

Factors associated with the utilization of dental health services by the pediatric population: an integrative review

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Abstract *This integrative literature review aimed to analyze studies about factors associated with the utilization of dental health services by the pediatric population between zero and 15 years old, published between 2006 and 2016 and available in Portuguese, English or Spanish. A survey of articles in the Lilacs and Medline databases was carried out, using the search strategy: (“dental care/utilization” OR “dental health services/utilization”) AND (“child” OR “child, preschool”) AND NOT adult. To analyze the methodological quality, the adapted Critical Appraisal Skill Programme (CASP) and the Agency for Healthcare and Research and Quality (AHRQ) were used. The following predictors of use of dental health services stood out: factors associated with children or adolescents (age, frequency of tooth brushing, chronic conditions), caregivers (schooling, perception of child’s dental health, perceived oral health needs), dentists (availability at night and on the weekends) and follow up of oral health by the family health team. These are inherent factors for the planning of oral health policies or programs for the pediatric population. However, these factors vary according to the context, and therefore, a contextual analysis should be conducted.*

Key words *Health services accessibility, Dental health services, Child, Adolescent*

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Introduction

The utilization of health services is the core of health care operations, resulting from the interaction between the behavior of the users and the professionals who conduct them within this system. It is also related to access (the act of entering, entrance) and accessibility (quality of what is accessible)¹. Among health services, dental health services (DHS) show inequalities related to use. These inequalities could be identified in several countries, regardless of the nature, scope and efficiency of the health systems².

Children and adolescents are less prone to receiving dental care and, therefore, have unmet oral health care needs³. Data from the National Household Survey (2008) conducted in Brazil showed that among the 11.7% of the population that have never consulted a dentist, 47.9% were children up to 4 years of age and 36.5% were children and adolescents between 5 and 19 years old⁴.

Factors related to the pediatric population, caregivers and DHS may influence the visit to the dentist⁵. Therefore, it is of utmost importance that managers and health professionals be familiar with these factors and analyze them carefully when offering dental services, since early interventions during childhood and adolescence may affect adult life and, consequently, reduce inequalities in health⁶.

Studies that evaluate factors that influence the use of DHS are performed in the general population, and are fundamental to provide information for the planning of policies and programs that encourage the utilization of DHS and reduce social injustices. Despite the importance of these services, there are no published studies that gather scientific evidence on factors associated with the utilization of DHS by pediatric patients.

Thus, this study aimed to analyze articles published between 2006 and 2016 on factors associated with the utilization of DHS by the pediatric population between zero and 15 years old, contributing to a discussion based on scientific evidence.

Methods

This is an integrative literature review, which allows the synthesis and critical analysis of scientific knowledge on a particular topic or guiding question, contributing to evidence-based health practice⁷.

The study comprised six methodological steps: 1 - identification of the topic and selection of the guiding question; 2 - establishment of inclusion and exclusion criteria of the studies; 3 - definition of the information to be extracted from the selected studies and their respective categorization; 4 - methodological evaluation of the included studies; 5- interpretation of the results; 6- presentation of the review and synthesis of knowledge^{8,9}.

For the first step, the following guiding question was constructed: "Which are the factors associated with the utilization of DHS by the pediatric population between zero and 15 years old?" Subsequently, eligibility criteria for the articles were established by searching the LILACS (Latin American and Caribbean Health Sciences Literature) and MEDLINE (Medical Literature Analysis and Retrieval System Online) databases between March and April 2016. The articles were independently selected by two reviewers, considering the following sequence to verify eligibility: titles, abstracts and full text articles were read. In case of discrepancies, reviewers resolved these by consensus.

The inclusion criteria were: articles on factors associated with the utilization of DHS by pediatric patients between zero and 15 years old, published between 2006 and 2016, and available in Portuguese, English or Spanish. There were no restrictions on the study design. The exclusion criteria were: duplicate studies in databases and publications not available in full. The articles were searched with descriptors indexed at the Health Science Descriptors (DeCS) and the Medical Subject Headings (MeSH) – "dental care" and "dental health services" – associated to the qualifier "utilization" and the descriptors "child", "child, preschool" and "adult". The Boolean operators were: OR, AND and AND NOT (NOT for MEDLINE). The search strategy used was ("dental care/utilization" OR "dental health services/utilization") AND ("child" OR "child, preschool") AND NOT adult.

