Volume 3, Issue 6, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

PREVELANCE OF DENTAL CARIES IN 6-8 YEARS OLD CHILDERN IN SWAT REGION

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DOI: https://doi.org/10.5281/zenodo.16881505

Keywords
Prevalence, dental carries, children, Mingora Swat.

Article History
Received: 14 May, 2025
Accepted: 19 July, 2025
Published: 15 August, 2025

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Abstract

Background: *Dental caries, a global health issue caused by carbohydrates and acid-producing microbes, is avoidable and affects quality of life. Its frequency depends on race, culture, socioeconomic status, and environment. Fluoride, nutrition, and brushing are essential for prevention. The study of caries now includes biofilm mediation and biological, behavioral, psychological, and environmental factors.*

Methodology*: This cross-sectional study examined dental caries in 6-8-year-olds in urban and rural Swat, Khyber Pakhtunkhwa, Pakistan, attending primary schools. Yamane's formula with a 5% error margin yielded 384 samples from basic random sampling. SPSS version 27.0.1 was used to analyze caries prevalence and socio-demographic characteristics using descriptive statistics (means, standard deviations, percentages, frequencies) and inferential statistics (chi-square and t-tests).*

Results: *The survey found that 38% of Swat children aged 6-8 had two decaying teeth, 18% had four, and 25.3% were caries-free. Urban children had more caries ($p = 0.039$). Brushing frequency was strongly correlated with caries ($p = 0.001$), with children brushing once daily having more decaying teeth than they did twice. Sugar consumption increased dental caries ($p = 0.024$), with regular consumers having more deteriorated teeth. Middle-income families had the highest caries ($p = 0.023$*

Conclusion(s): *In Swat, 38% of 6-8-year-olds had two decaying teeth and 18% have four, and dental caries is more common in urban and middle-class homes. Infrequent brushing (one a day) and high sugar intake caused deterioration, although gender did not. Based on these findings, recommendations include encouraging daily brushing twice, reducing sugar in the diet, increasing inexpensive dental care, especially in remote regions, and establishing school-based dental health programs to teach good oral hygiene habits.*

INTRODUCTION

Caries is one of the most prevalent diseases in the world and affects almost 90% of schoolchildren and a vast number of adults (1). The condition is preventable, but is a multifaceted disease in which diet, oral hygiene, bacteria and host susceptibility all play key roles (2). Even with the

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

progress of science, dental caries still remains a significant public health problem. It is a major cause of morbidity, leading to over 51 million hours of school absenteeism because of oral health each year (3-5).

Children with disabilities are at an increased risk for various oral health problems, including dental caries (6-8). However, there is a scarcity of studies on the dental health of children with disabilities, especially in low-resource countries such as Rwanda (9). This research aims to address this gap by examining the prevalence and risk factors associated with dental caries in children with disabilities, contributing to a more comprehensive understanding of their oral health needs.

The age of six is crucial in a child's dental development as the first permanent molars begin to erupt. These molars are particularly prone to caries, which can disrupt proper dental function, affecting a child's ability to speak, chew, and interact socially (10-13). Understanding the patterns of dental caries in children at this stage is vital, as the condition can lead to both physical and psychological challenges (14). Despite the preventability of dental caries, its prevalence remains high due to several socio-economic and behavioral factors, including poor dietary habits, lack of access to preventive care, and inadequate oral hygiene practices (15,16).

The chronicity and impact of dental caries on children's health and well-being underscores the need for early intervention (17). Preventive interventions, such as good oral hygiene, dietary habits, fluoride application, and availability of fluoridated water, have been successful in reducing caries risk (18). Nevertheless, in developing countries prevalence of dental caries is still unacceptably high and evolving diet and lifestyle factors have fostered an increase in disease pattern (19).

This survey is intended to assess the prevalence and severity of dental caries and its risk factors in disabled children and provide data for the formulation of specific prevention and treatment programs. We aim to use the knowledge gained from this work to ameliorate oral disease disparities and the impact of dental caries in this vulnerable population.

