

Socioeconomic differences in clinical oral health and evaluation of its impact on daily performances among 10-14 years old children using child ODP Index: A cross-sectional study

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Abstract

Background: Oral health problems can significantly affect children's daily activities, self-esteem, and overall well-being. This study assessed disparities in clinical oral health status and their impact on daily performances among school children from low and high socio-economic groups in Pune City using the Child-Oral Impacts on Daily Performances (Child-ODIP) index.

Materials and Methods: A descriptive cross-sectional study was conducted among 120 school children aged 10–14 years selected from schools representing different socioeconomic strata. The Child-ODIP questionnaire evaluated oral impacts on daily performances. Data were analyzed using descriptive statistics and correlation tests.

Results: The mean age of participants was 11.38 ± 1.92 years. Mean DMFT and deft scores were 1.61 ± 1.83 and 1.54 ± 2.09 , respectively. Eating (56.7%) and cleaning teeth (45.0%) were the most commonly affected daily activities. Dental caries was the leading cause of oral impacts. No statistically significant differences were found in clinical parameters or Child-ODIP scores between low and high socioeconomic groups ($p = 0.544$). However, female children had significantly higher odds of moderate-to-severe impacts ($p = 0.214$).

Conclusion: Oral conditions substantially impair daily performances among urban school children. While socioeconomic disparities were not statistically significant in this sample, gender differences and the close link between clinical disease and quality of life highlight the need for targeted preventive programs and routine use of oral health related quality of life measures in public health dentistry.

Keywords: Oral health-related quality of life, child-ODIP, socioeconomic disparities, dental caries, school children, Pune City, public health dentistry

Introduction

Evaluating how individuals experience a health condition provides valuable insights into their unique treatment requirements and supports more effective patient care. The ultimate goal is to enhance quality of life for both people and communities. Oral Health-Related Quality of Life is a multidimensional concept that captures people's comfort while eating, sleeping, and interacting socially, along with their self-esteem and overall satisfaction with their oral health. Understanding OHRQoL plays a key role in shaping health policies, guiding resource allocation, and developing effective disease prevention strategies. Adolescence is a critical period when young people gain greater independence and become increasingly conscious of their physical appearance, social surroundings, and personal needs. They begin making independent decisions about their behaviours and dietary habits while placing greater importance on how they look. For these reasons, assessing OHRQoL during this stage is particularly important [1]. Oral conditions such as dental caries, malocclusion, traumatic dental injuries, and fluorosis can significantly affect Oral Health-Related Quality of Life in children and adolescents. A wide range of OHRQoL instruments has been developed specifically for use in these age groups. These questionnaires vary in format and can be self-reported or

interviewer-administered, condition-specific or generic, and tailored to particular age range [2].

According to Allen (2003), patients' own assessments of how their health affects their quality of life frequently differ from those of healthcare professionals [3]. Therefore, incorporating patients' subjective evaluations is essential in the provision of care. Despite being largely preventable, oral diseases continue to affect more than 3.5 billion people worldwide

Oral diseases negatively impact the oral health-related quality of life of more than half of children and adolescents worldwide. Considerable variation in the prevalence of oral impacts was observed across different regions. These results can assist policymakers in designing effective strategies to minimise the effects of oral diseases and improve health-related quality of life [4]. Surveys on patient satisfaction and patient-reported outcomes are useful for determining whether healthcare services are appropriate and beneficial from the patient's viewpoint. Achieving a balance between normative (clinical) and subjective measures can be challenging, as the two do not always align perfectly. Nevertheless, considering both dimensions leads to a more comprehensive healthcare approach. A balanced strategy that incorporates both perspectives is essential for effective planning, delivery, and evaluation of healthcare services,

ultimately promoting more patient-centered and holistic care [5].

Prior research indicates that oral health-related quality of life across various age cohorts is multi-factorially determined, with key predictors including clinical dental status, demographic variables, psychosocial elements, and socioeconomic position. Research surrounding the social determinants of dental disease consistently highlights increased clinical pathology among marginalized socioeconomic groups. Specifically, when assessing various criterias such as parental education, household income, or employment status, children from lower socioeconomic backgrounds experience significantly higher rates of dental caries and gingival inflammation than the children from higher economic groups [6].

