# Prevalence of dental caries in preschool children in Peñaflor, Santiago, Chile

## Prevalência de cárie dentária em crianças residentes em Peñaflor, Santiago, Chile


### Abstract

Purpose: Despite the reduction in the prevalence of dental caries in Chile, very little is known about the prevalence of this disease in deciduous teeth. The aim of the present study was to evaluate the prevalence of dental caries in children aged 3 to 5 year-old of Peñaflor, a semirural commune in Santiago, Chile.

Methods: A total of 94 children from families of low socioeconomic status were examined. One trained and calibrated dentist (kappa 0.87) performed the clinical examinations and recorded data on caries free children, caries severity, and dmft index, using the WHO protocols.

Results: The results showed that 50% of the 3 year-old children were caries-free compared to 42.2% at the age of 5 year-old. There was no statistically significant gender difference in the prevalence of the disease. For the total sample, the percentage of caries-free children was 43.2%. The dmft index in the study population at 3, 4, and 5 year-old was 1.30, 2.51, and 2.52, respectively.

Conclusion: This study showed that children in Peñaflor commune have not reached the WHO goals proposed for the year 2000, which indicates that this population requires the adoption of additional preventive and restorative strategies to improve oral health.


**Key words:** Dental caries; caries-free; dmft index; preschool children; deciduous teeth


### Resumo

Objetivo: Apesar da redução de prevalência de cárie no Chile, muito pouco se sabe sobre a prevalência da doença em dentes decíduos. O objetivo deste estudo foi avaliar a prevalência de cárie em crianças de 3 a 5 anos de idade em Peñaflor, uma comunidade semirrural em Santiago, Chile.

Metodologia: A amostra foi constituída por um total de 94 crianças de famílias de baixo nível sócio-econômico. Um cirurgião dentista previamente treinado e calibrado (kappa 0.87) realizou os exames clínicos e registrou a porcentagem de crianças sem cáries, severidade da cárie e índice ceo-s, usando a metodologia descrita pela OMS.

Resultados: Os resultados mostraram que 50% das crianças de 3 anos não apresentavam cáries em comparação com 42,2% das crianças de 5 anos de idade. Não houve diferença estatisticamente significativa entre gênero para a prevalência da doença. Para o total da amostra, a porcentagem de crianças sem cáries foi de 43,2%. O índice ceo-s na população estudada foi 1,30; 2,51 e 2,52, aos 3, 4 e 5 anos de idade, respectivamente.

Conclusão: Este estudo mostrou que as crianças da comunidade de Peñaflor não alcançaram os objetivos propostos pela OMS para o ano 2000. Isto indica que esta população necessita da aplicação de estratégias preventivas e restauradoras adicionais.


**Palavras-chave:** Cárie dentária; índice ceo-s; pré-escolar; dentes decíduos


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## Introduction

Despite the remarkable reduction in the prevalence of dental caries in Chile over the years, dental caries still is very frequent in infants and young children in Chile and other developing countries. Previous studies have reported a wide range in the prevalence of dental caries for 3 to 5 year-old children. A study on the oral health conditions of children aged 0-30 months attending 20 public day nurseries in Salvador, Brazil, found that the overall prevalence of caries was 55.3%, and the figures varied according to the age strata: 25% for subjects aged 0-12 months, 51.18% for subjects aged 13-24 months, and 71.03% for those aged 25-30 months (1). In Juiz de Fora, Minas Gerais, Brazil, 50.6% of the examined children were caries-free (2). In preschool children in the city of Manizales, Colombia, 33% presented signs of caries history and 28% had active lesions, with a dmf-t Index of 1.4 (3).

Data from other continents also have large variability. In the state of Mexico, Rodríguez et al. (4) showed that the prevalence of dental caries in 3 and 5 year-old infants was high, and the number of caries-free children was only 39% and 22%, respectively. In India (Hubli, Dharwad city), Mahejabeen et al. (5) found that the disease prevalence in children aged 3,4, and 5 year-old was 42.6%, 50.7%, and 60.9%, respectively, and the dmf index was 2.31, 2.56, and 2.96 for these age groups. In Saudi Arabia, the caries prevalence was 50% at the age of 31 to 59 months and the mean dmft index was 1.98 (6). Data from the African continent showed that the percentage of Mpumalanga Province (South African) children affected by dental caries at the ages of 3, 4, and 5 year-old was 25.4%, 55.8%, and 53.4%, respectively (7). Ferro et al. (8) reported that the prevalence and mean dmft by age group in preschool children in the Veneto region (Italy) were 13.28% and 0.53 for 3 year-old children, 18.95% and 0.83 for 4 year-old children, and 26.9% and 1.34 for 5 year-old children. A study in the United States reported that 23.7% of 2-5 year-old children had caries experience and 18.7% have untreated decay. It is important to note that the prevalence of ECC (early childhood caries) reported by most U.S. studies does not include non-cavitated lesions or white spot lesions. Therefore, it is expected that the true prevalence of ECC has been underestimated in the published studies (9-11).

