

# The Prevalence of Dental Caries Among Students Aged 12-15 Years in Vientiane, Laos

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## ABSTRACT

**The Aim of this Study:** To Describe the prevalence of dental caries among students aged 12–15 years at Sikhay secondary School, Sikhottabong District, and Salakham secondary School, Hatsaifong District, Vientiane Capital.

**Methodology:** This Cross-sectional study descriptive study was conducted over a specific period to examine the knowledge, attitudes, and oral hygiene practices affecting dental caries among students aged 12–15 at Sikhay secondary School, Sikhottabong District, and Salakham secondary, Hatsaifong District, Vientiane Capital. Data were collected using questionnaires and clinical oral health examinations of the entire sample group.

**Results:** The study included a total of 452 students, consisting of 272 students from Sikhay secondary School (157 females (57.7%) and 115 males (42.3%) and 180 students from Salakham secondary School (91 females (50.6%) and 89 males (49.4%). The largest age group was 15 years old (135 students, 29.9%), followed by 14 years old (113 students, 25%), with the 13-year-old group being the smallest (98 students, 21.7%). Regarding clinical oral examination results revealed that students at Sikhay secondary School had a DMFT index of 2.18, while students at Salakham secondary School had a DMFT index of 1.96.

**Conclusion:** The results of this study indicate that students at Sikhay secondary School, Sikhottabong District, and Salakham secondary School, Hatsaifong District, prevent dental caries.

**Keywords:** Prevalence, Dental Caries, Oral Hygiene, Behavior, Laos.

## Introduction

The human oral cavity consists of many organs, such as teeth, tongue, gums, blood vessels, nerves, etc. Each part has different functions, and the human body cannot lack any of them, as every part is essential in daily life. Food must be consumed through the mouth. If not cared for or cleaned correctly, it can lead to various problems, such as dental caries, gingivitis, and periodontal disease.

Most dental caries result from dietary habits, such as consuming sweets, soft drinks, and sugary foods regularly. Most students still lack knowledge in dental care, establishing good oral health habits, and do not receive information about visiting the dentist for oral health checks and appropriate dental treatment for those with oral health problems [1]. Historically, oral health problems have been the most common issue among students, such as dental caries. According to the 2012 oral health survey, 52.3% of the 12-year-old group had molar caries, averaging 1.3 teeth per person. The same 12-year-old group had untreated dental caries in 29.1%, which is considered a significant epidemiological

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group because it is the age group with 28 permanent teeth in the mouth. The incidence of dental caries in this age group is therefore used as a proxy for the incidence of dental caries in adults.

Good oral health care requires changes in dietary behavior. Furthermore, oral diseases can be self-managed if detected early and oral health care behaviors are modified. In the case of early-stage dental caries, it can be treated with fillings. If severe dental caries cannot be treated, tooth extraction may be necessary, which can affect the digestive system.

**Material and Methods**

The study was approved by the Research Ethics committee of University of Health Sciences N.175, 20/ May/2024.

The cross-sectional descriptive study was conducted to investigate the dental caries of students at Sikay secondary School Sikhottabong District, Vientiane Capital and Salakham secondary School Hadxayfong District, Vientiane Capital. June13, 2024– October 15, 2024, and this study aims to investigate the knowledge, attitudes, and practices concerning oral and dental hygiene of students aged 12–15 years at Sikhay Secondary School, Sikhottabong District, and Salakham Secondary School, Hat Yai Fong District, Vientiane Capital. The sample size is calculated using the Cochran’s formula as follows:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where:

n= sample size

n= 1.96

Z=1.96

d=0.05

P=56% (13)

