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ORIGINAL RESEARCH

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# Knowledge of parents regarding early childhood caries prevention among preschool children in Brazzaville, Republic of Congo: a cross-sectional study

Corinne Wusing Poaty[1,*], Qianyi Deng[2], Cecile Lebeka[1], Biernes Beich Mounguiri-Ime[1], Félix Molloumba[3]

[1]Department of Stomatology, Mother-Child Specialized Hospital Blanche Gomes, Brazzaville, Congo
[2]Hospital of Stomatology, Guanghua School of Stomatology, Sun Yat-sen University, 510000 Guangzhou, Guangdong, China
[3]Health Ministry, Brazzaville, Congo

***Correspondence**
Corinnepoaty1@gmail.com
(Corinne Wusing Poaty)

## Abstract

**Background**: Dental caries in preschool children remains a widespread public health concern globally, particularly in developing countries. Thus, assessing parents/guardians' knowledge and identifying associated factors remain essential for guiding health professionals in developing effective early childhood caries (ECC) prevention programs. This study evaluated the level of knowledge among parents/guardians in Brazzaville regarding ECC prevention, examined demographic factors associated with their knowledge and explored the availability of oral health information during pediatric visits. **Methods**: This cross-sectional study was conducted among parents/guardians of medically healthy children attending the Department of Stomatology at the Mother-Child Specialized Hospital Blanche Gomes in Brazzaville between September 2023 and July 2024. The participants were invited to complete a structured questionnaire, assessing their demographic information, knowledge on the etiology and prevention of ECC, awareness of dental floss use in children and the availability of oral health information provided during pediatric consultations. Each knowledge-based question had a single correct response, with one point awarded per correct answer. **Results**: A total of 120 parents/guardians completed the questionnaire. Among them, only 23 (19.2%) demonstrated a high level of knowledge regarding dental caries and ECC risk factors. While most participants (95%) correctly identified the optimal brushing frequency, significant knowledge gaps were observed regarding the appropriate age for initiating tooth brushing, the person responsible for a child's oral hygiene, and the recommended brushing duration. None of the participants showed a high level of knowledge on oral health education and dietary habits. Notably, parents/guardians working in the medical field had significantly better knowledge about ECC and its riks factors compared to teachers/academics ($p$ = 0.023). **Conclusions**: These findings highlight the need for targeted ECC prevention programs in Brazzaville. Strengthening parental/guardian knowledge through public health initiatives is needed to improve oral health outcomes in preschool children.

## Keywords

Early childhood caries (ECC); Prevention; Oral health; Brazzaville

## 1. Introduction

Early childhood caries (ECC) is defined as the presence of one or more decayed, missing (due to caries) or filled tooth surfaces in any primary tooth in children under six years of age [1]. Over the past century, dental caries in preschool-aged children has been described using various terms. For instance, in 1911, EricHR Harries first referred it as "Comforter Caries" [2], and in 1962, Fass described it as "Milk Bottle Mouth" [3]. Before the 1998 National Institutes of Health-sponsored Early Childhood Caries Conference, the condition was also commonly known as "baby bottle syndrome", "nursing bottle caries" or "baby bottle tooth decay". These terms reflected an assumed causality between the condition and improper bottle-feeding practices or comforter use [4].

The etiology of ECC is multifactorial and complex, and can be influenced by factors such as poor oral hygiene, diets high in sugar, low parents/guardians' oral health literacy, limited access to dental care and socioeconomic status [5, 6]. Other contributing risk factors include dental crowding, malocclusion, certain medical conditions or syndromes associated with enamel hypoplasia, changes in salivary properties such as reduced flow rate and low pH, physical disabilities and congenital conditions such as cleft lip or palate [7].


  

Dental caries in preschool children remains a widespread public health challenge globally, with particularly high prevalence in developing countries [8]. The oral pain and premature tooth loss associated with ECC can impair mastication and speech development, adversely affecting the oral health-related quality of life (OHRQoL) of both children and their families, which, in turn, impacts the physical, psychological and social well-being of young children [7].

Parents/guardians play a significant role in promoting preventive oral health practices in early childhood. As highlighted in previous studies, a lack of parental knowledge regarding pediatric oral health is one of the main contributing factors to ECC development [9].

