PERMANENT TOOTH CARIES EXPERIENCE AMONG STUDENTS AGED 10–12 YEARS AT STATE ELEMENTARY SCHOOL 18 SITAPUNG, AGAM REGENCY, INDONESIA

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Abstract

Purpose: This study aimed to describe the caries experience of permanent teeth among students aged 10–12 years at State Elementary School 18 Sitapung, Agam Regency, Indonesia. Methodology: A descriptive study was conducted in June 2026. Of the 62 students aged 10–12 years, 55 who met the inclusion criteria were examined through saturated sampling. Caries experience was measured with the Decayed, Missing, and Filled Teeth (DMF-T) index using a mouth mirror, a dental explorer, and a standard examination form, and the data were analysed univariately. Findings: The mean decayed component was 1.89, the mean missing component was 0.05, and no filled teeth were found (mean 0.00). The total DMF-T score was 107, giving a mean DMF-T of 1.95, which falls into the low severity category. Nevertheless, 65.5% of the students were classified under the poor DMF-T criterion, and untreated decay made up 97.2% of all caries experience. Practical implications: The results reveal a substantial unmet need for restorative care and support strengthening school-based dental services through six-monthly check-ups, early fillings, reduced consumption of cariogenic snacks, and twice-daily toothbrushing after breakfast and before bed. Originality/value: This is the first oral health study conducted at this school, and it provides baseline data for the local community health centre to plan promotive, preventive, and curative dental programmes for school-age children.

Keywords: Caries Experience, Decayed Missing Filled Teeth Index, Dental Caries, Elementary School Students, Permanent Teeth.

1. INTRODUCTION

The World Health Organization defines health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity [1], [2]. Indonesian Law Number 17 of 2023 on Health adopts a similar view and adds that a healthy condition should enable a person to live productively [3]. Oral health is an inseparable part of general health. It refers to the healthy condition of the hard and soft tissues of the teeth and related oral structures that enables a person to eat, speak, and interact socially without dysfunction, aesthetic disturbance, or discomfort [4].

Oral health remains a public health problem in Indonesia. The 2018 Basic Health Research (Riskesdas) found that 57.6% of Indonesians had dental and oral problems, yet only about 10% received care from health workers [5]. The 2023 Indonesian Health Survey (SKI) showed a similar picture, with 56.9% of the population aged three years and above reporting dental and oral problems [6]. In West Sumatra Province, the proportion reached 43.9%, which indicates that public awareness of oral health still needs to be improved [7].

Dental caries is the most frequently found dental problem. It is a disease of the hard tissues of the teeth caused by demineralisation from acids produced by plaque bacteria, which damages the enamel, dentin, and cementum and eventually forms a cavity. Untreated caries can cause pain, chewing difficulty, infection, and tooth loss, and it lowers quality of life [8]. Elementary school children are particularly vulnerable because their daily habits often do not yet support good oral health [8]. Riskesdas

2018 reported that 41.4% of Indonesian children aged 10–14 years had dental and oral problems [5], while in West Sumatra the proportion among 12-year-olds was 24.8% and caries prevalence among children aged 11–12 years was 56.2% [7].

Caries experience in the permanent dentition is commonly measured with the DMF-T index, which counts the number of decayed teeth, teeth missing because of caries, and filled teeth. The index is widely used in dental epidemiology because it describes caries severity in a population, and a higher score reflects a higher caries experience [9], [10]. Earlier studies show that caries experience among school-age children in West Sumatra and elsewhere in Indonesia remains noteworthy. Busman et al. found that among 92 children aged 12–15 years in the Mentawai Islands, 41.3% were in the very low category, but 9.8% and 1.1% were in the high and very high categories [11]. In Agam Regency, Warman et al. reported a mean DMF-T of 2.3 among fifth- and sixth-grade students, with a higher mean in girls (3.1) than in boys (1.8) [12], while Ulum and Hadi recorded a mean DMF-T of 1.12 among children aged 11–12 years [13].