For the methodological analysis of the included articles, the following instruments were applied: 1) an instrument adapted from the Critical Appraisal Skill Programme (CASP)¹⁰ and 2) Agency for Healthcare and Research and Quality (AHRQ)¹¹. The adapted CASP has 10 items in the scoring: 1) clear and justifiable objective; 2) adequate methodology; 3) presentation and discussion of theoretical and methodological procedures; 4) adequate selection of sample; 5)

detailed data collection; 6) relationship between researcher and researched; 7) preserved ethical aspects; 8) rigorous and substantiated analysis of data; 9) presentation and discussion of the results and 10) contributions, limitations and indications of new research questions. For each item, the value 0 (zero) or 1 (one) is assigned, and the final result is the sum of the scores, with a maximum score of 10 points. The selected articles were classified according to the scores: level A – 6 to 10 points (good methodological quality and reduced bias) or level B – at least 5 points (satisfactory methodological quality, but with increased risk of bias).

The AHRQ classifies studies in seven levels according to the level of evidence: I) systematic review or meta-analysis; II) randomized controlled trials; III) controlled trials without randomization; IV) case-control and cohort studies; V) systematic reviews of descriptive and qualitative studies; VI) single descriptive or qualitative

study; and VII) opinion of authorities and/or report of expert committees.

Results

Of the 307 articles found, 158 did not meet the inclusion criterion for “year of publication”, 2 for “language” and 126 for the “guiding question”, amounting to 21 articles. Of these, 4 (2 duplicates and 2 were not available in full) were excluded, for a total of 17 articles in the final sample (Figure 1). Major information on the final sample is summarized in Chart 1.

Most of the articles (58.9%) investigated factors associated with the utilization of DHS in preschoolers (2-5 years) and/or schoolchildren (6-12 years), followed by 3 articles (17.6%) with infants (zero to 23 months) and preschoolers, and 2 (11.7%) with schoolchildren and adolescents (13-15 years). Also, 1 (5.9%) article includ-

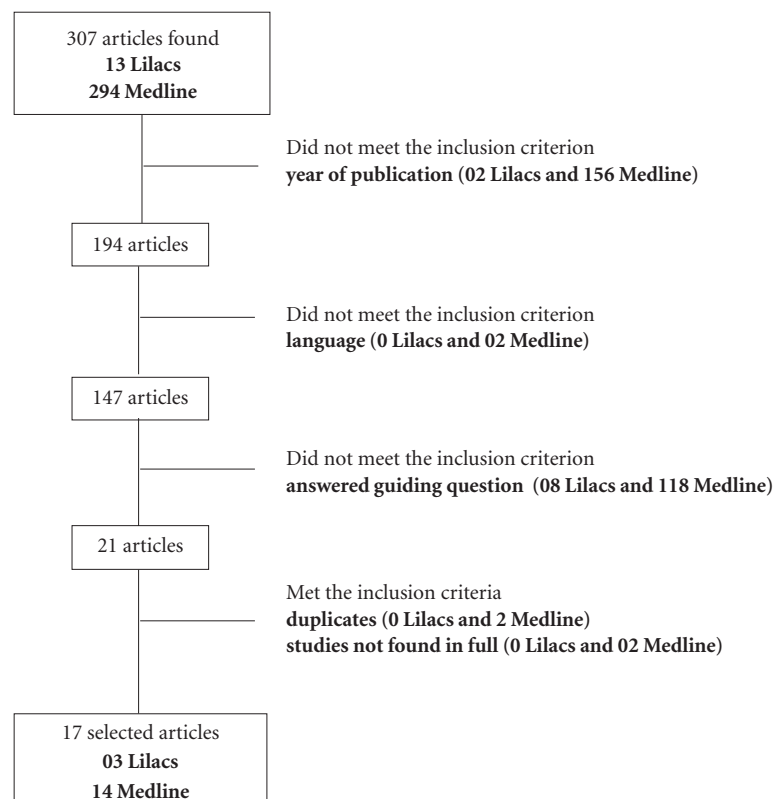


Figure 1. Flowchart with final sample.

Chart 1. Description of literature and levels of evidence, according to adapted CASP and AHRQ, for each study of the final sample of this review. Recife-PE, 2016.

