

## Dental caries in the primary dentition in public nursery school children in Juiz de Fora, Minas Gerais, Brazil

Cárie dentária na dentição decídua de crianças assistidas em algumas creches públicas em Juiz de Fora, Minas Gerais, Brasil

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**Abstract** *The aim of this study was to assess the prevalence of dental caries in the primary dentition and associated variables in low socioeconomic preschool children enrolled in public nursery schools in Juiz de Fora, Minas Gerais, Brazil. Four public institutions were selected by geographic criteria (two in the central region and two in the peripheral region). The study population comprised 338 children (181 boys; 157 girls) aged 2-6 years old. Dental caries was recorded using the decayed, missing, and filled teeth (dmf-t) index. Among the examined children, 50.6% were caries-free. The mean dmf-t index was 2.03. It was higher in the peripheral nursery schools ( $p < 0.01$ ). A trend towards a difference between sexes ( $p = 0.06$ ) was observed. Logistic regression analysis selected a previous child's visit to dentist ( $p < 0.001$ ), geographic location of the public nursery school ( $p < 0.01$ ), and age ( $p < 0.01$ ) as predictive variables for the dmf-t index. The study showed the need for an oral health program for this population, including both curative and preventive measures in order to achieve the WHO/FDI goals for the year 2000, namely 50% of children free of caries at age 5-6 years.*

**Key words** *Dental Caries; Primary Dentition; Prevalence; Epidemiology*

**Resumo** *O objetivo deste estudo foi avaliar a prevalência de cárie dentária em dentição decídua e variáveis a ela associadas em pré-escolares, de baixo nível sócio-econômico, assistidos em creches públicas da cidade de Juiz de Fora, Minas Gerais, Brasil. Quatro instituições públicas foram selecionadas por critérios geográficos (duas na região central e duas na região periférica). A população do estudo compreendeu 338 crianças (181 meninos; 157 meninas) com idade de dois a seis anos. A cárie dentária foi registrada usando o índice ceo-d. Dentre as crianças examinadas, 50,6% estavam livres de cárie. A média do índice ceo-d foi 2,03, que foi maior na creches periféricas ( $p < 0,01$ ), e uma tendência de diferença entre sexos foi observada ( $p = 0,06$ ). A análise de regressão logística selecionou as variáveis visita prévia da criança ao dentista ( $p < 0,001$ ), localização geográfica da creche pública ( $p < 0,01$ ) e idade ( $p < 0,01$ ) como preditoras do índice ceo-d. O estudo mostrou a necessidade de um programa de saúde bucal para essa população, incluindo medidas tanto curativas, quanto preventivas, com o objetivo de alcançar as metas da OMS/FDI para o ano 2000 (50% de crianças livres de cárie na faixa etária de cinco a seis anos).*

**Palavras-chave** *Cárie Dentária; Dentição Primária; Prevalência; Epidemiologia*

## Introduction

There is ample evidence that prevalence of dental caries has been declining over the last two decades in most countries in Western Europe and North America. The reduction in the average decayed, missing, and filled teeth (dmf-t) scores has been reported to be between 40% and 60% in most age groups. The decline in caries has been associated mainly with the widespread availability of fluoride toothpastes and changes in the pattern and amount of extrinsic sugar consumption, whereas the increase is primarily related to the increase in consumption of extrinsic sugars, especially sucrose (Sheiham, 1984; Holm, 1990; Freire et al., 1996). Prevalence of dental caries in Brazil still constitutes a public health problem, particularly in some areas. Data from a national epidemiological survey showed a mean dmf-t of 4.84 at age 12 years (SESI, 1995).

Internationally, dental disease in young children has been less studied than in older age groups. Despite poor dental conditions, few epidemiological studies focused on children under 6 years of age in Brazil. Freire et al. (1996) assessed dental caries in the primary dentition of 2,267 preschool children, aged 0-6 years old, in Goiânia, Goiás, attending public (low socioeconomic) and private (high socioeconomic) nursery schools. Caries prevalence was higher in public than private nursery school children ( $p < 0.05$ ). Among children from public nursery schools, the highest dmf-t component was untreated decay, while in private nurseries it was filled teeth. Mattos-Graner et al. (1996) determined the prevalence of dental caries in 322 Brazilian children aged 6-36 months in Piracicaba, São Paulo. The earliest ages at which initial and manifest caries were recorded in children were 6-12 months and 13-18 months respectively. Sixty-five per cent of the children were caries-free. Seventeen per cent of the affected children showed 46% of the total caries lesions, which demonstrates the need for early identification of those with a high caries risk. In an epidemiological survey of caries prevalence and distribution in 0-36-month-old children living in Diadema, São Paulo, Brazil, conducted by Bônecker et al. (1997), mean dmf-t per child was 0.16 at one year, 0.87 at two years, and 2.54 at three years of age. Mean dmf-s values for the same groups were 0.17, 1.13, and 3.68, respectively.