Brazzaville, the capital and largest city of the Republic of Congo, was reported to have an estimated population of 2,145,783 in 2023, and to date, no studies have assessed the awareness and knowledge of Congolese parents/guardians concerning ECC and its prevention. Therefore, assessing their level of knowledge and identifying the associated demographic factors could help clinicians and local authorities develop effective preventive and educational programs to enhance OHRQoL, improve general health outcomes, and generate long-term economic benefits for both individuals and society [10].

In this study, we assessed the knowledge of parents/guardians regarding dental caries and ECC prevention in Brazzaville, analyzed demographic factors associated with their knowledge, and examined the availability of oral health information provided during pediatric consultations.

## 2. Materials and methods

### 2.1 Study location

This cross-sectional study was conducted in the Department of Stomatology at the only Mother-Child Specialized Hospital (Brazzaville, Republic of Congo), formally known as the Mother-Child Specialized Hospital Blanche Gomes.

### 2.2 Study population and ethics

Parents/guardians of medically healthy children who visited the Department of Stomatology at the Mother-Child Specialized Hospital Blanche Gomes between September 2023 and July 2024 were invited to participate. They were provided a Participant Information Sheet (PIS), and written or verbal informed consent was obtained before study inclusion. This study was approved by the hospital authorities.

### 2.3 Inclusion and exclusion criteria

The participants were eligible for inclusion if they met the following criteria: (1) parents/guardians of a child aged six years or younger with no significant medical conditions, classified as American Society of Anesthesiologists (ASA) Physical Status I or II; and (2) individuals who could provide informed consent and communicate in French or one of the local languages (Lingala or Munukutuba). Those who did not fulfill these predefined inclusion criteria were excluded from the study.

### 2.4 Sampling

The sample size was determined using G*Power 3.1.9.4 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, NRW, Germany) [11] to ensure robust statistical estimates. Assuming a low-knowledge prevalence of 40% and targeting a minimum detectable odds ratio (OR) of 0.6, with 80% power and a significance level ($\alpha$) of 0.05, the power analysis indicated a minimum sample size of 111 participants. To account for potential attrition and enhance the stability of the statistical analysis, we aimed to recruit 120 participants. The actual statistical power achieved in the study was 0.802.

### 2.5 Data collection

The data were collected using a structured questionnaire developed based on previously published studies [7, 12, 13], with appropriate modifications to account for the lifestyle and cultural context of the Congolese population. The questionnaire was translated into French and, when necessary, into the local language by a professional translator. Before the start of this investigation, a pilot study was conducted using 20 individuals to assess the validity and relevance of the questionnaire to our targeted Congolese population.

Next, discussions were held with the sample participants to examine the variability of the responses, clarity of the items and the presence of any ambiguous wording, based on which the questionnaire was refined to enhance its precision and cultural appropriateness, and the final version was used for data collection.

The study's parents/guardians completed the questionnaire through face-to-face interviews. Each knowledge-based question had a single correct answer, and correct responses were awarded 1 point, while incorrect responses received 0 points.

The final questionnaire comprised five sections with a total of 24 closed-ended questions designed to assess the following factors:

(a) Demographic variables (5 questions): These included the child's age, parents/guardians' age, gender, educational level (uneducated, middle school or high school, some degree, bachelor's degree and above), and field of work (teacher/academic, military, medical field, housewife, unemployed or other).

(b) Purpose of the visit at the time of the survey (1 question).

(c) Parents/guardians' knowledge regarding dental caries and ECC risk factors (6 questions): The responses were scored using a three-tier scale, with 6–5 points indicating high knowledge, 4–3 points moderate knowledge and 2–0 point(s) low knowledge.

(d) Parents/guardians' knowledge on oral health education and dietary habits (9 questions): A similar scoring system was used, where 9–8 points indicated high knowledge, 7–5 points moderate knowledge and 4–0 points low knowledge.

(e) Awareness of dental floss, its use in children, and the availability of oral health information during pediatric visits (3 questions): Participants who had heard of dental floss but were unaware of its application were considered to lack knowledge on the topic.

Of note, only female participants were asked questions regarding the availability of oral health information during pediatric visits to minimize potential recall bias from male partici-

pants, as fathers often do not attend these appointments [7, 14]. This approach was further supported by pilot survey findings, which showed that most fathers were absent during pediatric visits. Restricting the question to female participants aimed to reduce bias and ensure more accurate data on oral health information availability.