MATERIAL AND METHOD

STUDY DESIGN

This was a cross-sectional study design and was used to determine the prevalence of dental caries among children aged 6 to 8 going to primary schools situated in both urban and rural parts of the Swat region, Khyber Pakhtunkhwa, Pakistan.

STUDY SETTING

The study was carried out in the Swat District, which has a varied population in both rural and urban areas. To offer comparative perspectives, a number of public and private elementary schools from both urban and rural areas were included.

STUDY POPULATION

Children between the ages of 6 and 8 who were enrolled in elementary schools and madrassas in the Swat region made up the study population.

INCLUSION CRITERIA

Children between the ages of 6 and 8 are enrolled in elementary schools.
On the day of the test, available and wishing to participate.
The informed consent was authorized by the head of the institution.

EXCLUSION CRITERIA

Children receiving dental treatment or with incomplete dentition records.
Children with particular needs, systemic abnormalities, or circumstances influencing oral exams.
Those who don't want to participate.

SAMPLING TECHNIQUE

A simple random sampling technique was used.

SAMPLE SIZE DETERMINATION

The sample size was determined through formula method of the finite population (Yamane, 1967).

$n= N/1+N*e^2$

Where

n= Sample Size

Frontier in Medical & Health Research

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N= Population

e = Chances of error (5%)

Calculation	Sample Size
Population Size (N)	5000
n=5000/1+5000*(.0025)	384
Calculated Sample Size	384

DATA COLLECTION TOOLS AND MATERIALS

The following tools were used for clinical examination:

Mouth mirror, Dental probe, Tweezers, Disposable gloves, Handheld torch/flashlight, Face masks and hand sanitizer (for hygiene).

All tools were sterilized or disposable to maintain infection control.

DATA COLLECTION PROCEDURE

To gather information for this study, a pre-tested, validated, and structured questionnaire was used to assess oral health practices and awareness in the rural and urban communities of Mingora, Swat. To make sure it was clear, dependable, and culturally relevant, the questionnaire was pilot tested prior to the primary data collection. To accommodate participants with varying literacy levels, the questionnaire was administered in-person by data collectors. Using this approach, precise and thorough data about participants' prevalence of dental caries in 6-8 years age children. All participants gave their informed consent. The gathered information was anonymized and safely stored to protect privacy and confidentiality.

This study's main data collection tool was a structured questionnaire that was specifically created to gather comprehensive data on prevalence of dental caries in children living in rural and urban area of Mingora, Swat. To enable both quantitative analysis and qualitative insights, the questionnaire contained both closed-ended and open-ended questions.

DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS) version 27.0.1 was used to analyze and enter all of the questionnaire responses after data collection. Analyze one. Before running statistical tests, the data were cleaned and verified to be consistent and complete. To summarize the participants' prevalence of dental caries in 6-8 years children, descriptive statistics were computed, including means, standard deviations, percentages, and frequencies. To assess relationships between prevalence of caries and socio-demographic factors like age, gender, education, and socioeconomic status, inferential statistics such as chi-square and t-tests were employed.

RESULTS

This chapter encompasses all the outcomes obtained regarding the prevalence of dental caries among Children aged 06 to 08 years in swat region after establishing various results during analysis process. It draws on research of socio-demographic variables, oral hygiene practices, and dietary habits.

Table 1: Descriptive Statistics.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	384	1.00	3.00	1.8594	.80534
Gender	384	1.00	2.00	1.5495	.49819
Decayed	384	1.00	6.00	2.9531	1.50816
Missed	384	1.00	4.00	3.4219	1.13531
Filled	383	4.00	4.00	4.0000	.00000

Frontier in Medical & Health Research

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Socioeconomic status	384	1.00	3.00	1.2734	.60089
Brushing	384	1.00	4.00	1.9583	1.19325
Sugar consumption	384	1.00	4.00	2.2760	1.35456
Location	384	1.00	2.00	1.2969	.45748
Dental visit	384	1.00	3.00	1.8073	.80426
Valid N (list wise)	383				

Age: This represents the children's age range. The levels are 1 (6 years), 2 (7 years), and 3 (8 years). About 7 years old on average, the children have a median age of 1.86.

