



## Use of Dental Services Among Brazilian Children Aged Zero to Three Years: Analysis of National Household Surveys

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### Abstract

**Objective:** To describe the use of dental services among children aged zero to three years in Brazil according to socio-demographic characteristics. **Material and Methods:** A cross-sectional study was carried out using data from the 1998, 2003 and 2008 Brazilian National Household Surveys involving a total of 25,769, 25,644 and 22,237 children, respectively. Prevalence rates and 99% confidence intervals (CI) were calculated. **Results:** : In 1998, 10.4% (99%CI: 9.7-11.1) of the children had been to the dentist. This figure was 13.4% (99%CI: 12.6-14.3) in 2003 and 16.2% (99%CI: 15.2-17.1) in 2008. In 2008, the prevalence rates of dental appointments in lifetime were respectively 10.2% (99%CI: 9.2-11.4) and 30.6% (99%CI: 27.7-33.6) for children in the lowest and highest income quartiles, 10.2% (99%CI: 8.9-11.7) and 22.4% (99%CI: 20.9-23.9) for children from families whose head of household had up to four and nine or more years of schooling, 9.6% (99%CI: 2.2-11.1) and 27.5% (99%CI: 24.5-30.8) for those living in the northeast and central west regions of the country. **Conclusion:** Statistically significant increases in the prevalence rates of the use of dental services among Brazilian children aged zero to three years occurred between 1998 and 2008. The rates were lower among children belonging to socially and ethnically disadvantaged groups.

**Keywords:** Dental Care; Health Services Accessibility; Child.

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## Introduction

Early care is an achievement in dentistry and represents a new understanding that is strongly directed toward preventive care and health promotion [1]. Early dental care measures aimed at avoiding or diminishing the consequences of adverse oral conditions in the population have had positive results in recent years [2].

For adequate oral health, it is recommended that individuals visit the dentist periodically. The parameters established by the Brazilian Ministry of Health for the planning of public oral health resources range from one dental appointment every two years to two appointments per year. Moreover, according to the guidelines of the National Oral Health Policy, inclusion into the system should occur when a child is a maximum of six months of age [3].

The intensity and severity of tooth decay in the primary dentition often lead to the need for treatment [4]. However, most parents/guardians are unaware of the risks of the development of this type of disease among small children [5]. Thus, information offered to parents/guardians regarding care to avoid tooth decay can contribute toward improving the quality of life of children. For such, access to dental services is essential for this age group.

Other positive aspects of early care regard changes in thinking on the part of dental professionals and clients as well as cost reductions in both the public and private sectors [1]. However, the Brazilian public healthcare system continues to play a proportionally small role in the use of dental services among children up to three years of age [6]. In 1998, data from the National Household Survey reported the following findings: a large portion of Brazilian children had never been to the dentist; the demand for medical services far outweighed the demand for dental services; and the proportion of dental services financed by the patient was much higher than that financed by health insurance policies or the public healthcare system [6].

The aim of the present study was to describe the use of dental services among Brazilian children aged zero to three years according to socio-demographic characteristics in 1998, 2003 and 2008.

## Material and Methods

### Study Design

A cross-sectional study was carried out using data from the 1998, 2003 and 2008 National Household Surveys conducted by the Instituto Brasileiro de Geografia e Estatística (IBGE [Brazilian Institute of Geography and Statistics]).

### Data Collection

National Household Surveys have been performed in Brazil for more than forty years to gather important data for the formulation, validation and evaluation of public policies directed at socioeconomic development and better living conditions [7]. Data collection is carried out through the use of a structured questionnaire addressing the characteristics of the home and residents.

Sampling is performed in three successive stages: municipalities, census sectors and household units [8]. Until 2003, the surveys excluded only rural areas of the northern region of the country (states of Rondônia, Acre, Amazonas, Roraima, Pará and Amapá) [9]. A total of 344,975 individuals were surveyed in 1998 [10] and 384,834 were interviewed in 2003 [7]. In 2008, 391,868 individuals were interviewed, encompassing 150,591 household units distributed throughout all states of Brazil [9]. In 1998, the date of reference for the data collection was September 26th, 1998 (week of reference: September 20th to 26th, 1998). In 2003, the period of reference spanned 365 days, with data collected from September 28th, 2002 to September 27th, 2003. In 2008, interviews were held between September 28th, 2007 and September 28th, 2008 [7,9,11].

