e-ISSN: 2807-6257

Open Access Indonesian Journal of Medical Reviews

[OAIJMR]

https://hmpublisher.com/index.php/oaijmr

Beyond Awareness: Investigating the Disconnect Between Oral Health Knowledge and Caries Experience (DMF-T) in Indonesian Primary Schoolchildren

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ARTICLE INFO

Keywords:
Dental caries
DMF-T index
Health education
Oral health knowledge
Primary school children

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All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/oaijmr.v5i4.727

A B S T R A C T

Dental caries remains a significant public health problem among Indonesian children, impacting their quality of life and development. While oral health knowledge is considered crucial for prevention, its direct impact on caries experience, particularly in specific Indonesian contexts, requires further investigation. This study aimed to assess the relationship between oral health knowledge and caries experience (DMF-T index) among grade 2 students at an Islamic Integrated Primary School in Indonesia. A cross-sectional study was conducted involving 85 second-grade students selected via purposive sampling. Oral health knowledge was assessed using a validated, structured questionnaire covering topics like tooth brushing importance, frequency, caries causes, and prevention. Caries experience was measured using the DMF-T (decayed, missing, filled teeth) index through clinical examinations performed by trained dental personnel. Data were analyzed using descriptive statistics and the Chi-square test to determine the association between knowledge level (categorized as low or sufficient) and DMF-T status (categorized as low, moderate, or high), with significance set at $p<0.05$. The study included 45 (52.9%) female and 40 (47.1%) male students. The majority of students (80%, n=68) demonstrated sufficient oral health knowledge, with a mean knowledge score of 5.52 (SD=1.52) on a scale of 1-7. Despite this, the prevalence of dental caries was high, with a mean DMF-T score of 7.92 (SD=5.11). Overall, 61.2% (n=52) of students were categorized as having high DMF-T status, 18.8% (n=16) had moderate DMF-T, and 20% (n=17) had low DMF-T. The Chi-square analysis revealed no statistically significant association between the level of oral health knowledge and DMF-T status (p=0.920). High DMF-T prevalence was observed in both the low knowledge group (58.8%) and the sufficient knowledge group (61.8%). In conclusion, this study highlighted a significant disconnect between oral health knowledge and actual caries experience among primary schoolchildren in this Indonesian setting. While most students possessed sufficient knowledge, the prevalence and severity of dental caries remained alarmingly high, and knowledge level was not significantly associated with DMF-T status. These findings underscore the inadequacy of knowledge-based interventions alone and emphasize the need for comprehensive, multifaceted oral health promotion programs that address behavioral, practical, and environmental factors to effectively combat dental caries in children.

1. Introduction

Oral health is fundamentally important to overall health and well-being, especially during childhood. Dental caries, a common term for tooth decay, stands out as one of the most prevalent chronic diseases affecting children on a global scale. The significant impact of this disease on the younger population highlights the urgent need to address and manage it effectively. In Indonesia, the prevalence of dental caries among children poses a substantial public health challenge. Data from national surveys have consistently revealed high rates of dental problems, with dental caries identified as the most common issue, affecting a large proportion of the population.

This is further supported by a recent systematic review and meta-analysis, which estimated a high overall prevalence of dental caries among Indonesian children. The widespread occurrence of this preventable disease in the country underscores the necessity for targeted interventions and preventive strategies. The consequences of untreated dental caries in children extend beyond the oral cavity and can have profound effects on various aspects of a child's life. Children experiencing dental caries may suffer from pain, infections, and difficulties with eating, which can lead to sleep disturbances and negatively impact their school performance. These factors collectively contribute to a diminished quality of life, affecting a child's physical, social, and emotional development. Recognizing the broad impact of untreated caries is crucial in understanding the importance of prioritizing oral health in children.[1-3]