Oral health conditions of preschool children had never been documented in the city of Juiz de Fora, Minas Gerais. The current study was thus conducted to investigate dental caries

prevalence in the primary dentition of preschool children attending public nursery schools in this city in order to provide data for formulation of oral health programs for this specific population.

## Methods

### Subjects

The study was performed in the first semester of 1998 in the city of Juiz de Fora, State of Minas Gerais, Southeast Brazil, which has had fluoridated water (0.8mgF/l) since 1983. The study group comprised 338 preschool children with complete primary dentition (181 boys; 157 girls) aged 2-6 years old (mean age 4.3 years old) attending public nursery schools on weekdays. The sample included four randomly selected public nursery schools representing 22% of the 18 existing public nurseries in 1998. A household income lower than the Brazilian monthly minimum wage (R\$136,00 or US\$75.00) was required for these children to be admitted to such nursery schools. The study sample represented 16.1% of the total population (aged 2-6 years-old) served by these institutions (338/2,100 children). The nurseries were randomly selected on the basis of their geographic location according to data provided by the local health authority. The sample included two institutions located in the central region of the city and two located on the periphery. The study design received prior approval by the Ethics Committee of the School of Medicine at the Federal University in Juiz de Fora. Parental consent forms were also obtained. Distribution of the sample by age, sex, and geographic location of the public nursery schools is shown in Table 1.

### Clinical recordings

Clinical visual examinations were done on site in daylight by the authors using a mouth mirror. The children had their teeth brushed and dried with gauze before the examination. Examiners were calibrated in one nursery school before the beginning of the survey. Inter-examiner agreement was calculated by the *Kappa* coefficient at 0.85. Dental caries (dmf-t index) was recorded according to WHO (1994). A tooth was considered carious (d component) if there was visible evidence of a cavity, including untreated dental caries and filled teeth with recurrent caries. The m component included teeth with indications for extraction due to caries (Freire et al., 1996; Mattos-Graner et al., 1996).

Table 1

Distribution of preschool children (n = 338) sex and geographic location of the public nursery schools – Juiz de Fora, Minas Gerais, Brazil, 1998.

Age	Central region			Peripheral region			Central and peripheral region		
	n	Male	Female	n	Male	Female	n	Male	Female
2	23	47.8%	52.2%	19	62.6%	37.4%	42	50.0%	50.0%
3	31	54.8%	45.2%	20	60.0%	40.0%	51	56.9%	43.1%
4	52	55.8%	44.2%	35	48.6%	51.4%	81	40.5%	59.5%
5	49	34.7%	65.3%	35	48.6%	51.4%	84	63.8%	36.2%
6	52	63.8%	36.2%	28	69.3%	31.7%	80	63.8%	36.2%
<b>Total</b>	<b>207</b>	<b>51.7%</b>	<b>48.3%</b>	<b>131</b>	<b>56.5%</b>	<b>43.5%</b>	<b>338</b>	<b>181</b>	<b>157</b>

Table 2

Caries experience in relation to age of a group of 338 preschool children – Juiz de Fora, Minas Gerais, Brazil, 1998.

Age (years)	n <sup>a</sup> in groups	n <sup>a</sup> (%) caries free	Mean dmft (± SD) all children	Mean dmft (± SD) excluding caries free children	d (Mean ± SD and % of dmft-t)	m (Mean ± SD and % of dmft-t)	f (Mean ± SD and % of dmft-t)
2	23	32 (76.2%)	0.7 (1.50)	2.9 (1.8)	0.6 (1.3) 86.2%	0.1 (0.6) 13.8%	–
3	31	33 (64.7%)	1.4 (2.61)	3.9 (3.1)	1.3 (2.5) 91.4%	–	0.1 (0.6) 8.6%
4	52	37 (45.7%)	1.9 (2.68)	3.5 (2.8)	1.6 (2.5) 82.4%	0.1 (0.3) 2.6%	0.2 (0.9) 14.9%
5	49	37 (44.0%)	2.4 (3.06)	4.3 (2.9)	2.1 (2.7) 87.6%	0.1 (0.6) 5.5%	0.2 (0.7) 6.9%
6	52	32 (40.0%)	2.9 (3.30)	4.8 (8.6)	2.4 (2.8) 80.7%	0.2 (0.8) 7.9%	0.3 (1.0) 11.4%