Gender: Numbers indicating gender are used (1 for male, 2 for female). The mean of the sample 1.55 suggests that there are slightly more boys than girls.

Number of teeth with caries: Tooth-affected: It ranges from 1-6 and counts the number of decayed teeth. Children in this sample have on average almost three teeth decayed, mean value 2.95.

Missed (teeth) - This shows a count of teeth missed or lost due to decay. A significant percentage of children have more than one missing tooth as shown by the mean of 3.42.

Teeth filled: The number of filled teeth is the same for all the children with a constant mean value of 4.00 for all the children.

Socioeconomic status: These are marked 1 (low), 2 (middle), 3 (high) and reflect the wealth of children. Most of the children are from low- to middle-income family, with a mean of 1.27.

Brushing: How frequently a person brushes is rated on a scale of 1 (once daily) to 4 (rarely). The average value of 1.96 means most kids brush their teeth once or twice a day.

Sugar: This is the frequency of eating sugary foods on a scale of 1 for "Never" to 4 for "Frequently". The mean of 2.28 represents a moderate number of sweet foods consumed.

Location: whether children reside in rural (2) versus urban (1) location. The children are mostly urban children (mean=1.30).

Dental visit: These variables assess the child's dental visit Yes=1, no=2, not sure=3. The mean (average) is

1.81 which means from the mean the majority of kids have been to the dentist.

Table 2: Affected Teeth by Cavities Frequency Distribution.

		Frequency	Percent	Cumulative Percent
Valid	0.00	97	25.3	25.3
	1.00	34	8.9	34.1
	2.00	146	38.0	72.1
	3.00	21	5.5	77.6
	4.00	69	18.0	95.6
	5.00	17	4.4	100.0
	Total	384	100.0	

The frequency distribution of the quantity of Affected Teeth by cavities is displayed in this table 2. A smaller percentage of children (4.4%) had five decayed teeth, whereas the largest group (38%) had two. In some instances, the fact that a quarter of the kids (25.3%) had no decayed teeth may suggest that they practiced reasonably good oral hygiene. The severity of dental caries is shown in the table, where many children have several decayed teeth.