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Jiménez-Gayosso et al., 2015 ¹²	Mexico	Cross-sectional	1404 schoolchildren between 06 and 12 years old	To determine the prevalence and existence of socioeconomic inequalities in the utilization of DHS in Pachuca, Hidalgo, Mexico.	Increasing age and higher socioeconomic status of schoolchildren were associated with the utilization of DHS.	A	VI
Machry et al., 2013 ¹³	Brazil	Cross-sectional	478 children between 01 and 05 years old	To evaluate relationships between socioeconomic and psychosocial factors and the utilization of DHS by children in the city of Santa Maria, Rio Grande do Sul, Brazil.	Younger children (01 and 02 years old) who did not brush their teeth regularly or whose mothers had less than 08 years of schooling were more likely to have never gone to the dentist. In addition, children of low-income families, with dental caries, or mothers with poor perception of their child's oral health had a higher probability of using curative DHS compared to preventive ones.	A	VI
Leroy et al., 2013 ¹⁴	Belgium	Retrospective-Cohort	1057 children at birth, 587 at the age of 03 and 699 at the age of 05	To investigate the proportion of visits to the dentist in children aged 03 and 05 years; to describe the experience of parents about their children's first visit to dentist at the age of 03 and 05; factors associated with early use of DHS.	Children who were not first-born, who had mothers with higher levels of education, and whose parents recently visited the dentist were more likely to have visited the dentist at a younger age.	A	IV

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ed the age group of preschoolers to adolescents and 1 (5.9%) of infants to adolescents. Of the total, 2 (11.7%) investigated children and/or adolescents with chronic conditions. The main factors associated with the utilization of DHS included: maternal level of education, family income, health insurance plan, age, unmet oral

health needs, frequency of tooth brushing, and parental perception of child's oral health. Additionally, contextual factors related to the dentist and to the systemic health status of the pediatric population should be pointed out (Chart 1).

Regarding the language, 10 articles (58.9%) were published in English, 5 (29.4%) in Spanish

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Lapresa e Sanz-Barbero, 2012 ¹⁵	Spain	Cross-sectional	2172 children between 02 and 05 years old	To know the prevalence of the utilization of DHS, to quantify and analyze the existence of variability among the autonomous communities, and to identify the variables associated with the utilization of DHS by the preschoolers in Spain.	Increasing age, frequency of daily tooth brushing and presence of oral diseases were associated with a higher probability of using DHS. Families with low socioeconomic status, measured by both social class and maternal schooling, were associated with a lower probability of using DHS.	A	VI
Pontigo-Loyola et al., 2012 ¹⁶	Mexico	Cross-sectional	1538 adolescents between 12 and 15 years old	To identify factors that influence the utilization of DHS by old Mexican adolescents from three localities in the municipality of Tula de Allende.	Children whose parents had higher levels of education and had at least one tooth with dental caries favored the utilization of DHS.	A	VI
Tellen et al., 2012 ¹⁷	United States of America	Cross-sectional	320 children between 04 and 08 years old	To assess predictors of utilization of DHS by Hispanic-American children in three neighborhoods in the city of Chicago.	Predictors of age for the first visit to the dentist were: mother's awareness of the importance of preventive care. Predictors of the increase in the number of planned visits to the dentist were: family income and availability of the professional on the weekends. Predictors of the decision to return to the same dentist included: weekly availability of the dentist at night; satisfactory communication among dentist, mother and child, and mother's awareness of the importance of preventive care.	B	VI

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Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Vallejos-Sánchez et al., 2012 ¹⁸	Mexico	Cross-sectional	1373 schoolchildren between 06 and 12 years old	To determine the sociodemographic, maternal and treatment needs associated with the utilization of DHS by school-age children in Campeche, Mexico.	Higher level of education, positive maternal attitude about the importance of child's oral health, moderate and high levels of dental caries severity, increased schoolchildren age and frequency of dental brushing were associated with DHS use.	B	VI
Chi e Raklios, 2012 ¹⁹	United States of America	Retrospective-Cohort	25993 children with chronic conditions, between 03 and 14 years old, enrolled in Medicaid from Iowa during 11 months or longer	To assess the utilization of DHS by children with chronic diseases enrolled in Medicaid and to identify subgroups of children with chronic diseases less likely to use these services.	Children with severe, endocrine, craniofacial or hematological neurological conditions were at increased risk of not using DHS compared to other chronic disease subgroups. On the other hand, children with respiratory, musculoskeletal, digestive or ear, nose and throat conditions presented a lower risk of not using DHS in comparison to other subgroups of chronic diseases.	A	IV

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and 2 (11.7%) in Portuguese. Also, 14 articles (82.4%) were found in international journals and 3 (17.6%) in national journals. Regarding the year of publication, most articles were published in 2012 (29.4%), followed by 2008 (17.6%). The countries of origin of the study included Mexico (35.2%), Brazil (23.5%), Spain and the United States (11.8% each) and Belgium, Canada and Nicaragua (5.9% each).

