The effects of socio-economic status on dental caries incidence in a group of primary school children, Tehran-2000

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ABSTRACT

Purpose: Dental caries is one of the most common and costly chronic diseases in the world. Many studies have reported socio-economic status (S.E.S) as an important factor predisposing caries. This investigation was carried out to evaluate the effect of differences in socio-economic status of parents as a multidimensional factor on caries development in a group of 8-year-old children in Tehran during the year 2000.

Materials & Methods: A total of 1024 children were randomly selected from 99 primary schools throughout the greater Tehran. The prevalence of dental caries was recorded using the “DMFT” and “dmft” indices. S.E.S was assessed through evaluating, parents' educational level, fathers' job. Collected data was then analyzed using Chi-square and one-way ANOVA tests, in association to a regression analysis.

Result: Results showed that, the mean caries prevalence in primary teeth (d) to be at 2.4±2.4 and 4.6±2.3 in the highest and lowest socio-economic status respectively. This value was at 2.1±2.4 and 4.5±2.3 in children of highly educated mothers and illiterate ones, respectively. There were similar findings for the effect of the other factors determining S.E.S, on caries prevalence of the children. Regression Analysis showed that, mothers' education was as important as the other factors to determine the families' S.E.S. This was in fact found to be the most effective factor on caries prevalence. (PV=0.01)

Conclusion: S.E.S is an important factor on caries prevalence, with mothers' educational level being the main determining factor on S.E.S.

Keywords: Caries incidence, Socio-economic status, Iran, Mixed dentition, DMFT, dmft

INTRODUCTION

Dental caries is well known as an infectious microbiological disease of the teeth causing, localized dissolution and destruction of calcified tissues, from acid production by bacteria on the tooth surface. (1,2) It is widely accepted as, one of the most common and costly chronic diseases in the global population. (1) However, now a days with improvements in both cultural and socio-economic status (S.E.S) of the families, within different societies there are clear indications on what is accepted as health behavior changes, providing more care for general health and exclusively oral health.

Several studies, reported the direct effect of the socio-economic status (especially, fathers' job) as an important factor predisposing caries, with a high prevalence in a society. (3-11) KuriaKose & Joseph (1999) and Malik et al. (2001) reached to the same results in India and Saudi Arabia. (2,12) Nevertheless, there are some other reports with results
disagreeing the effect of economic status on caries prevalence in other Middle Eastern countries.\textsuperscript{(13-15)}

Gaughwin & Spencer \textsuperscript{[1999]} study was in disagree with the effect of S.E.S on caries prevalence through an study in South Australia.\textsuperscript{(16)} But, Most of the earlier reports are centered on correlation between S.E.S and even more specific, fathers’ job and economic status on caries prevalence among children.\textsuperscript{(11,17,18)} They are used to rank the groups either by affluence or life-style which is identified by income, while cultural aspect, such as educational level would be underestimated or just hinted at, and not considered as a determining factor.

Brown \textit{et al}(2000). classified the children by their poverty level in to three groups of: at/below and above the poverty level.\textsuperscript{(4)}

Van-Kaenel \textit{et al}(2001). evaluated the socio-demographic factor according to: place of residence, race of the child and parent’s marital status.\textsuperscript{(19)}

Irigoyen \textit{et al}(1999). believed that the S.E.S is based on the economic well-being, and whether the family income is high enough to register the child at a private or public school.\textsuperscript{(6)}

Waplington \textit{et al}(1998). analyzed the results by ACORN category (A Classification Of Residential Neighborhoods) which makes the relation between the child's post code and Census data for assessing his social background.\textsuperscript{(20)}

Some of the studies assessed parents’ education, as a determining factor on S.E.S. Al-Hosani & Rugg-Gunn (1998) categorized children, into high, middle, or low groups according to parental education and income in Abu Dhabi.\textsuperscript{(15)}

Malik \textit{et al}(2001). assessed children’s social class in terms of the fathers’ job and mothers’ education and kind of school participated in Jeddah.\textsuperscript{(2)}

Every society has it’s own specific culture, custom and demographic status. Little data is available on Iranian families. High prevalence of dental caries have been reported in many similar countries in Asia.\textsuperscript{(15)} Iran like other developing countries is on the edge of rise in caries prevalence.\textsuperscript{(14)} This investigation was designed to assess the S.E.S of Iranian families (both culturally and economically) on caries prevalence. This was mainly focused on parents’ education level and fathers’ occupation, surface area of residence, family size and the house ownership status.

