



## Evaluation of Dental Caries Among Preschool Children in Kathmandu-Using Significant Caries Index

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### ABSTRACT

**Introduction:** Dental caries among preschool children is common but there is scarcity of updated data about its prevalence among Nepalese preschool children. This study was conducted to evaluate prevalence, Significant Caries Index, Caries pattern, Restorative care index and Disparity ratio among preschool children of Kathmandu aged 3-6 years.

**Methods:** A cross sectional study was conducted on 17 preschools of Kathmandu following WHO criteria. Data were analysed using SPSS 20 and descriptive statistics was applied.

**Results:** Prevalence of dental caries was 803 (55.6%) with a mean dft of 3.28±3.581 and Significant Caries Index score was 7.439. Caries pattern showed the most commonly decayed teeth were mandibular second molars followed by maxillary central incisors. The least affected teeth were mandibular lateral incisors. The restorative care index was 106 (7.32%) in the total sample size and 14 (2.86%) in the SiC and disparity ratio was 2.26.

**Conclusions:** The SiC Index indicated high dental caries prevalence; severity rates and restorative care index indicated little experience of restorative treatment in preschool children of Kathmandu identifying the need for more targeted efforts to reach preschool children early to effectively address unmet oral health needs.

**Keywords:** caries pattern; dental caries; Kathmandu; preschool; significant caries index.

### INTRODUCTION

Dental caries is one of the most prevalent disease worldwide which has significant impact on the growth and cognitive development of child by interfering with nutrition, concentration and subsequently school participation.<sup>1,2</sup> Dental caries among preschool children is a major public health problem and there is scarcity of updated data about its prevalence in many developing countries including Nepal. The 2004 National Pathfinder Survey<sup>3</sup> shows 58% of schoolchildren (5-6 years) suffer from dental caries and recent study by Bhagwat

T<sup>4</sup> showed mean dft of 1.84 and SiC 4.60 in schoolchildren of Eastern Nepal. The reason for this neglect may be either the perception that primary teeth are not important as the permanent counterparts or the inaccessibility and difficulty of examining such young children.

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The aim of the study is to evaluate the Prevalence of dental caries, Significant Caries Index, Caries pattern, Restorative care Index and Disparity ratio among the preschool children in Kathmandu.

## METHODS

A cross-sectional study was conducted on a randomly selected sample of preschool children in Kathmandu from February 2017 to May 2017. The study was conducted after getting approval from the Institutional Ethical Review Committee of the Kantipur Dental College and Teaching Hospital. The sample size was determined utilizing the "sample size formula" for estimating a mean.<sup>5</sup> Seventeen preschools were selected through a convenience sampling method from the list of preschools to fulfill the sample size requirement. Preschool children aged 3-6 years from both private and government preschools were participated in the study. The schools were officially informed and assured about the confidentiality of the research findings. Permission to conduct the study was obtained from the concerned school authorities and written informed consent was also obtained from the parents.

Oral examinations were carried out in classrooms using a mouth mirror and a probe under adequate daylight. Dental caries were diagnosed clinically by visual detection of apparent cavitations and/or visually diagnosed recurrent caries lesions as per WHO criteria<sup>6</sup> and the number of carious, missing and filled teeth were recorded in form. For primary dentition, dft (d = untreated caries and f = filled tooth, that were present at the time of examination) was used as the standard tool to record dental status of the children. The missing component for primary dentition was not recorded because of the difficulty in distinguishing between teeth extracted for caries and exfoliation.<sup>7</sup> DMFT (Decayed, Missing and Filled Teeth) index gives out average or mean caries prevalence in any population. No radiographs were taken at that stage. Significant caries index<sup>8</sup> (SiC) was calculated by: first sorting individuals according to their dmft values. Then one third of the population with the highest caries scores was selected and the mean dmft score for this subgroup was calculated. The obtained value constituted the SiC Index.

The Restorative Care Index was calculated to estimate the proportion of teeth that had received restorative care. The component "f" (filled teeth) was divided by the dmft and multiplied by 100.<sup>9</sup>

Disparity ratio was also calculated to see the difference in amount of care needed among the dmft and SiC groups. Since dmft also includes the healthy population, it leads to decrease in value and hence decreases the

actual degree of care needed compared to SiC.

The data obtained was statistically analysed using SPSS 20. Percentages of dft and caries-free children were used to describe dental caries distribution among preschool children. Significant Caries Index (SiC Index), Caries pattern, Restorative care index (RI) and Disparity ratio were adopted to assess the unequal distribution of dental caries and oral health care. Descriptive statistics such as mean and standard deviation were calculated.