In light of these gaps, the present study was conducted to explore socioeconomic disparities in clinical oral health status and their effects on daily performances among school children aged 10 to 14 years in Pune City, Maharashtra. Using the Child-OIDP instrument, the study compared children from varied socioeconomic backgrounds to better understand how social inequalities relate to oral health and quality of life in an urban Indian setting. The findings are expected to contribute valuable evidence for developing more equitable and targeted oral health programs in public health dentistry.

Materials and Methodology

Study Design: This study adopted a descriptive cross-sectional design to explore how socioeconomic differences influence children's oral health and how these conditions affect their everyday lives. We used the Child-Oral Impacts on Daily Performances (Child-OIDP) [7] tool to capture the real-life impact of oral problems, while also carrying out standard clinical examinations based on DMFT, GI and PI. Data was collected from January 2025 to April 2025.

Setting: The research was carried out in Pune City, Maharashtra, India. As a large and rapidly growing metropolitan city, Pune offers a diverse mix of socioeconomic environments, making it well-suited for studying oral health inequalities. Children were recruited from different schools.

Study Population: The study included school-going children between 10 and 14 years of age. A total of 120 children participated. The approach ensured fair representation from different socioeconomic backgrounds. Children with serious medical conditions that could affect their oral health, those currently undergoing orthodontic treatment, and children who did not wish to take part were excluded from the study. Verbal consent was obtained from the school staff, consent was also taken from the children themselves before any examination or interview. This multi-school approach, spanning varied socioeconomic settings within the same city, enabled a meaningful comparison of clinical oral health problems — such as tooth decay, gum conditions — and their effects on children's daily activities and well-being in an Indian context.

Sampling: Convenience sampling was done to select the study participants. Schools were selected based on accessibility and permission from the respective school authorities.

Study Procedure: Children aged 10–14 years who met the eligibility criteria were included in the study. Prior to participation, parents/guardians were informed about the study objectives and procedure. Verbal assent was obtained from each child on the day of data collection. All study procedures were conducted during a single visit within the school premises in a quiet and private setting to ensure participant comfort, confidentiality, and the collection of reliable data. It consisted of two main parts:

Clinical Oral Examination: A comprehensive oral examination was performed under natural daylight using a mouth mirror and dental explorer. Dental caries experience was assessed using the Decayed, Missing, and Filled Teeth indices for permanent and primary dentitions (DMFT/deft) [18, 19] as described by Klein, Palmer, and Knutson. Oral hygiene status was evaluated using the Plaque Index developed by Silness and Loe, while gingival health was assessed using the Gingival Index proposed by Loe and Silness [10]. These standardized indices were employed to obtain objective measures of oral health status among the study participants.

Child-OIDP Interviewer administered questionnaire: Following the clinical examination, each participant underwent an interviewer-administered Child Oral Impacts on Daily Performances (Child-OIDP) assessment. The questionnaire was administered individually to evaluate the impact of oral health conditions on daily activities during the preceding three months. To ensure accurate comprehension and response validity, questions were presented in the participant's preferred language that is Marathi, Hindi, or English using age-appropriate terminology. Interviews were conducted in a quiet and supportive setting to facilitate effective communication and encourage participants to provide reliable self-reported information regarding their oral health experiences.

Data management and statistical analysis: The data was obtained and entered in Microsoft Excel version 13. The data was analyzed using IBM SPSS Version 26 for continuous data Mean and SD was obtained for Categorical data frequency and percentage was obtained. For Correlation between Child-OIDP Percentage Score, Number of Performances Affected, Intensity and Other Variables spearman correlation was applied. For evaluation of association between ODIP Daily performance and SES Chi square test of association was applied. All the statistical tests were applied keeping confidence interval at 95% and ($p < 0.05$) was considered to be statistically significant.

Results

The study included 120 participants with a mean age of 11.38 ± 1.92 , with years ages ranging from 10 to 14 years.