\section*{MATERIALS & METHODS}

This descriptive study was carried out on 1024 children aged 8 years (496 girls and 528 boys).

Selected subjects were simply randomized selected from the total 990 schools in greater Tehran, during the year 2000. Only 10\% of which were then used for assessment. This would bring the number of schools to 99.

About 100-120 pupils of this age were estimated for each school. From which 11-12 subjects were randomly selected (10\%). The registration list of schools was used with the following criteria :

1. The age between 8 years and 1 month to 8 years and 11 months and 29 days (according to the day of examination).
2. Having certain teeth present (Permanent central & lateral incisor and first molar, primary canine and first & second molar, of each quadrant). This would provide the chance to assess caries prevalence in mixed dentition stage.

Overall all 11 examiners took part in this investigation for whom a training and calibrating program was set. Inter examiner reliability executed and kappa statistics was performed with the range of 0.7-0.85 between examiners. In addition to a test retest for both inter & intra examiner reliability, showing correlation coefficient with r>0.8 , r>0.85, respectively.

Examination was carried out with a dental mirror and explorer No.5 with the child being seated on a chair. Both DMFT and dmft were measured to compare the differences. Dental caries was recorded clinically according to the WHO criteria.\textsuperscript{(20)} In order to enable a conclusion to be derived from the children’s oral health status and predisposing factors involved several other factors were also evaluated including, The frequency of tooth
brushing (less than once a day, once a day, twice a day and more); mothers’ education level (from university degrees to illiterate); socio-economic status, i.e.: fathers’ education (from university degrees to illiterate) and job (from specialist to unemployed); The proportion of residence surface area to family size for each individual; house ownership (owner, tenant).

It should be noted that, the education level assessed in this study was performed similar to the method used in an earlier report from Jeddah, Saudi Arabia.\(^2\) Job classification was performed independently as detailed in table1. This classification was decided and judged suitable for this specific community.

Furthermore, the last two criteria mentioned earlier were added, due to their importance for assessing S.E.S in the Iranian society. At least 3 items were considered essential to allocate the subject in one of the groups.

Data was collected using a questionnaire filled in by attending parents.

All data were entered on computer using SPSS+ analysis. One-way ANOVA test was used to compare quantitative variables, while, Chi-squared test was used to compare qualitative variables. In addition to single analyses, multivariate analysis was also carried out using Regression analysis by Enter, and the significant level was set at (P<0.05).

### Table 1. S.E.S groups and descriptors

<table>
<thead>
<tr>
<th>S.E.S Groups</th>
<th>Fathers’ education</th>
<th>Fathers’ Job</th>
<th>House Ownership</th>
<th>The proportion of area of residence to family size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division I</td>
<td>University degree</td>
<td>Specialist &amp; manager</td>
<td>Owner</td>
<td>&gt;50m</td>
</tr>
<tr>
<td>Division II</td>
<td>Completed secondary school degree</td>
<td>Businessman</td>
<td>Owner</td>
<td>&gt;30m, &lt;50m</td>
</tr>
<tr>
<td>Division III</td>
<td>Un completed secondary school degree</td>
<td>Government employee</td>
<td>Owner</td>
<td>&gt;20m, &lt;30m</td>
</tr>
<tr>
<td>Division IV</td>
<td>Primary school degree</td>
<td>Worker</td>
<td>Tenant</td>
<td>&gt;10m, &lt;20m</td>
</tr>
<tr>
<td>Division V</td>
<td>Illiterate</td>
<td>Unemployed</td>
<td>Tenant</td>
<td>&lt;10m</td>
</tr>
</tbody>
</table>

### RESULTS

Mean dmft and DMFT were found to be at 6.2±2.7 and 1.5±1.5, respectively. From those, children with more than 5 carious teeth were rated at 1.4% for primary and 73.2% for permanent teeth. 22.1% of the children were caries free.

The frequency of tooth brushing, reported by patients was once per day in 64.5% of the cases. This was higher in children of higher educated parents. There was a significant difference between different mothers’ educational level with regards to the frequency of child’s tooth brushing frequency (P<0.0009). The difference was also significant between different levels of father’s education (P<0.007).

The number of family members was shown to have a negative effect on frequency of tooth brushing in children. Statistical difference was found to be significant between the frequency of tooth brushing in children according to their fathers’ profession. However, there was no clear change in caries prevalence by an increase in the frequency of brushing in these children.

