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Frequency and Risk Indicators of Dental Caries in Schoolchildren of Rawalakot, Azad Jammu and Kashmir

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ABSTRACT

Objective: The study evaluated the frequency of dental caries and their risk indicators among schoolchildren elevated and living in areas of low fluoridated. These indicators included socioeconomic status, toothbrushing habits, sweets consumption, pattern of dental visits, and salivary mutans streptococci levels (assessed only in 12-year-olds).

Materials and Methods: This community survey was conducted in schoolchildren of Rawalakot, Azad Jammu and Kashmir (AJK). The study children included a random sample of three age groups: 6 years (n=450), 12 years (n=230), and 15 years (n=180) from randomly selected schools in Rawalakot, AJK. For the study conducted between February and May 2023. The dmft (decayed, missing, and filled primary teeth) and DMFT (decayed, missing, and filled permanent teeth) and decay-missing-filled surfaces (dmfs/DMFS) indices were employed to document the frequency of caries.

Results: In 6-year-olds, the caries-free frequency in primary dentition was 58%. The dmft and dmfs mean was 1.9 and 3.7 respectively, while the score of DMFT and DMFS was 0.5. Nearly 90% of dmft score was due to active decay. Children with lower socioeconomic status had significant high dmft and dmfs scores, as well as a greater proportion of individuals with a combined dmft + DMFT score of ≥ 1. Among 12-year-olds, 55% had caries history, with mean DMFT and DMFS scores of 1.5 and 2.2, respectively. The filled component constituted the majority of scores. Children were mostly caries-free and had lower DMFT, DMFS, and DT scores if they regularly visited dentist for routine checkups, had higher socioeconomic status (although this not being associated to DMFT), frequently less consumed sweets, and had lower levels of streptococcus mutans. Among 15-year-olds, 70% had a history of caries, with mean of 1.7 DMFT and 3.5 DMFS scores, and a high frequency of the filled teeth (FT).

Conclusion: Children who regularly visited dentist for routine checkups had significant low caries experience, as well as low DMFT, DMFS, and DT scores, compared to those who attended irregularly. Additionally, children from lower socioeconomic backgrounds mostly have high DMFS scores.

Keywords: Child, Dental Caries, Streptococcus Mutans

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INTRODUCTION

Recent epidemiological data show a significant decrease in caries prevalence among children in many developed countries.[1] Numerous cariologists have sought to understand the reasons behind this decline in caries prevalence. The most significant and likely reason identified is the increased use of fluoride toothpaste.[2] In contrast, several factors have been suggested as responsible for the development of dental caries, including oral hygiene practices, sugar consumption, and characteristics of saliva.[3]

In Pakistan, there has been a growing interest in community dentistry in recent years.[4] Many epidemiological studies have been conducted to assess the oral health and intervention needs of special groups.[5] However, there is limited specific information available regarding the representative child and adolescent population. In a study of children ages 6–12-year-olds, 74% were found to have caries, with a mean dft score of 2.29.[6] In a survey of 12-year-olds, caries prevalence was 55%, with a DMFT of 1.87.[7] Among 3 to 15-year-olds who used low fluoride, the prevalence was 69% with a DMFT of 2.76.[8]

This study aimed to report the results of a survey on the dental caries experience and potential risk indicators among schoolchildren of Rawalakot, AJK.

MATERIALS AND METHODS

This community survey was conducted in schoolchildren of Rawalakot, AJK. Inclusion criteria was school children of either gender aged between 6 and 15 years. Children with physical and mental retardation, and chronic illness were excluded from the study.

A non-probability stratified sampling of three age groups: 6 years (n=500), 12 years (n=250), and 15 years (n=200), both genders from randomly selected schools in Rawalakot, AJK. WHO sample size calculator was employed with the following parameters; 95% confidence interval, alpha type I error 5%, and prevalence of dental caries was 70%.[8] For the study conducted between February and May 2023, the schools informed and invited the parents of children to participate in the study.

The dental examinations were performed at the school using portable equipment by a single examiner, with the subjects seated on a chair in a room. The examiner underwent training and calibration. Examination of caries using a sterilized mirror and probe, without the use of radiographs. The dmft (decayed, missing, and filled primary teeth) and DMFT (decayed, missing, and filled permanent teeth) and decay-missing-filled surfaces (dmfs/DMFS) indices were employed to document the frequency of caries. The number of natural teeth was clinically recorded based on WHO criteria.[9]

All 12 and 15-year-old children completed a pretested, structured questionnaire before the dental examination, supervised by the same examiner. For 6-year-olds, parents/guardians completed the questionnaire on their behalf. The questionnaire covered sociodemographic information, sweet consumption, frequency of oral hygiene practices, fluoride use, and dental service utilization. The sociodemographic details included gender, age, the child's residential status, and the employment status of parent(s) or guardian(s).

