

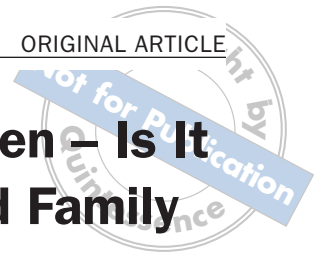


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# Dental Caries Experience in Preschool Children – Is It Related to A Child’s Place of Residence and Family Income?

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**Purpose:** To assess the caries prevalence in 3- to 5-year-old children and determine whether urbanisation and income are associated with the dental decay status of these preschool children residing in the district of Lahore, Pakistan.

**Materials and Methods:** Multistage random sampling was done to collect the sample of children from urban and rural areas. A list of children 3 to 5 years of age was prepared, and every 2nd child on the list was randomly selected until a total of 700 children were enrolled in the study. Lady Health Workers (LHWs) were trained to conduct this survey after permission from the pertinent authorities. The data of the children and their mothers regarding their age, gender, socio-economic status (SES) and area of residence were collected. The caries status of children was recorded using the dmft index as per WHO criteria.

**Results:** The prevalence of dental caries in preschool children of Lahore was found to be 40.5%. Within this group, caries prevalence was 33.3% in 3-year-old children, 47.6% in 4-year-old children and 75% in the 5-year-old children. The mean dmft score for the entire child population was  $1.85 \pm 3.26$ . A significant association was found between caries prevalence, low socioeconomic status, female gender and rural residence.

**Conclusion:** Preschool children in Lahore, Pakistan have average dmft scores of  $1.85 (\pm 3.26)$ , which are mostly related to untreated carious lesions. Lower caries experience was found to be associated with rural residence and low family income.

**Key words:** dental caries, Pakistan, preschool children

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Globally, issues of oral health in children revolve predominantly around dental caries (Bader et al, 2004). Due to its high prevalence worldwide, caries in children has often been described as a

‘pandemic’ disease characterised by a high proportion of untreated carious cavities causing pain, distress and functional restrictions (Edelstein, 2006). In addition, these untreated carious lesions have a considerable impact on the general health of children, which influences the social and economic well-being of communities (Sheiham, 2006). It has been observed that untreated caries among children is more widespread in developing than in developed countries (Baelum et al, 2007).

Pakistan is a developing country confronted with a rapid growth of urbanisation (Jan et al, 2008). Previous surveys of oral health in Pakistan indicate that more than 90% of all carious lesions are untreated (Khan, 1992; Haleem and Khan, 2001; Khan et al, 2004) and that this oral disease is equally prevalent in urban and rural areas (Khan et al, 2004). These studies, however, did not include

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preschool children. Therefore, the prevalence of caries and dental health status of the preschool-age children are not known.

Children under five years of age (preschool children) constitute a considerable proportion of Pakistani population. The purpose of this study was to assess the caries prevalence in children less than five years old and also examine whether urbanisation and income are associated with the dental decay status of these preschool-age children in the district of Lahore, Pakistan.

## MATERIALS AND METHODS

The present survey was conducted in the district of Lahore, Pakistan, in collaboration with National Program for Primary Healthcare and Family Planning (NPPH & FP). A complete record of households in the encatchment area of the NPPH & FP was obtained. Permission from the Director of the NPPH & FP, the Director of Health Services (DHS) and the government of the Punjab was sought to involve the Lady Health Workers (LHWs) in carrying out this survey.

Multistage random sampling was done to collect the sample of children from urban and rural areas. In the first stage, a list of areas where NPPH & FP was functional was prepared both for urban and rural sites. Four sites – two rural and two urban – were randomly selected. In the next step, all the households were listed that housed children up to five years of age. Out of this list, 725 households were randomly selected: 475 urban and 230 rural.

The number of 3- to 5-year-old children totaled 1422. Stratified random sampling was done, and every second child was selected until a total of 700 children were enrolled in the study. At the second stage, a random selection of 32 LHWs was done for urban centres and 9 for rural centres. The LHWs were trained during a workshop for implementation of the questionnaires, while the author underwent calibration exercises for dental health examination.

Data of children regarding their age, gender, socioeconomic status (SES) and area of residence were collected. Based on socioeconomic status, the study population was divided into two groups based on the family income: a low income group (family income < PKR 5000 per month) and a middle income group (family income > PKR 5000 per month).