This study was conducted at State Elementary School 18 Sitapung, Ampek Angkek District, Agam Regency. The school runs its school health programme in cooperation with Biaro Community Health Centre, located about 5 km away, which visits the school only twice a year to examine oral health, nutritional status, and the eyes and ears. According to the health centre, the school had never been the site of oral health research, and dental problems were more common there than in other schools. The school canteen sells sweet and sticky foods such as ice cream, chocolate, and candy, and vendors outside the school sell similar snacks. The school health team also reported that most students had never visited a dental service. A preliminary examination of 10 students on 6 January 2026 found 23 decayed and 3 missing teeth, with each student having 3–4 carious teeth, and no filled teeth. Therefore, this study aimed to describe the caries experience among students aged 10–12 years at State Elementary School 18 Sitapung.

2. METHODOLOGY

This was a descriptive study [14], [15] carried out from January to June 2026 at State Elementary School 18 Sitapung, Agam Regency, with the clinical examination held on 5 June 2026. The population comprised all 62 students aged 10–12 years (Table 1). A saturated sampling technique was applied [16], and 55 students who met the inclusion criteria were examined.

Table 1. Distribution of students aged 10–12 years at State Elementary School 18 Sitapung, 2026.

Age (years)	Boys (n)	Girls (n)	Total (n)
10	11	9	20
11	15	14	29
12	9	4	13
Total	**35**	**27**	**62**

Source: Administration Office of State Elementary School 18 Sitapung.

Primary data were obtained through DMF-T examinations using a mouth mirror, a dental explorer, and a DMF-T examination form, assisted by five enumerators who had been trained in the study procedure. Secondary data on the number of students were obtained from the school administration. The data were processed through editing, coding, entry, and cleaning. Univariate analysis was used to calculate the total and mean of each DMF-T component, with the mean obtained by dividing the total score by the number of students examined. The mean DMF-T was interpreted using the DMF-T severity categories, and each student was classified into the good or poor DMF-T criterion and presented as a frequency distribution.

3. RESULTS

The examination took place from 08.00 to 13.00 Western Indonesian Time and involved 55 students, consisting of 33 boys and 22 girls. The totals and means of each DMF-T component are shown in Table 2.

Table 2. Total, mean, and share of each DMF-T component among students aged 10–12 years (n = 55).

Component	Total (teeth)	Mean	Share of DMF-T (%)
Decayed (D)	104	1.89	97.2
Missing (M)	3	0.05	2.8
Filled (F)	0	0.00	0.0
DMF-T	**107**	**1.95**	**100.0**

DMF-T: Decayed, Missing, and Filled Teeth index.

Table 2 shows that caries experience in this group consisted almost entirely of untreated decay, while tooth loss due to caries was rare and no student had received a filling. The overall mean DMF-T of 1.95 falls into the low severity category. However, the distribution of individual scores in Table 3 shows that almost two-thirds of the students were classified under the poor criterion.

Table 3. *Frequency distribution of DMF-T criteria among students aged 10–12 years.*

DMF-T criterion	Frequency (n)	Percentage (%)
Good	19	34.5
Poor	36	65.5
Total	**55**	**100.0**

4. DISCUSSION

4.1 Decayed Component

The decayed component was the largest contributor to the DMF-T score, with an average of one to two untreated carious permanent teeth per student. This indicates that active caries is still common among the students. The researchers assume that this is related to suboptimal oral hygiene, frequent consumption of cariogenic foods, poor toothbrushing habits, and low use of dental services. The health centre visits the school only twice a year, most students have never used a dental service for check-ups or fillings, and sweet, sticky snacks are easy to buy both inside and outside the school.