Table 1 Descriptive Characteristics of Study Population

		Mean	SD
Age		11.3750	1.91878
		n	%
Gender	Male	58	48.3%
	Female	62	51.7%
Socio Economic Status	Low	49	40.8%
	High	71	59.2%
Impact Intensity	No Impact	1	.8%
	Very Little	21	17.5%
	Little	56	46.7%
	Moderate	26	21.7%
	Severe	16	13.3%
Plaque Index	Absent	0	0.0%
	Mild	7	5.8%
	Moderate	44	36.7%
	Severe	69	57.5%
Gingival Index	Absent	19	15.8%
	Mild	82	68.3%
	Moderate	18	15.0%
	Severe	1	.8%
		Mean	SD
Total Raw Score		14.8917	6.20625
Child - OIDP % SCORE		19.1418	10.24272
DMFT Score		1.6083	1.83475
DEFT Score		1.5417	2.08595

Among the 120 participants, 51.7% were females and 48.3% were males. A majority of the participants belonged to the high socioeconomic status (59.2%), while 40.8% belonged to the low socioeconomic status group. Regarding oral health-related quality of life intensity, 46.7% of the participants reported little impact, followed by 21.7% reporting moderate impact, 17.5% very little impact, 13.3% severe impact, and 0.8% no impact. Assessment of plaque status revealed that 57.5% of the participants had severe plaque accumulation,

36.7% had moderate plaque accumulation, 5.8% had mild plaque accumulation, and none had an absent plaque index. Gingival assessment showed that 68.3% of the participants had mild gingival inflammation, 15.8% had healthy gingiva, 15.0% had moderate gingivitis, and 0.8% had severe gingivitis.

The participants demonstrated a mean Total Raw Score of 14.89 ± 6.21 , with a mean Child-OIDP percentage score of 19.14 ± 10.24 . The mean DMFT score was 1.61 ± 1.83 , while the mean DEFT score was 1.54 ± 2.09 .

Table 2: Association between Daily performances affected with SES

Daily Performance	Low SES (n = 49) n (%)	High SES (n = 71) n (%)	Total (N = 120) n (%)	χ^2	p value
Eating	42 (85.7)	63 (88.7)	105 (87.5)	0.24	0.623
Speaking	7 (14.3)	14 (19.7)	21 (17.5)	0.59	0.441
Cleaning teeth	41 (83.7)	52 (73.2)	93 (77.5)	1.81	0.179
Sleeping/relaxing	32 (65.3)	44 (62.0)	76 (63.3)	0.14	0.709
Smiling	10 (20.4)	15 (21.1)	25 (20.8)	0.01	0.924
Emotional state	9 (18.4)	15 (21.1)	24 (20.0)	0.14	0.71
Studying	8 (16.3)	14 (19.7)	22 (18.3)	0.22	0.637
Social contact	24 (49.0)	27 (38.0)	51 (42.5)	1.42	0.233

The Chi-square analysis demonstrated no statistically significant association between socioeconomic status and any of the eight Child-OIDP daily performance domains (all $p > 0.05$). Although eating (87.5%) and cleaning teeth (77.5%) were the most frequently affected performances, their distribution did not differ significantly between children from low- and high-socioeconomic groups.

Likewise, speaking, sleeping/relaxing, smiling, emotional state, studying, and social contact showed comparable proportions across the two socioeconomic categories, indicating that socioeconomic status was not significantly associated with the impact of oral health on daily performances in this study population.