Therefore: calculate in to the formular

$$= \frac{((1.96)^2 \times 0.56(1-0.56))}{(0.05)^2}$$

$$n=378+20\%(\text{data error})=453$$

$$n=453$$

Sample Selection was selected from Sikai secondary School and Salakham secondary School, among student’s grad 1 to grad 4, and used the questionnaire a closed-ended questions format and is divided into four main sections to be administered by the interviewer: General information. The sections include: General Information, Knowledge of Oral Hygiene The secondary variables and their corresponding levels of measurement are described below: General Data Variables; the gender of participant was Female and Male the coding for Analysis: Respondents can choose one of two categories for further analysis: Female = 1, Male=2; Scale: Ratio (as a continuous set of data referring to the respondent’s actual age). Age grouping for Descriptive Analysis: For descriptive questions, the data is grouped into four categories for further analysis: group 1: 12 years, group 2: 13 years, group 3: 14 years, group 4: 15 about Dental Caries; the total number of questions Items was 8 and in each only one correct answer. The scoring answer code by Correct was 1 point, and incorrect answer was 0 points.

**Result**

The population studied in this research were students from Sikai secondary School and Salakham secondary School, who were selected by simple random sampling to study General Information. This study covered 452 secondary school students aged 12–15 years from Sikai secondary School in Sikhottabong District and Salakham secondary School in Hadxayfong District, Vientiane Capital. The collected data regarding gender, age, and grade level are as follows: Data on Gender from all the data collected, the population aged 12–15 years consisted of 452 students from the two schools. The majority were Female, 248 students (54.9%), and Male, 204 students (45.1%). Specifically, Sikai secondary School had 157 female students (57.7%) and 115 male students (42.3%), and Salakham secondary school had 91 female students (50.6%).

**Table 1: Number and Percentage of Students’ Gender at Sikai secondary School and Salakham secondary School**

| Variable | Sikai secondary school |             | Salakham secondary school |             | Total   |             |
|----------|------------------------|-------------|---------------------------|-------------|---------|-------------|
|          | No. (n)                | Percent (%) | No. (n)                   | Percent (%) | No. (n) | Percent (%) |
| Female   | 157                    | 57.7        | 91                        | 50.6        | 248     | 54.9        |
| Male     | 115                    | 42.3        | 89                        | 49.4        | 204     | 45.1        |
| Total    | 272                    | 100         | 180                       | 100         | 452     | 100         |

**Information Regarding Age**

Based on the study results, there was a total of 452 students from both schools, consisting of 272 students from Sikai secondary school and 180 students from Salakham secondary school. The largest age group overall was 15 years old with 135 students (29.9%), followed by the 14-year-old group with 113 students (25%), and the smallest was the 13-year-old group with 98 students (21.7%). At Sikai secondary School, the 15-year-old group had the most students with a total of 89 students (32.7%), followed by the 14-year-old group with 67 students (24.6%), and the 12-year-old group with 57 students (21%). At Salakham secondary school, the 12-year-old group had the most students with a total of 49 students (27.2%), followed by the 14 and 15-year-old groups, each with 46 students (25.6%), and the 13-year-old group with 39 students (21.7%).

**Table 2: Number and Percentage of Students' Ages at Sikai secondary School and Salakham secondary School**

| Variable<br>(Age in years) | Sikai secondary School |             | Salakham secondary School |             | Total   |         |
|----------------------------|------------------------|-------------|---------------------------|-------------|---------|---------|
|                            | No. (n)                | Percent (%) | No. (n)                   | Percent (%) | No. (n) | Percent |
| 12                         | 57                     | 21          | 49                        | 27.2        | 106     | 23.5    |
| 13                         | 59                     | 21.7        | 39                        | 21.7        | 98      | 21.7    |
| 14                         | 67                     | 24.6        | 46                        | 25.6        | 113     | 25      |
| 15                         | 89                     | 32.7        | 46                        | 25.6        | 135     | 29.9    |
| Total                      | 272                    | 100         | 180                       | 100         | 452     | 100     |

**Age Regarding of Dental Caries**

A study of 452 students from two schools revealed that 77 students aged 12 (22.4%) had dental caries. This was followed by 73 students aged 13 (21.2%), 94 students aged 14 (27.3%), and 100 students aged 15 (29.1%) institution at Sikai School, dental caries were found in 40 students aged 12 (18.9%), 46 students aged 13 (21.7%), 57 students aged 14 (26.9%), and 69 students aged 15 (32.5%). Meanwhile, at Salakham secondary School, the affected group consisted of 36 students aged 12 (27.3%), 29 students aged 13 (22%), 35 students aged 14 (26.5%), and 32 students aged 15 (24.2%).