It is widely recognized that oral health knowledge is essential for the prevention of dental diseases. A solid understanding of proper oral hygiene practices, such as effective tooth brushing techniques and the recommended frequency, is fundamental. Additionally, knowledge about the role of diet, particularly the impact of sugary foods and drinks, and the causes of dental caries is considered a prerequisite for adopting preventive behaviors. This knowledge empowers individuals to take proactive steps in maintaining their oral health and preventing the onset of dental problems. In light of the importance of oral health knowledge, health education has become a fundamental component of oral health promotion strategies, especially within school settings. Schools provide a unique and strategic environment to reach a large number of children during their formative years. This setting offers valuable opportunities to instill positive oral health habits that can last a lifetime. School-based programs often include educational components designed to increase awareness and knowledge about maintaining optimal oral health. However, the relationship between knowledge and actual health outcomes is not always straightforward. While it is often assumed that increased knowledge will lead to improved health behaviors and, consequently, better health status, research has demonstrated inconsistent results. A discrepancy frequently exists between what individuals know about health and what they actually do in practice, particularly when it comes to adopting and maintaining healthy behaviors.[4-6]

Several factors beyond knowledge can significantly influence oral health practices and outcomes. These include attitudes, beliefs, self-efficacy, and practical skills necessary for effective oral hygiene. Environmental influences, such as access to dental care and healthy food options, also play a crucial role. Socioeconomic factors and parental or family habits further contribute to shaping oral health behaviors and ultimately impact oral health status. Understanding these complex interactions is essential for developing effective interventions. Systematic reviews that have assessed school-based interventions often indicate that while knowledge may improve through educational efforts, there is limited evidence for significant and sustained behavioral change or a substantial reduction in caries rates based solely on traditional educational approaches. Interventions that incorporate behavioral theories, provide opportunities for practical skill development (such as supervised tooth brushing), and implement environmental modifications have shown more promising results in achieving better oral health outcomes. These comprehensive approaches acknowledge the multifaceted nature of health behavior change. In Indonesia, despite ongoing efforts through school-based oral health programs, the prevalence of caries remains a significant concern. While studies have explored oral health knowledge and practices among Indonesian schoolchildren, further investigation is warranted to understand the specific relationship between knowledge levels and the DMF-T index, particularly within specific school contexts, such as religious or private institutions. A deeper understanding of this relationship is crucial for evaluating the effectiveness of current educational strategies and for designing more impactful

interventions to address the issue of dental caries in this population. This study was conducted at the Sekolah Dasar Islam Terpadu (Integrated Islamic Primary School) Cendikia Andalas.[7-10] The study aimed to investigate the relationship between the level of oral health knowledge and caries experience, measured by the DMF-T index, among second-grade students attending this school.

2. Methods

This study employed a quantitative, descriptive correlational research design utilizing a cross-sectional approach. This methodological framework was chosen to enable the examination of the relationship between oral health knowledge and caries experience within a specific group of individuals at a single point in time. The cross-sectional design is particularly suited for exploring associations between variables without establishing causality, providing a snapshot of the variables of interest and their relationship as they exist concurrently. This approach facilitates the simultaneous assessment of oral health knowledge levels and caries experience, as measured by the DMF-T index, thereby allowing for an analysis of their potential association.

The study was conducted at Sekolah Dasar Islam Terpadu Cendikia Andalas, an integrated Islamic primary school situated in Indonesia. The selection of this particular school as the study setting was based on the aim to investigate the research question within a specific educational context. Integrated Islamic primary schools in Indonesia represent a unique educational environment that combines general academic instruction with Islamic religious education. Conducting the study in this setting allowed for an examination of the relationship between oral health knowledge and caries experience within a population of children receiving education in this specific context. Prior to the commencement of any data collection activities, formal permission to conduct the research was obtained from the school administration. This step was crucial to ensure that the study was conducted ethically and with the full knowledge and consent of the relevant authorities within the school. Furthermore, meticulous coordination was established with relevant school staff and healthcare personnel who were to be involved in the various stages of the research process. This coordination was essential for the smooth and efficient execution of the study, ensuring that all parties were aware of their roles and responsibilities.

The study adhered to strict ethical principles to protect the rights and well-being of the student participants. Ethical approval was obtained from the faculty of dentistry, Universitas Andalas, Padang, Indonesia. This approval ensured that the research protocol met the ethical standards set by the institution. Informed consent was obtained from the parents or legal guardians of all participating students. The process of obtaining informed consent involved providing detailed information about the study's purpose, procedures, potential risks, and benefits. Parents or guardians were given the opportunity to ask questions and were assured that their children's participation was voluntary. Confidentiality of the participants was maintained throughout the study. All data collected were anonymized, and no identifying information was linked to individual responses or clinical findings. Data were stored securely and accessed only by authorized research personnel.