The concentration of streptococci mutans in saliva was assessed using the 'spatula method' only in 12-year-olds. Following two minutes stimulation of saliva secretion, a sterile wooden spatula was rotated in the subject's mouth. Excess saliva was removed by withdrawing the spatula through closed lips. Both sides of the spatula were pressed onto selective MSB agar (Mitis Salivarius agar supplemented with sucrose and bacitracin), which was poured into RODAC plates. Colony counts showing typical mutans streptococci morphology were conducted per 1.5 cm^2 after 48 hours of anaerobic incubation.[10]

Stepwise multiple linear regression and multiple logistic regression analyses were conducted on the 12- and 15-year-olds children to determine the variables influencing dental caries outcomes such as caries-free status, DMFT, DMFS, and DT. For 6-year-olds, the analyses focused on caries-free status, dmft, and dmfs.

The variable salivary streptococcus mutans was included in all models for the 12-year-old children. The outcome "caries free status" was divided into two categories: "caries free" (dmft + DMFT = 0) and "caries" (dmft + DMFT ≥ 1). Data regarding the deciduous dentition were excluded from the 12-year-old group. Adjusted odds ratio (OR) with 95% confidence interval (CI) was computed. The data were analyzed using SPSS v 23.

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RESULTS

A few children from the original sample did not participate in the study, resulting in a final sample of (n=450) for 6-year-olds, (n=230) for 12-year-olds, and (n=180) for 15-year-olds, corresponding to response rate was respectively 90%, 92%, and 90%. The study sample was born, raised, and currently living area with low water fluoridation. Nearly all children use fluoridated toothpaste (99%).

Since no significant difference in caries frequency by gender, results are presented in a combined form. Table 1 displays the caries experience in deciduous dentition based on various explanatory variables in children of 6-year-olds. Frequency of children without caries in their primary dentition was 58%; overall mean dmft and dmfs were respectively 1.9±1.1 and 3.7±2.1, and both the mean DMFT and DMFS were 0.5±0.2. The distribution of the different components of the dmft indicated that nearly 90% of the score was due to active decay observed during the examination. The dental health status was significantly associated with the parents' occupation, as children from low socioeconomic backgrounds had higher dmfs values ($p = 0.035$) and a higher proportion of caries (dmft + DMFT ≥ 1) (OR: 1.62, 95% CI: 1.2–1.88, $p = 0.003$).

Table No 1: Caries experience in 6-year-old children, n=450

		f	%	Caries free %	DMFT	DT	MT	FT	DMFS	DS	MS	FS
Gender	**Male**	216	48.0	64.8	1.4	1.1	0.2	0.3	1.8	2.1	0.1	0.3
	Female	234	52.0	65.0	1.2	1.0	0.2	0.3	2.1	2.5	0.2	0.3
Parents employment status	**High profession**	70	15.6	70.0	1.2	1.1	0.2	0.1	2.8	2.3	0.2	0.3
	Lower profession	195	43.3	55.4	1.9	1.6	0.2	0.1	3.8	3.2	0.1	0.3
	Cleric	23	5.1	34.8	2.1	2.0	0.2	0.1	3.5	3.2	0.2	0.1
	Commercial job	113	25.1	45.1	2.3	2.1	0.2	0.2	4.8	4.4	0.1	0.1
	Farmers	49	10.9	44.9	1.9	1.8	0.2	0.2	4.2	3.6	0.4	0.2
Toothbrushing habits	**< Once a day**	113	25.1	49.6	2.1	1.9	0.2	0.2	4.4	4.2	0.2	0.2
	Once a day	162	36	43.2	2.2	2.0	0.2	0.2	4.3	3.7	0.3	0.1
	> Once a day	175	38.9	53.1	1.8	1.5	0.2	0.1	3.6	3.9	0.1	0.4
Dental visits	**Never**	315	70.0	44.8	2.2	2.0	0.2	0.2	4.5	4.0	0.2	0.1
	Routine checkup	135	30.0	56.3	1.6	1.3	0.2	0.1	3.0	2.4	0.1	0.3
Sweets consumption	**Never**	158	35.1	53.2	1.9	1.7	0.2	0.2	4.2	4.0	0.2	0.1
	< Once a day	207	46.0	49.3	1.9	1.6	0.2	0.1	3.3	2.8	0.1	0.2
	Each day	54	12.0	48.2	1.9	1.6	0.2	0.1	3.5	3.0	0.2	0.3
	> Once a day	31	6.9	29.0	2.6	2.2	0.1	0.2	4.6	4.0	1.2	0.2