**Table 3: Number and percentage of dental caries prevalence by age among students at Sikai secondary School and Salakham Secondary School**

| Variable                  |          | 12      |             | 13      |             | 14      |             | 15      |             |
|---------------------------|----------|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
|                           |          | No. (n) | Percent (%) | No. (n) | Percent (%) | No. (n) | Percent (%) | No. (n) | Percent (%) |
| Sikai secondary School    | No Carie | 17      | 28.3        | 13      | 21.7        | 10      | 16.7        | 20      | 33.3        |
|                           | Caries   | 40      | 18.9        | 46      | 21.7        | 57      | 26.9        | 69      | 32.5        |
| Salakham secondary School | No Carie | 12      | 25          | 12      | 25          | 9       | 18.8        | 15      | 31.2        |
|                           | caries   | 37      | 28          | 27      | 20.5        | 37      | 28          | 15      | 31.2        |
| Total                     | caries   | 29      | 26.9        | 25      | 23.1        | 19      | 17.6        | 35      | 32.4        |
|                           | No Carie | 77      | 22.4        | 73      | 21.2        | 94      | 27.3        | 100     | 29.1        |

Number and percentage of dental caries prevalence by gender among students at Sigai Secondary School and Salakham Secondary School.

A study of a population of 452 individuals from two schools found that 198 females (57.6%) and 146 males (42.4%) suffered from dental caries. At Sikai Lower Secondary School, 212 students had dental caries, consisting of 129 females (60.8%) and 83 males (39.2%). At Salakham Secondary School, 132 students were affected, consisting of 69 females (52.3%) and 63 males (47.7%). The study indicates that in both schools, the rate of dental caries was higher in females than in male.

**Table 4: Number and percentage of gender in relation to the prevalence of dental caries among students Sikhai secondary School and Salakham secondary School**

| Variable                  | D   |          | M  |          | F  |          | DMFT |          |
|---------------------------|-----|----------|----|----------|----|----------|------|----------|
|                           | N   | N/person | N  | N/person | N  | N/person | N    | N/person |
| Sikai Secondary School    | 535 | 1.97     | 35 | 0.31     | 22 | 0.08     | 592  | 2.18     |
| Salakham Secondary School | 325 | 1.81     | 18 | 0.10     | 9  | 0.05     | 352  | 1.96     |
| Total                     | 860 | 1.90     | 53 | 0.12     | 31 | 0.07     | 944  | 2.09     |

The number and index of Decayed, Missing, and Filling teeth among students Sikhai secondary School and Salakham secondary School.

From a study of a population of 452 individuals across 2 schools, it was found that there were 860 decayed teeth (D = 1.90 teeth/person), 53 missing teeth (M = 0.12 teeth/person), and 31 filled teeth (F = 0.07 teeth/person). The average value for decayed, missing, and filled teeth according to the DMFT index was 2.09 teeth/person.

**Sikhai Secondary School:** The study found 535 decayed teeth (D = 1.97 teeth/person), 35 missing teeth (M = 0.13 teeth/person), and 22 filled teeth (F = 0.08 teeth/person). The DMFT was 2.18 teeth/person.

**Salakham Secondary School:** The study found 325 decayed teeth (D = 1.8 teeth/person), 18 missing teeth (M = 0.10 teeth/person), and 9 filled teeth (F = 0.05 teeth/person). The DMFT was 1.96 teeth/person.