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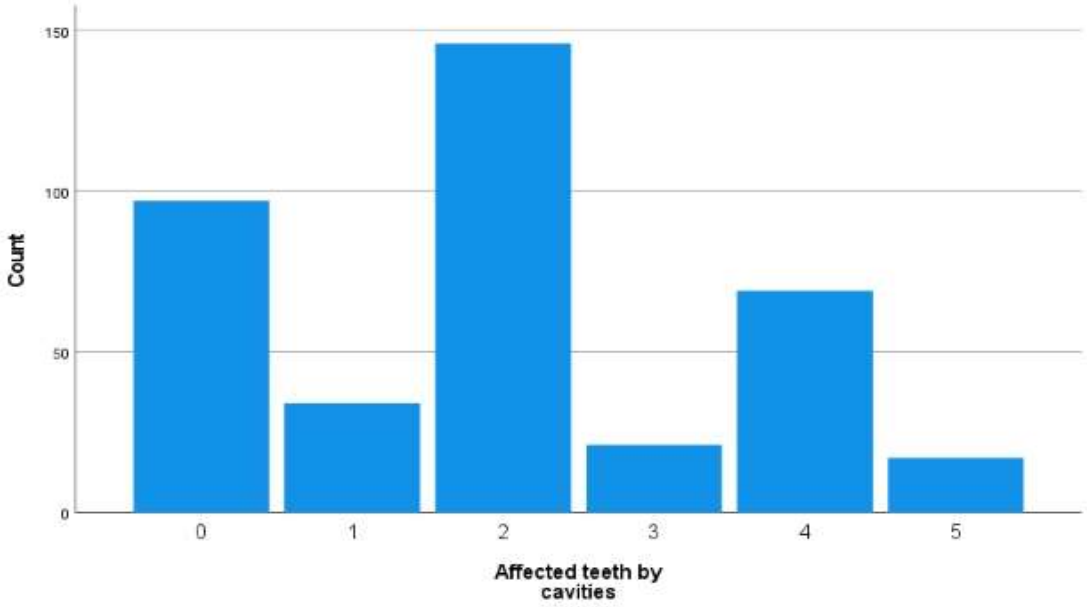
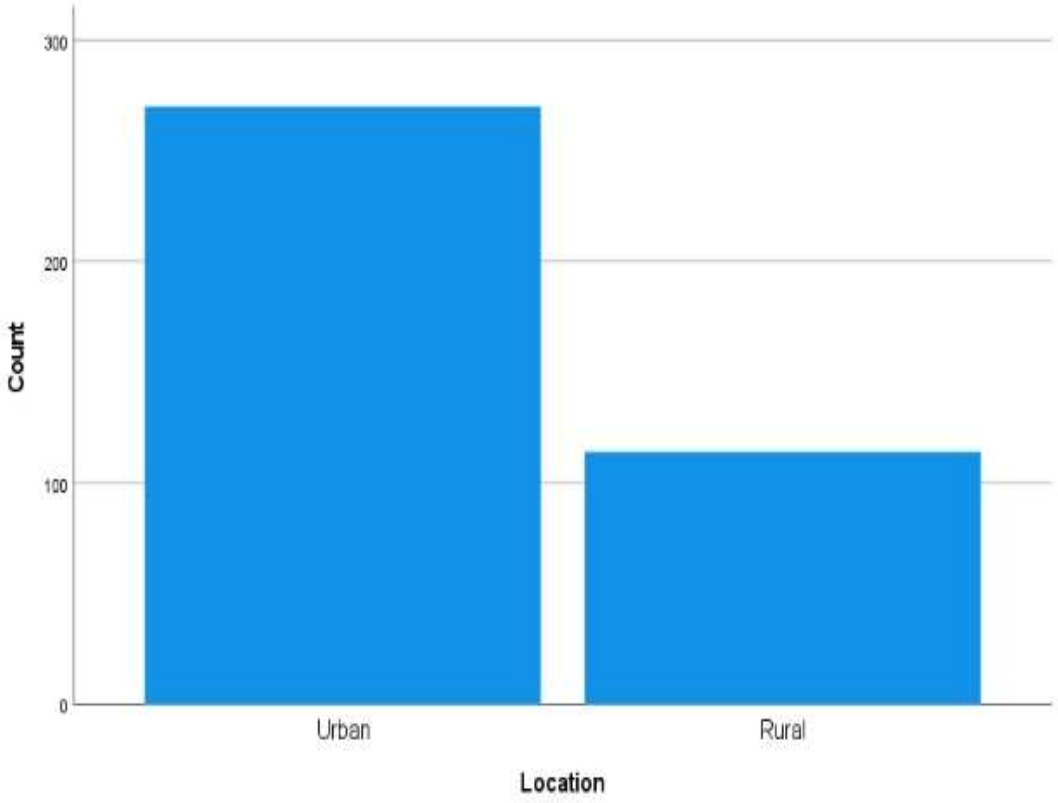


Graph 1 Affected teeth by cavities distribution.



Graph 2: Location distribution of Urban and Rural.