### 2.6 Statistical analysis

The data were entered and analyzed using the Statistical Package for the Social Sciences software (SPSS version 22 from IBM, Chicago, IL, USA). Continuous variables are shown as means and standard deviations, and categorical variables as frequencies and percentages. Firth's penalized likehood regression analysis was performed to determine factors associated with the parents/guardians' knowledge of dental caries etiology and ECC prevention. A $p$-value $\leq 0.05$ was considered statistically significant.

## 3. Results

### 3.1 Characteristics of the study population

A total of 120 parents/guardians participated in the study, and their demographic and background characteristics are shown in Table 1.

**TABLE 1. Characteristics of the study parents/guardians (n = 120).**

| Variables | Subgroups | Mean (SD) or n (%) |
|---|---|---|
| Child's age, yr | | 4.38 (1.80) |
| Parent/guardian's age, yr | | 36.70 (8.27) |
| Gender | | |
| | Female | 88 (73.3%) |
| | Male | 32 (26.7%) |
| Education level | | |
| | Middle school or high school | 29 (24.2%) |
| | Some degree | 9 (7.5%) |
| | Bachelor's degree or above | 79 (65.8%) |
| | Uneducated | 3 (2.5%) |
| Occupation | | |
| | Medical field | 22 (19.0%) |
| | Teacher/Academic | 5 (4.3%) |
| | Unemployed | 15 (12.9%) |
| | Other | 74 (63.8%) |
| Chief complaint | | |
| | Pain related to dental caries | 71 (61.2%) |
| | Recommendation | 14 (12.1%) |
| | Routine dental check-up | 6 (5.2%) |
| | Other | 25 (21.6%) |

*SD, standard deviation.*

The mean age of parents/guardians was 36.70 ± 8.27 years, that of the children was 4.38 ± 1.80 years, and most of the participants were female (n = 88, 73.3%). In terms of education, more than half of the respondents (n = 79, 65.8%) held a bachelor's degree or higher (including master's and doctoral degrees). Regarding occupation, a substantial proportion (n = 74, 63.8%) were employed in banking, administration or public and private sectors. The remaining 22 participants (19.0%) were employed in the medical field, including nurses, midwives, dental assistants and doctors, while 5 participants (4.3%) worked in the education sector, including schoolteachers and academics. Regarding the reason for visiting the dental clinic, the most frequently reported complaint was pain related to dental caries (n = 71, 61.2%). Other reasons included pain due to dental trauma, herpetic gingivostomatitis and misaligned teeth (n = 25 participants, 21.6%). Only a small proportion (n = 6, 5.2%) reported routine dental check-ups as the purpose of their visit.

### 3.2 Factors associated with the knowledge of parents/guardians regarding dental caries and ECC risk

A summary of the responses regarding parent/guardians' knowledge on dental caries and ECC risk factors is presented in Table 2.

The most commonly answered items correctly were those related to the non-transmissible character of dental caries (n = 81, 67.5%) and the bacterial cause of dental caries (n = 95, 79.2%). Despite this, the overall level of knowledge among participants remained low. Only 23 individuals (19.2%) demonstrated a high level of knowledge regarding dental caries and ECC risk factors, while 44 (36.7%) had a moderate level of knowledge. Notably, nearly half of the participants (n = 53, 44.2%) exhibited a low level of knowledge in this area.

Firth's penalized likelihood regression analysis was performed to identify factors associated with the level of knowledge among parents/guardians regarding dental caries and ECC risk factors. The analysis revealed that parents/guardians employed in the medical field exhibited significantly greater knowledge compared to individuals working in the education sector ($p = 0.023$).

### 3.3 Factors associated with the knowledge of parents/guardians regarding oral health education and dietary habits

A summary of parents/guardians' knowledge regarding oral health education and dietary habits is presented in Table 3.

A significant proportion of parents/guardians (n = 114, 95.0%) correctly identified the recommended frequency for brushing teeth as twice daily. However, notable gaps were observed in other areas, including the appropriate time to initiate brushing, the duration of parental involvement in a child's oral hygiene, and the optimal brushing duration. None of the participants demonstrated a high level of knowledge regarding oral health education and dietary habits. Only 23 (19.2%) exhibited moderate knowledge, most (n = 97, 80.8%) had low knowledge.