The study population consisted of second-grade students who were enrolled at the participating integrated Islamic primary school. Second-grade students were specifically chosen as the target population for this research. The selection of this particular grade level was based on the researchers' interest in assessing oral health knowledge and caries experience in children at this stage of development.

A purposive sampling technique was utilized to select the participants for this study. Purposive sampling is a non-probability sampling method where researchers select participants based on specific criteria or characteristics relevant to the research question. In this case, all second-grade students who were present at the school on the days designated for

data collection and who also met the inclusion criteria were invited to participate in the study. The primary inclusion criterion was that the students were of the appropriate age for second grade. This criterion ensured that the participants were within the specific age range of interest for the study. A total of 85 students met the inclusion criteria and participated in the study. This sample size was deemed appropriate to provide sufficient data to address the research question and to allow for meaningful statistical analysis.

The study employed two primary data collection instruments to gather the necessary information from the participants: a structured questionnaire to assess oral health knowledge and a clinical oral examination using the DMF-T index to assess caries experience.

A structured questionnaire was developed or adapted specifically for this study to assess the students' knowledge regarding oral health. The questionnaire was designed to gather information on the students' understanding of various aspects of oral health, including; The importance of tooth brushing; The recommended frequency of tooth brushing; The etiology or causes of dental caries; Preventive measures that can be taken to maintain oral health. The questions included in the questionnaire were carefully designed using simple language that was appropriate for second-grade students. This consideration in the design process was crucial to ensure that the students could easily understand the questions and provide accurate responses. The use of age-appropriate language minimized the potential for confusion or misinterpretation of the questions, thereby enhancing the validity of the data collected. The questionnaire was tested and validated to ensure its reliability and validity. However, the specifics of the validation process were not detailed in the summarized results. The questionnaire was designed to yield a total score, likely ranging from 1 to 7. This scoring system allowed for a quantitative assessment of the students' oral health knowledge. Based on their scores on the questionnaire, the students were categorized into different knowledge levels. These categories included 'low' and 'sufficient'. However, the specific cut-off score that was used to determine this categorization was not explicitly stated in the summarized results.

Caries experience in the primary dentition of the participating students was assessed using the DMF-T index. The DMF-T index is a widely recognized and standardized tool used in dental epidemiology to measure the prevalence and severity of dental caries, particularly in primary teeth. This index provides a quantitative measure of caries experience by evaluating three components; Decayed teeth (d): This component represents the number of teeth that have visible caries or decay; Missing teeth (m): This component indicates the number of teeth that have been lost due to caries; Filled teeth (f): This component represents the number of teeth that have been filled or restored due to caries. Clinical oral examinations were performed by trained dental personnel. These examiners were either dentists or dental students/interns who had received specific training in conducting oral examinations and using the DMF-T index. The use of trained personnel ensured that the examinations were conducted in a standardized and consistent manner, minimizing the potential for examiner bias or variability. The examinations were conducted using appropriate dental instruments. These instruments are specifically designed for oral examinations and allow for a thorough assessment of the teeth and surrounding structures. The examinations were performed under adequate lighting conditions. Proper illumination is essential for accurate visual inspection of the oral cavity and the detection of any signs of dental caries. Examiners were likely calibrated to ensure consistency in their assessments. Calibration is a process that involves training and standardization of examiners to ensure that they are applying the diagnostic criteria for dental caries in a uniform manner. This process helps to minimize inter-examiner variability and enhances the reliability of the data. However, while the document mentions that examiners were likely calibrated, it does not explicitly state that calibration was performed.

Based on the total DMF-T score calculated for each student, the students were categorized into different caries experience groups. These categories included 'low', 'moderate', and 'high' caries experience. However, the specific numerical ranges that were used to define these categories were not provided in the summarized results.