Table 2 displays the caries experience based on various explanatory variables in 12-year-old children. Nearly all children had detectable levels of salivary mutans streptococci (98%). Over half (55%) had caries history (DMFT ≥ 1). Mean DMFT was 1.5±1.2 and DMFS was 2.2±1.3, with filled teeth accounting for the majority. Children were mostly caries-free and had lower DMFT, DMFS, and DT scores if they regularly visited dentist for routine checkups, had a high socioeconomic status (although this not being associated to DMFT), frequently less consumed sweets, and had lower levels of salivary mutans streptococci (Table 4).

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Table No 2: Caries Experience in 12-Year-Old Children, N=230

		f	%	Caries free %	DMFT	DT	MT	FT	DMFS	DS	MS	FS
Gender	Male	112	48.7	65.2	1.2	1.3	0.2	0.1	1.2	1.4	0.2	**0.4**
	Female	118	51.3	70.3	1.1	1.2	0.1	0.1	1.7	1.6	0.3	**0.2**
Parents employment status	High profession	65	28.3	60.0	1.1	0.2	0.2	0.5	1.9	0.4	0.4	**0.5**
	Lower profession	92	40.0	44.6	1.5	0.4	0.2	0.9	2.4	0.6	0.3	**1.2**
	Cleric	10	4.3	40.0	1.3	1.0	0	0.2	1.8	1.4	0	**0.3**
	Commercial job	23	10.0	56.5	1.3	0.3	0	0.9	1.8	0.6	0	**1.1**
	Farmers	40	17.4	40.0	1.8	0.9	0.2	0.7	2.4	1.9	0.2	**1.2**
Toothbrushing habits	< Once a day	23	10.0	56.5	1.2	0.4	0	0.5	2.2	1.2	0	**1.1**
	Once a day	46	20.0	45.7	1.7	0.7	0.2	0.8	1.8	1.4	0.1	**1.1**
	> Once a day	161	70.0	50.0	1.4	0.4	0.2	0.8	1.4	0.8	0.3	**1.1**
Dental visits	Never	127	55.2	44.9	1.6	0.6	0.2	0.8	1.7	1.1	0.3	**1.1**
	Routine checkup	103	44.8	60.2	1.3	0.3	0.2	0.8	1.9	0.7	0.2	**1.2**
Sweets consumption	Never	23	10.0	60.9	1.3	0.2	0.2	0.9	1.9	0.6	0.1	**1.2**
	< Once a day	138	60.0	59.4	1.1	0.3	0.2	0.6	1.8	0.6	0.1	**1.1**
	Each day	35	15.2	40.0	1.7	0.7	0.2	0.8	2.9	1.5	0.2	**1.2**
	> Once a day	34	14.8	38.2	2.3	0.8	0.1	1.2	3.9	1.5	0.6	**1.7**
Streptococci mutans saliva	1 – 30	81	35.2	65.4	0.8	0.2	0.2	0.4	1.2	0.5	0.2	**0.5**
	31 – 60	104	45.2	50.0	1.4	0.3	0.2	0.9	2.2	0.7	0.1	**1.2**
	61 – 100	23	10.0	30.4	2.1	1.2	0	1.2	3.5	2.2	0	**1.5**
	> 100	22	9.6	31.8	2.5	1.5	0.2	1.1	3.5	2.8	0.2	**1.5**

Table 3 presents the caries experience based on various explanatory variables in 15-year-old children. Over two-thirds (70%) had caries history (DMFT ≥ 1). Mean DMFT and DMFS was 1.7±1.8 and 3.5±4.7, respectively, with the filled teeth (FT) comprising 75% of the total. The regression analysis results indicated that children without caries experience and with lower DMFT, DMFS, and DT scores were more likely to visit a dentist for routine checkups than those who only sought dental care when experiencing pain or discomfort. Additionally, children from low socioeconomic backgrounds were mostly have high DMFS scores (Table 4 & 5).