From 1998 until 2008, the Brazilian Ministry of Health included a supplementary module for the acquisition of information on access to and the use of health services (including dental services), coverage by different health insurance policies, health needs based on chronic diseases, limitations to activities of daily living due to chronic or acute health problems and expenditures on private health plans, healthcare services and medications [11,12].

The sample in the present study was composed of children aged zero to three years included in the 1998, 2003 and 2008 National Household Surveys. This age group was considered based on the importance of preventive actions in oral health care and awareness on the part of parents through orientations given to pregnant mothers during prenatal care regarding the importance of early socialization directed at the establishment of healthy habits in the child [1].

The dependent variable was “visit to the dentist” and was determined from the answer to a question on the last time the subject had been to the dentist [“when did (...) last go to the dentist?”], to which the response options were 1) “less than one year ago”; 2) “between one and two years ago”; 3) “between two and three years ago”; and 4) “had never been to the dentist”.

The following were the independent variables: a) Socio-demographic characteristics of the child: sex (male or female), age (0, 1, 2 or 3 years), ethnicity (Caucasian/Asian descent or Mulatto/African descent/Indigenous), household monthly income per capita (in quartiles), schooling of head of household (0 to 4, 5 to 8 and 9 or more years of study), region of residence (north, northeast, southeast, south or central west) and area of residence (urban or rural); b) Aspects related to access to health services: For children who had sought health services in the two weeks prior to the interview, data were collected on the reason for seeking such services (dental or other problem). For those who had sought dental services, data were collected on where care was sought (health unit or centre, dental office, medical office, emergency room, hospital, clinic or dental services offered by firms or workers’ unions).

## Data Analysis

Data analysis was performed with the software Stata program, version 10, taking into account the sample design of the national household survey. Sampling weight, strata and primary units were specified (data available from the IBGE) to calculate prevalence rates and respective 99%

confidence intervals (CI). Statistical significance of the differences was analysed at the 1% level using these intervals.

### Ethical Aspects

The present study was conducted with data acquired from secondary sources (national household surveys). To ensure anonymity, the IBGE databases do not allow the identification of the interviewed subjects. IBGE surveys are conducted to assist in the planning of public policies and follow international ethical principles that govern research involving human subjects. According to current legislation, there is no need for approval from an ethics committee in such cases. Thus, the study protocol was submitted to the institutional review board of the Franciscan University and the researchers received a letter authorizing the publication of the data.

### Results

Table 1 displays the data on the demographic and socioeconomic characteristics of the sample composed of children aged zero to three years included in the 1998 ( $n = 25,769$ ), 2003 ( $n = 25,644$ ) and 2008 ( $n = 22,237$ ) surveys.

**Table 1. Absolute and relative frequencies of variables related to socioeconomic characteristics of children (age: 0 to 3 years) included in sample. Brazil – 1998, 2003 and 2008.**

Variables	National Household Survey					
	1998		2003		2008	
	N	%	N	%	N	%
<b>Sex</b>						
Male	13,059	50.7	13,154	51.3	11,345	51.0
Female	12,710	49.3	12,490	48.7	10,892	49.0
<b>Age (Years)</b>						
< 1	6,274	24.4	6,043	23.7	5,279	23.7
1	6,200	24.1	5,832	22.7	5,431	24.4
2	6,482	25.1	6,502	25.3	5,595	25.2
3	6,813	26.4	7,267	28.3	5,932	26.7
<b>Ethnicity</b>						
Caucasian or Asian descent	13,156	51.1	12,311	48.0	10,616	47.8
Mulatto, African descent or Indigenous	12,610	48.9	13,332	52.0	11,592	52.2
<b>Monthly Income in Quartiles</b>						
1 <sup>st</sup> quartile	10,128	39.3	10,887	42.4	9,895	44.5
2 <sup>nd</sup> quartile	7,336	28.5	7,229	28.2	6,072	27.3
3 <sup>rd</sup> quartile	4,777	18.5	4,409	17.2	3,476	15.6
4 <sup>th</sup> quartile	3,528	13.7	3,119	12.2	2,794	12.6
<b>Schooling of Head of Household (Years of Study)</b>						
0 to 4	11,689	45.6	9,335	36.7	6,378	28.8
5 to 8	8,003	31.2	8,249	32.4	6,540	29.6
9 or more	5,962	23.2	7,870	30.9	9,203	41.6
<b>Region of Residence</b>						
North	2,272	8.8	3,619	14.1	3,693	16.6
Northeast	8,969	34.8	9,055	35.3	7,725	34.7
Southeast	7,565	29.4	6,489	25.3	5,458	24.6

South	4,199	16.3	3,587	14.0	2,845	12.8
Central West	2,764	10.7	2,894	11.3	2,516	11.3
Area of Residence						
Urban	20,196	78.4	21,537	84.0	18,263	82.1
Rural	5,573	21.6	4107	16.0	3,974	17.9

Based on data from national household surveys conducted by Brazilian Institute of Geography and Statistics in 1998, 2003 and 2008.