Volume 3, Issue 6, 2025

Frontier in Medical & Health Research

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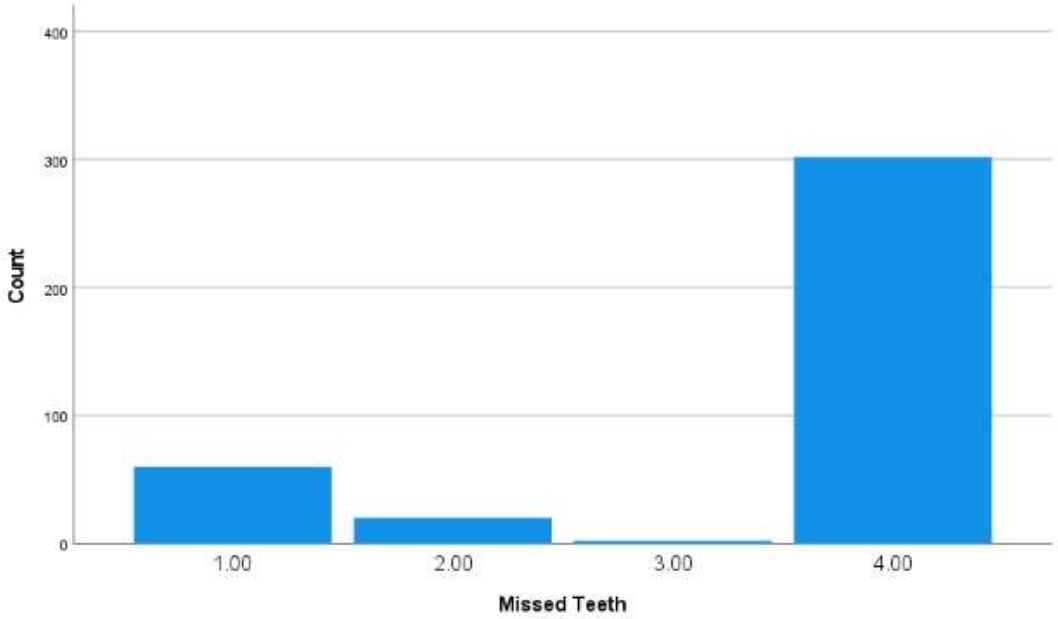

Graph 3: Missed Teeth distribution.

Table 3: Cross tabulation of Location vs. Affected Teeth by Cavities.

Location * Affected Teeth by cavities Cross tabulation								
Count								
		Affected teeth by cavities						Total
		0.00	1.00	2.00	3.00	4.00	5.00	
Location	Urban	63	25	107	17	48	10	270
	Rural	34	9	39	4	21	7	114
Total		97	34	146	21	69	17	384

Table 4: Chi square test result of the location * affected teeth by cavities.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.357[a]	5	.039
Likelihood Ratio	4.371	5	.047
Linear-by-Linear Association	.119	1	.730
N of Valid Cases	384		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.05.			

Chi-square test findings Pearson Chi square= 4.357, p=0.039

This table 3 describes number of Affected Teeth by cavities in both urban and rural area. There are more decayed teeth on urban children than on rural children. The Chi-Square test (p = 0.039) shows significant difference between urban and rural children in relation to the number of decayed teeth, indicating that urban children are more likely

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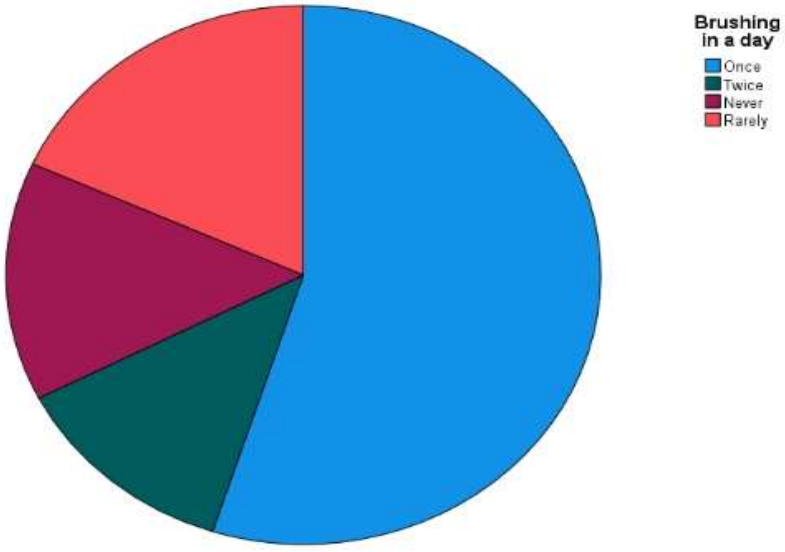

Graph 4: Pie chart of Brushing in a day.

Table 5: Cross tabulation of Brushing Frequency vs. Affected Teeth by Cavities.