Firth's penalized likelihood regression analysis was per-

**TABLE 2. Parents/guardians' knowledge regarding dental caries and ECC risk factors.**

| Variables | Subgroups | n (%) |
|---|---|---|
| Is dental caries a transmissible disease? | | |
| | Yes | 21 (17.5%) |
| | No | 81 (67.5%) |
| | I don't know | 18 (15.0%) |
| Is dental caries caused by bacteria? | | |
| | Yes | 95 (79.2%) |
| | No | 9 (7.5%) |
| | I don't know | 16 (13.3%) |
| Could a mother's poor oral hygiene expose her child to a higher risk of developing dental caries? | | |
| | Yes | 41 (35.04%) |
| | No | 59 (50.43%) |
| | I don't know | 17 (14.53%) |
| Can sharing feeding utensils (spoons) with a child increase the risk of developing dental caries? | | |
| | Yes | 16 (13.3%) |
| | No | 54 (45.0%) |
| | I don't know | 50 (41.7%) |
| Can caries on baby teeth impact the child's overall health? | | |
| | Yes | 60 (53.6%) |
| | No | 25 (22.3%) |
| | I don't know | 27 (24.1%) |
| Can caries on baby teeth increase the risk of developing caries in permanent teeth? | | |
| | Yes | 47 (41.6%) |
| | No | 35 (31.0%) |
| | I don't know | 31 (27.4%) |
| Overall level of knowledge regarding dental caries and early childhood caries risk factors. | | |
| | High knowledge | 23 (19.2%) |
| | Moderate knowledge | 44 (36.7%) |
| | Low knowledge | 53 (44.2%) |

**TABLE 3. Parents/guardians' knowledge regarding oral health education and dietary habits.**

| Variables | Subgroups | n (%) |
|---|---|---|
| When is the appropriate time for parents to start cleaning their child's teeth? | | |
| | As soon as the first tooth erupts | 24 (20.0%) |
| | 12 mon | 34 (28.3%) |
| | 18 mon | 16 (13.3%) |
| | 24 mon | 31 (25.8%) |
| | 36 mon | 1 (0.8%) |
| | I do not know | 14 (11.7%) |
| Until which age should parents brush their child's teeth? | | |
| | 3 years old | 64 (53.33%) |
| | 6 years old | 36 (30.00%) |
| | 8 years old | 16 (13.33%) |
| | 12 years old | 3 (2.50%) |
| | I don't know | 1 (0.83%) |

**TABLE 3. Continued.**

| Variables | Subgroups | n (%) |
|---|---|---|
| Until which age should parents supervise or complete their child's oral hygiene? | | |
| | 3 years old | 24 (20.0%) |
| | 6 years old | 37 (30.83%) |
| | 8 years old | 35 (29.2%) |
| | 12 years old | 22 (18.3%) |
| | I don't know | 2 (1.7%) |
| How often should parents brush their child's teeth? | | |
| | Once a week | 1 (0.83%) |
| | Once every two days | 0.00% |
| | Once a day | 5 (4.17%) |
| | Twice a day | 114 (95.00%) |
| What is the optimal duration for brushing? | | |
| | 1 min | 13 (10.83%) |
| | 2 min | 31 (25.83%) |
| | 3 min | 34 (28.33%) |
| | 4 min | 10 (8.33%) |
| | 5 min | 31 (25.83%) |
| | I don't know | 1 (0.83%) |
| When should parents take their child for his/her first dental visit (Right timing of the first dental visit)? | | |
| | 1 year old | 24 (20.00%) |
| | 6 years old | 8 (6.67%) |
| | 3 years old | 27 (22.50%) |
| | If there is a problem | 59 (49.17%) |
| | I don't know | 2 (1.67%) |
| After introducing solid food, should parents continue frequent and prolonged daytime breast/bottle feeding? | | |
| | No | 64 (55.65%) |
| | Yes | 50 (43.48%) |
| | I don't know | 1 (0.87%) |
| After introducing solid food, should parents continue frequent and prolonged nighttime breast/bottle feeding? | | |
| | No | 63 (54.31%) |
| | Yes | 52 (44.83%) |
| | I don't know | 1 (0.86%) |
| Do snacks between meals increase the risk of developing dental caries in children? | | |
| | Yes, regardless of the snack | 17 (14.53%) |
| | Yes, if it is a salty snack | 0.00% |
| | No | 10 (8.55%) |
| | Yes, if it tastes sweet | 90 (76.92%) |
| Overall level of knowledge regarding oral health education and dietary habits. | | |
| | Moderate knowledge | 23 (19.2%) |
| | Low knowledge | 97 (80.8%) |

*Percentages do not always add up to 100% due to rounding off.*

formed to identify potential factors associated with knowledge in this domain and we observed no statistically significant associations between demographic variables and parents/guardians' knowledge of oral health education and dietary habits.