**Table 5: Number and indices of Decayed, Missing, and Filled Teeth (DMFT) of students at Sikhai Secondary School and Salakham Secondary School**

| Variable                  | Female   |             |         |             | Male     |             |         |             |
|---------------------------|----------|-------------|---------|-------------|----------|-------------|---------|-------------|
|                           | No Carie |             | Carie   |             | No Carie |             | Carie   |             |
|                           | No. (n)  | Percent (%) | No. (n) | Percent (%) | No. (n)  | Percent (%) | No. (n) | Percent (%) |
| Sikai secondary School    | 28       | 46.7        | 129     | 60.8        | 32       | 53.3        | 83      | 39.2        |
| Salakham secondary School | 22       | 45.8        | 69      | 52.3        | 26       | 54.2        | 63      | 47.7        |
| Total                     | 50       | 46.3        | 198     | 57.6        | 58       | 53.7        | 146     | 42.4        |

### Oral Hygiene Behaviors and Dental Caries Factors for Sikai and Salakham Secondary School Students

The study on oral hygiene behaviors affecting dental caries among students at Sikai Secondary School revealed the following: Brushing Frequency: 23 students (10.8%) brush once a day, 151 (71.2%) brush twice a day, 37 (17.5%) brush more than twice a day, and 1 student (0.5%) does not brush. Brushing Technique: 94 students (44.3%) use a vertical (up-and-down) stroke, 30 (14.2%) use a scrub/horizontal technique, 82 (38.7%) use a combination technique, and 6 (2.8%) use a circular motion. Fluoride Usage: 178 students (84%\*) use fluoride toothpaste, while 34 (16%) do not. Additional Oral Care: 80 students (37.7%) use mouthwash to clean their mouths, 108 (50.9%) [reported using mouthwash - noted as repeated data], 24 (11.8%) use toothpicks, and 8 (3.8%) do not use any additional tools. Post-Meal Cleaning: 24 students (11.3%) never clean their mouths after eating or drinking, 111 (52.4%) do so occasionally, and 77 (36.3%) do so regularly. Dental Visits (Past Year): 122 students (57.5%) visited a dentist, while 90 (42.5%) did not. Among those who visited, 100 (47.2%) went once, 62 (29.2%) went twice, and 50 (23.6%) went more than twice. At Salakham secondary School Students The survey of oral hygiene behaviors affecting dental caries among students at Salakham Secondary School found the following: Brushing Frequency: 10 students (7.6%) brush once a day, 98 (74.2%) brush twice a day, 24 (18.2%) brush more than twice a day, and 0 students (0%\*) do not brush. Brushing Technique: 65 students (49.2%) brush with a vertical stroke, 11 (8.3%) use a scrub technique, 53 (40.2%) use a combination technique, and 3 (2.3%) use a circular motion. Fluoride Usage: 114 students (86.4%) use fluoride toothpaste, while 18 (13.6%) do not. Additional Oral Care: 35 students (26.5%) use mouthwash for cleaning, 85 (64.4%) [reported using mouthwash], 17 (13.3%) use toothpicks, and 7 (5.3%) do not use any additional tools. Post-Meal Cleaning: 12 students (9.1%) never clean their mouths after eating or drinking, 16 (50%\*) do so occasionally, and 54 (40.9%) do so regularly. Dental Visits (Past Year): 79 students (59.8%) visited a dentist, while 53 (40.2%) never visited. Of those who visited, 36 (27.3%) went once, 58 (43.9%) went twice, and 35 (28.8%) went more than twice.

### Discussion

Based on the study of oral hygiene knowledge at Sikhay Junior High School and Salakham Senior High School, knowledge was categorized into three levels: high, moderate, and low. In this study, it was found that 376 students (83.2%) possessed a high

level of knowledge, 66 students (14.6%) had a moderate level, and 10 students (2.2%) had a low level. This percentage of low knowledge is significantly lower than that found in the study by Smyth E, Caamano F, and Fernandez Riveiro P conducted on 12-year-old children (n=1105), which reported that 68.2% of children had a low level of knowledge [2-14].