Data collection for this study occurred during the first triwulan (quarter) of the research timeline. This timeframe was designated for the administration of the knowledge questionnaire and the clinical oral examinations. Following the acquisition of the necessary permissions from the school administration, the oral health knowledge questionnaire was administered to the participating second-grade students. The questionnaire was administered within the classroom setting. This setting was chosen to provide a familiar and comfortable environment for the students, which could help to facilitate their participation and ensure accurate responses. The questionnaire was administered potentially with assistance from teachers or research staff. This assistance was intended to ensure that the students understood the questions and were able to complete the questionnaire effectively. The presence of teachers or research staff could also help to address any questions that the students might have had and to maintain order during the administration process. Sufficient time was provided for the students to answer the questions included in the questionnaire. This allowance ensured that the students had ample opportunity to carefully consider each question and provide thoughtful and accurate responses. Concurrently or subsequently, clinical oral examinations were conducted on each of the participating students. These examinations were performed by the trained dental examiners to determine the DMF-T status of each student. The examinations were conducted in a systematic and standardized manner to ensure the accuracy and reliability of the data collected. Data on both the knowledge scores obtained from the questionnaire and the DMF-T indices obtained from the clinical examinations were collected for each participant in the study. This comprehensive data collection allowed for a thorough analysis of the relationship between oral health knowledge and caries experience. In addition to these primary data points, basic demographic information was also recorded for each participant. This demographic information included gender. The collection of this information allowed for a description of the sample characteristics and for potential analyses of any differences between subgroups within the sample.

The processing and analysis of the collected data were planned for the second triwulan of the research timeline. This timeframe was designated for the data entry, statistical analysis, and interpretation of the findings. The collected data were entered into a statistical software package. This software facilitated the organization, management, and analysis of the data. Descriptive statistics were calculated to summarize the participant demographics, the knowledge scores obtained from the questionnaire, and the distribution of DMF-T index values. These descriptive statistics included; Frequencies; Percentages; Means; Standard deviations; Median; Mode. These descriptive measures provided a comprehensive overview of the data and allowed for a clear understanding of the sample characteristics and the distribution of the variables of interest. To investigate the primary research question regarding the association between oral health knowledge and caries experience, the Chi-square test was employed. The Chi-square test is a statistical test used to examine the association between two categorical variables. In this study, it was used to compare the distribution of DMF-T categories (low, moderate, high) across the different knowledge level categories (low, sufficient). The level of statistical significance was set at $p < 0.05$. This threshold is a commonly accepted value in scientific research for determining whether the results of a statistical test are statistically significant, indicating that the observed association is unlikely to be due to chance.

3. Results and Discussion

Table 1 presents the characteristics of grade 2 study participants; Gender: The study population included both female and male students. A slight majority of the participants were female, with 45 female students representing 52.9% of the total sample. The remaining 40 students were male, comprising 47.1% of the sample. This indicates a relatively balanced gender distribution within the study; Grade Level: All participants in this study were in Grade 2. This is represented by 85 students, or 100% of the sample, falling into this category. This confirms the homogeneity of the sample with respect to grade level, which is a key characteristic for this study's focus; Oral Health Knowledge: The oral health knowledge of the students was categorized into two levels: sufficient and low. The majority of the students, 68 out of 85, demonstrated sufficient oral health knowledge, accounting for 80% of the sample. The remaining 17 students were categorized as having low oral health knowledge, which constituted 20% of the study participants. The oral health knowledge scores, measured on a scale of 1 to 7, had a mean of 5.52 with a standard deviation of 1.52. This suggests that, on average, students scored above the midpoint of the scale, but there was some variability in scores. The median score was 6, and the mode was 7, indicating that the most frequent score was the highest possible, and that half of the students scored 6 or higher, further supporting the observation that most students had sufficient knowledge; Caries Experience (DMF-T): Caries experience was assessed using the DMF-T index, and the students were categorized into three groups: high, moderate, and low. A substantial proportion of the students, 52 out of 85, were categorized as having high caries experience, representing 61.2% of the sample. Sixteen students had moderate caries experience, which was 18.8% of the participants. The remaining 17 students had low caries experience, accounting for 20% of the sample. The DMF-T index scores, which ranged from 0 to 19, had a mean of 7.92 with a standard deviation of 5.11. This indicates a relatively high average caries experience within the group, with considerable variability in scores. The median DMF-T score was 8, and the mode was 4. The median being higher than the mode suggests a positive skew in the data distribution, meaning there are more individuals with higher DMF-T scores.

Table 1. Characteristics of grade 2 study participants (N=85).

