Research Article

Assessment of Dental Caries Experience and Treatment Needs Among 12 and 15-Year-Old Schoolchildren in Government and Private Schools of Bhopal City

Syed Mohammad Ali, Swapnil Jain, Vijayta Sharva, Shiksha Nahar, Mohammed Waseeullah, Sonesh Sharma

Department of Public Health Dentistry, People's Dental Academy, People's University, Bhopal (Madhya Pradesh)

ABSTRACT:

Background: Dental caries remains one of the most prevalent chronic conditions among school-aged children. Monitoring caries prevalence and treatment needs at key WHO index ages (12 and 15 years) provides valuable insight for public health planning. The study was aimed to assess and compare the prevalence of dental caries and treatment needs among 12- and 15-year-old children studying in government and private schools in Bhopal city.

Materials & Methods: A cross-sectional study was conducted over 3 months among 730 schoolchildren (12 and 15 years old) selected from government and private schools in Bhopal. Data collection included a visual-tactile dental examination using a dental explorer, based on WHO Dentition Status and Treatment Need criteria (2013).

Results: The mean DMFT score was significantly higher in 15-year-olds (1.69) than in 12-year-olds (1.34) ($p = 0.032$), and in government school children (1.90) compared to private school children (1.20) ($p = 0.001$). Children brushing twice daily had significantly lower caries experience than those brushing occasionally or once daily ($p = 0.005$). Snack consumption between meals was positively associated with higher DMFT scores ($p < 0.001$). Restorative care was the most common treatment need (32.9%), followed by preventive care (26.0%), with government school students showing significantly higher treatment needs across categories.

Conclusion: Regular school-based oral health programs, preventive education, and timely restorative care are essential to address these gaps and improve oral health outcomes among school-aged children in Bhopal.

KEY WORDS: Dental caries, DMFT, government and private schools, oral health, WHO criteria

Address for correspondence : Dr. Syed Mohammed Ali, Postgraduate Student, Department of Public Health Dentistry, Peoples Dental Academy, People's University, Bhopal (Madhya Pradesh), India, E-mail: syed.mohd.ali@gmail.com

Submitted: 24.12.2024**, Accepted:** 21.05.2025, **Published:** 20.06.2025

INTRODUCTION:

Oral health is widely recognized as a fundamental human right, transcending boundaries of race, religion, political ideology, social standing, or economic status.[1] The interconnectedness of oral and general health was first formally acknowledged in

Access this article online

Quick Response Code:

Website: www.pjsr.org

DOI: https://doi.org/10.5281/zenodo.15704535

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial ShareALike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: editor.pjsr@peoplesuniversity.edu.in

How to cite this article: Ali SM, Jain S, Sharva V, Nahar S, Waseeullah M, Sharma S. Assessment of Dental Caries Experience and Treatment Needs Among 12- and 15-Year-Old Schoolchildren in Government and Private Schools of Bhopal City. PJSR. 2025;18(1):106e

1989, with the oral cavity often described as a "window" to overall health.[7] Oral health encompasses more than just the absence of disease; it includes psychosocial well-being, self-confidence, and the ability to perform essential functions such as eating, speaking, and socializing without pain or embarrassment.[3] Throughout life, oral health plays a critical role in enabling individuals to thrive and fully participate in society. However, oral diseases-particularly dental caries-remain a major public health concern globally, especially among children and adolescents, with notable shifts in prevalence patterns over the past two decades.[4,5]

The prevalence of dental caries among schoolchildren in India varies widely, with studies reporting rates ranging from 31.5% to as high as 89% across different regions of the country.[6] Dental caries commonly affect children, largely due to changing dietary habits-particularly increased consumption of refined carbohydrates-and inadequate oral hygiene practices. Although these conditions are prevalent across all socioeconomic groups, they are disproportionately observed among children from lower socioeconomic backgrounds, reflecting persistent oral health inequalities in society. Studies have shown that children from economically disadvantaged families exhibit higher rates of dental caries and gingivitis.[7] The consequences of dental caries extend beyond oral discomfort, causing both acute and chronic pain that can hinder a child's growth, development, school performance, and overall well-being. If left untreated, dental caries can lead to irreversible tooth damage and systemic infection, thereby significantly affecting a child's quality of life.[8]