Table 2 displays the prevalence rates of dental appointments in one's lifetime according to socio-demographic characteristics. A total of 10.4% (99%CI: 9.7-11.1) of the children had been to the dentist in the 1998 survey. This figure was 13.4% (99%CI: 12.6-14.3) in 2003 and 16.2% (99%CI: 15.2-17.1) in 2008.

**Table 2. Prevalence (%) of dental appointments in lifetime among children (age: 0 to 3 years) according to socio-demographic variables. Brazil – 1998, 2003 and 2008.**

Variables	National Household Survey					
	1998		2003		2008	
	Prevalence %	99% CI*	Prevalence %	99% CI*	Prevalence %	99% CI*
Sex						
Male	10.7	9.8-11.7	13.3	12.3-14.3	16.9	15.7-18.1
Female	10.0	9.1-10.9	13.6	12.5-14.7	15.5	14.3-16.8
Age (Years)						
< 1	2.1	1.6-2.8	3.2	2.5-3.9	2.6	2.0-3.4
1	5.2	4.4-6.2	8.8	7.7-10.1	10.5	9.3-12.0
2	12.9	11.6-14.3	15.4	14-16.9	19.3	17.6-21.1
3	20.0	18.4-21.8	23.7	22.1-25.4	30.7	28.6-32.8
Ethnicity						
Caucasian or Asian descent	12.7	11.8-13.8	16.1	14.9-17.3	18.8	17.5-20.1
Mulatto, African descent or Indigenous	7.6	6.8-8.5	10.6	9.7-11.5	13.5	12.3-14.7
Monthly Income in Quartiles						
1 <sup>st</sup> Quartile	4.9	4.2-5.7	7.2	6.4-8.2	10.2	9.2-11.4
2 <sup>nd</sup> Quartile	9.0	8.0-10.3	13.3	11.9-15.0	15.1	13.6-16.8
3 <sup>rd</sup> Quartile	14.3	12.7-16.1	18.5	16.8-20.4	22.2	20-24.5
4 <sup>th</sup> Quartile	22.9	20.7-25.3	26.5	24-29.1	30.6	27.7-33.6
Schooling of Head of Households						
0 to 4	5.6	4.9-6.4	7.3	6.4-8.3	10.2	8.9-11.7
5 to 8	10.8	9.7-12.0	13.3	12.0-14.7	13.4	12.1-14.9
9 or more	19.6	17.8-21.5	20.9	19.4-22.4	22.4	20.9-23.9
Region of Residence						
North	9.9	7.5-13.2	12.2	10.3-14.3	12.8	10.8-15.1
Northeast	5.6	4.8-6.5	7.1	6.1-8.2	9.6	8.2-11.1
Southeast	11.5	10.3-12.8	14.8	13.2-16.5	17.5	15.7-19.3
South	16.3	14.3-18.5	22.1	19.7-24.8	25.3	22.5-28.3
Central west	14.4	12.4-16.7	19.6	17.4-22.1	27.5	24.5-30.8
Area of Residence						
Urban	12.1	11.2-13.0	15.0	14.1-16.0	17.8	16.7-18.9
Rural	5.0	4.1-6.2	6.1	4.9-7.5	9.3	7.3-11.7
Total	10.4	9.7-11.1	13.4	12.6-14.3	16.2	15.2-17.1

§In years of study; \*Confidence Interval; Based on data from national household surveys conducted by Brazilian Institute of Geography and Statistics in 1998, 2003 and 2008.

## Discussion

Data from the 1998 Brazilian National Household Survey reveal that 89.6% of children aged zero to three years of age had never been to the dentist. While this figure had lowered to 83.4% by 2008, it remains far from satisfactory. Important inequalities also remain, with less use of dental services among children belonging to socially and ethnically disadvantaged groups as well as those living in rural areas and the poorest regions of the country.

