7). This survey showed that 68.7% of 12 year-olds had a DMFT of less than 1 (7). A study in Rafsanjan, Iran, showed that the mean DMFT of students was 2.46 ± 2 (girls: 2.13; boys: 2.78) and this indicator was 1.9 ± 1.6 in the first permanent molar (8). Moreover, the results of a study in Babol, Iran, showed that the mean DMFT6 (DMFT of first permanent molar) in 12-year-old students was 1.59 ± 2; this index was significantly higher in boys compared to girls (9).

The first permanent molar tooth is one of the most important permanent teeth. The growth of this tooth is at an age in which the child is unable to maintain the oral hygiene and frequently uses sugary products. Furthermore, parents' negligence toward the growth of this tooth and lack of knowledge regarding the fact that this tooth is their child's first permanent tooth has caused the loss of this important tooth due to the negligence of society regarding oral health. Therefore, the first measure that must be taken in this regard is to inform parents of the importance of the timely prevention and treatment of caries in this tooth (10).

Children of 7-12 years of age form the basis and foundation of the active population of a country; moreover, at this age primary teeth are lost and permanent teeth erupt (11). In addition, no study has been performed in this regard in Larestan, Fars Province, Iran. Thus, the present study was conducted with the aim to determine DMFT6 and its related factors with lack of dental caries in students of 12 years of age in Larestan in 2014.

## Material and Methods

The present cross-sectional study was conducted through census method on 2436 students of 12 years of age (year 6) in schools (85 public and 3 private schools) of Larestan.

Larestan is a city in Fars Province and one of the initial 49 cities constituted in 1937. It is situated in the north of Hormozgan Province and south of Fars Province between the cities of Gerash, Lamerd, Khanj, Bastak, Darab, and Jahrom, Iran. The municipality of Lar is the center of Larestan city and is one of the oldest cities in Iran. It is situated at a distance of 330 km from the center of Fars Province (Shiraz) and 190 km from Bandar Abbas, Iran (12).

The data collection tool used was the National Oral Health Promotion Plan Checklist designed by the Oral and Dental Health Bureau of Iran. The checklist consists of two sections; the first section was a demographic characteristics form including questions on name, surname, school type, area of residence, occupation, parents' education and the second section of the checklist included questions on the students' oral and dental status and number of decayed, missing, and filled teeth. To insure the confidentiality of information, the name and surname items were

not used. The study inclusion criteria were being 12 years of age and a student in Lar and the surrounding villages, and the exclusion criterion was unwillingness to participate in the study.

Data on oral and dental health were collected through oral examination under suitable lighting and using a sickle probe while the patient was lying on the dental unit at a suitable height in a health center. The first permanent molar teeth were evaluated starting from the upper right half of the jaw and ending at the lower left half of the jaw. In this index the letters D, M, and F, respectively, represented untreated decayed teeth, missing teeth due to decay, and teeth filling or restoration such as dental crown procedure based on the standards of the WHO (1). Hence, if damage was observed in the surface and grooves of the tooth, i.e., empty spaces in or softening of the tooth enamel is felt by a prober, the tooth is considered as decayed. Teeth with temporary dental dressing or filled teeth with caries were also considered as decayed. Teeth extracted due to caries were considered as missing (13).

If the features of decayed, missing, and filled were observed in any of the first four permanent molars (tooth number 6), they would receive a score of 1.

It is noteworthy that, in order to prevent any error by the examiners (6 individuals), they received the necessary training on the correct method of examining the students by a dentist.

After obtaining individual consent from the students, they were examined individually during 2013-2014 and data were recorded in coded checklists by health personnel. Then, data were coded and entered into SPSS (version 21, IBM Corporation, Armonk, NY, USA) and SAS software (version 9.1, SAS Institute Inc., Cary, NC, USA) and analyzed.