### 3.4 Factors associated with the awareness of parents/guardians regarding the use of dental floss in children and the availability of oral health information during pediatric visits

The parents/guardians' awareness on the use of dental floss in children and the availability of oral health information during pediatric visits are shown in Table 4.

**TABLE 4. Parents/guardians' awareness regarding the use of dental floss in children and the availability of information related to oral health.**

| Variables | Subgroups | n (%) |
|---|---|---|
| Do you know what is dental floss? | | |
| | No | 50 (48.1%) |
| | Yes | 54 (51.9%) |
| Is dental floss recommended for children? | | |
| | I don't know | 17 (31.5%) |
| | No | 29 (53.7%) |
| | Yes | 8 (14.8%) |
| Availability of oral health information during pediatric visits (female participants only, n = 88). | | |
| | No | 78 (91.8%) |
| | Yes | 7 (8.2%) |

Among the 54 participants (51.9%) who were familiar with dental floss, only 8 (14.8%) believed it to be appropriate for children when teeth are in contact. Firth's penalized likelihood regression analysis indicated no significant associations between participant characteristics and awareness of dental floss use in children.

Regarding oral health information, most female participants (n = 78, 91.8%) reported that no information on oral health was provided during pediatric visits, and only a small proportion (n = 7, 8.2%) confirmed receiving such information.

## 4. Discussion

This cross-sectional study was conducted at the Mother-Child Specialized Hospital of Brazzaville, formally known as Mother-Child Specialized Hospital Blanche Gomes. This institution is a public hospital, and the facility is open to patients from diverse educational and socio-economic backgrounds. Notably, the study sample predominantly comprised educated parents/guardians, with 79 participants (65.8%) having attained a bachelor's degree or higher, and only three participants reported as uneducated.

Previous studies have demonstrated that both educational level and occupation are significant factors influencing parents' awareness of oral health [15, 16]. Education is strongly associated with functional health literacy, which enhances an individual's ability to understand and apply health-related information [17]. A higher level of education may enable parents to access appropriate sources of information and comprehend that information more effectively. However, in the present study, no statistically significant difference was observed in the level of knowledge regarding ECC between parents/guardians with higher education and those with lower educational attainment. This finding may be explained by the limited availability or accessibility of oral health information, regardless of educational background.

In contrast, occupation was found to be significantly associated with parents/guardians' knowledge regarding the etiology of dental caries and ECC risk factors. Participants working in the medical field demonstrated greater knowledge than those employed in the education sector ($p$ = 0.034). This finding is understandable, as medical training typically includes basic oral health education, providing healthcare professionals with relevant knowledge. However, since no single preventive strategy has proven to be superior, ECC prevention should not be limited to approaches targeting specific occupational groups. Preventing ECC requires a community-wide approach to oral health education, with efforts directed at all segments of society. Teachers, after parents, spend the most time with children during their early developmental years and, therefore play a key role in shaping their health-related behaviors, including oral hygiene practices [18]. Given this responsibility, teachers are expected to have sufficient knowledge of both general and oral health, particularly because oral diseases share several modifiable risk factors with major non-communicable diseases [19].

It has been shown that improper oral hygiene practices can lead to the transmission of *Streptococcus mutans*, one of the main etiological agents of dental caries. Vertical transmission from mother to child has been shown to have a more pronounced effect on the development of the child's oral microbiota than horizontal transmission [20], and despite this evidence, more than half of the participants in the present study (n = 59, 50.43%) believed that poor maternal oral hygiene does not increase the child's risk of developing dental caries. Furthermore, most parents/guardians (n = 104, 86.7%) were either unaware of or did not believe that sharing feeding utensils could contribute to an increased risk of dental caries in children. These findings are consistent with reports from studies conducted in Saudi Arabia and Jordan, where over half of the respondents considered sharing food with their children to be acceptable [7, 15].