Clinical examination for dental caries was conducted by the first author who was calibrated by a

previously calibrated epidemiologist. The intra-examiner reliability was Kappa = 0.86. The children's caries status was recorded by using the dmft index. The criteria recommended by the WHO for diagnosing dental caries were adopted. A dental health examination of each child was carried out by the principal author using a plain mouth mirror, only to retract the soft tissues. Visual examination was done in an open space in broad daylight while the child sat either in the mother's lap in a knee-to-knee position or independently in an ordinary upright chair. The dental examination took between 2 and 5 minutes, depending upon the child's level of cooperation. The oral health examination charts were filled in by the researcher herself. The children were given a sample of paediatric toothpaste at the end of the examination.

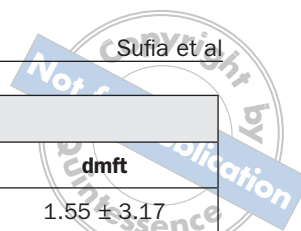
## Statistical Analysis

For analysis, regrouping and recoding of responses was performed. The chi-square test and, where applicable, Fisher's exact test were applied to test the association between oral health parameters and maternal age, education, residence and family income. For all analyses, a *P*-value < 0.05 was considered significant with a confidence level of 95%.

## RESULTS

Out of the total of 700 children selected, 601 children completed the dental examination, giving a response rate of 85.8%. The children were aged 3 to 5 years on their last birthdays (mean age  $3.53 \pm 0.53$  years). Three hundred twenty children (53.3%) were between 3 and 4 years old, while the rest were over 4 years old. Four hundred children (66.6%) belonged to the urban areas of the Lahore district. Male children constituted 54.2% of the sample. Four hundred ninety-seven (82.8%) of the children were categorised as belonging to the low income group with a monthly family income of less than PKR 5000.

In over 98% of the total sample, their primary teeth had all erupted; approximately 3/5 of the total sample was caries free (59.5%). Caries prevalence within the age groups was 33.3% in the 3 year olds, 47.6% in 4 year olds and 75% in the 5-year-old children. The mean dmft score for the entire child population was  $1.85 \pm 3.26$ . The mean dmft score for the 3-, 4- and 5-year-old children was

**Table 1 Agewise distribution of d, m, f and dmft score of the study sample**

		d	m	f	dmft
Age	3 years	1.55 ± 3.17	0	0	1.55 ± 3.17
	4 years	2.06 ± 3.17	0.01 ± 0.12	0.02 ± 0.31	2.09 ± 3.19
	5 years	4.42 ± 4.92	0.25 ± 0.86	0	4.66 ± 5.29
<b>Total</b>		1.83 ± 3.24	0.01 ± 0.14	0.01 ± 0.20	1.85 ± 3.26

**Table 2 Number (percent) of children with dental caries in relation to child's age, gender, area of residence and family income**

		Age of the child in years					Mean dmft
		3	4	5	Total		
Gender	Male	167 (51.4)	154 (47.4)	4 (1.2)	325 (54.2)	2.10 ± 3.49	
	Female	154 (56.0)	113 (41.1)	8 (2.9)	275 (45.8)	1.57 ± 2.94*	
Residence	Urban	205 (51.2)	184 (46.0)	11 (2.8)	400 (66.6)	2.14 ± 3.50	
	Rural	116 (58.0)	83 (41.5)	1 (0.5)	200 (33.4)	1.28 ± 2.63*	
SES	Low income	267 (53.6)	219 (44.1)	11 (2.2)	497 (82.8)	1.74 ± 3.11*	
	Middle income	54 (52.4)	48 (46.6)	1 (1.0)	103 (17.2)	2.42 ± 3.86	

\*P < 0.05. SES = socioeconomic status.

1.55 ± 3.17, 2.09 ± 3.1 and 4.66 ± 5.29, respectively. Agewise distribution of decayed (d), missing (m) and filled (f) teeth is shown in Table 1.

Thirty-nine percent of the children from low income families had an experience of decay compared to 49% of the children sample belonging to middle income group. The caries prevalence in the rural areas was 31.5%, whereas 45.2% of urban residents were observed to have tooth decay. The dmft scores based on residence and socioeconomic status are shown in Table 2.

The Significant Caries Index (SiC Index) was also calculated for the sample, yielding 5.34 ± 3.67. Only 5 (0.8%) children had teeth missing because of caries. The mean value for missing teeth was 0.01. The majority of the children (99.7%) did not have fillings in their teeth. Among the rest, one of the children had only one filling in his mouth while the other had a total of 5 teeth with sound fillings. None of the children in this study had fissure-sealed teeth or bridges.