In children aged 10–12 years, the first permanent molars (teeth 16, 26, 36, and 46) are the teeth most often affected. These teeth erupt at about 6–7 years of age, so they have been exposed to plaque and cariogenic foods longer than other permanent teeth, and their deep occlusal pits and fissures easily retain food debris and plaque. Most lesions found in this study had reached the dentin; if left untreated, they may progress to the pulp, cause pain, and lead to tooth loss. Sweet foods such as candy, chocolate, cakes, and soft drinks provide a substrate for plaque bacteria, which convert sugar into acids that accelerate demineralisation [17]. Regular toothbrushing after breakfast and before going to bed removes plaque and food debris, whereas improper timing, frequency, or technique allows plaque to accumulate and raises caries risk [18]. Low use of dental services also prevents early detection and treatment, so lesions continue to progress [19]. These findings agree with Hidayati et al., who reported that low use of oral health services was associated with more severe caries in children [19].

4.2 Missing Component

Only three permanent teeth were missing, which shows that most of the students' permanent teeth can still be retained. All missing teeth were permanent molars that had been extracted because caries had progressed to an advanced stage. Because permanent molars erupt early and have deep fissures, untreated demineralisation can spread from the enamel to the dentin and the pulp until the tooth can no longer be saved. The low missing score should therefore not be seen as reassuring: if the many decayed teeth found in this study remain untreated, the risk of tooth loss will increase. Knowledge plays an important role here, because behaviour based on knowledge tends to last longer, and limited oral health education and promotional media leave children unaware of the need for early treatment [4]. Damanik likewise found that lower oral health knowledge was associated with higher DMF-T scores, including the missing component, because untreated caries eventually ends in extraction [20].

4.3 Filled Component

No filled permanent teeth were found. The researchers assume that this is due to low use of dental services, fear of the filling procedure, and the view that fillings are not important. A filling is a restorative treatment that repairs tooth tissue damaged by caries and restores the tooth's shape and function. It should be done as early as possible, because a small cavity can be filled directly in one visit, whereas a deep lesion requires prior treatment and more visits [21]. Chasanah et al. found that elementary school students had a moderate level of anxiety about dental fillings, driven largely by environmental and social factors [22], which may explain why children leave cavities untreated as long as they are not painful. Hidayati et al. also showed that low use of dental services leaves many carious teeth unfilled [19].

4.4 Overall Decayed, Missing, and Filled Teeth Index

Although the mean DMF-T was in the low category, 65.5% of the students fell under the poor criterion. This shows that the mean alone understates the caries problem at the individual level and that most students need attention. Caries results from the interaction of the host tooth, microorganisms, substrate, and time; when these factors interact long enough, plaque bacteria ferment carbohydrates, especially sugar, into acids that dissolve enamel minerals and form a cavity [21]. At 10–12 years of age, newly erupted permanent teeth are not yet fully mature and are therefore more susceptible, while children also begin to choose their own snacks [21]. The mean DMF-T in this study was higher than the 1.12 reported by Ulum and Hadi among children aged 11–12 years [13] and slightly lower than the 2.3 reported by Warman et al. in the same regency [12]. Together, these findings confirm that caries remains a concern at an age when most permanent teeth have already erupted.

Prevention should focus on daily habits and regular care. Children should brush their teeth twice a day, after breakfast and before going to bed, because saliva flow decreases during sleep and bacteria multiply more easily, and they should rinse their mouths after eating sweet or sticky foods [23]. Dental check-ups every six months allow small cavities to be detected and treated before they become larger. The School Dental Health Programme, together with the community health centre, plays an important role in educating students and increasing their awareness of oral health.

5. CONCLUSIONS

The caries experience among students aged 10–12 years at State Elementary School 18 Sitapung was dominated by untreated decay. The mean decayed, missing, and filled components were 1.89, 0.05, and 0.00, respectively, and the mean DMF-T of 1.95 falls into the low category. However, 65.5% of the students were classified under the poor DMF-T criterion, which shows that most students have caries problems that need attention. Students are advised to have their teeth checked and decayed teeth filled at least every six months, to reduce cariogenic foods, and to brush their teeth at least twice a day, after breakfast and before going to bed. The school and Biaro Community Health Centre are encouraged to strengthen the School Dental Health Programme through more frequent examinations, education, and referral for restorative treatment.

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