Inequality is a general term that refers to the heterogeneous distribution of health in a population, especially with regard to demographic and social characteristics, such as age, gender, region of residence, degree of urbanization and social class [13-15]. Inequality in health and the use of healthcare services (including dental services) is a nearly universal problem [2,6,14,16,17].

Previous studies have also demonstrated low frequencies of the use of services among the child population in Brazil, despite efforts on the part of the federal government to minimize barriers by including dental care within the scope of the Family Health Program [16-19]. Studies using data from the 1998 National Household Survey report that 67% of children had never been to the dentist [6,16]. A study using data from 2003 reports that approximately 15% of the Brazilian population had never been to the dentist, which was a reduction in comparison to the 18.7% reported for 1998; moreover, differences were found among the different macro-regions of the country [3].

No significant gender differences were found regarding the categories analyzed in the present study, which is in agreement with findings reported in previous studies [18,20]. In contrast, mulatto children, indigenous children and those of African descent visited the dentist less than Caucasian children and those of Asian descent. Studies addressing the use of healthcare services among different ethnicities in this age group (0 to 3 years) are scarce. However, a study conducted in the southeast region of Brazil found no difference in access of dental services according to self-reported race (white and non-white) [18].

In the present study, the advance in age was associated with a greater number of children who had been to the dentist. The fact that few individuals in the first and second years of life had been to the dentist may be related to a lack of awareness of the part of parents/guardians regarding the ideal age for the first dental appointment [3]. In the analysis of all three surveys, a greater frequency of children from families with a higher income and whose heads of household had a higher level of schooling had been to the dentist. Studies have demonstrated that, despite the higher rates of tooth decay, children from poorer families and those whose parents/guardians have a lower level of schooling go to the dentist less often than those from families with a higher income and whose parents/guardians have a higher level of schooling [17-21].

There is a need to investigate social inequalities with regard to factors associated with the use of dental services by children. Inequality in health seems to be more associated with socioeconomic aspects than limitations regarding the offer of services [14,22,23]. However, this issue merits more in-depth studies addressing regional differences both between and within countries. Moreover, achieving and maintaining adequate oral health depends not only on the use of

health services, but also on adequate self-care practices, such a regular brushing and the use of fluoride toothpaste [20]. Studies have shown that individuals with positive attitudes regarding oral hygiene use dental services more often than those with negative attitudes [21].

In the three surveys analysed, children from the northeast region of Brazil visited the dentist with less often in comparison to those residing in other regions of the country. In contrast, the south and central west regions had the highest frequencies of children who had been to the dentist. Previous studies reveal that the availability of dental services and the ease of access to such services in certain regions exert an influence on patterns of use [24]. Moreover, despite considerable improvements in the oral health status of children in Brazil, significant differences are found among the macro-regions of the country regarding the mean decayed, missing and filled teeth (dmft/DMFT) index [3].

Analyzing area of residence, the findings of the present investigation and previous studies suggest that the population in urban areas has greater access to dental services [6,23,25]. Regarding the search for dental services in the two weeks prior to the interview, the analysis revealed that, although the percentage of individuals seeking care at a health post or centre increased between 1998 and 2003, more than half of the children sought treatment at private dental offices in 2008. It therefore seems that a large portion of the population seeks dental care in the private sector, despite the implementation of public health policies in Brazil, such as the inclusion of dental care within the scope of the Family Health Strategy and the establishment of the program entitled Brazil Smiling, both of which were implemented with the aim of broadening access to free dental services. The health centers of the Family Health Strategy were associated with the greater dental visitation of children and the expansion of this program, which includes active home visits to families with young children, may encourage the use of dental services in early life [16,26].

The limitations of the present study are mainly related to the methodological aspects of the national household surveys. All data analysed came from information reported by interviewees (parents/guardians of the children) and are therefore subject to information bias, which can result in an underestimation or overestimation of prevalence rates. Another limitation regards the cross-sectional design, which does not allow the determination of causality. However, one's level of schooling normally remains stable throughout life and is not affected by the occurrence of disease or disability in adulthood, as occurs with income. Another limitation is related to the exclusion of the rural areas of six states of the north region from the survey samples up to 2003, which could overestimate the prevalence rate of the use of dental services, especially for rural areas. Moreover, the sample size used to investigate the aspects related to access to health services was limited to the number of children who had sought dental care, resulting in broad confidence intervals for the estimates.