## RESULTS

The study population consisted of 1445 pre-schoolers in the age range of 3-6 years. Out of 1445 children examined, 828 (57.3%) were male and 617 (42.7%) were female (Figure 1).

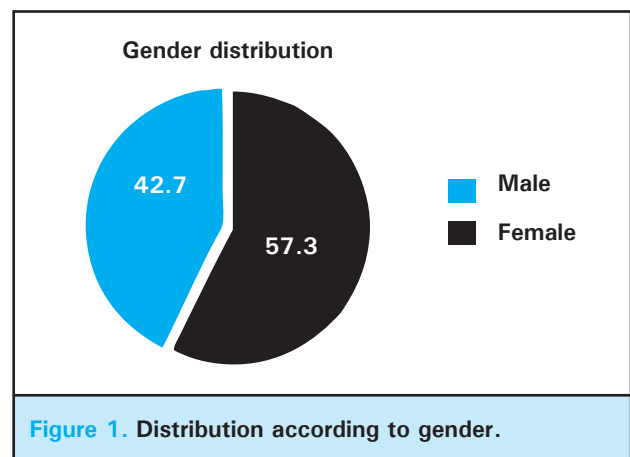


Figure 1. Distribution according to gender.

The prevalence of dental caries among the study population was 803 (55.6%) with a mean dft of  $3.28 \pm 3.581$ . The mean dft in male was  $3.26 \pm 3.658$  and the mean dft in female was  $3.29 \pm 3.478$ .

The SiC index of the study population was 7.439. The SiC index in male was 7.67 and the SiC index in female was 7.15. Mean dft and SiC among gender (Table 1).

According to caries pattern, the most commonly decayed teeth were mandibular second molars (32.7% on right side of the arch and 35.2% on left side of the arch) followed by maxillary anteriors (27.1% and 25.6% for maxillary right and maxillary left central incisor respectively). The least affected teeth were mandibular lateral incisors. Among the maxillary teeth, central incisors were most carious followed by first molars and the least affected were canines. Among the mandibular teeth, second molars were the most carious followed by first molars and the least affected were lateral incisors. The study also shows the caries pattern was fairly symmetrical across the arches.

**Table 1. Mean dft and SiC of study population according to gender.**

Categories	dft (Mean ± SD)
Male (828)	3.26 ± 3.658
Female (617)	3.29 ± 3.478
Overall (1445)	3.28 ± 3.581
	SiC (Mean ± SD)
Male (268)	7.67 ± 3.030
Female (214)	7.15 ± 2.988
Overall (1445)	7.43 ± 2.95

The Restorative care index was used to assess the capacity of health services in meeting the needs of the population and it came out to be 106 (7.32%) in the total sample size and 14 (2.86%) in the SiC, which revealed a low percentage of care for this population. Only 2.4% and 2.2% of left and right side mandibular

second molar respectively had undergone restorative treatment. The disparity ratio was 2.26. Pattern of toothwise distribution of decayed and filled (Table 2).

## DISCUSSION

This present study was conducted on 1445 preschoolers aged 3-6 years in 17 preschools of Kathmandu. Study focuses on dental caries among preschoolers who fall under neglected and needy high risk group that calls for a more specific and targeted actions. The presence of caries in the primary dentition is the strongest predictor of caries in permanent dentition.<sup>10</sup> Identification of the caries prevalence in a preschool population helps to promote prevention to reduce the overall caries burden of the underprivileged preschool age group.<sup>8,11</sup> Effective early prevention measures will cut down complex and expensive treatment expenditure for the caries prone group in their adult life.

**Table 2. Pattern of toothwise distribution of decayed and filled.**

Toothwise Distribution (Primary tooth)	Maxillary Right	Maxillary Left	Mandibular Right	Mandibular Left
Decayed n (%)				
Central incisor	392 (27.1)	370 (25.6)	21 (1.5)	30 (2.1)
Lateral incisor	193 (13.4)	200 (13.8)	16 (1.1)	18 (1.2)
Canine	78 (5.4)	74 (5.1)	25 (1.7)	24 (1.7)
First molar	352 (24.4)	316 (21.9)	355 (24.6)	366 (25.3)
Second molar	289 (20)	314 (21.7)	472 (32.7)	508 (35.2)
Filled n (%)				
Central incisor	2 (0.1)	4 (0.3)	0	0
Lateral incisor	4 (0.3)	2 (0.1)	0	2 (0.1)
Canine	4 (0.3)	0	4 (0.3)	2 (0.1)
First molar	7 (0.5)	8 (0.6)	19 (1.3)	16 (1.1)
Second molar	5 (0.3)	11 (0.8)	32 (2.2)	34 (2.4)

The children were examined both for non cavitated (including white spot lesions); cavitated lesions and recorded using the dft index. No attempt was made to use dental explorer to confirm cavitation of the lesions due to the young age of the children. This ensured their compliance with the examination without adversely affecting their cooperation and behavior in the dental environment in future.