## DISCUSSION

The present study is among the foremost efforts to determine the caries pattern in the preschool children in Pakistan. It found almost 60% of children in this age group to be caries free. Although no previous data are available for comparison, the results are consistent with the findings of national pathfinder studies which reported 50% caries-free 12-year-old children in Pakistan (Khan, 1992; Haleem and Khan, 2001; Khan et al, 2004). These results are similar to reports from developed countries, e.g. the United Kingdom, Portugal, Northern Ireland, Poland, Greece, Italy and Australia (McCabe and Kinirons, 1995; de Almeida et al, 2003; Campus et al, 2004; Szatko et al, 2004; Hallet and O'Rourke, 2006; Kalyvas et al, 2006; Pitts et al, 2007; Topaloglu-Ak et al, 2009). In these countries, the low caries prevalence is predominantly due to children's intensive use of promoted preventive oral health measures, supported by appropriate cura-

tive care provided by an umbrella of accessible clinics and affordable health insurance (Topaloglu-Ak et al, 2009). On the other hand, countries such as the Philippines, Korea, Kuwait, Ajman, Estonia, Iran, Brazil and India which have similar socioeconomic and cultural environments have reported that more than 70% of their child population is affected by tooth decay (Vigil et al, 1996; Dini et al, 2000; Cariño et al, 2003; Jin et al, 2003; Rosenblatt and Zarzar, 2004; Hashim et al, 2006; Mohebbi et al, 2006; Goyal et al, 2007; Olak et al, 2007).

While analysing the results of the present study, many factors have to be considered. Historically, Pakistan has been classified as a low-caries prevalence country (WHO, 1996; Petersen, 2003; Whelton, 2004). The present study has an urban bias, and more than 85% of the children in this study were reportedly using fluoridated toothpaste and cleaned their teeth at least once daily (data not shown). Another factor possibly contributing to the low caries prevalence and experience of the current sample is the optimal fluoride levels found naturally in the drinking water (1.42 ppm) in the district of Lahore, Pakistan (Khan et al, 2002).

Untreated decay comprised the major component of the dmft score in the current sample, with a very low filled component (0.3%). These results are comparable to the non-treated decay status of children of Pakistan in general (Khan et al, 2004) and also other developing countries or regions such as Iran, the Middle East and Africa (Vigil et al, 1996; Kiwanuka et al, 2004; Olak et al, 2007). The management of caries in children is practically nonexistent in low- and middle-income countries (Edelstein, 2006) and remains inadequate even in high-income countries such as the United States, Saudi Arabia and the United Kingdom (Sheiham, 2006; Baelum et al, 2007; Jan et al, 2008). The burden of untreated caries in children has been recognised in several studies (Khan, 1992; Haleem and Khan, 2001; Khan et al, 2004). The negligible filled component in the present sample could be due to the lack of structured preventive care in Pakistan, poor awareness amongst the parents regarding the importance of primary teeth and limited training of dentists in providing care to young children.

Diverse evidence exists in the literature on the difference in caries between urban and rural populations. Some studies found no difference in the caries prevalence (de Almeida et al, 2003; Abid, 2004) or observed the prevalence to be higher in the rural centres (Khan et al, 2004). In contrast, the present study observed caries to be more prev-

alent in the urban areas of Lahore, probably because of the greater access of city dwellers vs rural populations to refined carbohydrates.

While some studies have reported an increase in decay levels with declining income (Beighton et al, 2004; Ferreira et al, 2007) others have found higher decay levels in the higher social classes (Khan and Cleaton-Jones, 1998). Still others did not find any association between dental caries, social class and family income (Sufia et al, 2009). The present study observed higher mean decay scores in children of families from middle income groups, which can again be attributed to higher affordability and access to sugary snacks combined with parental lack of knowledge on their detrimental effects (Gussy et al, 2008).

Past caries experience is a good indicator for future caries increment and caries activity (Hausen, 1997). The occurrence of tooth decay has multiple factors associated with it, including social, behavioural, cultural, psychological and environmental factors. The high-risk groups need to be confirmed in larger scale studies so that they are specifically targeted by dental health education and awareness programmes. This is of utmost importance to reduce the risk of decay in Pakistan and also to improve access to care. Qualitative research is indicated to identify the possible factors related to high dental decay levels in the urban areas and groups living above the poverty line in the district of Lahore in particular, and the whole country in general.

## CONCLUSION

Preschool children of Lahore, Pakistan have a low caries prevalence and experience; however, most of the children were observed to have untreated decay. The caries experience in preschool children was found to be higher in those residing in urban areas and in children belonging to middle income families.



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