Brushing in a day * Affected Teeth by cavities Cross tabulation								
Count								
		Affected teeth by cavities						
		0.00	1.00	2.00	3.00	4.00	5.00	Total
Brushing	Once	42	19	90	17	38	5	211
	Twice	10	6	25	2	3	2	48
	Never	18	6	18	0	10	3	55
	Rarely	27	3	13	2	18	7	70
Total		97	34	146	21	69	17	384

Table 6: Chi square test of brushing in a day * Affected Teeth by cavities

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	42.276[a]	15	.001
Likelihood Ratio	46.280	15	.001
Linear-by-Linear Association	.175	1	.675
N of Valid Cases	384		
a. 8 cells (33.3%) have expected count less than 5. The minimum expected count is 2.13.			

Results of Chi-Square test: Pearson Chi-Square = 42.276, p = 0.001.

The table 6 reflects relationship of frequency of brush and decayed teeth. Children who brush never or rarely have a significantly greater number of Affected Teeth by cavities when compared to children who brush twice a day or infrequently. The results of the Chi-Square test (p = 0.001) support that a significant association exists between the frequency of tooth brushing and the rate of dental caries.

Frontier in Medical & Health Research

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Graph4.8: Bar Chart of Sugar consumption

Table 7: Cross tabulation of Sugar Consumption vs. Affected Teeth by Cavities

Sugar Consumption * Affected Teeth by cavities Crosstabulation								
Count								
		Affected Teeth by cavities						Total
		0.00	1.00	2.00	3.00	4.00	5.00	
Sugar consumption	Frequently	49	14	58	14	33	9	177
	Occasionally	17	2	24	1	13	3	60
	Never	1	2	6	0	1	1	11
	Rarely	30	16	58	6	22	4	136
Total		97	34	146	21	69	17	384

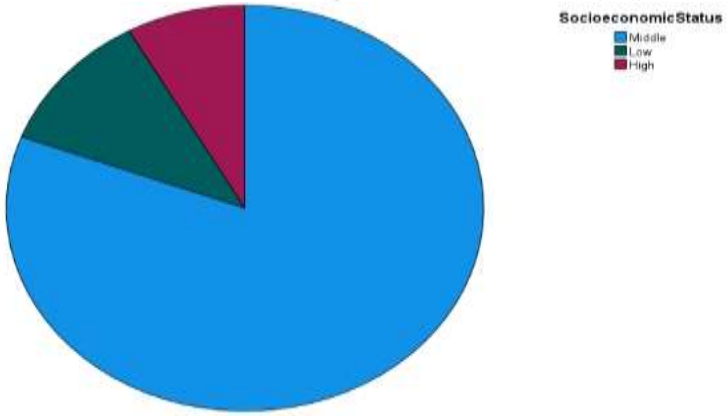
Table 8: Chi square tests of Sugar Consumption * Affected Teeth by cavities Crosstabulation

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.911[a]	15	.024
Likelihood Ratio	18.536	15	.036
Linear-by-Linear Association	.181	1	.670
N of Valid Cases	384		
a. 8 cells (33.3%) have expected count less than 5. The minimum expected count is .49.			

Results of Chi-Square Test: Pearson Chi-Square = 16.911, p = 0.024.

This table 8 presents the correlation between sugar intake and the number of Affected Teeth by cavities. Children who are frequent sugary foods eaters suffer significantly more from caries compared to low consumers. A statistically significant association between sugar intake and caries is confirmed by the Chi-Square test (p=0.024)

Investigation of the Prevalence of Dental Caries Impacted by Socio Demographic Characteristics.



Graph 5 Pie Chart of Socioeconomic status

Table 9: Socioeconomic Status vs. Affected Teeth by Cavities.