Table No 3: Caries Experience in 15-Year-Old Children, N=180

		f	%	Caries free %	DMFT	DT	MT	FT	DMFS	DS	MS	FS
Gender	Male	86	47.8	69.8	1.3	1.0	0.1	0.2	1.5	1.8	0	0.1
	Female	94	52.2	75.5	1.1	0.9	0.1	0.2	1.9	1.4	0.1	0.1
Parents employment status	High profession	72	40.0	37.5	1.7	0.5	0.2	1.9	3.3	0.9	0.5	1.7
	Lower profession	75	41.7	36.0	1.3	0.5	0.2	1.5	3.1	0.9	0.5	1.5
	Cleric	6	3.3	16.7	2.4	0.5	0.2	1.7	6.2	1.4	0.4	4.2
	Commercial job	16	8.9	31.3	2.0	0.6	0.1	1.1	4.6	1.4	0.7	2.3
	Farmers	11	6.1	27.3	2.5	0.9	0.2	1.2	5.8	1.7	1.6	2.3

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Toothbrushing habits	< Once a day	2	1.1	50.0	0.9	0.9	0	0	0.9	0.9	0	0
	Once a day	27	15.0	33.3	2.1	0.6	0.2	1.3	3.8	0.8	0.4	2.4
	> Once a day	151	83.9	35.1	1.7	0.5	0.1	1.1	3.7	0.9	0.7	1.8
Dental visits	Never	82	45.6	30.5	2.1	0.7	0.1	1.1	4.6	1.4	0.8	2.2
	Routine checkup	98	54.4	40.8	1.4	0.4	0.2	1.8	3.0	0.7	0.6	1.5
Sweets consumption	Never	27	15.0	40.7	1.2	0.4	0	1.7	2.1	0.7	0.2	1.8
	< Once a day	109	60.5	31.2	2.1	0.5	0.1	1.1	4.1	0.9	0.8	2.1
	Each day	19	10.6	36.8	1.2	0.5	0.1	1.4	2.8	0.8	0.7	1.1
	> Once a day	25	13.9	32.0	2.1	0.6	0.1	1.2	4.3	1.2	0.8	2.1

Table No 4: Logistic and Linear Regressions to Estimate the Association of Caries with Potential Risk Factors in 12-Year-Old Children, N=230

Caries-free status	**OR**	**SE**	**95% CI**	**p value**
Toothbrushing habits	1.1	0.1	0.8 – 1.7	.814
Dental visits	0.6	0.2	0.3 – 0.9	.002
Sweet consumption	1.28	0.2	1.1 – 1.9	.022
Streptococci mutans	1.8	0.3	1.4 – 2.3	.0001
Parent's employment	1.4	0.2	1.1 – 1.8	.011
Fluoride supplement	1.2	0.3	0.8 – 1.7	.594
DMFT	Coefficient	SE	t	p value
Dental visits	0.5	0.3	- 1.1	.031
Sweet consumption	0.4	0.2	4.3	.001
Streptococci mutans	0.7	0.2	6.1	.0001
Parent's employment	0.3	0.2	2.9	.072
Fluoride supplement	0.3	0.2	2.2	.384
Constant	0.1			
DMFS				
Dental visits	0.9	0.4	- 3.2	.041
Sweet consumption	0.7	0.3	4.5	.001
Streptococci mutans	2.1	0.2	6.5	.0001
Parent's employment	0.4	0.2	3.6	.023
Fluoride supplement	0.6	0.3	2.8	.094
Constant	1.1			
DT				
Dental visits	0.3	0.2	- 3.1	.043
Sweet consumption	0.3	0.1	3.0	.004
Streptococci mutans	0.4	0.1	7.1	.0001
Parent's employment	0.2	0.1	4.7	.0001
Constant	0.5			

Table No 5: Logistic and Linear Regressions to Estimate the Association of Caries with Potential Risk Factors in 15-Year-Old Children, N=180

Caries-free status	**OR**	**SE**	**95% CI**	**p value**
Toothbrushing habits	1.0	0.3	0.6 – 2.8	1.00
Dental visits	0.7	0.2	0.5 – 1.0	.041
Sweet consumption	2.1	0.2	0.9 – 2.4	.852
Parent's employment	2.3	0.2	1.0 – 2.5	.111
Fluoride supplement	2.2	0.3	0.8 – 2.9	.551
DMFT	Coefficient	SE	t	p value
Dental visits	0.7	0.3	- 1.2	.032
Sweet consumption	0.2	0.2	0.8	.571