The criteria used for decay severity was adapted by the authors from the WHO classification for permanent dentition (FDI/WHO, 1982), after which the very low prevalence was represented by a dmft-t from 0.1 to 0.7, low prevalence as dmft-t from 0.8 to 1.6, moderate from 1.7 to 2.7, high from 2.8 to 4.0, and very high over 4.1.

Data on independent variables were obtained from the mothers who agreed to participate in the study. The race variable was classified as white or black. Visit to dentist was described as the presence of private and/or public restorative intervention at any time in the child's life (data provided by mother and visual inspection). Number of times teeth brush per day in the nursery school was recorded according to information obtained by the school nurse.

Data were processed and analyzed using *EpiInfo* version 6.0 and *SPSS 6.0 for Windows*. Comparisons between groups were made using  $\chi^2$  test, analysis of variance was applied for the study of dmft-t index related to race, sex, ge-

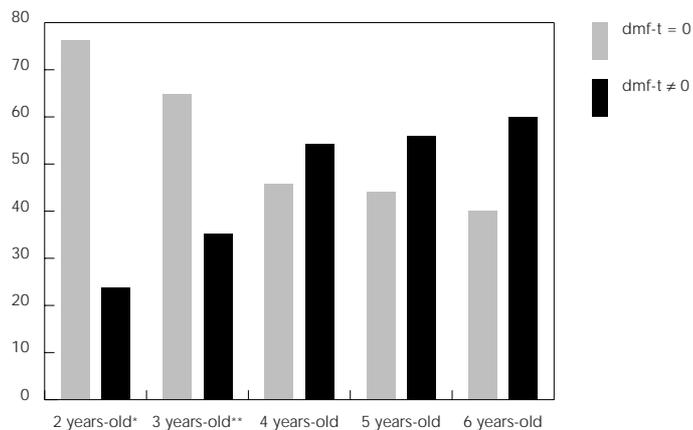
ographic location, and prior visits to dentist. The influence of independent variables and the dmft-t index was established by logistic regression analysis.

## Results

The number of children in each age bracket and their experience with caries are shown in Table 2. Data from 338 children indicated that 50.6% were caries-free. The proportion of caries-free children ranged from 76.2% in 2-year-old children to 40.0% in six-years-old (Figure 1). Of all the caries-free children (n = 171), 26.9% were from nursery schools in neighborhoods, whereas 73.1% attended nursery schools in neighborhoods with relatively higher socioeconomic status. Analyzing the proportion of caries-free children by geographic location, the data revealed a statistical difference between central and peripheral nursery schools ( $p < 0.01$ ). For the sample as a whole, the dmft-t index was 2.03. Mean dmft-t was lower in two-

Figure 1

Percentages of children caries free and caries positive in relation to age (=338).



\* indicates statistically significant difference ( $p < 0.01$ )

\*\* indicates statistically significant difference ( $p < 0.05$ )

years-old ( $0.7 \pm 1.50$ ) and higher in six-years-old ( $2.9 \pm 3.30$ ); these differences were statistically significant (Table 2). The dmf-t component values shown in Table 2 show that the index consisted largely of decayed teeth (d component), which constituted 0.6 of the total in two-years-old, 1.3 in three-years-old, 1.6 in four-years-old, 2.1 in five-years-old, and 2.6 in six-years-old. Analysis of variance showed no significant differences in caries scores between races or sexes ( $p = 0.62$  and  $0.06$ , respectively). However, geographic location of the public nursery school and the child's prior visit to dentist showed a highly significant influence (Figure 2).