Quantitative variables were reported as mean ± standard deviation (SD) and qualitative variables presented as number (percentage). To evaluate the relationship between nominal qualitative variables (gender, school type, residential area, parents' occupation) and the variable of caries free, *chi*-square test was used. Furthermore, *chi*-square test for trend was used to evaluate the relationship between ordinal qualitative variable (parents' education level) and the caries free variable. Independent two-sample *t*-test was used to determine the relationship between DMFT6 and students' gender.

To determine the predictors of the caries free variable, multiple logistic regression model was used. The variables of gender, school type, residential area, parents' occupation, and parents' education level were entered into the model through stepwise selection. The results of logistic regression are reported as odds ratio (OR), 95% confidence interval (CI) for OR, and P-value.

To evaluate the accuracy and power of logistic regression model in the prediction of caries free, Hosmer-Lemeshow goodness-of-fit test and area under the receiver operating characteristics (ROC) curve were also reported. The significance level in all tests was considered as 0.05.

**Results**

Among the 2436 participants, 1253 (51.4%) were boys and 1183 (48.6%) were girls. Moreover, 96.7% of the participants studied in public schools and only 3.3% studied in private schools, and more than half of the students (55%) resided in the city. The majority of the students' mothers and fathers were, respectively, homemakers (95.4%) and manual workers (52.8%). The education level of the majority of students' parents was at a primary school level (fathers: 32%; mothers: 39.4%). In addition, more than half of the students (51.5%) were caries free in their permanent teeth (Table 1).

**Table 1:** Frequency percentage of demographic variables in students of 12 years of age in Larestan, Iran, in 2014

| Variable | Category | N (%) |
|---|---|---|
| **Gender** | Boy | 1253 (51.4) |
| | Girl | 1183 (48.6) |
| **School type** | Public | 2356 (96.7) |
| | Private | 80 (3.3) |
| **Mother's education** | Illiterate | 152 (6.2) |
| | Primary school education | 864 (35.5) |
| | Middle school education | 538 (22.1) |
| | High school education | 477 (19.6) |
| | University education | 161 (6.6) |
| | Unspecified | 244 (10.0) |
| **Father's education** | Illiterate | 127 (5.2) |
| | Primary school education | 713 (29.3) |
| | Middle school education | 669 (27.5) |
| | High school education | 490 (20.1) |
| | University education | 231 (9.5) |
| | Unspecified | 206 (8.5) |
| **Mother's occupation** | Homemaker | 2325 (95.4) |
| | Employee | 94 (3.9) |
| | Other (e.g., salesperson and farmer) | 17 (0.7) |
| **Father's occupation** | Employee | 275 (11.3) |
| | Salesperson | 203 (8.3) |
| | Farmer | 146 (6) |
| | Industrial worker | 257 (10.6) |
| | Manual worker | 1287 (52.8) |
| | Military employee | 14 (0.6) |
| | Self-employed | 254 (10.4) |
| **Residential area** | Urban area | 1340 (55.0) |
| | Rural area | 1096 (45.0) |
| **Caries free** | Yes | 1255 (51.5) |
| | No | 1181 (48.5) |

Mean and SD of DMFT6 in all students was 1.00 ± 1.36; 1.07 ± 1.39 in girls and 0.93 ± 1.33 in boys. This difference was statistically significant (P = 0.008). Demographic variables are presented based on being or not being caries free in table 2. The analysis of caries free in first permanent molar based on gender showed that this indicator was higher in boys compared to girls and this difference was statistically significant (P = 0.001). As can be seen in the results presented in table 2, this indicator was higher in students living in urban areas than those in rural areas; this difference was statistically significant (P = 0.045). The percentage of caries free was higher in public school students than in private school students; however, this difference was not statistically significant (P = 0.465).

Moreover, *chi*-squared test for trend illustrated a significant direct relationship between parents' education level and being caries free in 12-year-old students (P < 0.001). Increase in parents' education level resulted in an increase in the percentage of caries free cases; the highest percentage of caries free cases were related to high school education (Table 2).