72% of the cases had used fluoride dentifrice, 5% used fluoride mouth wash, gel therapy, drop or tablet and, 18% used more than one of these supplements with only 5% using none.

Most of the parents had only high school education (37.3% of the fathers and 33.6% of the mothers). 9.2% of the mothers and 19.3% of the fathers had university degrees, while, 4.4% of the fathers and 7.9% of the mothers were illiterate.

Majority of fathers (44%) were involved in private businesses, while only 17% of the whole population were involved in a
specialized profession, with 2% of them being unemployed.

The majority of subjects were in four member families (40.1% of the whole population). Most of the families had moderate S.E.S (60% of the families).

A decline was seen in the prevalence of dental caries in children of educated mothers associated with a rise in the mean number of filled primary teeth ($P<0.05$). (Fig.1)

Different levels of mothers’ education showed a significant effect on caries prevalence of their children. (Fig.2)

A similar finding was recorded when fathers’ education level was tested for its’ effect on child’s caries prevalence. (Fig.1, Fig.2)

A clear decrease was observed in children’s caries prevalence when the father’s occupation was at a higher level, however higher level of occupation did not necessarily have a higher income, in this sample community. (Table2)

Similar findings were seen when an improvement was achieved in S.E.S of the family. (Table3)

There was a clear decline in the number of filled teeth and an increase in the number of decayed teeth, was seen in children of
families with higher number of children (P<0.05). A better S.E.S could be expected as seen here in families with highly educated mothers (P<0.0001). This also affects the child’s oral health status.

Regression analysis showed that mothers’ educational level is as important as the other factors stated earlier determining the family’s S.E.S. (Table 4)

<table>
<thead>
<tr>
<th>S.E.S</th>
<th>β(β)</th>
<th>SE</th>
<th>P.V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.3</td>
<td>0.07</td>
<td>0.0001</td>
</tr>
<tr>
<td>Living area</td>
<td>-0.3</td>
<td>0.0</td>
<td>0.0001</td>
</tr>
<tr>
<td>Fathers’ educational level</td>
<td>-0.017</td>
<td>0.01</td>
<td>0.0001</td>
</tr>
<tr>
<td>Fathers’ job</td>
<td>-0.1</td>
<td>0.01</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mothers’ educational level</td>
<td>-0.05</td>
<td>0.01</td>
<td>0.0001</td>
</tr>
<tr>
<td>Family size</td>
<td>-0.004</td>
<td>0.01</td>
<td>-0.61</td>
</tr>
</tbody>
</table>

Table 2. Mean DMFT & dmft scores by fathers’ occupation.

<table>
<thead>
<tr>
<th>Fathers’ job</th>
<th>Caries</th>
<th>d±SD</th>
<th>m±SD</th>
<th>f±SD</th>
<th>dmf±SD</th>
<th>D ±SD</th>
<th>M±SD</th>
<th>F±SD</th>
<th>DMF ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager professional specialist (n=68)</td>
<td>1.1±2.3</td>
<td>0.9±1.4</td>
<td>1.9±2.3</td>
<td>5±2.8</td>
<td>0.9±1.4</td>
<td>0.06±0.4</td>
<td>0.4±1</td>
<td>1.3±1.6</td>
<td></td>
</tr>
<tr>
<td>Business (n=468)</td>
<td>3.7±2.6</td>
<td>1.3±1.7</td>
<td>1.3±2</td>
<td>6.3±2.6</td>
<td>1.2±1.4</td>
<td>0.1±0.4</td>
<td>0.2±0.6</td>
<td>1.5±1.5</td>
<td></td>
</tr>
<tr>
<td>Simple government employee (n=326)</td>
<td>3.3±2.7</td>
<td>1.1±1.4</td>
<td>1.4±2</td>
<td>5.8±2.8</td>
<td>1.1±1.3</td>
<td>0.12±0.5</td>
<td>0.2±0.7</td>
<td>1.4±1.5</td>
<td></td>
</tr>
<tr>
<td>Worker (n=137)</td>
<td>4.6±2.2</td>
<td>1.5±1.8</td>
<td>0.3±1</td>
<td>6.5±2.5</td>
<td>1.5±1.5</td>
<td>0.13±0.5</td>
<td>0.09±0.4</td>
<td>1.7±1.6</td>
<td></td>
</tr>
<tr>
<td>Unemployed (n=25)</td>
<td>4.7±2</td>
<td>1.8±1.3</td>
<td>0.2±0.7</td>
<td>6.8±1.7</td>
<td>1.7±1.6</td>
<td>0±0</td>
<td>0±0</td>
<td>1.7±1.6</td>
<td></td>
</tr>
<tr>
<td>P.V.</td>
<td>0.0001</td>
<td>0.02</td>
<td>0.0001</td>
<td>0.0002</td>
<td>0.006</td>
<td>0.6</td>
<td>0.02</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Mean DMFT & dmft scores according to S.E.S.