After reading the studies in full, 15 (88.2%) were classified as level A and two (11.8%) as level B, according to the adapted CASP. According to the AHRQ, 14 articles (82.4%) were classified as level of evidence VI (cross-sectional studies) and

3 (17.6%) as level IV (2 cohort studies and one case-control study).

Discussion

The studies included in this review suggested that demographic, socioeconomic, parental, behavioral, contextual and well as factors related to the dentist and oral and/or systemic health status were associated with the utilization of DHS by the pediatric population between zero and 15 years old.

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Lapresa e Barbero, 2011 ²⁰	Spain	Cross-sectional	5441 children and adolescents between 06 and 15 years old	To identify individual and contextual variables associated with the utilization of DHS by children and adolescents in Spain.	Individual variables associated with greater probability of using DHS were: presence of perceived oral diseases and frequency of tooth brushing. Variables associated with a lower probability of use were: high or moderate intake of sugary soft drinks and lower socioeconomic status of the family. From the contextual variables, having a dental insurance plan (Children's Dental Care Plan), established in the autonomous community over 10 years ago, was associated with a greater probability of using DHS.	A	VI
Baldani et al., 2011 ²¹	Brazil	Cross-sectional	350 children and adolescents between zero and 14 years old	To evaluate the individual determinants that influence the utilization of DHS by a low-income pediatric population living in areas served by the Family Health Program (FHP) in a large city in southern Brazil.	Absence of perception about child's dental care needs decreased the chances of using DHS. Follow-up by the FHP team increased the likelihood of use.	A	VI

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Demographic and socioeconomic factors

Age was the major demographic factor related to the utilization of DHS by the population between zero and 12 years old. The articles evaluated this factor among infants, preschoolers and schoolchildren in Mexico^{12,18,22,23,28}, Brazil^{13,25} and Spain¹⁵ and confirmed a greater probability of using DHS with increasing age. Lapresa and Bar-

bero¹⁵ observed that of 601 Spanish 2-year-old children, only 24 had gone to the dentist and of 459 5-year-old children, 181 used DHS. A Brazilian study by Machry et al.¹³ with children aged 1 to 5 years showed that the youngest (1 to 2 years) showed higher probability of having never visited the dentist.

The main reasons for the association between age and use are the cumulative effect of

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Villalobos-Rodelo et al., 2010 ²²	Mexico	Case-Control	379 cases (schoolchildren between 6 and 12 years old who used DHS in the last year due to dental pain) and 1137 controls	To identify the effect of unmet dental treatment needs and socioeconomic and demographic variables on patterns of dental visits due to toothache in schoolchildren aged 06 to 12 years.	CSchoolchildren with moderate (04 to 06 teeth affected by caries), high (07 to 09) and very high (> 09) needs were more likely to have visited the dentist due to dental pain than those with low needs (zero to 03). Schoolchildren who had no health insurance plan or were older (10 to 12 years old) were more likely to have visited the dentist due to dental pain than those who had a health insurance (public or private) or were younger (06 to 09 years old), respectively. Boys from public schools had a 70% chance of having gone to the dentist due to dental pain than those from private schools. The probability of visiting the dentist due to dental pain in girls in public schools was 28%, when compared to those attending private schools.	A	IV

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oral problems as the child's age increases as well as the lack of parental awareness of the importance of early preventive dental health care^{13,25,29}. Another reason is the poor parents' perception of the child's need for oral health, followed by a visit to the dentist only after the presence of oral problems or the appearance of symptoms, such as toothache³⁰. In this context, a Mexican study by Villalobos-Rodelo et al.²² with students aged 6 to 12 years concluded that older children (10-12 years old) were more likely to go to the dentist

due to dental pain than younger ones. The authors suggested that teeth of older children are exposed to cariogenic challenges for a longer period of time, increasing the likelihood of having more advanced stages of carious lesions³¹ and consequently, of using curative DHS.