This study documented a 55.6% prevalence of dental caries among preschoolers which is in equivalence to studies by Mahejabeen R et al,<sup>12</sup> which showed 54.1% among 3-5 yrs old and Dawani N et al,<sup>13</sup> showed 51% in 3-6 yr old in Karachi, Pakistan. Higher prevalence are also observed like 74.8% was observed in study conducted by Wyne AH.<sup>14</sup>

The study population in the present study had a mean dft of  $3.28 \pm 3.581$  and this can be classified as high dental caries experience. Similar study by Namal N et al,<sup>15</sup> also showed the mean dmft of the children as  $3.74 \pm 3.49$  in Istanbul, Turkey. However, it was much lesser in comparison to study done by Wyne A et al,<sup>16</sup> who reported a mean dmft of  $8.6 \pm 3.4$ . Whereas study by Singh S et al,<sup>17</sup> had a lower dft of  $1.89 \pm 3.3$ .

The study showed SiC index of 7.439 for 3-7 year old preschoolers where the dft index was 3.28, indicating that one-third of the sample had a caries experience more than twice the mean dft. The WHO SiC index target (DMFT) for 12-year-olds by 2015 was less than 3.<sup>8</sup> However, there is no WHO target for the SiC levels for dmft of primary teeth for 5-6 year olds. Since there is no such target, we could not compare our study with

a standard value. Similar study by Namal N et al,<sup>15</sup> also showed the SiC index value of 7.75 in 5-6 yr children in Turkey. Our value was higher than the SiC index for 3-5 year old preschoolers reported by Singh S et al,<sup>17</sup> (5.51) and Xavier A et al,<sup>18</sup> (4.88). Our study showed SiC value lower than that recorded by Nelly Molina-Frechero N et al,<sup>19</sup> (8.95).

According to caries pattern, the most commonly decayed teeth were mandibular second molars followed by maxillary anteriors. The least affected teeth were mandibular lateral incisors. Similarly Wyne AH,<sup>14</sup> Sachdeva A et al,<sup>20</sup> Saravanan S et al,<sup>21</sup> and Wyne HA et al,<sup>22</sup> have reported higher caries prevalence in lower molars and upper incisors in preschool children. Similar to study by Wyne AH et al,<sup>23</sup> our study also reported caries bilaterality in mandibular molars and maxillary central incisors. In this study, among the maxillary teeth, central incisors were most carious followed by first molars and the least affected were canines. Highest caries prevalence of maxillary central incisors is similar to study by Wyne AH<sup>14</sup> and Saravanan S et al.<sup>21</sup> Close interproximal contact, direct exposure during intake and pooling of cariogenic fluids around these teeth may be the reason for high caries prevalence in these teeth.

This study showed the Restorative care index to be 7.32% from the total sample size which was less than Xavier A et al,<sup>18</sup> study which showed a care index of 30%. Restorative care index in our study from the SiC index was 2.86% which means only about 3% of the children had restoration although the need was high, demonstrating the limited access of this population to health services and the low restorative care to which they have been exposed. The attributed explanation might be that majority of children do not undergo dental restorations primarily because parents cannot afford high treatment cost, lack of affordable dental services, lack of knowledge/time and false perceptions of parents regarding significance of retaining primary teeth and while those who undergo treatment prefer extraction rather than restorations.

The study showed disparity ratio of 2.26, indicating more than 2 times need in the most vulnerable group compared to the overall population. Starting a preschool

dental service has been previously recommended<sup>11</sup> and such service will not only meet the huge treatment need in these young children presently but more importantly play a pivotal role in the prevention of dental disease in these children through direct contact by dental professionals with children and their parents. Preschool teachers and care takers should also get involved in caries prevention programs.

This study had some limitations because the sample was drawn from a population of 3-6 year old preschool children attending 17 private and government preschools of Kathmandu, thus the conclusions are valid only for this population. The educational and preventive program in oral health may change the epidemiological profile of caries in children from these preschools.

## CONCLUSIONS

The early identification of caries risk group is of great help to dental practitioners. This study SiC Index indicated poor dental health status with considerably high dental caries prevalence rate among preschoolers of Kathmandu identifying the need for more early targeted efforts to reach children with oral health needs. Restorative care index also highlights the need of more treatment care need in this younger age group. Health promotion and education programs for preschool children should be addressed including oral health issues, risk factors and its consequences for caries. Thus, specifically designed oral health strategies for the preschool population are highly recommended to decrease caries prevalence to promote overall general health of children through adolescence.

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**Conflict of Interest: None.**

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