Schools play a vital role in shaping children's long-term oral health behaviors, as the school years represent a critical window when habits are most easily adopted and retained. According to the World Health Organization (WHO), monitoring dental caries at age 12 is essential because it coincides with the eruption of permanent teeth (excluding third molars), making it a global benchmark for caries surveillance, while age 15 provides insight into the cumulative effects of early adolescent habits.[9,10] The implementation of regular assessments in both government and private schools helps reveal socioeconomic disparities in oral health, enabling targeted interventions. School-based programs such as oral health education, sealant application, and screening have been shown to significantly improve oral hygiene and reduce caries prevalence among students.[11,12] Continuous monitoring at these key ages supports early detection, prevention, and education efforts, ultimately fostering lifelong healthy practices. The aim of thisour study was to assess and compare the prevalence of dental caries among 12 and 15-year-old children studying in government and private schools in Bhopal city.

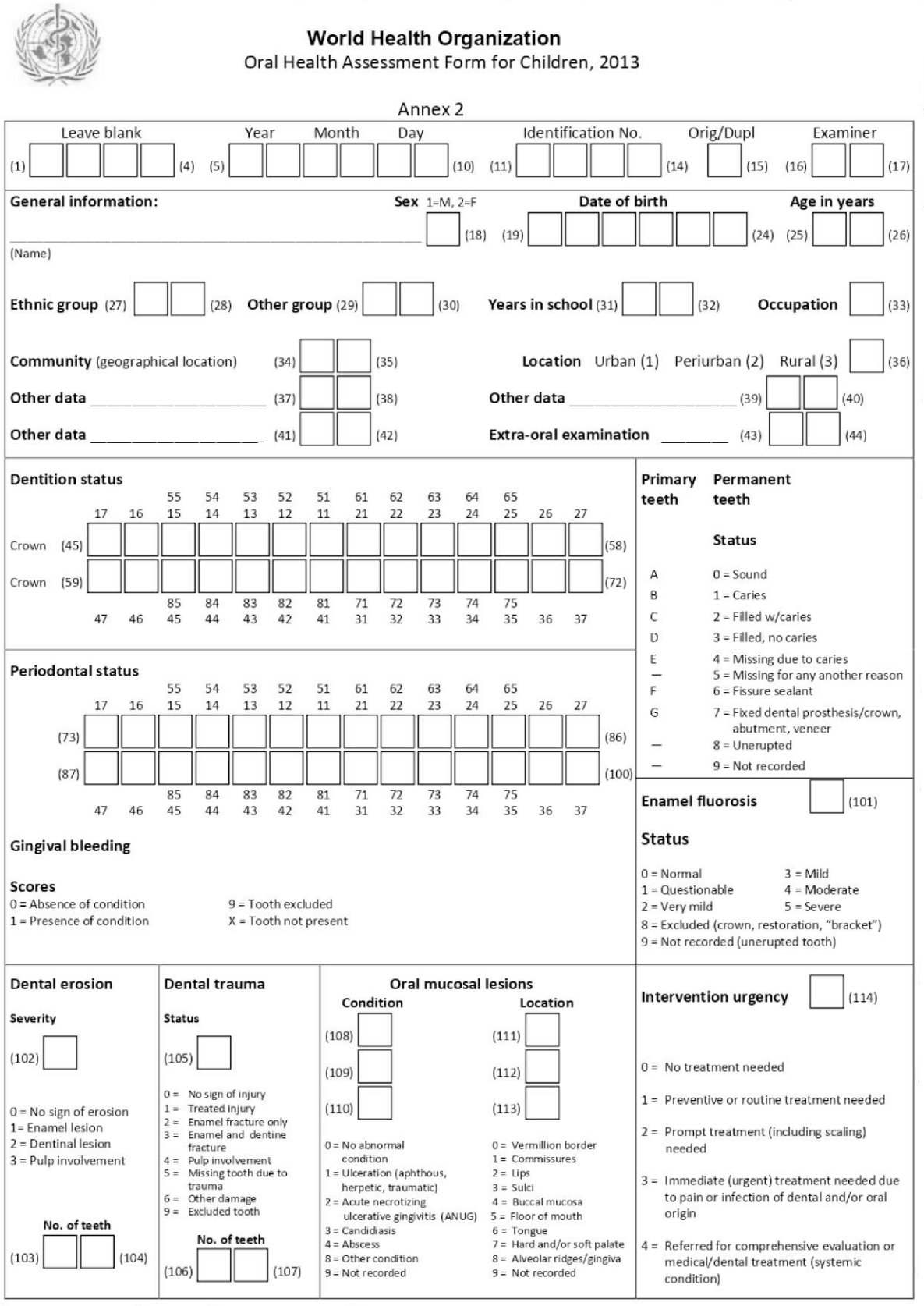
MATERIALS & METHODS:

A cross-sectional study was conducted over a period of three months to assess the prevalence of dental caries among 12- and 15-year-old schoolchildren in Bhopal city. Ethical clearance was obtained from the Institutional Ethics Committee. A total of 730 students were selected using stratified random sampling from both government and private schools, ensuring representation across different socioeconomic backgrounds. Informed consent was obtained from the parents, and permission was granted by school authorities prior to data collection.

Data collection involved two components: a clinical oral examination and a structured questionnaire. The clinical examination was carried out within the school premises under adequate natural light using the visual-tactile method, with a sterile dental explorer and plane mouth mirror. Dental caries status and treatment needs were recorded according to the WHO Oral Health Assessment Form (2013). All examinations adhered to standard infection control protocols (Figure 1).

In addition to clinical data, a pretested questionnaire was administered to collect information on socio-demographic factors such as the child's age, gender, type of school (government or private), and parental education level (Figure 2). Oral hygiene practices were assessed by asking about the frequency of tooth brushing. Dietary habits were evaluated by recording the frequency of consumption of sugary foods and beverages, as well as snacking habits between meals. Courtesy reporting of oral health findings was shared with schools and parents, and children identified with treatment needs were referred to nearby dental care facilities.

The collected data was entered and analyzed using IBM SPSS Statistics software, version 30. Descriptive statistics, including frequency and percentage distributions, were used to summarize categorical variables such as age, gender, type of school, and oral hygiene practices. The mean and standard deviation were calculated for continuous variables like the DMFT scores. An independent *t*-test was used to compare the mean DMFT scores between two groups (e.g., government vs. private schools), while one-way ANOVA was applied to assess differences in mean DMFT scores across more than two categories, such as varying frequencies of snack



World Health Organization
Oral Health Assessment Form for Children, 2013

Annex 2

Leave blank (1) (4) | Year Month Day (5) (10) | Identification No. (11) (14) | Orig/Dupl (15) | Examiner (16) (17)

General information: Sex 1=M, 2=F (18) | Date of birth (19) (24) | Age in years (25) (26)

(Name)

Ethnic group (27) (28) **Other group** (29) (30) **Years in school** (31) (32) **Occupation** (33)

Community (geographical location) (34) (35) **Location** Urban (1) Periurban (2) Rural (3) (36)

Other data (37) (38) **Other data** (39) (40)

Other data (41) (42) **Extra-oral examination** (43) (44)

Dentition status

		17	16	55/15	54/14	53/13	52/12	51/11	61/21	62/22	63/23	64/24	65/25	26	27	
Crown	(45)															(58)
Crown	(59)															(72)
		47	46	85/45	84/44	83/43	82/42	81/41	71/31	72/32	73/33	74/34	75/35	36	37	

Periodontal status

		17	16	55/15	54/14	53/13	52/12	51/11	61/21	62/22	63/23	64/24	65/25	26	27	
	(73)															(86)
	(87)															(100)
		47	46	85/45	84/44	83/43	82/42	81/41	71/31	72/32	73/33	74/34	75/35	36	37	

Gingival bleeding

Scores
0 = Absence of condition
1 = Presence of condition
9 = Tooth excluded
X = Tooth not present

Primary teeth	Permanent teeth
	Status
A	0 = Sound
B	1 = Caries
C	2 = Filled w/caries
D	3 = Filled, no caries
E	4 = Missing due to caries
—	5 = Missing for any another reason
F	6 = Fissure sealant
G	7 = Fixed dental prosthesis/crown, abutment, veneer
—	8 = Unerupted
—	9 = Not recorded

Enamel fluorosis (101)