The sex of the child was also associated with the utilization of DHS^{22,25,26}. In the Brazilian study by Kramer et al.²⁵ with children between zero and 5 years old, girls were more likely to use the services than boys, in compliance with Medina-Solis

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Medina-Solis et al., 2009 ²³	Mexico	Cross-sectional	3048 schoolchildren between 06 and 12 years old	To evaluate the association between socioeconomic indicators and the utilization of DHS, according to the type of service used (preventive or curative), in children from Navolato, Sinaloa, Mexico.	The following factors facilitated the use of DHS: higher socioeconomic status, health insurance and increased age. Also, higher frequency and lower age of onset of tooth brushing increased the possibility of using DHS, especially preventive services, regardless of socioeconomic status and health needs. Individuals with higher clinically evaluated health needs used more curative DHS.	A	VI
Noro et al., 2008 ²⁴	Brazil	Cross-sectional	3425 children between 05 and 09 years old	To analyze the utilization of DHS by children in the municipality of Sobral, Ceará, Brazil, relating it to socioeconomic factors and the use of health services.	High influence of socioeconomic status on the utilization of DHS. Children who had a health insurance plan were more likely to use these services. In addition, children whose mothers had lower levels of education showed greater difficulty of using DHS. Regarding the consumption of health services, the lack of home visits by a community health worker showed as a protection factor, i.e., the households that did not receive their visit were more likely to have access to dental treatment.	A	VI

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et al.'s findings²⁶ with Mexican schoolchildren. However, a study by Villalobos-Rodelo et al.²² reported different results, showing that boys from

public schools used more DHS than girls. These discrepancies may be influenced by the decision of the persons responsible for seeking and using

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Kramer <i>et al.</i> , 2008 ²⁵	Brazil	Cross-sectional	1092 children between zero and 05 years old	To verify the prevalence of preschool children who have consulted with the dental surgeon and the age at which the first dental appointment was performed in a representative sample of preschool children from the city of Canela, Rio Grande do Sul, Brazil.	Relationship between age of the child and utilization of DHS. As age increased, the frequency of children who went to the dental surgeon increased. In addition, female children were more likely to use DHS than male children.	A	VI
Medina-Solís <i>et al.</i> , 2008 ²⁶	Nicaragua	Cross-sectional	1400 schoolchildren between 06 and 12 years old	To determine factors associated with the utilization of DHS in schoolchildren in León, Nicaragua.	Older girls or schoolchildren (> 08 years old) were more likely to use DHS. Those with a higher socioeconomic status were more likely to use both curative and preventive DHS. Those who brushed their teeth at least once a day were more likely to use preventive services. Evaluated oral health needs were positively associated with the use of DHS, especially curative services.	A	VI

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DHS²⁵. Therefore, parental factors can directly influence the association between the child's sex and the visit to the dentist.

Only one study¹⁴ reported that first-born children were less likely to visit the dentist earlier than non-first-born children. According to the authors, parents tend to take their younger children to the dentist with their first-born child. However, this association should be carefully analyzed because the social background³² of the parents, according to the different types of capital accumulated throughout life, can influence

the early use of preventive DHS regardless of whether or not the child is a first-born. Thus, parents who have accumulated greater cultural, social, and economic capital³³ tend to have a better perception of their children's oral health and may take them to the dentist earlier.

Regarding socioeconomic factors, the socioeconomic status of the family was associated to the utilization of DHS by the population between zero and 15 years old. Studies showed that children and adolescents with low socioeconomic status were less likely to visit the dentist^{12,15,20,23,26,28}

Chart 1. continuation

Author, year	Country	Study Design	Sample	Objective	Major findings	Evidence (adapted CAPS)	Evidence AHRQ
Nicopoulos et al., 2007 ²⁸	Canada	Cross-sectional	120 patients between 03 and 12 years old	To assess the prevalence of oral health needs and barriers in the utilization of DHS in hospitalized children with chronic or acute medical conditions	Children with chronic conditions were less likely to use DHS due to medical barriers than those with acute conditions. The main barriers were: hospitalization, denial of treatment and low blood count.	A	VI
Medina-Solis et al., 2006 ²⁷	Mexico	Cross-sectional	1303 children between 03 and 06 years old	To identify factors associated with the utilization of DHS in children from 10 public schools participating in an oral health program in Campeche, Mexico.	Facilitating factors for the use of DHS were: older children (05 to 06 years old); moderate and high need of evaluated oral health; greater frequency of tooth brushing; families with a higher socioeconomic status.	A	VI