<table>
<thead>
<tr>
<th>S.E.S</th>
<th>Caries</th>
<th>d±SD</th>
<th>m±SD</th>
<th>f±SD</th>
<th>dmf±SD</th>
<th>D ±SD</th>
<th>M±SD</th>
<th>F±SD</th>
<th>DMF ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division I &amp; II (n=237)</td>
<td>2.42±2.4</td>
<td>1.3±1.8</td>
<td>2.3±2.4</td>
<td>6±2.7</td>
<td>1.01±1.33</td>
<td>0.12±0.5</td>
<td>0.3±0.8</td>
<td>1.4±1.5</td>
<td></td>
</tr>
<tr>
<td>Division III (n=614)</td>
<td>3.8±2.6</td>
<td>1.2±1.5</td>
<td>1.03±1.7</td>
<td>6.2±2.7</td>
<td>1.14±1.36</td>
<td>0.12±0.5</td>
<td>0.2±0.6</td>
<td>1.5±1.5</td>
<td></td>
</tr>
<tr>
<td>Division IV &amp; V (n=173)</td>
<td>4.6±2.3</td>
<td>1.4±1.6</td>
<td>0.3±1.1</td>
<td>6.3±2.6</td>
<td>1.6±1.6</td>
<td>0.01±0.1</td>
<td>0.02±0.18</td>
<td>1.65±1.6</td>
<td></td>
</tr>
<tr>
<td>P.V.</td>
<td>0.0001</td>
<td>0.1</td>
<td>0.0001</td>
<td>0.4</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.0002</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Total (n=1024)</td>
<td>3.6±2.6</td>
<td>1.2±1.6</td>
<td>1.2±1.9</td>
<td>6.1±2.7</td>
<td>1.9±1.2</td>
<td>0.1±0.5</td>
<td>0.2±0.7</td>
<td>1.5±1.5</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Relationship between S.E.S and other variables assessed by multiple regression analysis in the families.
The level of mothers’ education was shown to have the most important role on caries prevalence. Surprisingly father’s education level was the second factor lowering the dmft. (Table 5, Table 6)

**Table 5.** Relationship between DMFT and the most essential variables in a model given by regression analysis.

<table>
<thead>
<tr>
<th>DMF</th>
<th>β(e^β)</th>
<th>SE</th>
<th>P.V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.52</td>
<td>0.55</td>
<td>0.35</td>
</tr>
<tr>
<td>Mothers’ educational</td>
<td>0.12</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Fathers’ educational</td>
<td>0.04</td>
<td>0.04</td>
<td>0.3</td>
</tr>
<tr>
<td>Family size</td>
<td>0.03</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td>Fathers’ job</td>
<td>0.01</td>
<td>0.03</td>
<td>0.8</td>
</tr>
</tbody>
</table>

**Table 6.** Relationship between dmft and the most essential variables in a model given by regression analysis.

<table>
<thead>
<tr>
<th>DMF</th>
<th>β(e^β)</th>
<th>SE</th>
<th>P.V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.5</td>
<td>0.95</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mothers’ educational</td>
<td>0.16</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Fathers’ educational</td>
<td>0.13</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Family job</td>
<td>-0.04</td>
<td>0.06</td>
<td>0.48</td>
</tr>
<tr>
<td>Fathers’ size</td>
<td>-0.03</td>
<td>0.06</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*β= Coefficient of the regression for each variable*  
*SE= Standard error of estimate*  
*P.V= P-value of the T test*

**DISCUSSION**

Socio-economic status of the families has been clarified as, having a major role on the prevalence of dental caries in children. (15-6,21-23) This, however, has been mainly centered on the role of fathers’ job as having a more effective influence on children’s caries prevalence. (17-18) Results of this investigation shows a clear difference with the parents’ education, exclusively mothers’ education level as a cultural aspect of S.E.S having a higher effect on this issue.

The age of 8 was chosen intentionally, because children of this age, are expected to have an equal number and kind of both primary and permanent teeth present in the mouth with minimum probability of missing teeth caused either by physiologic exfoliation of deciduous teeth or un erupted permanent teeth.