Status

0 = Normal
1 = Questionable
2 = Very mild
3 = Mild
4 = Moderate
5 = Severe
8 = Excluded (crown, restoration, "bracket")
9 = Not recorded (unerupted tooth)

Dental erosion

Severity (102)

0 = No sign of erosion
1= Enamel lesion
2 = Dentinal lesion
3 = Pulp involvement

No. of teeth (103) (104)

Dental trauma

Status (105)

0 = No sign of injury
1 = Treated injury
2 = Enamel fracture only
3 = Enamel and dentine fracture
4 = Pulp involvement
5 = Missing tooth due to trauma
6 = Other damage
9 = Excluded tooth

No. of teeth (106) (107)

Oral mucosal lesions

Condition (108) (109) (110)

0 = No abnormal condition
1 = Ulceration (aphthous, herpetic, traumatic)
2 = Acute necrotizing ulcerative gingivitis (ANUG)
3 = Candidiasis
4 = Abscess
8 = Other condition
9 = Not recorded

Location (111) (112) (113)

0 = Vermillion border
1 = Commissures
2 = Lips
3 = Sulci
4 = Buccal mucosa
5 = Floor of mouth
6 = Tongue
7 = Hard and/or soft palate
8 = Alveolar ridges/gingiva
9 = Not recorded

Intervention urgency (114)

0 = No treatment needed
1 = Preventive or routine treatment needed
2 = Prompt treatment (including scaling) needed
3 = Immediate (urgent) treatment needed due to pain or infection of dental and/or oral origin
4 = Referred for comprehensive evaluation or medical/dental treatment (systemic condition)

Figure 1: WHO Oral Health Assessment Form.

STUDY PROFORMA

1. General Information

- **Name of the Student**: _____
- **Age**: ☐ 12 years ☐ 15 years
- **Gender**: ☐ Male ☐ Female
- **Type of School**: ☐ Government ☐ Private

2. Oral Hygiene Practices

- **Frequency of Brushing**:
  ☐ Once daily
  ☐ Twice daily
  ☐ Occasionally
- **Type of Oral Hygiene Aid Used**:
  ☐ Toothbrush and toothpaste
  ☐ Finger and toothpaste
  ☐ Others (Specify): _____
- **Use of Fluoridated Toothpaste**:
  ☐ Yes ☐ No ☐ Don't know

3. Dietary Habits

- **Do you consume snacks between meals?**
  ☐ Never
  ☐ Once
  ☐ More than once
- **Type of snacks commonly consumed** (tick all that apply):
  ☐ Chocolates/sweets
  ☐ Chips/fried snacks
  ☐ Soft drinks
  ☐ Biscuits
  ☐ Fruits
  ☐ Others (specify): _____

Examiner's Name & Signature: _____
Date of Examination: ____ / ____ / _____
Let me know if you would like to include an oral hygiene index (like OHI-S) or SES details.

Figure 2: Pretested questionnaire.

consumption. A *p*-value of <0.05 was considered statistically significant.

RESULTS:

The analysis revealed important patterns in the distribution and determinants of dental caries among school children. The study included a total of 730 participants, with a nearly equal distribution of males (51.4%) and females (48.6%), and no statistically significant difference in gender distribution (p=0.284) (Figure 3).

The mean DMFT score was significantly higher in 15-year-olds (1.69) compared to 12-year-olds (1.34), indicating that caries experience increases with age (p=0.032). Males had a higher caries experience (1.71) mean DMFT than females (1.38), with a significant difference (p=0.048). A notable disparity was observed between school types—government school students had a significantly higher mean DMFT (1.90) than those in private schools (1.20) (p=0.001), suggesting socioeconomic influences on oral health. Brushing frequency was significantly associated with caries levels (p=0.005); children brushing twice daily had lower mean DMFT scores (1.10), while those brushing occasionally or never had the highest mean DMFT scores (2.40) (Table 1). Additionally, frequent snacking between meals was linked to increased caries experience, with a statistically significant difference among groups (p=0.001) (Table 2).