DHS = Dental Health Services.

or more likely to use DHS due to dental pain²². These findings suggest socioeconomic inequalities that may result from structural barriers to public services, i.e., these services have more demand than supply. This prompts individuals to seek the private sector, who are confronted with economic barriers, such as the costs of treatments²³. Moreover, socioeconomic inequalities can be explained by Bourdieu's sociological theory³², where caregivers with greater accumulation of cultural, economic and social capitals mediated by *habitus* tend to have a better perception of oral health in children or adolescents, dental care practices and utilization of DHS^{33,34}. According to Cruz³⁵, *habitus* is the product of the agent's position within the social space and mediates the need for health and the factors that facilitate the utilization of DHS. Thus, although parents have economic resources, universal coverage and access to DHS, their dispositions (perceiving, feeling, acting, and thinking)³⁶ may anticipate or postpone their children's use of DHS³⁵.

Most of the studies assessed the socioeconomic status using variables such as maternal and/or paternal schooling and family income^{13-18,24}. A study conducted by Lapresa and Barbero¹⁵ with

preschool children showed that lower maternal schooling was associated with lower probability of using DHS. According to the authors, the number of years the mother attended school will eventually have greater impact on their children's oral health than paternal schooling. However, this statement should be interpreted carefully because some children and adolescents are looked after by people other than the mothers. Therefore, a caregiver is an individual with direct kinship and is also responsible for coordinating the resources required by the child or adolescent^{37,38}. Their level of education can influence the utilization of DHS. In this sense, a Mexican study by Pontigo-Loyola et al.¹⁶ showed that adolescents aged 12 to 15 years with parents with higher level of education showed great probability of using DHS.

Regarding family income, a Brazilian study by Machry et al.¹³ showed that 1- to 5-year-old children in a lower-income family are more likely to use curative DHS. Also, an American study by Tellen et al.¹⁷ showed that family income was a predictor of the increase in the number of planned visits to the dentist of 4- to 8-year-old children. Essentially, the caregiver's level of education and family income are interconnected,

and the former can generate the latter. In other words, education gives access to a specific occupation and, therefore, to a certain level of income, and this may influence access to health care³⁹.

Another socioeconomic factor was the possession of private health insurance plan. Two studies^{23,24} showed that children and adolescents with health insurance (public or private) were more likely to use DHS. A Mexican study carried out by Villalobos-Rodelo *et al.*²² showed that schoolchildren who did not have a health insurance plan presented higher probability of using DHS due to dental pain. This can be explained by the fact that children who do not have a health insurance plan are usually from families with low socioeconomic status, therefore, with greater unmet oral health needs⁴⁰.

Only Villalobos-Rodelo *et al.*²² related the type of school with the utilization of DHS, and observed that children from public schools were more likely to use DHS due to dental pain in comparison to children from private schools. Usually, caregivers of public school children have lower levels of education⁴¹, tend to have poor perception of the child's oral health⁴² and will eventually seek dental care in advanced stages of oral diseases. However, in other contexts, the school can be notably perceived as a place to establish oral care practices³⁵.

Parental factors

Mother's perception¹³ about the child's dental care and a positive maternal attitude¹⁸ towards it were related to the use of DHS in infants, preschoolers and schoolchildren. A Brazilian study by Machry *et al.*¹³ showed that 1- to 5-year-old children whose parents had an inadequate perception of the child's oral health were more likely to use curative DHS. The authors pointed out that "poor" perception implies greater oral health needs of the child, and this is essential to measure the need for dental care³⁰. A Mexican study by Vallejos-Sánchez *et al.*¹⁸ showed that schoolchildren whose mothers had a positive attitude towards their child's oral health were more likely to use DHS. The authors highlighted the relationship of this variable with the frequency of brushing, *i.e.*, among preschoolers and schoolchildren, the frequency usually depends on the mother⁴³. It is also noteworthy that according to Andersen and Davison⁴⁴, attitude towards health services is an important predictor of DHS use.