Regarding the attitudes of Sikhay Junior High School students, levels were categorized as positive, moderately positive, and poor (weak). The results showed that 409 students (90.5%) had a positive attitude, 41 students (9.1%) had a moderately positive attitude, and 2 students (0.4%) had a poor attitude. This prevalence of positive attitudes is higher than the findings of Smyth, Caamano F, and Fernandez Riveiro P regarding 12-year-old children (n=1105), which found that 77% of children demonstrated a high attitude [14].

regarding the oral hygiene practices of students at Sikhay Junior High School and Salakham Senior High School, the findings were as follows: At Sikhay Junior High, 26 students (9.6%) brushed their teeth once daily, 198 students (72.8%) brushed twice daily, 47 students (17.3%) brushed more than twice daily, and 1 student (0.4%) never brushed. At Salakham Senior High, 12 students (6.7%) brushed once daily, 138 students (76.7%) brushed twice daily, 30 students (16.7%) brushed more than twice daily, and 0 students (0%) reported never brushing. In contrast, a study on the knowledge, attitudes, and behaviors of 1,105 Spanish 12-year-olds by Smyth E, Caamano F, and Fernandez-Riveiro P (2007) reported that, in terms of practice, 26% of the total sample reported brushing their teeth twice a day [14].

The study of dietary consumption habits revealed that at Sikhay Junior High School, 71 students (33.5%) consumed ready-made cakes, and 78 students (36.8%) consumed carbonated soft drinks. At Salakham Senior High School, 61 students (46.2%) consumed ready-made cakes, and 57 students (43.2%) consumed carbonated soft drinks. From the study of knowledge and attitudes.

A 2018 study on the attitudes and behaviors of 11-12-year-old students in Malaysia revealed that 56.3% consumed sweets and 53.8% consumed sugar-sweetened beverages [15].

Clinical oral examinations using dental caries forms showed an average DMFT (Decayed, Missing, and Filled Teeth) index

of 2.09 per person. Specifically, the DMFT index for 272 secondary school students was 2.18, while the index for 180 students at Salakham Secondary School was 1.69. These figures are higher than those found in a 2015 study assessing dental caries levels and oral health Knowledge, Attitudes, and Practices (KAP) among 15-year-old students in Yangon and rural Bago, Myanmar. In that study, the overall DMFT index was 1.24, with urban students (n=217) averaging 1.50 and rural students (n=193) averaging 0.98 [9].

### Conclusion

This cross-sectional study investigated the knowledge, attitudes, and oral hygiene behaviors of 452 students, aged 12–15 years, at Sikhai secondary School and Salakham secondary School during the 2024–2025 academic year. The study utilized questionnaires and clinical oral examinations. The questionnaires covered general information, knowledge, attitudes, and oral hygiene behaviors.

The oral examination results revealed that 344 students from both schools had dental caries, accounting for 76.1%. This indicates a significant prevalence of oral health issues among the students. When categorized by gender, the prevalence was higher in females (198 students, or 57.6%) than in males (146 students, or 42.4%). The age group with the highest prevalence of caries was 15-year-olds (29.1%), while the lowest prevalence was found in the 13-year-old group (21.2%).

Regarding the survey on oral hygiene knowledge, results were categorized into three levels: high, moderate, and low. It was found that 376 students (83.2%) had a high level of knowledge, 66 students (14.6%) had a moderate level, and 10 students (2.2%) had a low level.

The survey on oral hygiene attitudes, results were similarly categorized into three levels: good, moderate, and poor. The findings showed that 409 students (90.5%) had a good attitude, 41 students (9.1%) had a moderate attitude, and 2 students (0.4%) had a poor attitude.

The clinical oral examination revealed that the mean DMFT index (Decayed, Missing, and Filled Teeth) was 2.18 per person for students at Sikhai secondary School and 1.9 per person for students at Salakham secondary School.

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