Table 3 presents odds ratios calculated by using b coefficient obtained during stepwise logistic regression. Data indicated that children with at least one prior visit to the dentist were 12 times more likely to be in the higher dmf-t group ( $\text{dmf-t} > 4$ ) than the other, holding all other variables constant. Geographic location showed a similar strong effect in the model (i. e., children attending peripheral nursery schools were almost 4 times more likely to have a higher dmf-t than were those attending central nursery schools). Table 3 also shows that if the variables with p-values ranging from 0.05 to 0.10 were kept in the final prognostic model, sex and number of times teeth were brushed per day in the nursery school would have been included. Data suggested that the overall probability of boys having a higher dmf-t (above

2.8) than girls was 0.80. In addition, the number of daily brushings at nursery school was inversely proportional to dmf-t.

## Discussion

The present study demonstrated early initiation of tooth decay in Brazilian preschool children, confirming previous observations (Freire et al., 1996; Mattos-Graner et al., 1996; Bönecker et al., 1997). The results also demonstrated a significant relationship between age and caries. This relationship had been shown in both younger (Freire et al., 1996; Mattos-Graner et al., 1996; Bönecker et al., 1997) and older children (Dini et al., 1996; Moreira et al., 1996; Vigild et al., 1996).

Mean dmf-t and the proportions of children with caries are similar to those observed in another group of Brazilian preschool children attending public and private nursery schools:  $\text{dmf-t} = 2.03$  (Freire et al., 1996). The rates are higher than those found amongst nursery school children in Nairobi, Kenya:  $\text{dmf-t} = 1.88$  (Masiga & Holt, 1993). However, they are lower than those from in studies in Hong Kong:  $\text{dmf-t} = 2.93$  (Wei et al., 1993); Kuwait:  $\text{dmf-t} = 6.2$  (Vigild et al., 1996), and San Fernando, Spain:  $\text{dmf-t} = 3.19$  (Romero-Ruiz et al., 1996).

Analysis of each component in the dmf-t index showed a marked influence of the D component, as also observed in other surveys (Wei et al., 1993; Freire et al., 1996; Mattos-Graner et al., 1996; Bönecker et al., 1997). In other words, it appears that the pressing need for dental treatment in the primary dentition reflects the current economic and practical difficulties within the health services system administered by local health authorities, supporting the conclusions reported by Petersen et al. (1994).

These results showed a low percentage of children with a high number of dental caries. Of the 338 children, 18.3% had a very high dmf-t ( $n = 62$ ), and 6.2% had a high dmf-t ( $n = 21$ ). Three per cent of the affected children had  $\text{dmf-t} > 10$ . These results demonstrated the need for early identification of children at high risk of caries, as suggested by other studies (Mandel, 1989; Wei et al., 1993; Freire et al., 1996). In addition, children's prior experience with caries has often been shown to be the single best predictor of future dental disease (Sæmundsson et al., 1997). Our results indicated the influence of prior dental restorative treatment on a higher dmf-t score, when all other variables remained constant (Table 3). It appears that the sort of dental care offered to

Figure 2

Dmf-t index by race ( $p = 0.62$ ), sex ( $p = 0.06$ ), geographic location of the nursery school ( $p < 0.01$ ), and a previous child's visit to dentist ( $p < 0.001$ ).