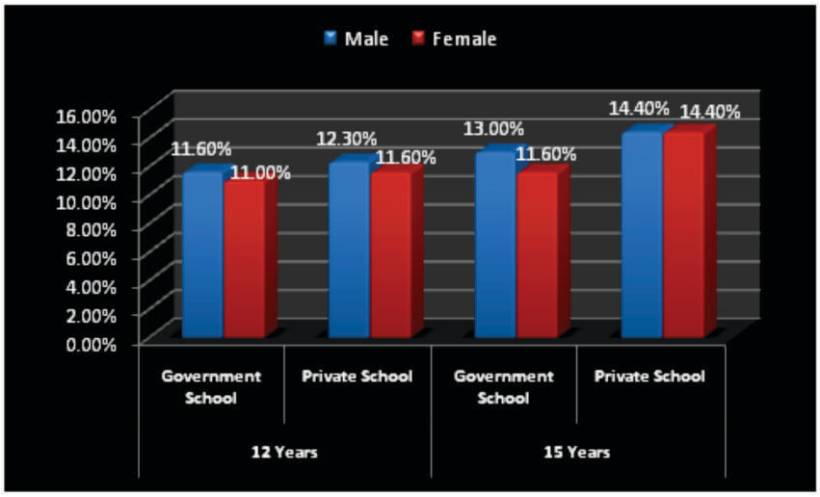


Figure 3: Distribution of School children According to Gender and Age.

Table 1: Mean Caries Experience (DMFT) by Age, Gender, School Type, and Brushing Frequency.

Variable	n	Mean DMFT	SD	p-value
Age				
12 years	340	1.34	1.10	0.032*
15 years	390	1.69	1.25	
Gender				
Male	375	1.71	1.18	0.048*
Female	355	1.38	1.09	
School Type				
Government	345	1.90	1.20	0.001 *
Private	385	1.20	1.10	
Brushing Frequency				
Once daily	425	1.90	1.25	0.005 *
Twice daily	250	1.10	0.90	
Occasionally/Never	55	2.40	1.30	

***Statistically significant**

Table 2: Association between Dental Caries and Snack Consumption between Meals.

Snack Consumption Between Meals	n (%)	Mean DMFT	SD	*f-value*	*p-value*
Never/Rarely	210 (28.8%)	1.10	0.85	10.62	0.001 *
Once daily	280 (38.4%)	1.45	1.05		
More than once daily	240 (32.9%)	2.10	1.30		

***Statistically significant**

DISCUSSION:

The present study aimed to assess and compare the oral health status and treatment needs of 12 and 15-year-old school-going children enrolled in government and private schools in Bhopal city. These two age groups are considered global indicator ages for oral health surveillance by the WHO, as they represent important developmental stages during which

Table 3: Distribution of Treatment Needs among School Children.

Treatment Need	12 year		15 year		Total (n=730)
	Government (n=165)	Private (n=175)	Government (n=180)	Private (n=210)	
Urgent treatment needed	12 (7.3%)	4 (2.3%)	15 (8.3%)	6 (2.9%)	37 (5.1%)
Referral needed	10 (6.1%)	5 (2.9%)	14 (7.8%)	8 (3.8%)	37 (5.1%)
Preventive care	45 (27.3%)	40 (22.9%)	50 (27.8%)	55 (26.2%)	190 (26.0%)
Restorative care	65 (39.4%)	45 (25.7%)	70 (38.9%)	60 (28.6%)	240 (32.9%)
Prosthetic treatment	8 (4.8%)	2 (1.1%)	10 (5.6%)	3 (1.4%)	23 (3.2%)
No treatment needed	25 (15.1%)	79 (45.1%)	21 (11.6%)	78 (37.1%)	203 (27.8%)
Total	165 (100%)	175 (100%)	180 (100%)	210 (100%)	730 (100%)

permanent teeth are fully erupted and preventive interventions can be most impactful. The findings of this study provide valuable insights into the existing disparities in oral health conditions and access to care between children from different school types, which may reflect broader socioeconomic and educational inequalities.