Two other parental factors related to the utilization of DHS were parents' use¹⁴ and mothers'

awareness of the importance of preventive dental care¹⁷. A prospective cohort study conducted by Leroy *et al.*¹⁴ followed up on Belgian children from birth to age 5, and showed that recent use of DHS by parents implied that children were more likely to have visited the dentist earlier. Parents with a regular source of dental care may have a better perception of their children's oral health⁴⁵, and therefore take them to the dentist earlier. In this sense, a study by Tellen *et al.*¹⁷ with 4- to 8-year-old children living in Hispanic American communities in Chicago (USA) suggested that the children whose mothers had improved awareness of the importance of preventive dental care for their children had a better chance of visiting the dentist early and regularly. Therefore, it is worth mentioning that in order to increase the frequency of early use of DHS by children, attention should be paid to the parents who do not use these services regularly¹⁴. Ultimately, dentists play a key role in oral health promotion and prevention of aggravation⁴⁶, being the link between caregivers and children.

Behavioral factors

The frequency of tooth brushing was the major factor related to the utilization of DHS by the population between 1 and 15 years old. The articles evaluated this factor in infants, preschoolers, schoolchildren and adolescents in Mexico^{18,23,28}, Brazil¹³, Nicaragua²⁶ and Spain^{15,20} and concluded that individuals who brushed their teeth regularly, especially 3 times a day, showed greater chances of using mainly preventive DHS²³. Also, lower age at onset of tooth brushing (< 2 years)²³ and low consumption of sugary soft drinks²⁰ increased the likelihood of visiting the dentist.

Notably, these are cross-sectional studies and, consequently, reverse causality may occur, *i.e.*, because children and adolescents use DHS, they may have started brushing their teeth earlier and regularly and consumed less sugary soft drinks. Also, the influence of parental factors on the behavior of this population plays an important part. Therefore, educational approaches with parents and children are essential to increase the practice of healthy oral habits⁴², reducing the use of curative DHS.

Factors related to oral and/or systemic health status

Perceived oral health need was the main factor related to the utilization of DHS by the pop-

ulation between 1 and 15 years old. The articles evaluated this factor among infants, preschoolers, schoolchildren and adolescents in Spain^{15,20}, Mexico^{16,18,22,28}, Brazil^{13,21} and Nicaragua²⁶ and concluded that people with oral health needs perceived by caregivers or evaluated by the dentist presented greater chance to use DHS, especially curative DHS²⁶. The main reasons reported included: severity and number of decayed teeth, presence of dental pain²² and caregivers' poor awareness of the importance of deciduous dentition.

It should be pointed out that according to the Andersen and Newman's model⁴⁷, health care need is the most proximal determinant of use of health services, i.e., greater health needs would imply greater prediction of DHS use. Additionally, perceived oral health needs can be explained by social structure and awareness towards health, being an important predictor of the demand for health care and adherence to treatment⁴⁸. In this review, only two studies assessed the needs of perceived oral health^{15,20} and, therefore, more research is needed including this issue.

Only two studies^{19,27} suggested the association of children with chronic diseases with the utilization of DHS. In the Canadian study by Nicopoulos et al.²⁷ with hospitalized children aged 3 to 12 years, those with chronic conditions (oncological, hepatic, renal, congenital heart disease, immunosuppression, among others) showed lower chances of using DHS due to medical barriers than children with acute conditions. According to the authors, the major medical barriers included: recurrent hospitalizations, dentist's reluctance to treat this population and pancytopenia. An American study conducted by Chi and Raklios¹⁹ with children and adolescents aged 3 to 14 years with chronic conditions revealed that the individuals with neurological, endocrine, craniofacial or hematological conditions used less DHS than those with other chronic conditions. The authors attributed this fact to the behavioral characteristics of the caregiver, such as high level of stress in relation to the systemic health needs of this population and approach to oral health as a lower priority.

Importantly, individuals with greater vulnerability are more affected by oral health morbidities, showing greater accumulation of needs⁴⁹, as well as they seem to have more restricted access to DHS^{50,51}. Thus, this group should be considered when proposing oral health policies aiming at ensuring health equity.

Factors related to the dentist

Only one study¹⁷ observed an association between factors related to the dentist and the utilization of DHS in evaluating predictors of use by 4- to 8- year-old children in three Hispanic-American neighborhoods of Chicago, USA. The authors found that the dentist's availability at night or on the weekends increases the number of planned visits to the dentist as well as returns visits. Possibly, these factors facilitate the use of DHS because the dentist is available in shifts and days in which caregivers are usually not working¹⁷. However, in other contexts, such as the Family Health Strategy (FHS) in Brazil, the dentist does not work at night or on the weekends, posing difficulties for children whose caregivers work during the week⁵². Therefore, this issue should be addressed when proposing public oral health policies.