Evidence-based research has shown that providing oral health education during pregnancy can significantly improve maternal oral health, influence maternal oral hygiene practices and positively affect children's oral health outcomes [21], thereby supporting the importance of incorporating oral health education into routine prenatal care.

In the present study, although most parents/guardians (n = 114, 95%) were aware of the recommended frequency of tooth brushing, more than half demonstrated limited knowledge regarding several other essential aspects of pediatric oral

hygiene, such as the appropriate time to initiate oral hygiene, the recommended age for children to begin brushing independently, and the optimal duration for brushing. According to the American Academy of Pediatric Dentistry (AAPD), parents should begin brushing their child's teeth as soon as the first tooth erupts, supervise or assist with brushing until the child reaches eight years of age, and ensure that each brushing session lasts approximately two minutes [22, 23].

The AAPD further recommends that children attend their first oral health consultation within six months of the eruption of the first tooth and no later than 12 months of age for a comprehensive caries risk assessment, parental education and anticipatory guidance on the prevention of dental disease [24]. However, in the current study, only 24 participants (20%) correctly identified the timing of the first dental visit as coinciding with the eruption of the first tooth, while nearly half of the respondents (49.17%) believed that the first dental visit should take place only when the child exhibits symptoms or complaints, consistent with findings from studies conducted in Port Harcourt, Nigeria [25], and the Western Region of Saudi Arabia [7], where fewer than one-quarter of respondents were aware of the recommended timing for the first dental visit. Although slightly higher levels of awareness were reported in studies from Jordan (38.3%) and Enugu state Nigeria (32.2%) [15, 26], overall knowledge on this topic remains low, particularly among populations residing in socioeconomically disadvantaged areas.

It is well known that feeding practices and the age at which free sugars, including those naturally occurring in fruit juices or honey, are introduced, as well as the frequency of their consumption, play a crucial role in the development of ECC. However, the association between breastfeeding and ECC remains one of the most debated risk factors for ECC [27].

According to the World Health Organization (WHO), prolonged and exclusive breastfeeding does not increase the risk of ECC. Based on available evidence, WHO recommends exclusive breastfeeding for the first six months, followed by continued breastfeeding alongside complementary feeding up to two years of age or beyond [28]. In contrast, the American Academy of Pediatric Dentistry (AAPD) supports breastfeeding for up to 12 months but advises against unrestricted nocturnal breastfeeding after the eruption of the first primary tooth, citing its potential to increase ECC risk due to prolonged exposure to breast milk fermentable carbohydrates during sleep [27].

In the present study, nearly half of the participants reported frequent and prolonged breast or bottle feeding during both daytime and nighttime, which reflects a lack of awareness regarding the potential role of feeding duration and timing in ECC development. Additionally, 76.92% of parents/guardians believed that snacking between meals increases the risk of dental caries only when the snacks taste sweet, indicating a limited understanding of how feeding behaviors and hidden sugars contribute to the onset of caries.

The short- and long-term health benefits of breastfeeding are well established as it supports optimal physical growth, enhances developmental outcomes and contributes to psychosocial well-being in infants. However, parents/guardians should also recognize the potential oral health risks associated with prolonged and nocturnal breastfeeding or bottle-feeding, particularly regarding the increased risk of ECC. In the present study, although most participants (n = 90, 76.92%) acknowledged that sugar contributes to the development of dental caries, there was a noticeable lack of awareness regarding the different forms of dietary sugars. For instance, many parents may not realize that fresh, unsweetened fruit juice contains free sugars, including fructose, sucrose, and glucose, which are released during the juicing process. The concentration of free sugars in such juices can be comparable to that of standard soft drinks, rendering them potentially cariogenic [29]. These findings highlight a critical gap in parental understanding and emphasize the need for improved oral health education. Thus, oral health professionals must provide parents and guardians with simple, clear and consistent information, ensuring that it is both verbally accessible and practically applicable in daily routines.