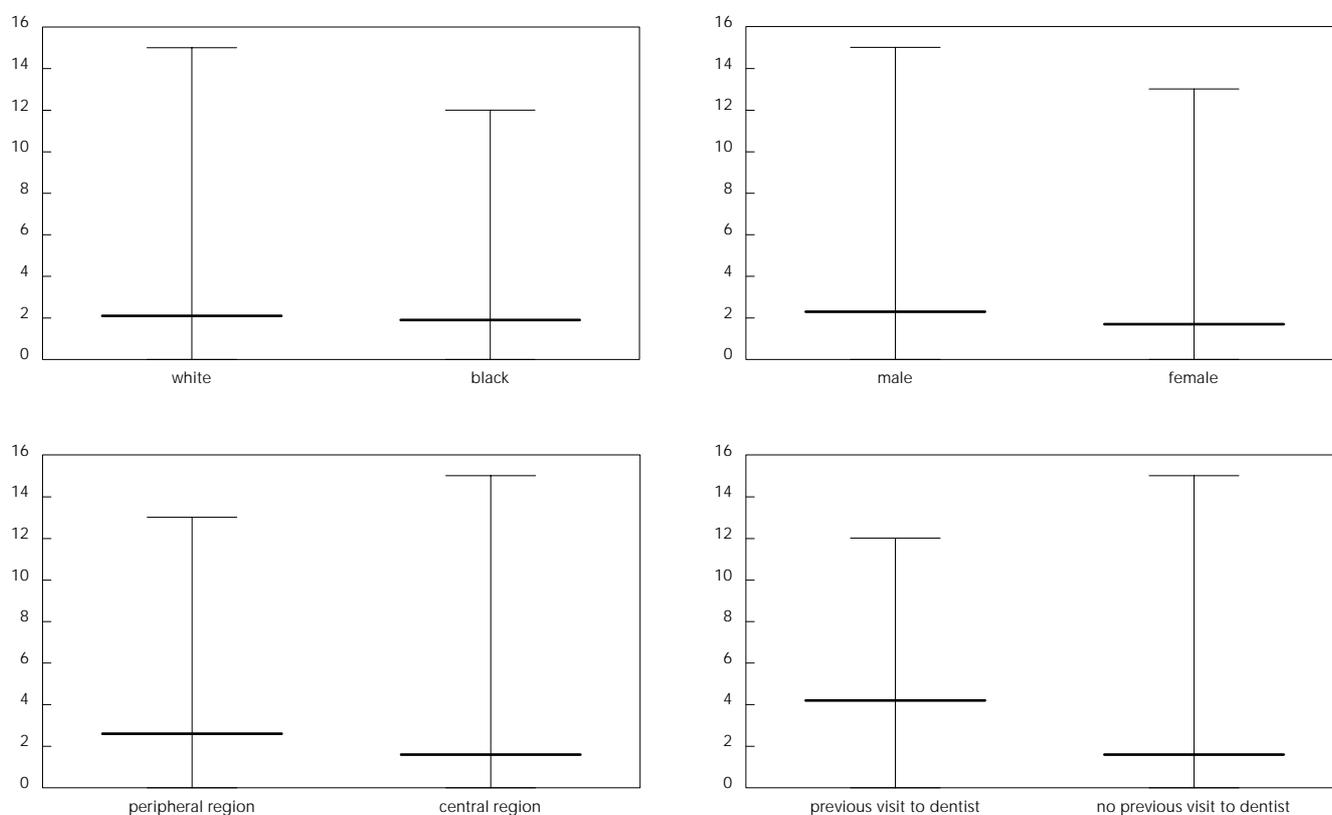


Table 3

Odds ratios with 95% lower and upper confidence bounds (L95, U95) of increased risk.

Predictors	OR	L95	U95	p-valor
Previous visit to dentist	12.50	5.58	26.31	$p < 0.001$
Children attending peripheral nursery schools	3.52	1.97	6.30	$p < 0.001$
Age	1.40	1.11	1.75	$p < 0.01$
Sex	1.77	1.01	3.06	$p = 0.06$
Number of daily toothbrushing	1.15	1.02	1.35	$p = 0.09$

these children is insufficient to promote their oral health, as related by Freire et al. (1996).

Forty per cent of children were caries-free at age six years. This rate is still lower than the first oral health goal of FDI/WHO (1982) for the year 2000 (i. e. 50% of children free of caries at this age). However, this rate is better than that of Brazilian preschool children attending public nursery schools in Goiânia (Freire et al., 1996). It is also better than those observed among children from other countries, where rates ranged from 9% to 34% (Holbrook, 1993; Petersen et al., 1994; Romero-Ruiz et al., 1996; Vigild et al., 1996). Taking into account the geographic location of public nursery schools, we note that 26.9% of the caries-free children were attending peripheral nursery schools, whereas 73.1% were attending nursery schools in more central and relatively more affluent neighborhoods. This pattern appeared in the epidemiological

survey conducted in São Paulo (NEPESS, 1999). In 1998, the mean dmft was 2.94 (2.90-2.98) and 39% 5-year-old children were in the caries-free group. However, this percentage was higher in private (59%) as compared to public schools (38%).

In light of these results from our survey, one can conclude that implementation of an oral health program for children attending public nursery schools should be a high priority. Such a program should include not only preventive measures but also curative treatment of the affected primary teeth, in order to allow for permanent teeth to erupt under more favorable conditions. The educational program should emphasize prenatal orientation for groups of pregnant women as well as professional training for preventive attention to babies (0-3 years) in order to encourage healthy oral habits during this period.