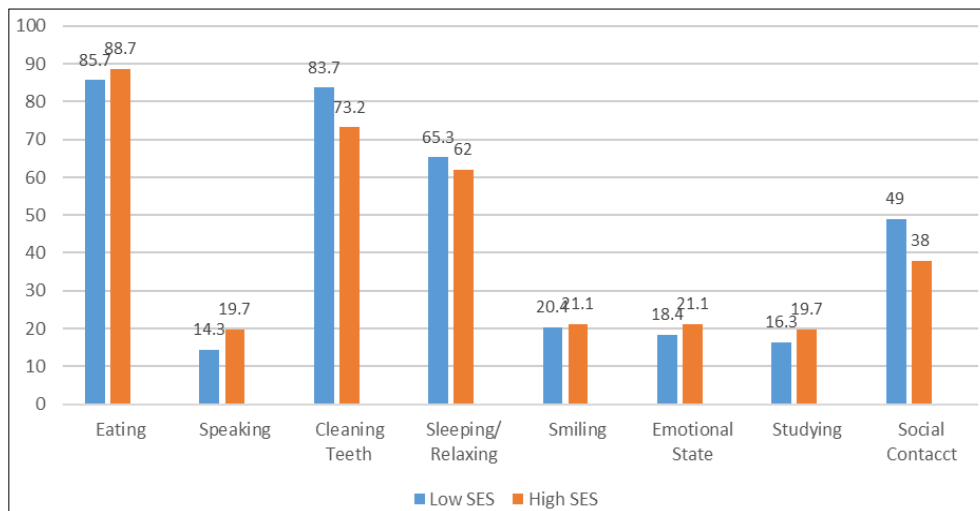


Fig 1: Prevalence% of Oral Impacts on Daily Performances

Table 4: Comparison of PI and GI between Low and High SES

			Socio Economic Status		Total	Chi Square	p Value
			Low	High			
Plaque Index	Mild	n	4	3	7	0.86	0.65
		%	8.2%	4.2%	5.8%		
	Moderate	n	17	27	44		
		%	34.7%	38.0%	36.7%		
	Severe	n	28	41	69		
		%	57.1%	57.7%	57.5%		
Total		n	49	71	120		
		%	100.0%	100.0%	100.0%		
Gingival Index	Absent	n	7	12	19	1.554	0.670
		%	14.3%	16.9%	15.8%		
	Mild	n	36	46	82		
		%	73.5%	64.8%	68.3%		
	Moderate	n	6	12	18		
		%	12.2%	16.9%	15.0%		
	Severe	n	0	1	1		
		%	0.0%	1.4%	.8%		
Total		n	49	71	120		
		%	100.0%	100.0%	100.0%		

The distribution of plaque index scores was comparable between the low and high socioeconomic status groups, with no statistically significant difference observed ($\chi^2 = 0.86$, $p = 0.650$). The distribution of gingival index scores did not

differ significantly between participants with low and high socioeconomic status ($\chi^2 = 1.55$, $p = 0.670$), indicating no significant association between socioeconomic status and gingival health in the study population

Table 5: Comparison of the Child ODIP % Score, Total Raw Score, No of Performance Affected, DMFT Score, DEFT Score between Low and High SES

Socio Economic Status		N	Mean	Std. Deviation	Std. Error Mean	p Value
Child - OIDP % SCORE	Low	49	19.8382	9.89636	1.41377	0.542
	High	71	18.6611	10.51768	1.24822	
Total Raw Score	Low	49	15.2857	5.98609	.85516	0.543
	High	71	14.6197	6.38159	.75736	
No. Of Performancs Affected	Low	49	3.5306	.86848	.12407	0.568
	High	71	3.4225	1.05101	.12473	
Dmft Score	Low	49	1.5918	1.88103	.26872	0.879
	High	71	1.6197	1.81554	.21546	
Deft Score	Low	49	1.7551	2.07696	.29671	0.221
	High	71	1.3944	2.09407	.24852	

Participants belonging to the low socioeconomic status group had a mean Child-OIDP percentage score of 19.84 ± 9.90 , compared with 18.66 ± 10.52 among participants with high socioeconomic status; however, the difference was not statistically significant ($p = 0.542$). Similarly, the mean

Total Raw Score was 15.29 ± 5.99 in the low socioeconomic status group and 14.62 ± 6.38 in the high socioeconomic status group, with no statistically significant difference ($p = 0.543$). The mean Number of Performances Affected was 3.53 ± 0.87 among participants with low

socioeconomic status and 3.42 ± 1.05 among those with high socioeconomic status, showing no statistically significant difference ($p = 0.568$). Likewise, the mean DMFT score was 1.59 ± 1.88 in the low socioeconomic status group and 1.62 ± 1.82 in the high socioeconomic

status group ($p = 0.879$). The mean DEFT score was 1.76 ± 2.08 among participants with low socioeconomic status compared with 1.39 ± 2.09 among participants with high socioeconomic status; this difference was also not statistically significant ($p = 0.221$).