Socioeconomic status * Affected teeth by cavities Crosstabulation

Frontier in Medical & Health Research

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Count								
		Affected teeth by cavities						
		0.00	1.00	2.00	3.00	4.00	5.00	Total
Socioeconomic status	Middle	82	28	119	18	52	11	310
	Low	9	5	13	2	12	2	43
	High	6	1	14	1	5	4	31
Total		97	34	146	21	69	17	384

Table 10: Chi square test of Socioeconomic Status vs. Affected Teeth by Cavities

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.175[a]	10	.023
Likelihood Ratio	10.611	10	.038
Linear-by-Linear Association	3.658	1	.056
N of Valid Cases	384		
a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is 1.37.			

Chi-Square Test Results: Pearson Chi-Square = 12.175, p =.023.

This table 10 presents the vector geometry of Affected Teeth by cavities and their relation to SES. Number of decayed teeth were highest among children in the middle socio-economic status followed by those in the low and high economic group. The prevalence of caries exhibited a significant association with SES (p = 0.023) as observed in the Chi-Square test. This indicates that the dental caries prevalence of the children from middle income family (slightly) were much higher than the children from low or high-income family.

DISCUSSION

This study aimed to evaluate dental caries prevalence in 6–8-year-old Swat Valley children based on socio-demographic characteristics, oral hygiene behaviors, and food. This project will increase children's oral health by enhancing understanding of factors contributing to dental caries. A significant number of children in Swat are impacted by dental caries, according to the study. 38% of children had 2 decayed teeth, while 18% had 4 impacted teeth, indicating a high prevalence of dental caries in the population. Dental caries remains a frequent childhood disease globally, particularly in underdeveloped countries, due to inadequate dental care. Interestingly, 25.3% of youngsters in the region were caries-free, suggesting high oral hygiene. However, the significant number of youngsters with untreated decaying teeth highlights the importance of oral hygiene and preventive measures including regular dental appointments and reducing sugar intake. Significant (p = 0.023) correlation between SES and dental caries shows that middle-income children are more likely to have caries than low or high-income children. Though contradictory, children from low-income homes are more susceptible to dental caries due to limited access to dentists. Children from middle-income homes may consume more processed meals and sugary drinks, which may contribute to dental caries. Lack of education on oral hygiene and dental health may contribute to a higher occurrence of

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ISSN: (e) 3007-1607 (p) 3007-1593

caries in this relationship.

Urban children had a higher frequency of dental caries than their rural counterparts. A significant difference (p = 0.039) suggests urban youngsters may have more access to sugary snacks and less good eating habits. Urban locations have increased access to processed food, which may contribute to higher rates of caries. The study found a remarkable association between brushing frequency and caries prevalence. Children who brushed once a day had more decaying teeth than those who brushed twice daily. This connection was substantial (p=0.001). At least clean teeth in the afternoon and night to avoid dental caries. The main causes of caries are poor brushing habits and poor dental hygiene. Increasing teeth brushing frequency to twice daily may significantly reduce dental cavities in the Swat valley population. Diet, particularly sugar intake, significantly correlated with dental caries. Patients who consume more sugary meals have a higher risk of tooth decay. A Chi-square test (P = 0.024) indicates that dietary habits, particularly sugar consumption, contribute to dental caries development. Consuming sweets, particularly between meals, promotes plaque buildup on teeth. Reducing sugar consumption, especially among children, would considerably reduce dental caries incidence. In this study, there was no significant correlation between child sex and dental caries prevalence. The chi-square test (p = 0.265) revealed no significant difference in decaying teeth between male and female children. Gender does not impact dental caries risk in our sample, with both girls and boys equally affected.

Conclusion: The purpose of this study was to determine the factors that contribute to dental decay and to find out how common dental caries is in children in the Swat region between the ages of 6 and 8. Nearly 38% of children in the Swat region have two decayed teeth, and 18% have four. This indicates that a sizable portion of children in the region suffer from dental caries**.** Dental caries was most common in children from middle-class families. Additionally, compared to children in rural areas, children in urban areas had a higher incidence of dental cavities**.** Dental caries and brushing frequency are strongly correlated. Compare to children who brushed twice a day, children who brushed once a day had more decayed teeth**.** Dental caries was substantially linked to high sugar intake, indicating that dietary practices are a key factor **in the development of tooth decay.**

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