As parents/guardians often demonstrate limited knowledge regarding the oral health of infants and toddlers, there is a need for educational programs directed at this age group addressing the aetiology and transmission of tooth decay, the use of fluoride toothpaste and oral hygiene

practices [5,27,28]. The education of parents/guardians and children can help avoid the development of dental caries and its consequences. Public policies and the distribution of resources should be planned based on the needs of the population and regional disparities regarding the causes, effects and possible solutions to the problems encountered [29]. Eliminating disparities in health requires going beyond financial barriers to address social and cultural issues (health determinants) through an understanding of the impact of culture on perceptions regarding health behaviour and practices [30].

One hypothesis for the small increase in the number of dental appointments among children aged zero to three years in Brazil is the limited knowledge on the part of families with a lower income and schooling regarding the importance of dental care for infants and toddlers. As there was a significant increase in the offer of public dental services in Brazil, mostly in the last decade, one may assume that there are important barriers to the access of younger children to public dental care. This subject merits further investigation. It is therefore of the utmost importance to implement public health policies aimed at educating parents/guardians regarding the importance of adequate oral health care for small children and improving access to dental services in Brazil. Moreover, it is important to ensure access to quality oral health care for young children in the public healthcare system.

## Conclusion

An increase in the prevalence of dental appointments among children aged zero to three years occurred in Brazil between 1998 and 2008. However, the frequency of use remains far below the ideal rate. The use of dental services was lower among children living in the poorest regions of the country and those belonging to more disadvantaged groups (mulatto, African descent and indigenous) and those living in households with lower income and whose head of the household had few years of schooling.

## References

1. Savage MF, Lee JY, Kotch JB, Vann Jr. WF. Early preventive dental visits: Effects on subsequent utilization and costs. *Pediatrics* 2004; 114(4):418-23. doi: 10.1542/peds.2003-0469-F.
2. Kramer PF, Ardenghi TM, Ferreira S, Fischer LA, Cardoso L, Feldens CA. Use of dental services by preschool children in Canela, Rio Grande do Sul State, Brazil. *Cad Saúde Pública* 2008; 24(1):150-6. doi: 10.1590/S0102-311X2008000100015.
3. Pinheiro RS, Torres TZGD. Access to oral health services between Brazilian States. *Ciênc Saúde Coletiva* 2006; 11(4):999-1010. doi: 10.1590/S1413-81232006000400021.
4. Rayner JA. The first dental visit: A UK viewpoint. *Int J Paediatr Dent* 2003; 13(4): 269. doi: 10.1046/j.1365-263X.2003.00463.x.
5. Poulsen S. The child's first dental visit. *Int J Paediatr Dent* 2003; 13(4):264-5. doi: 10.1046/j.1365-263X.2003.00473.x.
6. Barros DJA, Bertoldi DA. Inequalities in utilization and access to dental services: A nationwide assessment. *Ciênc Saúde Coletiva* 2002; 7(4):709-17. doi: 10.1590/S1413-81232002000400008.
7. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios, 2003. Available at: <http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2003/brasilpnad2003.pdf>. [Accessed April 14, 2012].