Moreover, an important factor for returning to the dentist was the satisfactory communication among professionals, mothers and children¹⁷, with focus on the importance of the command of language, since the population of his study was composed of immigrants from Latin American countries. However, it is important to point out that non-verbal communication, humanization of care and bonding are important strategies for a satisfactory relationship among dentists, caregivers and children^{53,54}.

Contextual factors related to dental care

Two Brazilian studies^{21,24} and one Spanish study²⁰ showed that contextual factors are related to the utilization of DHS. A study by Noro et al.²⁴ observed that 5- to 9-year-old children whose households did not receive visits from a community health agent (CHA) were more likely to use DHS. According to the authors, most visited households by CHAs are those where children's caregivers showed greater needs for follow-up due to systemic diseases or situations of social vulnerability, rendering them unable to articulate child health care, such as dental care. At the same time, it is important to point out how challenging it is for Brazilian dentists to work according to the FHS guidelines due to the historical influences of the Flexner's model, their conceptions of FHS and the autonomy provided by this model. As a consequence, consultations will take place exclusively at a dental practice⁴⁶. Therefore, equity, as a perspective of expanding access to DHS, should be considered in the construction of oral health policies.

In contrast to Noro *et al.*'s findings²⁴, Baldani *et al.*²¹ showed that children and adolescents between zero and 14 years old followed up by the family health team were more likely to visit the dentist. This demonstrates the longitudinality of dental care and the existence of a bond between users and staff^{46,55}.

Lapresa and Barbero²⁰ showed that having a Children's Dental Care Plan in a Spanish autonomous community for more than 10 years increased the probability of DHS use by the population between 6 and 15 years old. Spain is divided into autonomous communities, with varied health system coverage and financing mechanisms. The Children's Dental Care Plan caters to the population between 6 and 15 years of age, offering urgent restorative and preventive treatment in the permanent and preventive dentition, as well as exodontia in the deciduous dentition, not including restorative treatment here²⁰. The authors report that although this assistance model is consolidated, the socioeconomic gradient is still present and does not vary between the autonomous communities. This means that parents or caregivers who have higher socioeconomic status, as well as accumulated cultural capital, tend to have better perception of child oral health and, therefore, seek DHS³⁴.

Final considerations

The studies of this review show that demographic, socioeconomic, parental, behavioral and contextual factors as well as those related to the dentist and to the oral and/or systemic health status are associated with the utilization of DHS by the pediatric population between zero and 15 years old. Predictors of DHS use include: factors related to children or adolescents (age, frequency of tooth brushing, chronic conditions), caregivers (schooling, perception of the child's oral health, perceived oral health needs), dentists (availability at night or on the weekends) and follow-up of oral health by the family health team.

Nevertheless, it is important to emphasize that most studies are cross-sectional; therefore, it is difficult to establish a causal relationship. Also, the studies used questionnaires, and memory bias is likely to occur. Therefore, longitudinal studies should be conducted to clarify causality and minimization of bias. Research on the utilization of DHS in pediatric patients with chronic diseases should be further conducted, comparing them to healthy individuals of the same age

group, as this field has not been thoroughly explored.

In this review, most of the studies used the Andersen Behavioral Model⁴⁷ to establish which conditions facilitate or hinder the utilization of DHS. However, they did not explain the reasons for inequalities. Thus, comprehensive research based on Bourdieu's³² sociological theory should be carried out. Moreover, the Andersen Behavioral Model was developed to analyze the use of US private health services and should be carefully interpreted, since the studies of this review applied this model in contexts which are different from those in the USA.

Ultimately, the articles were written in different countries, which have different health care systems. In this sense, it can be pointed out that factors related to the use of DHS by children and adolescents may vary according to the context in which the research is performed. Therefore, for the planning of oral health policies or programs for the pediatric population, an exploratory research should be conducted according to the context in which the actions are to be carried out. Also, increasing supply of DHS alone is not able to guarantee better utilization of dental health services and reduce inequalities between vulnerable groups. A sociological analysis of these services should be carried out following Bourdieu's model³².

Collaborations

DSC Curi was responsible for the concept, design, analysis and interpretation of data, writing of the manuscript and critical review, as well as for the approval of the version to be published. ACL Figueiredo accounted for the concept, design, analysis and interpretation of data, writing of the manuscript and critical review, as well as for the approval of the version to be published. SR Jamelli was responsible for critical review as well as for the approval of the version to be published.

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