The present study showed a significant association between mean DMFT scores and several demographic and behavioral variables. The increase in caries experience with age, from 1.34 (12-year-olds) to 1.69 (15-year-olds), similar findings from a meta-analysis in India, where mean DMFT values rose from 1.95 at age 12 to 3.31 at age 15.[13] In our study, males (1.71) exhibited higher mean DMFT than females (1.38), a trend also reported in Singh N et al, where 15-year-old males had significantly greater DMFT than females.[14] Boys exhibited a higher mean DMFT score (0.42 ± 0.85) than girls (0.28 ± 0.65), and this difference was statistically significant ($p = 0.041$). This finding is in agreement with studies conducted in Saudi Arabia by Al-Darwish M et al, where male children were reported to have significantly higher caries experience compared to females, likely due to poorer oral hygiene practices and less frequent dental visits among boys.[15] However, a contrasting result was noted in a study from Nepal conducted by Chapain KP et al, where female children had higher mean DMFT scores than their male counterparts, suggesting that sociocultural and behavioral factors can influence gender-related differences in oral health.[16]

A similar trend was observed in the type of school attended, where children studying in government schools demonstrated a significantly higher mean dmft score (0.51 ± 0.90) compared to those in private schools (0.22 ± 0.55), with a p-value of 0.019. This is consistent with findings from a large-scale study involving 28,343 schoolchildren, which reported significantly greater caries prevalence among children attending public schools, likely reflecting disparities in socioeconomic status, dietary habits, and access to dental care.[17] Other regional studies from Turkey and Iran also support this association, attributing the higher dmft scores in government school children to reduced awareness and fewer preventive oral health measures available in public educational settings.[18,19]

In the present study, treatment needs based on WHO criteria showed clear disparities between government and private school children aged 12 and 15. Government school students had a higher need for restorative care (39.4% at age 12 and 38.9% at age 15) compared to their private school counterparts (25.7% and 28.6%). Urgent treatment and referrals were also more common among government schoolchildren, reflecting limited access to timely dental care. Conversely, a higher proportion of private school students required no treatment (45.1% at age 12 and 37.1% at age 15). These findings align with studies from Shimla and Kanpur, where government school students showed significantly greater treatment needs due to socioeconomic disparities and reduced service access.[20,21] This highlights the urgent need for targeted preventive and restorative oral health programs in government schools.

CONCLUSION:

The present study highlights a significant prevalence of dental caries among 12- and 15-year-old

schoolchildren in Bhopal city, with marked differences between government and private school students. Children from government schools exhibited higher mean DMFT scores and greater treatment needs, reflecting the impact of socioeconomic disparities, poor oral hygiene practices, and limited access to dental care. Age, gender, brushing frequency, and dietary habits were significantly associated with caries experience. These findings emphasize the need for early, school-based oral health interventions-particularly in government schools-including preventive education, routine screenings, and accessible restorative services-to reduce oral health inequities and promote lifelong healthy behaviors.

Financial Support and Sponsorship
Nil.

Conflicts of Interest
There are no conflicts of interest.