8. Travassos C, Viacava F, Laguardia J. Health supplements in the Brazilian National Household Survey - PNAD. *Rev Bras Epidemiol* 2008; 11(1):98-112. doi: 10.1590/S1415-790X2008000500010.
9. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios 2008. Available at: <http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2008/brasilpnad2008.pdf>. [Accessed April 28, 2012].
10. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios, 2008. Available at: <http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad98/saude/saude.pdf>. [Accessed April 28, 2012].
11. Instituto Brasileiro de Geografia e Estatística. Acesso e utilização de serviços de saúde: 1998. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2000.
12. Travassos C, Martins M. A review of concepts in health services access and utilization. *Cad Saúde Pública* 2004; 20(2):S190-198. doi: 10.1590/S0102-311X2004000800014.
13. Petersen PE. Social inequalities in dental health – Towards a theoretical explanation. *Community Dent Oral Epidemiol* 1990; 18(3):153-8. doi: 10.1111/j.1600-0528.1990.tb00042.x.
14. Reda MR, Krois J, Reda SF, Thomson WM, Schwendicke F. The impact of demographic, health-related and social factors on dental services utilization: Systematic review and meta-analysis. *J Dent* 2018; 75:1-6. doi: 10.1016/j.jdent.2018.04.010.
15. Carvalho CDS, Figueiredo ACL, Jamelli SR. Factors associated with the utilization of dental health services by the pediatric population: An integrative review. *Ciênc Saúde Coletiva* 2018; 23(5):1561-76. doi: 10.1590/1413-81232018235.20422016.
16. Baldani MH, Mendes YB, Lawder JA, De Lara AP, Rodrigues MM, Antunes JL. Inequalities in dental services utilization among Brazilian low-income children: The role of individual determinants. *J Public Health Dent* 2011; 71(1):46-53. doi: 10.1111/j.1752-7325.2010.00201.x.
17. Goettems ML, Ardenghi TM, Demarco FF, Romano AR, Torriani DD. Children's use of dental services: Influence of maternal dental anxiety, attendance pattern, and perception of children's quality of life. *Community Dent Oral Epidemiol* 2012; 40(5):451-8. doi: 10.1111/j.1600-0528.2012.00694.x.
18. Rodrigues LAM, Martins AMEBL, Silveira MF, Ferreira RC, Souza JGS, Silva JM, Caldeira PC. The use of dental services among preschool children: A population-based study. *Ciênc Saúde Coletiva* 2014; 19(10):4247-56.
19. Palma ABO, Ferreira RC, Martins QMEB, Assis KBO, Duarte DA. Individual determining factors of the non-use of dental services by 5-year-old children. *Arq Odontol* 2015; 51(1):14-24.
20. Medina-Solís CE, Maupomé G, Avila-Burgos L, Hajar-Medina M, Segovia-Villanueva A, Pérez-Núñez R. Factors influencing the use of dental health services by preschool children in Mexico. *Ped Dent* 2006; 28(3):285-92.
21. Milgrom P, Mancl L, King B, Weinstein P, Wells N, Jeffcott E. An explanatory model of the dental care utilization of low-income children. *Med Care* 1998; 36(4):554-66. doi: 10.1097/00005650-199804000-00011.
22. Machry RV, Tuchtenhagen S, Agostini BA, Silva Teixeira CR, Piovesan C, Mendes FM, Ardenghi TM. Socioeconomic and psychosocial predictors of dental healthcare use among Brazilian preschool children. *BMC Oral Health* 2013; 13:60. doi: 10.1186/1472-6831-13-60.
23. Manhães ALD, Costa AJL. Access to and utilization of dental services in the State of Rio de Janeiro, Brazil: An exploratory study based on the 1998 National Household Sample. *Cad Saúde Pública* 2008; 24(1):207-18. doi: 10.1590/S0102-311X2008000100021.
24. Locker D, Ford J. Evaluation of an area-based measure as an indicator of inequalities in oral health. *Community Dent Oral Epidemiol* 1994; 22(2):80-5. doi: 10.1111/j.1600-0528.1994.tb01577.x.
25. Piotrowska DE, Pędziński B, Jankowska D, Huzarska D, Charkiewicz AE, Szpak AS. Socio-economic inequalities in the use of dental care in urban and rural areas in Poland. *Ann Agric Environ Med* 2018; 25(3):512-6. doi: 10.26444/aaem/89917.
26. Feldens CA, Fortuna MJ, Kramer PF, Ardenghi TM, Vítolo MR, Chaffee BW. Family Health Strategy associated with increased dental visitation among preschool children in Brazil. *Int J Paediatr Dent* 2018; 28(6):624-32. doi: 10.1111/ipd.12421.
27. Mouradian WE, Wehr E, Crall JJ. Disparities in children's oral health and access to dental care. *JAMA* 2000; 284(20):2625-31. doi: 10.1001/jama.284.20.2625.
28. Vann WFJ, Lee JY, Baker D, Divaris K. Oral health literacy among female caregivers: Impact on oral health outcomes in early childhood. *J Dent Res* 2010; 89(12):1395-1400. doi: 10.1177/0022034510379601.

29. Leroy R, Bogaerts K, Hoppenbrouwers K, Martens LC, Declerck D. Dental attendance in preschool children - A prospective study. *Int J Paediatr Dent* 2013; 23(2):84-93. doi: 10.1111/j.1365-263X.2012.01227.x.
30. Mouradian WE, Berg JH, Somerman MJ. Addressing disparities through dental-medical collaboration, part 1. The role of cultural competency in health disparities: Training of primary care medical practitioners in children's oral health. *J Dent Educ* 2003; 67(8):860-8.