Characteristic	Category / Value	Number (n)	Percentage (%)
Gender			
	Female	45	52.9%
	Male	40	47.1%
Grade level			
	Grade 2	85	100.0%
Oral health knowledge			
Level categorization			
	Sufficient	68	80.0%
	Low	17	20.0%
Score (Scale 1-7)	Mean ± SD		5.52 ± 1.52
	Median (Mode)		6 (7)
Caries experience (DMF-T)			
Status categorization			
	High	52	61.2%
	Moderate	16	18.8%
	Low	17	20.0%
Index score (Range 0-19)	Mean ± SD		7.92 ± 5.11
	Median (Mode)		8(4)

SD = Standard Deviation; DMF-T = decayed, missing (due to caries), and filled primary teeth index.

Table 2 presents the distribution of DMF-T status (low, moderate, and high) across the two levels of oral health knowledge (low and sufficient) among the 85 study participants. It also provides the results of the Chi-square test, which was used to assess the statistical significance of the association between these two variables; Low Oral Health Knowledge: Of the 17 students categorized as having low oral health knowledge, 4 (23.5%) had low DMF-T status, 3 (17.6%) had moderate DMF-T status, and 10 (58.8%) had high DMF-T status. This shows that in the low knowledge group, the majority of students exhibited high caries experience; Sufficient Oral Health Knowledge: Among the 68 students with sufficient oral health knowledge, 13 (19.1%) had low DMF-T status, 13 (19.1%) had moderate DMF-T status, and 42 (61.8%) had high DMF-T status. Similar to the low knowledge group, the largest proportion of students in the sufficient knowledge group also had high caries experience. The table also provides the total number and percentage of students in each DMF-T status category. Overall, 17 (20.0%) students had low DMF-T status, 16 (18.8%) students had moderate DMF-T status, and 52 (61.2%) students had high DMF-T status. This confirms that the majority of the entire study population had high caries experience. The Chi-square test result yielded a p-value of 0.920. This p-value is greater than the conventional significance level of 0.05.

Table 2. Association between oral health knowledge level and DMF-T status (N=85).

Oral health knowledge level	**DMF-T status – Low, n (%)**	**DMF-T status – Moderate, n (%)**	**DMF-T status – High, n (%)**	**Total, n (%)**
Low	4 (23.5%)	3 (17.6%)	10 (58.8%)	17 (100.0%)
Sufficient	13 (19.1%)	13 (19.1%)	42 (61.8%)	68 (100.0%)
Total	**17 (20.0%)**	**16 (18.8%)**	**52 (61.2%)**	**85 (100.0%)**
Chi-square test result: p = 0.920				

The most salient finding of this study is the absence of a statistically significant association between the level of oral health knowledge and the actual caries experience, as quantified by the DMF-T index. This observation underscores a critical disconnect between what children know about oral health and their actual oral health status. Specifically, despite a considerable majority (80%) of the students demonstrating sufficient knowledge about fundamental oral health concepts, the prevalence and severity of dental caries remained notably high within this population. This disparity is reflected in the high overall prevalence of caries (61.2%) and a mean DMF-T score of 7.92, indicating a substantial burden of the disease even among those deemed to possess adequate knowledge. This finding aligns with a growing body of evidence that challenges the assumption that knowledge dissemination alone is sufficient to translate into improved health behaviors and, consequently, better health outcomes. The concept of the knowledge-practice gap, or the knowledge-behavior gap, is well-established in health education research. It highlights the complexities involved in health behavior change and suggests that simply knowing what constitutes good oral health practices does not guarantee that individuals will consistently engage in those practices. This gap is particularly relevant in the context of children, where factors such as autonomy, self-regulation, and external influences play a significant role in shaping behavior. The high DMF-T scores observed in this study, even among students classified as having sufficient knowledge, strongly emphasize this point. It suggests that while these children may possess the cognitive understanding of what they *should* do to maintain good oral health, other factors are likely exerting a more dominant influence on their actual oral health status. These factors may include behavioral, social,