In Chile, the updated information on prevalence and severity of dental caries in preschool children is scarce. National data in 1993 showed that the mean dmft was 2.6 for children aged from 4 to 5.4 year-old (12). Recently, reports from the Chilean Health Ministry and others (13,14) found that the prevalence of dental caries in children aged 2, 4, and 6 year-old was 83%, 52%, and 30%, respectively, and the dmf index was 1.5, 2.4, and 3.8 for these age groups. In those studies, the data for the 2 and 4 year-old children were collected in the metropolitan region.

Therefore, the aim of this study was to evaluate the prevalence and severity of dental caries in 3 to 5 year-old children in Peñaflor, a semirural commune in Santiago, Chile.

## Methods

### Study population

The study was carried out at the semirural commune of Peñaflor, located in the westside of Santiago city. The main economic activity in this geographic region is agriculture. The present study was performed in two preschools, and the total population was 512 children aged from 3 months to 6 year-old. The sample size was computed by using the equation: $n = z^2\pi(1- \pi)/\sigma^2$, where "n" was the sample size, "$\pi$" was the estimated prevalence proportion (40%), "z" was the probability (95%), and "$\sigma$" was the standard error (5%). The estimated sample size was approximately 90 preschool children. A convenience sample was selected from 3 to 5 year-old children whose parents accepted to participate in the study. The CASEN survey (Social Economic Characterization Survey) – 2002 indicated that the target population had low socioeconomic status, with a poverty percentage of 26.2%. Data were collected from a total of 94 children (n=26, 3 year-old; n=39, 4 year-old; n=29, 5 year-old), 48 girls and 46 boys, living in a rural-urban zone (Table 1).

**Table 1.** Study sample characteristics.

| Age (in years) | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| 3 | 13 | 28.5 | 13 | 27.1 | 26 | 27.7 |
| 4 | 19 | 41.3 | 20 | 41.7 | 39 | 41.5 |
| 5 | 14 | 30.4 | 15 | 41.2 | 29 | 30.9 |
| Total | 46 | 48.9 | 48 | 51.1 | 94 | 100 |

### Clinical examination

A trained and calibrated dentist examined all subjects and recorded their oral health status according to the World Health Organization (WHO) criteria for caries diagnosis (15), so the measurements were compatible with the data collected by the Ministry of Health of Chile previously. The dmft index was used; only extracted teeth were counted as missing teeth, and non-erupted teeth were not included. Preliminary analysis of intra- and interexaminer agreement for dental caries diagnosis yielded Kappa coefficient values of 0.87 and 0.93, respectively. The oral examination was performed in dental offices, and the teeth were examined under artificial light using a clinical mirror; an explorer probe was used to remove debris if necessary. Before clinical examination, the child's oral hygiene was performed with toothbrushing.

### Statistical analysis

Data were analyzed by the Statistica 4.5 software (StatSoft, Tulsa, USA) with Student t tests and analysis of variance at a 0.05 significance level and 95% confidence interval.

## Results

Table 2 shows the distribution of children with and without caries for the age groups 3, 4, and 5 year-old. The overall prevalence of dental caries in the study sample was 56.8%. The percentage of caries-free children decreased with age, but no statistically significant differences were found in the sample. The total number of caries-free children was 39.1% for boys and 47.9% for girls. No statistically significant differences were found in the frequency of caries-free children as a function of gender, but the number of caries-free children in females was higher than in males for the 3 year-old children (Table 3).

Table 4 displays the mean dmft scores according to the age groups. The total mean dmft was 2.1 (±2.9) for the 3-5 year-old children, and the scores increased from 1.3 at 3 year-old to 2.5 at 4 year-old. The proportion of decayed (d), missing (m) and filled (f) components was equal for all age groups and showed a trend to increase with ageing. The dmft index at 5 years old was 1.94 times greater than at 3 years, and the number of filled teeth at 5 years was three-fold the score at 3 years. No statistically significant differences were found in the dmft components between males and females at 3 and 5 years of age, but in general males were slightly more affected (2.4±2.8) than females (2.0±3.0).