**Table 2:** Frequency percentage of the caries free indicator based on demographic variables in 12-year-old students in Larestan, Iran, in 2014

| Variable | Category | Yes N (%) | No N (%) | *P-value |
|---|---|---|---|---|
| **Gender** | Boy | 686 (54.7) | 567 (45.3) | <0.001 |
| | Girl | 569 (48.1) | 614 (51.9) | |
| **School type** | Public | 1217 (51.7) | 1139 (48.3) | 0.465 |
| | Private | 38 (47.5) | 42 (52.5) | |
| **Mother's education** | Illiterate | 50 (32.9) | 102 (67.1) | <0.001 |
| | Primary school education | 433 (50.1) | 431 (49.9) | |
| | Middle school education | 304 (56.5) | 234 (43.5) | |
| | High school education | 270 (56.6) | 207 (43.4) | |
| | University education | 90 (55.9) | 71 (44.1) | |
| **Father's education** | Illiterate | 39 (30.7) | 88 (69.3) | <0.001 |
| | Primary school education | 365 (51.2) | 348 (48.8) | |
| | Middle school education | 357 (53.4) | 312 (46.6) | |
| | High school education | 279 (56.9) | 211 (43.1) | |
| | University education | 128 (55.4) | 103 (44.6) | |
| **Mother's occupation** | Homemaker | 57 (60.6) | 37 (39.4) | 0.140 |
| | Employee | 1191 (51.2) | 1134 (48.8) | |
| | Other (e.g., salesperson and farmer) | 7 (41.2) | 10 (58.8) | |
| **Father's occupation** | Employee | 155 (56.4) | 120 (43.6) | 0.022 |
| | Salesperson | 102 (50.2) | 101 (49.8) | |
| | Farmer | 55 (37.7) | 91 (62.3) | |
| | Industrial worker | 131 (51.0) | 126 (49.0) | |
| | Manual worker | 675 (52.4) | 612 (47.6) | |
| | Military employee | 6 (42.9) | 8 (57.1) | |
| | Self-employed | 131 (51.6) | 123 (48.4) | |
| **Residential area** | Urban area | 715 (53.4) | 625 (46.6) | 0.045 |
| | Rural area | 540 (49.3) | 556 (50.7) | |

**Chi*-square test, ***Chi*-square test for trend, P < 0.05 was statistically significant

The results of multiple logistic regression showed that the caries free variable has a significant relationship with gender (P = 0.0007); the possibility of caries free in boys is higher than girls (OR = 1.349). Furthermore, with increase in mother's education level, the possibility of being caries free increased in students (P < 0.0001). The highest possibility of being caries free was observed in students whose mothers had high school education compared to those with illiterate mothers (OR = 2.838). The relationship between father's occupation and caries free was also statistically significant (P = 0.0045). The possibility of being caries free was lower in students whose fathers were farmers compared to those whose fathers were employees (OR = 0.547) (Table 3).

**Table 3:** Factors related to the caries free variable in the multiple logistic regression model* in students of 12 years of age in Larestan, Iran, in 2014

| Variable | Category | Odds ratio (OR) | 95% confidence interval for OR | P-value* |
|---|---|---|---|---|
| Gender | Girl | 1.000 | - | 0.0007 |
| | Boy | 1.349 | 1.134-1.604 | |
| Mother's education | Illiterate | 1.000 | - | <0.0001 |
| | Primary school education | 2.077 | 1.431-3.014 | |
| | Middle school education | 2.738 | 1.849-4.052 | |
| | High school education | 2.838 | 1.893-4.255 | |
| | University education | 2.601 | 1.578-4.287 | |
| Father's occupation | Employee | 1.000 | - | 0.0045 |
| | Salesperson | 0.714 | 0.474-1.074 | |
| | Farmer | 0.547 | 0.350-0.854 | |
| | Industrial worker | 0.784 | 0.544-1.129 | |
| | Manual worker | 1.035 | 0.763-1.404 | |
| | Self-employed | 0.866 | 0.606-1.237 | |