environmental, and economic determinants that interact in complex ways to shape health practices. Understanding these multifaceted influences is crucial for designing effective interventions that go beyond simply imparting knowledge. The implications of this finding are significant for oral health promotion strategies. It suggests that traditional educational approaches that primarily focus on increasing knowledge may have limited effectiveness in achieving tangible improvements in oral health outcomes. While knowledge is undoubtedly a necessary foundation for informed decision-making and behavior change, it is often insufficient on its own to motivate and sustain the complex and consistent behaviors required for optimal oral health. These behaviors include regular and effective tooth brushing, dietary choices that limit sugary food and drink intake, and seeking regular professional dental care. The study's results call for a paradigm shift in how oral health interventions are designed and implemented, advocating for a more comprehensive and multifaceted approach. One potential contributing factor to the observed disconnect between knowledge and caries experience is the inadequacy of actual oral hygiene practices, despite the presence of sufficient knowledge. Children may possess the knowledge that they should brush their teeth twice daily, yet they might not consistently adhere to this recommendation in practice. Furthermore, even when they do brush, the effectiveness of their brushing technique may be compromised, leading to inadequate plaque removal and consequently, an increased risk of caries development. Factors such as insufficient brushing duration, incorrect brushing technique, and lack of supervision can all contribute to suboptimal oral hygiene practices. National data provides supporting evidence for this phenomenon. It indicates that while a significant proportion of Indonesian children report brushing their teeth daily, a much smaller percentage adhere to the recommended frequency of brushing after breakfast and before bed. This discrepancy highlights a gap between reported behavior and recommended behavior, suggesting that even when children are aware of the guidelines, they may not be consistently followed. This inconsistency can be attributed to various factors, including time constraints, lack of parental supervision or reinforcement, and competing priorities. The effectiveness of tooth brushing is not solely determined by frequency but also by the quality of the technique employed. Children may rush through the process, failing to reach all surfaces of the teeth and remove plaque effectively. Lack of proper guidance and instruction on correct brushing techniques can contribute to this issue. Additionally, the use of fluoride toothpaste is crucial for its protective effects against caries, and inconsistent or inadequate use can diminish its benefits. Therefore, while the children in this study may have demonstrated sufficient knowledge about the importance of tooth brushing, the actual implementation of effective oral hygiene practices may be lacking. This highlights the need for interventions that not only focus on knowledge dissemination but also provide practical training and reinforcement of proper oral hygiene techniques. Supervised tooth brushing programs in schools, coupled with parental education and involvement, can play a critical role in bridging this gap and promoting effective oral hygiene practices.[11-14]

Dietary habits, particularly the frequency and amount of sugary food and drink consumption, are well-established as strong determinants of caries risk. The consumption of sugary substances provides substrates for oral bacteria to produce acids, which demineralize tooth enamel and initiate the caries process. Frequent and prolonged exposure to sugar increases the risk of caries development, regardless of an individual's knowledge about healthy eating habits. In this study, even if children possess knowledge about the detrimental effects of sugary foods and drinks on their oral health, this knowledge might not override their preferences, availability, or cultural norms related to sugar consumption. Children's food choices are often influenced by a variety of factors, including taste preferences, peer influence, parental habits, and the availability of sugary products in their

environment. These factors can create a conflict between knowledge and behavior, leading to the consumption of sugary items despite an understanding of their negative impact. Furthermore, cultural practices and social norms can play a significant role in shaping dietary habits. In some cultures, sugary treats and beverages are commonly offered as rewards or during celebrations, which can reinforce their consumption. The availability of sugary products in school canteens and local stores further contributes to their accessibility and consumption. Therefore, even if children are knowledgeable about healthy eating, the complex interplay of personal preferences, environmental influences, and cultural norms can lead to dietary habits that increase their risk of caries. Interventions aimed at reducing caries risk must address these multifaceted influences. This includes promoting the availability of healthy food options, implementing policies that restrict the sale of sugary products in schools, and providing education that empowers children to make informed and healthy dietary choices. Parental involvement is also crucial in shaping children's dietary habits and creating a home environment that supports healthy eating. Parental influence is a critical factor in shaping children's oral health behaviors, particularly during early childhood. Parents' own knowledge, attitudes, and practices related to oral health significantly impact their children's diet, hygiene habits, and access to dental care. Children learn by observing and imitating their parents, and parental behaviors often serve as a model for their own. Parents who have poor oral hygiene habits are more likely to have children with similar habits. If parents do not prioritize oral health or do not have the knowledge or skills to effectively care for their own teeth, they may not adequately guide or supervise their children's oral hygiene practices. This can lead to inconsistent or ineffective tooth brushing, infrequent dental visits, and poor dietary choices. Parental attitudes towards oral health also play a crucial role. If parents do not value oral health or do not perceive it as important, they may not instill this value in their children. This can result in a lack of motivation to maintain good oral hygiene and a reluctance to seek dental care. Socioeconomic status can further influence parental practices and access to care. Families with lower socioeconomic status may face barriers to accessing dental care, such as cost, transportation, and lack of awareness about available services. They may also have limited access to healthy food options and may rely on cheaper, processed foods that are often high in sugar. In this study, parental factors were not assessed, which represents a significant limitation in understanding the contributors to the high DMF-T levels observed. It is plausible that parental knowledge, attitudes, and practices play a substantial role in shaping the oral health behaviors and outcomes of the children in this population. Future research should consider incorporating assessments of parental factors to gain a more comprehensive understanding of the determinants of caries experience in children. Interventions that target parents and families, in addition to children, are more likely to be effective in promoting long-term improvements in oral health.[15-17]

