

## DENTAL PLAQUE INDEX AMONG FOURTH TO SIXTH-GRADE STUDENTS AT SDN 01 NAN SABARIS, PADANG PARIAMAN

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### Abstract

Dental plaque is the primary etiology of dental caries and periodontal disease. National data indicates a significant rise in oral health issues. Objective: This study aims to evaluate the dental plaque index among fourth, fifth, and sixth-grade students at SDN 01 Nan Sabaris, Padang Pariaman Regency, in 2022. Method: A descriptive cross-sectional approach was utilized. The study sample comprised 86 students selected through a total sampling technique. Data collection involved direct clinical examination using the Patient Hygiene Performance (PHP) Index. Data were analyzed using univariate analysis. Results: The distribution of the plaque index showed that 28 students (32.55%) met the good criteria, 39 students (45.34%) fell into the moderate category, and 19 students (22.09%) exhibited poor criteria. No students achieved an excellent plaque index. Conclusion: The majority of elementary school students at SDN 01 Nan Sabaris present with a moderate dental plaque index, highlighting the need for structured dental health promotion and supervised brushing programs.

Keywords: Dental Plaque, PHP Index, Oral Hygiene, Elementary School Students

### 1. INTRODUCTION

Oral health is an integral component of systemic health and overall well-being. Maintaining optimal oral hygiene during childhood is paramount, as this period shapes lifelong health behaviors. Accumulation of dental plaque—a complex biofilm containing pathogenic bacteria—remains the major cause of dental caries and gingival inflammation if left unmanaged.

Globally, oral diseases affect billions of children, with the 10–12 age cohort being an essential monitoring group designated by the World Health Organization (WHO) for caries epidemiology. In Indonesia, the prevalence of dental and oral health issues remains high, reaching 45.3% nationally and 43.9% specifically within West Sumatra, according to Risesdas data.

While the School Dental Health Business (UKGS) program exists in collaboration with local health centers like the Pauh Kambar Health Center, empirical evidence on the precise baseline oral hygiene status of rural students in Padang Pariaman remains scarce. Previous studies in other regions show varying plaque levels in school children, but localized data is vital for tailoring public health interventions. This study addresses this research gap by providing an objective, descriptive baseline of the dental plaque index using the standard Patient Hygiene Performance (PHP) index among upper-grade students at SDN 01 Nan Sabaris. Health is a condition of physical, mental, and social well-being that allows a person to live a productive life. According to WHO, being healthy does not only mean being free from disease, but also includes overall well-being (Eliana & Sri Sumiati, 2016). Therefore, efforts to maintain health are the responsibility of all elements of society to increase awareness, willingness, and ability to live a healthy life in order to achieve optimal health (Ngongo, 2018). One of the health aspects that needs to be considered is dental and oral health because it is an integral part of the overall health of the body (Sherlyta M., et al., 2017).

### 2. METHODOLOGY

#### Study Design and Setting

This descriptive cross-sectional study was conducted in October 2024 at SDN 01 Nan Sabaris, Pauah Kamba Village, Nan Sabaris District, Padang Pariaman Regency.

### Ethical Consideration

Ethical approval was granted by the institutional review board. Prior to data collection, written informed consent was acquired from the school principal and the parents or legal guardians of the participating students.

### Participants and Sampling

The target population included all students enrolled in grades IV, V, and VI. Total sampling was employed, resulting in a final sample size of 86 students.

- **Inclusion Criteria:** Students in grades IV–VI present on the day of the examination with parental consent.
- **Exclusion Criteria:** Students undergoing active orthodontic treatment or presenting with systemic conditions that preclude oral clinical examinations.

### Measurement and Calibration

Clinical examinations were conducted using the Patient Hygiene Performance (PHP) Index method to measure plaque on six index teeth surfaces (maxillary right first molar, maxillary right central incisor, maxillary left first molar, mandibular left first molar, mandibular left central incisor, and mandibular right first molar). Prior to data collection, the researcher and two enumerators underwent a strict calibration process. Inter-examiner reliability was verified, yielding an acceptable Cohen's kappa coefficient of  $>0.80$ .

A disclosing solution was applied to the index teeth surfaces to facilitate plaque identification. Each tooth surface was conceptually divided into five areas: mesial, distal, marginal, central, and incisal/occlusal. A score of 1 was applied for the presence of plaque and 0 for its absence. The cumulative scores were averaged to calculate the final PHP Index, classified into: Excellent (0), Good (0.1–1.7), Moderate (1.8–3.4), and Poor (3.5–5). Data underwent editing, coding, entry, and cleaning before undergoing univariate frequency analysis.

## 3. RESULTS

**Table 3.1** Frequency Distribution of Plaque Index among Students (N=86)

Criteria	Frequency (f)	Percentage (%)
Excellent	0	0.00
Good	28	32.55
Moderate	39	45.34
Poor	19	22.09
<b>Total</b>	<b>86</b>	<b>100.00</b>

Based on Table 1, the largest segment of students presented with a moderate plaque index (45.34%), followed by the good category (32.55%). A notable proportion displayed poor oral hygiene (22.09%), while none of the students achieved an excellent score.

### 3.2 Discussion

The clinical findings indicate that the oral hygiene status among fourth to sixth-grade students at SDN 01 Nan Sabaris is predominantly moderate (45.34%) to poor (22.09%). This clinical pattern signifies a steady accumulation of plaque on tooth surfaces that requires systemic intervention.

These findings align closely with earlier regional studies. For instance, Princess Keloay et al. (2019) reported that the majority of school children at SD GMIM Siloam Tonselama exhibited a moderate category plaque index with a mean score of 2.6. Similarly, Karina (2020) observed predominantly moderate plaque indexes (mean score of 2.8) among students at SD Negeri 040467 Lingga. The consistency across these studies underscores a widespread public health challenge regarding pediatric oral hygiene in public elementary schools.

The presence of moderate and poor plaque indices highlights potential deficiencies in daily oral hygiene practices, such as ineffective brushing techniques or lack of regular post-meal rinsing. Proper removal of dental plaque biofilms is highly dependent on mechanical brushing efficiency. If students rely exclusively on basic horizontal or incorrect movements without thoroughly cleaning all surfaces—including lingual and palatal aspects—plaque will consistently build up, particularly around the cervical thirds of the crowns. Furthermore, a dietary pattern high in fermentable carbohydrates and sticky foods combined with irregular dental visits compounds plaque stagnation.

#### Study Limitations

This study utilized a descriptive cross-sectional design, which limits the ability to establish causal relationships between specific behavioral factors (e.g., exact brushing frequency or diet) and the clinical plaque index. Future research incorporating longitudinal tracking and analytical surveys regarding parental supervision and socioeconomic backgrounds would expand upon these findings.

### 4. CONCLUSIONS

The dental plaque index among upper-grade students at SDN 01 Nan Sabaris is primarily in the moderate category (45.34%), with a substantial proportion categorized as poor (22.09%). This baseline indicates that pediatric mechanical plaque control remains suboptimal.

#### Recommendations

1. **Practical Implications:** The school, via the UKGS program, should collaborate with local community health centers to institute supervised toothbrushing programs using fluoride toothpaste after school lunch breaks.
2. **Future Research:** Analytical studies should be conducted to evaluate the direct correlation between students' dietary habits, parental guidance, and the actual performance of oral health hygiene routines.

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