*Stepwise logistic regression model was used. The variables of gender, school type, residential area, parents' occupation, and parents' education level were entered into the model. $P < 0.05$ was statistically significant.
Hosmer-Lemeshow goodness-of-fit test; $P = 0.5357$
Area under the ROC (Receiver Operating Characteristics) curve; $C = 0.6778$

## Discussion

The DMFT index and each of its components in a community is representative of the true amount of dental caries and the preventive services provided (2). In the present study, mean and SD of DMFT6 in all students was 1.00 ± 1.37. Previous studies conducted in Iran in 1990-2006 have shown that this index ranged from 0.77 to 6.12 in children of 12 years of age in different areas of the country (8, 13-16). This may be due to cultural, ethnic, and geographical differences and differences in the nutritional status of children, access to dental services, increased awareness of parents and students, adherence to oral and dental hygiene, and fissure sealant therapy.

Another important criterion for the evaluation of oral and dental health is the percentage of caries free individuals. This indicator was 51.5% in the present study. However, this indicator was reported as 20.7%, 34.7%, and 34.8% in Rafsanjan (8), Sirjan (12), and Bandar Abbas (13), Iran, respectively, which is illustrative of the high prevalence of dental caries in the mentioned cities.

The results of this study showed that the percentage of caries free was higher in boys compared to girls and this difference was statistically significant. This may be due to the early growth and development of permanent teeth in girls, which results in the exposure of their teeth to the risk of caries for a longer duration of time (17). Nevertheless, in the studies by Eskandaryzedeh et al. in Kerman (18) and Nabipour et al. in Varamin (19), no significant relationship was observed between the caries free status and gender.

In this study, a significant direct relationship was found between mothers' education level and caries free; increase in mother's education resulted in an significant increase in possibility of being caries free. Campus et al. reported a significant relationship between fathers' education and low risk of caries in children (20). Ismail and Sohn also reported significantly lower cases of caries in children of individuals with university degrees compared to those with lower education levels (21).

Yousofi et al. in Boyer-Ahmad found a higher caries free index in students in urban areas

compared to those in rural areas (bivariate analysis) (22), which was in accordance with the results of the present study. In other words, the prevalence of dental caries in students in rural areas is significantly higher than students in urban areas. This difference can be explained through lower economic status and lack of knowledge, adherence to oral hygiene, and sufficient dental services in rural areas.

Furthermore, a significant relationship was observed between fathers' occupation and being caries free; the possibility of being caries free was lower in children whose fathers were farmers compared to those whose father were employees. A study in Boyer-Ahmad showed that the father being an employee and the mother not being an employee resulted in a significant decrease in caries in children (22). The parents being employees and their high education level resulted in increased awareness and knowledge among them regarding oral health care, which, in turn, resulted in reduced caries in students.

A limitation of the present study was the lack of evaluation of variables such as students' nutritional habits, toothbrush, mouthwash, and dental floss use, fluoride therapy, socio-economic status of the family, number of dental visits per year, number of instances of toothbrush use per day. The addition of these variables to the National Oral Health Promotion Plan Checklist is recommended.

Furthermore, encouraging the use of toothbrush, dental floss, and mouthwash containing fluoride among students, increasing students' and their parents' knowledge through educational media, teachers, and health care personnel, reducing the consumption of sugary product, and implementing preventive methods such as local fluoride therapy, fissure sealant therapy, and evaluation of the fluoride content of drinking water of different regions and the addition of fluoride to drinking water if necessary are recommended.

## Conclusion

The results of this study showed that the amount of the DMFT index of the first permanent molar in students of 12 years of age in Larestan was high compared to WHO standards in 2010 (≥ 1). Therefore, it is recommended that necessary plans be made to promote the oral and dental health of students.

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