Flossing is an essential component of interdental cleaning and plays a key role in preventing both proximal dental caries and periodontal disease. The AAPD recommends initiating the use of dental floss in children once adjacent teeth begin to make contact. Despite these recommendations, previous studies have reported a low prevalence of dental floss use among children [30, 31]. Consistent with earlier findings, the present study revealed that nearly half of the parents/guardians (n = 50, 48.1%) were unaware of the purpose and importance of dental floss, with only 8 participants (14.8%) stating that dental floss could be used in children. This limited awareness may contribute to poor adoption of flossing practices in pediatric oral care. As demonstrated by Rubim *et al*. [31], the use of dental floss by guardians is positively associated with its use in their children. Therefore, the low level of parental awareness observed in our study may partly suggest a low prevalence of dental floss use among children in this population.

In addition to specific knowledge gaps regarding flossing, the broader lack of understanding about dental caries and ECC prevention among parents or guardians may be influenced by the limited availability of oral health information during pediatric visits.

This study has several limitations that should be acknowledged. First, as a cross-sectional design, it does not allow for causal inferences to be made. However, such designs remain valuable for identifying associations and generating hypotheses that may inform future longitudinal studies.

Second, the study employed a convenience sampling method, including only parents or guardians of medically healthy children who visited the Department of Stomatology at the Mother-Child Specialized Hospital Blanche Gomes in Brazzaville between September 2023 and July 2024. As a result, the generalizability of the findings to the broader population is limited. Furthermore, the sample included a relatively small proportion of male participants (n = 32, 26.7%), which may also affect the applicability of the results across different demographic groups. Additionally, the number of individuals who declined to participate in the study was not tracked; thus, the response rate remains unknown and might have introduced potential selection bias.

Another notable limitation is the omission of questions related to fluoride knowledge. Fluoride plays a fundamental

role in oral health by protecting tooth enamel and preventing dental caries [32]. Nevertheless, due to the absence of fluoride toothpaste from the Republic of Congo's national essential medicines list [33], the current study focused primarily on mechanical oral hygiene practices, such as tooth brushing and flossing.

To address these limitations, future research could recruit a more gender-balanced sample and participants from a wider range of geographical regions and healthcare settings for external validity and representativeness of the findings. Moreover, assessing knowledge of fluoride use among Congolese parents/guardians is recommended for a more comprehensive understanding of oral health literacy in this population.

Despite its limitations, this study also presents several strengths. Notably, it is the first investigation to assess parents' or guardians' knowledge of ECC prevention in the Republic of Congo, thereby contributing to the limited literature on parental oral health awareness in regions with a high burden of oral disease. Furthermore, to the best of our knowledge, this is the first study in the Republic of Congo to examine parental knowledge regarding the use of dental floss in preschool-aged children.

Taken together, these findings offer valuable insights for future research and the planning of oral health interventions. They can support the design of targeted community-based services and preventive strategies to help reduce the prevalence of ECC. In particular, there is a need to develop a structured ECC prevention program aimed at educating parents/guardians who attend healthcare facilities with their children. The successful implementation of such a program would require coordinated efforts between the Ministry of Health and other relevant government sectors involved in child development and family welfare.

## 5. Conclusions

The overall knowledge of parents regarding the prevention of ECC was found to be inadequate, with nearly half of the participants (n = 53, 44.2%) demonstrating a low level of knowledge concerning the etiology of dental caries and the associated risk factors. A statistically significant difference was observed in knowledge levels between parents/guardians employed in the medical field and those working as teachers or academics, with the former demonstrating higher awareness. In terms of oral health education and dietary habits, a substantial proportion of participants (n = 97, 80.8%) showed limited knowledge, and no significant demographic or professional factors were associated with their understanding in these areas. The findings also revealed a lack of access to oral health information and low awareness regarding the use of dental floss in children.

Taken together, these findings highlight the need for targeted educational interventions and awareness campaigns to improve parents/guardians' understanding of infant oral health care and ECC prevention in Brazzaville.

### AVAILABILITY OF DATA AND MATERIALS

The data analyzed in this study are available upon request. Please write to the corresponding author.

### AUTHOR CONTRIBUTIONS

CWP and CL—designed the research study. CWP and BBM—performed the research. FM—provided support and advice in oral epidemiology. QD—analyzed the data. CWP and QD—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the Ethics Committee of the Department of Research at the Mother-Child Specialized Hospital Blanche Gomes, Brazzaville, Republic of Congo (HSMEBG/CE/03/2023). Participant Information Sheet (PIS) was provided and written, or verbal consent was obtained from all participants prior to the study.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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