**Table 2.** Distribution of dental caries-free and caries-affected children according to age.

| Age (in years) | Caries-Free | | Caries-affected | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| 3 | 13 | 50.0 | 13 | 50.0 | 26 | 27.7 |
| 4 | 19 | 48.4 | 20 | 51.6 | 39 | 41.5 |
| 5 | 9 | 30.4 | 20 | 69.6 | 29 | 30.8 |
| Total | 41 | 43.2 | 53 | 56.8 | 94 | 100 |

**Table 3.** Distribution of caries-free children according to age and gender.

| Age (in years) | Males | | | Females | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | Total | N | % | Total | N | % | Total |
| 3 | 4 | 33.0 | 12 | 9 | 64.0 | 14 | 13 | 50.0 | 26 |
| 4 | 11 | 47.4 | 24 | 8 | 50.0 | 15 | 19 | 48.4 | 39 |
| 5 | 3 | 25.0 | 10 | 6 | 33.3 | 19 | 9 | 30.4 | 29 |
| Total | 18 | 39.1 | 46 | 23 | 47.9 | 48 | 41 | 43.6 | 94 |

**Table 4.** Mean of the components of the dmf index according to age and gender.

| Age (in years) | N | | d | | m | | f | | dmf | | Total dmf | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | male | female | male | female | male | female | male | female | male | female | mean | SD |
| 3 | 12 | 14 | 0.9 | 1.4 | 0.0 | 0.0 | 0.3 | 0.0 | 1.2 | 1.4 | 1.3 | 1.6 |
| 4 | 24 | 15 | 2.7 | 1.9 | 0.1 | 0.1 | 0.0 | 0.0 | 2.8 | 2.0 | 2.5 | 3.2 |
| 5 | 10 | 19 | 1.8 | 2.1 | 0.0 | 0.1 | 0.9 | 0.2 | 2.6 | 2.5 | 2.5 | 3.5 |
| Total | 46 | 48 | 2.1 | 1.9 | 0.1 | 0.1 | 0.3 | 0.1 | 2.4 | 2.0 | 2.1 | 2.9 |

## Discussion

The overall prevalence of dental caries in the 3 to 5 year-old children of Peñaflor was 56.8%, which is consistent with the statistics reported in other Chilean studies (13,14). Although the commune of Peñaflor corresponds to a rural commune, it has mixed characteristics due to the proximity to Santiago city and the availability of public transportation. Thus, thispopulation is considered as rural-urban because of its geographic location and availability of some public services.

The present survey showed that the prevalence of dental caries in the study sample was greater than that established as a WHO goal for the year 2000 (16). In this sample, only 30.4% of the children at 5 years of age were caries-free. The findings of this small sample (94 children) might be representative for this commune and for others with similar characteristics, but may not be applicable to the entire country.

Even though the prevalence of dental caries has declined over the last decades, mainly as a result of fluoride use, it is still necessary much effort to eradicate the disease (17). The Peñaflor commune has fluoridate water since 1984, and the fluoride concentration ranges from 0.60 to 0.80 ppm F. This concentration has proved to be safe and effective for preventing dental caries, and this rural children population has received fluoride since their very young age.

Dental caries has been declining globally in the general population, more specifically among older children, yet the caries prevalence in younger children has not shown a significant decline (5). In 4 year-old preschool children, males and females, from municipal schools in Recife, Pernambuco, Brazil, in 2002 (18), caries prevalence was 47% and dmft was 2.06. These figures are lower than those of 4 year-old children in Peñaflor commune, which had prevalence of 51.6% and dmft of 2.5. As observed in other studies (4,5,19) the mean dmft increased with age,

and the percentage of children with dmft > 0 at 5 year-old was almost two-fold higher (1.94) than at 3 years. A similar increase in the disease was observed in Chile for 2-4 year-old children by the Chilean Health Ministry et al. (13) and in South Africa (7).

Caries prevalence did not vary between gender, but males showed slightly higher numerical rates than females, which could be attributed to better quality of diet and personal hygiene by women. These findings are similar to studies of Al-Ghanim et al. (20) and Mahejabeen et al. (5).

Availability of dental services, dental health awareness, and socioeconomic status may influence the distribution of dmft components. In the present study, the decayed component was more frequent, followed by filled and missing teeth. The filled component increased with age, but the missing component did not show any correlation with age. This pattern is characteristic of subjects who are socially disadvantaged, like the children of Peñaflor commune. The NHANES III (1988-1994) showed that the percentage of 2-5 year-old American children with untreated caries declined consistently as the family income increased. Children from families with higher socioeconomic level had a dft (decayed, filled teeth) mean of 0.31, while children from poor families had a dft mean of 1.49 (21).

In summary, this study found that the preschool children of Peñaflor commune, in Santiago, Chile, has still not reached the goal of 50% caries-free children at 5 year-old as proposed by the WHO for the year 2000. Therefore, the preschool student population of the Peñaflor commune requires the application of additional preventive measures and restorative programs. The oral health promotion since early age and the application of additional preventive measures may have a great impact on the oral health of this commune population in the future.

## Conclusions

The percentage of caries-free children aged 3 to 5 year-old was 43.2% in Peñaflor commune, Santiago, Chile. Additional preventive and restorative procedures are needed to accomplish the oral health goals proposed by the WHO.

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