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Parent's employment	0.2	0.2	2.5	.272
Constant	3.7			
DMFS				
Dental visits	0.5	0.6	- 3.6	.023
Sweet consumption	0.5	0.4	2.5	.271
Parent's employment	0.8	0.3	3.7	.011
Constant	4.7			
DT				
Dental visits	0.3	0.2	- 3.5	.027
Sweet consumption	0.1	0.1	0.8	.571
Parent's employment	0.1	0.1	1.0	.442
Fluoride supplement	0.1	0.2	0.9	.532
Constant	0.7			

DISCUSSION

This study aimed to assess the frequency of caries in 6-year-old children and adolescents aged 12 and 15 in AJK. Comparing our results with recent findings, we found them to be very similar to those reported in similarly aged children in many other regions of Pakistan with comparable lifestyles. Our caries-free frequency in children of 6-year-olds, 58%, and the dmft, 1.9, were similar to those in Peshawar, which reported values of 55% and 1.87, respectively.[7] In 12-year-olds, our caries-free frequency of 55% and DMFT of 1.5 were similar to the values reported in the Peshawar study, 74% and 1.1 in Quetta, and 57% and 1.3 in Southern Punjab.[6,7,11] Furthermore, our frequency was notably lower than that observed in the previously mentioned national survey in Pakistan, suggesting an improving trend in oral health with a decline in caries prevalence.[12] The levels of caries among 15-year-olds, with a DMFT of 1.7 and a caries-free frequency of 70%, appeared to be similar to the values of 2.8 and 69% reported in Abbottabad.[8] It's worth noting that our DMFT in 12-year-olds was approximately half of the WHO global goal for the year 2020, which is 3. Additionally, the frequency of caries-free 6-year-old children has almost reached the recommendation of 50%.[13]

Socioeconomic status was associated with children's caries experience, as those with parents with a low educational level were more likely to have dental caries and a high level of untreated caries compared to those from higher socioeconomic backgrounds. A similar finding has also been reported in earlier investigations in other countries.[14,15]

All caries outcomes in 12-year-olds who consumed sweets several times a day were significantly higher compared to the values reported in children with lower consumption. This finding supports associations observed in previous studies.[16,17] Assessing children's sweet consumption accurately is challenging, and therefore, it is possible that the percentage of those consuming sweets several times a day is underestimated.

Our children appeared to have a good toothbrushing frequency, and in line with previous findings, we did not find any difference in caries experience between those with high or low toothbrushing frequencies.[18] However, there was a trend towards a higher DMFT/DMFS and fewer caries-free children among those with the lowest frequencies.

Consistent with earlier studies, streptococcus mutans appears to contribute to development of dental caries and in increasing mean DMFT and DMFS scores.[19,20] However, comparison with these studies should be approached with caution, as important differences in methodology should be taken into account. These differences include factors such as the age of the sample selected and the method used for the estimation of mutans streptococci. Additionally, an intriguing finding was the association of the bacteria with untreated caries. This could be explained by the fact that open cavities increase the number of oral sites for mutans streptococci.

CONCLUSION

The children in AJK showed a high proportion of conservatively treated disease, and for 12-year-olds, the WHO goal for the year 2020 has already been achieved. One possible reason for the low caries frequency in our sample could be the use of fluoride toothpaste during the development and eruption of children's teeth.

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DISCLAIMER
None to declare.

CONFLICT OF INTEREST
There is no conflict of interest among the authors.

ETHICAL STATEMENT
Ethical approval was provided by the Ethical Review Committee at AK CMH Rawalakot. Ref no: 14/SKBZAN/CMHRWKT

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AUTHORS CONTRIBUTION
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Analysis and/or interpretation of data: H. Mumtaz, H. Qamar
Drafting the manuscript: S. Iqbal, S. M.S. Rahman
Revising the manuscript critically for important intellectual content: H. Mumtaz
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REFERENCES
1. Kazeminia M, Abdi A, Shohaimi S, Jalali R, Vaisi-Raygani A, Salari N, et al. Dental caries in primary and permanent teeth in children's worldwide, 1995 to 2019: a systematic review and meta-analysis. Head Face Med. 2020;16(2020):1-21.

2. Sampaio FC, Bönecker M, Paiva SM, Martignon S, Ricomini Filho AP, Pozos-Guillen A, et al. Dental caries prevalence, prospects, and challenges for Latin America and Caribbean countries: a summary and final recommendations from a Regional Consensus. Braz Oral Res. 2021;35(5): e056.