REFERENCES-

1. Park K. Man and medicine: Towards health for all. Park's text book of preventive and social medicine. 20th ed. Jabalpur India: M/S Banarsidas Bhanot publishers; 2009. p. 111.https://milonm28.wordpress.com/wp-content/uploads/2017/08/parks-preventive-social-medicine-23rd-ed.pdf
2. Kane SF. The effects of oral health on systemic health. Gen Dent. 2017 Nov-Dec;65(6):30-34. PMID: 29099363.
3. World Health Organization. (2023). Global strategy and action plan on oral health 2023–2030.Retrievedfrom https://iris.who.int/bitstream/handle/10665/376623/9789240090538-eng.pdf.sequence=1.
4. Lundström F, Hamp SE, Nyman S. Systematic plaque control in children undergoing long-term orthodontic treatment. Eur J Orthod. 1980;2(1):27-39. PMID: 6935056.
5. Taani DQ. Relationship of socioeconomic background to oral hygiene, gingival status, and dental caries in children. Quintessence Int. 2002 Mar;33(3):195-8. PMID: 11921767.
6. Nanda G Pai, Shrikala Acharya, Jinal Vaghela and Shubhangi Mankar. Prevalence and risk factors of dental caries among school children from a low socio economic locality in Mumbai, India. Int. J. Appl. Dent. Sci. 2018;4(1):203-207.
7. Nasser, GamalAbdul & Rupkumar, & Mohammed, Junaid. Prevalence of dental caries and gingivitis among corporation school-going children in Chennai city – A population-based cross-sectional study. SRM Journal of Research in Dental Sciences. 2019;10(1):7.DOI: 10.4103/srmjrds.srmjrds_59_18
8. Datta, P.P.Prevalence of dental caries among school children in Sundarban, IndiaEpidemiology. 2013; **3** 2161-1165. DOI: 10.4172/2161-1165.1000135
9. World Health Organization. Oral health [Internet]. 2023 Mar 14. Available from: WHO fact sheetWHO indicator metadata registry: dental caries at age 12 and 15 [Internet].. Available from: WHO data
10. Macnab J, et al. Children's oral health: the opportunity for improvement using the WHO Health Promoting School Model. Adv Public Health. 2015;2015: 651836.https ://doi.org/10.1155/2015/ 651836
11. Arora A, Kumbargere Nagraj S, Khattri S, Ismail NM, Eachempati P. School dental screening programmes for oral health. Cochrane Database Syst Rev. 2022 Jul 27;7(7):CD012595. doi: 10.1002/14651858. CD012595.pub4. PMID: 35894680; PMCID: PMC9327802.
12. BMC Oral Health. Effectiveness of primary school-based interventions in improving oral health of children in low- and middle-income countries: a systematic review and meta-analysis. 2022.
13. Janakiram C, Antony B, Joseph J, Ramanarayanan V**.** Prevalence of dental caries in India among the WHO index age groups: a meta-analysis. J Clin Diagn Res. 2018;12(8):ZE08–ZE13.DOI:10.7860/JCDR/2018/32669.11956
14. Singh N, Gaur S, Kumar M, Chauhan NS, Akhtar T, Agarwal S, Mathur R. Comparative Study of Dental Health Status and Its Determinants among Children Attending Government and Private Schools in Kanpur City. Int J Clin Pediatr Dent. 2021 Sep-Oct;14(5):666-673. doi: 10.5005/jp-journals-10005-2010. PMID: 34934281; PMCID: PMC8645610.
15. Al-Darwish M, El Ansari W, Bener A. Prevalence of dental caries among 12-14 year old children in Qatar. Saudi Dent J. 2014 Jul;26(3):115-25. doi: 10.1016/j. sdentj.2014.03.006. Epub 2014 May 5. PMID: 25057232; PMCID: PMC4095054.
16. Bramantoro T, Setijanto RD, Palupi R, Aghazy AZ, Irmalia WR. Dental Caries and Associated Factors among Primary School Children in Metropolitan City with the Largest Javanese Race Population: A Crosssectional Study. Contemp Clin Dent. 2019 Apr-Jun;10(2):274-283. doi: 10.4103/ccd.ccd_517_18. PMID: 32308290; PMCID: PMC7145260.
17. Peltzer K, Pengpid S. Dental health status and oral

health behavior among university students from five ASEAN countries. Nagoya J Med Sci. 2017 Feb;79(2):123-133. doi: 10.18999/nagjms.79.2.123. PMID: 28626248; PMCID: PMC5472538.

18. Brein DJ, Fleenor TJ Jr, Kim SW, Krupat E. Using the Theory of Planned Behavior to Identify Predictors of Oral Hygiene: A Collection of Unique Behaviors. J Periodontol. 2016 Mar;87(3):312-9. doi: 10.1902/jop.2015.150239. Epub 2015 Oct 15. PMID: 26469810.
19. Orhan AI, Alkan A, Orhan K, Tezel A, Karaoglanoglu S, Oztas D. Dental caries and associated factors among Turkish children and adults: Findings from the 3rd National Oral Health Survey. Community Dent Oral Epidemiol. 2024 Aug;52(4):499-508. doi: 10.1111/cdoe.12943. Epub 2024 Jan 18. PMID: 38238260
20. Thakur S, Sharma R, Singhal P, Chauhan D. Prevalence and determinants of early childhood caries among preschool children in district Shimla, North India: a cross -sectional study. BMC Oral Health. 2025 Jan 31;25(1):168. doi: 10.1186/s12903-025-05435-2. PMID: 39891156; PMCID: PMC11786517.
21. Singh A, Purohit BM, Sequeira P, et al. A cross-sectional study on dental treatment needs and related barriers among schoolchildren in Kanpur. Indian J Dent Res. 2018;29(4):468-472.