## References

- BÖNECKER, M. J. S.; GUEDES-PINTO, A. C. & WALTER, L. R. F., 1997. Prevalência, distribuição e grau de afecção de cárie dentária em crianças de 0 a 36 meses de idade. *Revista da Associação Paulista de Cirurgiões-Dentistas*, 51:535-540.
- DINI, E. L.; ROZATO-FOSCHINI, A. L.; CASARINI-DEMENDONÇA, F. C.; DE-NARDO, G.; GARDIM-ABBAD, M. T. & MARSON-SECHEV-FRAIS, R. L., 1996. Changes in dental caries prevalence of school children in Araraquara, SP, Brazil. *International Dental Journal*, 46:82-85.
- FDI (Fédération Dentaire Internationale)/WHO (World Health Organization), 1982. Global goals for oral health by the year 2000. *International Dental Journal*, 32:74-77.
- FREIRE, M. C. M.; MELO, R. B. & SILVA, S. A., 1996. Dental caries prevalence in relation to socioeconomic status of nursery school children in Goiânia-GO, Brazil. *Community Dentistry and Oral Epidemiology*, 24:357-361.
- HOLBROOK, W. P., 1993. Dental caries and cariogenic factors in pre-school urban Iceland children. *Caries Research*, 27:431-437.
- HOLM, A. K., 1990. Diet and caries in high-risk groups in developed and developing countries. *Caries Research*, 24:44-52.
- MANDEL, I. D., 1989. Preface. In: *Cariology* (E. Newbrun, ed.), 3<sup>rd</sup> Ed. Chicago: Quintessence.
- MASIGA, M. A. & HOLT, R. D., 1993. The prevalence of dental caries and gingivitis and their relationship to social class among nursery-school children in Nairobi, Kenya. *International Journal of Pediatric Dentistry*, 3:135-140.
- MATTOS-GRANER, R. O.; RONTANI, R. M. P.; GAVIÃO, M. B. D. G. & BOCATTO, H., 1996. Caries prevalence in 3-36-month-old Brazilian children. *Community Dental Health*, 13:96-98.
- MOREIRA, B. H. W.; PEREIRA, A. C. & OLIVEIRA, S. P., 1996. Avaliação da prevalência de cárie dentária em escolares de localidade urbana da região Sudeste do Brasil. *Revista de Saúde Pública*, 30:280-284.
- NEPESS (Núcleo de Estudos e Pesquisas de Sistemas de Saúde), 1999. *Levantamento Epidemiológico em Saúde Bucal - Estado de São Paulo, 1998*. São Paulo: Secretaria de Estado de Saúde de São Paulo.
- PETERSEN, P. E.; DANILA, I.; DALEAN, A.; GRIVU, O.; IONITA, G.; POP, M. & SAMOLIA, A., 1994. Oral health status among school children in Romania, 1992. *Community Dentistry and Oral Epidemiology*, 22:90-99.
- ROMERO-RUIZ, M. M.; SERRANO-GONZALEZ, A.; ALVAREZ-OSORIO, G. S.; M. R. & ZAFRA-MEZCUA, J. A., 1996. Prevalence of dental caries in a 6-year old population from San Fernando. *Atención Primaria*, 18:431-435.
- SÆMUNDSSON, S. R.; SLADE, G. D.; SPENCER, A. J. & DAVIES, M. J., 1997. The basis for clinicians' caries risk grouping in children. *Pediatric Dentistry*, 19:331-338.
- SESI (Serviço Social da Indústria), 1995. *Estudo Epidemiológico sobre Prevenção da Cárie Dental em Crianças de 3 a 14 Anos*. Brasília: SESI.
- SHEIHAM, A., 1984. Changing trends in dental caries. *International Journal of Epidemiology*, 13:142-147.
- VIGILD, M.; SKOUGAARD, M.; HADI, R. A.; AL-ZAABI, F. & AL-YASSEEN, I., 1996. Dental caries and dental fluorosis in 4-, 6-, 12- and 15-year-old children in kindergartens and public schools in Kuwait. *Community Dental Health*, 13:47-50.
- WEI, S. H. Y.; HOLM, A. K.; TONG, L. S. M. & YUE, S. W. H., 1993. Dental caries prevalence and related factors in 5-year-old children in Hong Kong. *Pediatric Dentistry*, 16:116-119.
- WHO (World Health Organization), 1994. *WHO Global Data Bank - GODB: World Day of Oral Health*. Geneva: WHO.