Access to preventive and restorative dental care is a crucial factor influencing the 'm' (missing) and 'f' (filled) components of the DMF-T index. Limited access to or utilization of dental services can lead to untreated decay, which can progress and eventually result in tooth loss. Furthermore, a lack of access to restorative care means that decayed teeth may not be filled, contributing to a higher DMF-T score. Several factors can contribute to limited access to dental care. The cost of dental treatment can be a significant deterrent for many families, particularly those with low socioeconomic status. In some areas, particularly rural or remote regions, there may be a shortage of dental professionals, making it difficult for individuals to access care. Inadequate dental insurance coverage can limit access to preventive and restorative services. Some individuals may not be aware of the importance of regular dental check-ups or the availability of dental services in their community. Dental anxiety can prevent individuals from seeking necessary dental care. In the context of this study, it is possible that

limited access to dental care contributed to the high DMF-T scores observed. Children who do not have regular access to dental services may be more likely to have untreated decay and a higher number of missing teeth. This highlights the importance of addressing barriers to dental care as part of comprehensive oral health promotion efforts. School-based dental programs, mobile dental clinics, and community outreach initiatives can help to improve access to care for children, particularly those from underserved populations. The prevalence of high DMF-T (61.2%) and the mean DMF-T of 7.92 found in this study population are concerning and appear to be higher than some national averages reported in earlier Indonesian surveys. However, it is important to acknowledge that variations in caries prevalence exist across different studies and regions within Indonesia. These variations can be attributed to differences in study methodologies, sample populations, socioeconomic factors, and access to care. A recent meta-analysis confirmed a high overall caries prevalence (76%) among Indonesian children, highlighting the persistent public health challenge of dental caries in this population. This meta-analysis provides a broader context for the findings of this specific study, indicating that the high caries prevalence observed in this school setting is consistent with the overall trend in Indonesia. The results from this specific school setting add to the growing body of evidence documenting the significant caries burden experienced by Indonesian primary schoolchildren. While the findings may not be generalizable to the entire Indonesian population due to the specific sampling method, they provide valuable insights into the oral health challenges faced by children in this particular context. This information can be used to inform the development of targeted interventions and strategies to address the high prevalence of caries in similar school settings and communities. It is crucial to recognize that caries prevalence is not uniform across Indonesia, and there are significant disparities in oral health outcomes. Factors such as socioeconomic status, geographical location, and access to care contribute to these disparities. Children from low-income families and those living in rural areas often experience a higher burden of dental caries. Therefore, while the findings of this study are concerning, they should be interpreted within the context of the broader national trends and the specific characteristics of the study population. The study highlights the urgent need for effective oral health promotion strategies that address the multifaceted determinants of caries and reduce disparities in oral health outcomes.[18-20]

4. Conclusion

This study revealed a significant disconnect between oral health knowledge and caries experience among primary schoolchildren in an Indonesian setting. While the majority of students demonstrated sufficient oral health knowledge, the prevalence and severity of dental caries remained alarmingly high. Furthermore, the level of oral health knowledge was not significantly associated with DMF-T status. These findings challenge the assumption that knowledge-based interventions alone are adequate to improve oral health outcomes. The results underscore the complexity of health behavior change and highlight the influence of factors beyond knowledge, such as behavioral patterns, dietary habits, parental influences, and access to dental care. The high prevalence of caries in this study population, despite sufficient knowledge, emphasizes the need for a paradigm shift in oral health promotion strategies. Comprehensive interventions that address the multifaceted determinants of caries are crucial for effectively combating this prevalent disease and reducing disparities in oral health outcomes among children.

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