Brown et al. (1990) evaluated the effect of social class on dental caries in 8-year-old children. Downer (1994) established changes in caries prevalence in 8-year-old children as one of the important age groups. Surprisingly, Waplington et al. (1998) studied a group of 8-year-old children, whose majority of the cases were Asian with identical customs, showed a less caries prevalence. (20,22,24) Similar investigations had shown a lower caries prevalence compared to the findings of the present study in the same age group. (18,24,26-27)

The differences could be due to, culture and socio-demographic differences between various societies, and the difference of oral sanitary and dietary habits between Iran, as a developing country and others.

Finding of the present study showed that the level of parents’ education and fathers’ job as well as the family size could affect the number of brushings per day. Wittles (1998) stated that, tooth brushing is more frequent in
affluent people than others. However no statistically significant difference was found between the level of caries for those with higher and lower brushing frequencies in the present study. Similar results are reported by Tubert et al. (1994) and Francesco et al. (1998) indicating the absence of any correlation between these two variables.\(^{(8,11,17)}\)

Spleith & Meyer (1996) suggested that, brushing habit has a questionable effect on dental caries prevalence and plaque index. So that, the frequency of tooth brushing doesn’t represent it’s quality. Kuriakose & Joseph (1999) in Kerla-India, indicated that, the mode of tooth brushing is more important than it’s frequency. Al-Ghanim et al (1998) showed, a highly significant relationship between caries and age of the children when starting their tooth brushing. Mascarenhas [1999] in Goa-India found that the frequency of tooth brushing is an effective indicator of caries reduction.\(^{(12-14,28)}\)

It seems that the quality of tooth brushing is more effective than it’s quantity, while parents with high educational and occupational level and those with less children appear to concentrate on frequency of tooth brushing more than it’s quality.

The prevalence of dental caries was found to be significantly higher in lower socio-economic class (P<0.0001). Malik et al. [2001] showed, similar results, indicating S.E.S based on both, mothers’ education and fathers’ occupation in Saudi Arabia.\(^{(2)}\)

Some other Middle East countries with the same customs have shown the different results.

Al-Hosani & Rugg-Guun (1998), showed that, high S.E.S due to high parental income was related to higher caries prevalence in Abu Dhabi.\(^{(15)}\) As S.E.S is considered based on the economic status of the families which is believed to be mainly their income, the differences between the regional countries explained. Consumption of western style diet is believed to be increased by any improvement in economic status and industrialization, resulting in higher caries prevalence.\(^{(13)}\) While, in this present study, the Iranian families’ S.E.S was assessed both culturally and economically with the positive change in culture appearing to have a direct effect on decrease of caries prevalence.

Gaughwin et al (1999), showed that, children with different socio-demographic characteristics and less developed backgrounds who received care from the School Dental Service (S.D.S) had more desirable dental health condition than children seen at the private sector.\(^{(16)}\)

Occupational improvement is believed to lead to a lower caries prevalence in children. Some other studies considered S.E.S just by fathers’ occupation and showed the same result.\(^{(11,17,18)}\)

As government employees are classified in a lower economic level than the members of business class in this research, there was an unexpected finding of higher caries prevalence in children of business class compare to the government employees who had at least some degrees of education. A few number of parents had, college and university education (19.3% and 9.2% in fathers and mothers, respectively) In this investigation. While, this was 70% for mothers in Saudi-Arabia.\(^{(2)}\) However, mothers’ education had been described as a determining factor of S.E.S in both of these two studies with a clear effect on lowering child’s caries prevalence. Angelillo et al (1998) mentioned that, parents with lower education level were more likely to have children with dental caries than those belonging to higher S.E.S.\(^{(11)}\)

Regression analysis of the data, revealed that, factors including parents’ education not only has a higher influence on dental caries prevalence but also, is of the most important and determining factor of S.E.S beside fathers’ job. This was also noted in an earlier report from Malik et al. in Saudi Arabia.\(^{(2)}\) The relationship between caries prevalence and the mothers’ education which reported as a determining factor on S.E.S, appeared to be stronger than fathers’ occupation.\(^{(2)}\)
CONCLUSION

A direct effect of S.E.S on caries prevalence of primary school children was observed among the population of this study. A few number of parents had university degrees. Surprisingly, this factor exclusively, amongst the mothers, was found to be more effective than others on caries prevalence. Mothers' education seemed to have an important role on S.E.S in Iranian families.

REFERENCES