3. Mahboobi Z, Pakdaman A, Yazdani R, Azadbakht L, Montazeri A. Dietary free sugar and dental caries in children: A systematic review on longitudinal studies. Health Promot Perspect. 2021;11(3):271-280.

4. Siddiqui AA, Alshammary F, Mulla M, Al-Zubaidi SM, Afroze E, Amin J, et al. Prevalence of dental caries in Pakistan: a systematic review and meta-analysis. BMC Oral Health. 2021;21(12):1-12.

5. Ahsan S, Hydrie MZ, Hyder Naqvi SM, Shaikh MA, Shah MZ, Jafry SI. Antibiotic prescription patterns for treating dental infections in children among general and pediatric dentists in teaching institutions of Karachi, Pakistan. PLoS One. 2020;15(7): e0235671.

6. Khail AA, Ronis K, Mureed S. Dental caries and Oral hygiene status among primary school children in Quetta, Pakistan: A quantitative approach. JPMA: J Pak Med Assoc. 2023;73(1):143-146.

7. Khan ZA, Omar KE. Prevalence and Comparison of Dental Caries of 6 to 12 Years Age in Government and Private School Children of Peshawar City, Pakistan. J Health Rehabil Res. 2024;4(2):399-403.

8. Shad S, Liaquat S, Khattak F, Basit K, Ullah W. Dental caries prevalence and oral health status in 3 to 15 years old school students in Abbottabad city, Pakistan: An assessment survey. J Khyber College Dent. 2023;13(2):16-21.

9. Gonçalves RM, Câmara JV, Pierote JJ, de Carvalho Vianna RF, Fried H, da Silveira Pereira GD, et al. Comparison between dmf/DMF and ICDAS in Brazilian schoolchildren: a cross-sectional study. Braz J Dev. 2021;7(3):27039-27051.

10. Smallridge JA, Albadri S. Operative treatment of dental caries in the young permanent dentition. Paediatric Dentistry. 2018:155-160. eBook.

11. Zafar R, Urooj A, Masood S. Dental caries in relation to sugar consumption among children-a study from Southern Punjab, Pakistan. BioMedica. 2021;37(2):110-113.

12. Jawed R, Khan Z, Kibria Z, Ahmad F. Dental caries and its determinants among children with special health care needs in district Karachi, Pakistan. Khyber Med Univ J. 2020;12(1):19-24.

DOI: 10.33897/fujd.v5i2.435

13. Mohiuddin S, Nisar N, Dawani N. Dental caries tatus among 6 and 12 years old school children of Karachi city. J Pak Dent Assoc. 2015;24(1):39-45.

14. Zhang T, Hong J, Yu X, Liu Q, Li A, Wu Z, et al. Association between socioeconomic status and dental caries among Chinese preschool children: a cross-sectional national study. BMJ Open. 2021;11(5): e042908.

15. Brito AC, Bezerra IM, Cavalcante DD, Pereira AC, Vieira V, Montezuma MF, et al. Dental caries experience and associated factors in 12-year-old-children: a population based-study. Braz Oral Res. 2020;34(2): e010.

16. Zahid N, Khadka N, Ganguly M, Varimezova T, Turton B, Spero L, et al. Associations between child snack and beverage consumption, severe dental caries, and malnutrition in Nepal. Int J Environ Res Public Health. 2020;17(21):7911.

17. Andrysiak-Karmińska K, Hoffmann-Przybylska A, Przybylski P, Witkowska Z, Walicka E, Borysewicz-Lewicka M, et al. Factors affecting dental caries experience in 12-year-olds, based on data from two polish provinces. Nutrients. 2022;14(9):1948.

18. Casanova-Rosado JF, Vallejos-Sánchez AA, Minaya-Sánchez M, Lara-Carrillo E, Robles-Bermeo NL, la Rosa-Santillana D, et al. Toothbrushing Frequency and Maternal Schooling Associated with Caries in Primary Dentition in 6-and 7-year-old Children. West Indian Med J. 2022;69(8):545-549.

19. Veena RL, Nagarathna C. Correlation of streptococcus mutans and streptococcus sobrinus colonization with and without caries experience in preschool children. Indian J Dent Res. 2020;31(1):73-79.

20. Zubaidah N, Dianawati N, Ridwan RD, Shirakawa T, Kuntaman K, Setiawatie EM, et al. The Clinical Pattern and Prevalence of Streptococcus mutans and Streptococcus sobrinus among Adult and Children Patients with Dental Caries. Pesqui Bras Odontopediatria Clin Integr. 2022;22(7): e210117.