Table 6: Comparison of the Intensity between Low and High SES

			Socio Economic Status		Total	Chi Square	p Value
			Low	High			
Intensity	No Impact	n	0	1	1	0.3695	0.449
		%	0.0%	1.4%	.8%		
	Very Little	n	6	15	21		
		%	12.2%	21.1%	17.5%		
	Little	n	26	30	56		
		%	53.1%	42.3%	46.7%		
	Moderate	n	9	17	26		
		%	18.4%	23.9%	21.7%		
	Severe	n	8	8	16		
		%	16.3%	11.3%	13.3%		
Total		n	49	71	120		
		%	100.0%	100.0%	100.0%		

The distribution of intensity of oral impacts did not differ significantly between participants belonging to the low and high socioeconomic

status groups ($\chi^2 = 0.37$, $p = 0.449$), indicating that socioeconomic status was not significantly associated with the reported intensity of oral health impacts

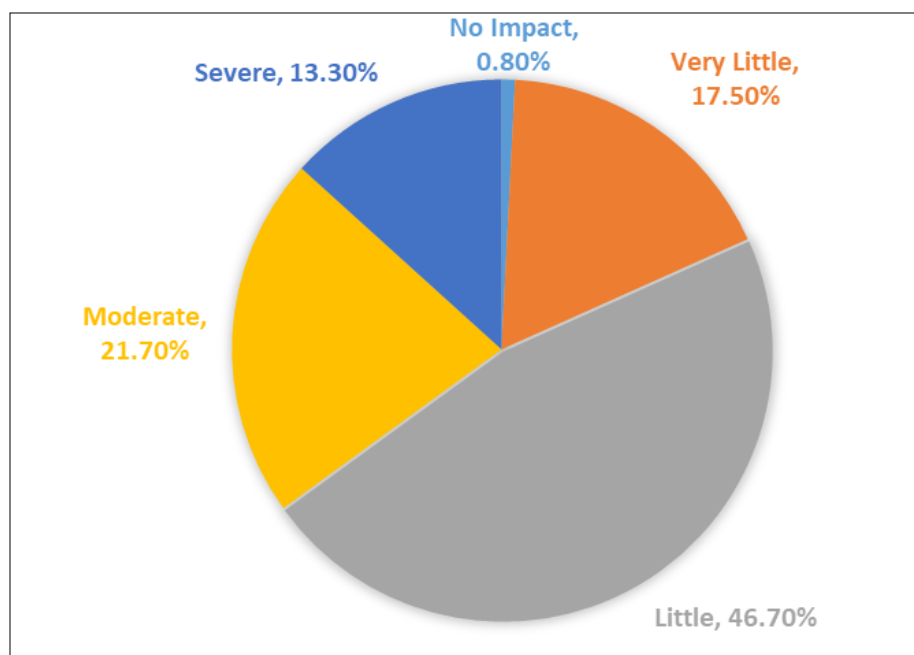


Fig 3: Distribution of Child-OIDP Intensity Categories

Table 7: Correlation between Child ODIP%, No of Performance Affected and Intensity with Age, Gender, SES, Total Raw Score, DMFT, DEFT, PI AND GI

			Child - oidp % score	No. Of performances affected	Intensity	Socio economic status	Total raw score	Dmft score	Deft score	Plaque index	Gingival index
Spearman's rho	Child - OIDP % SCORE	Correlation Coefficient	1.000	.543	.882	-.056	.901	.238	-.009	.195	.089
		p Value		.000	.000	.544	.000	.009	.918	.033	.331
		N	120	120	120	120	120	120	120	120	120
	NO. OF PERFORMANCE NCS AFFECTED	Correlation Coefficient	.543	1.000	.558	-.052	.610	.230	-.056	.079	.284
		p Value	.000		.000	.570	.000	.011	.547	.388	.002
		N	120	120	120	120	120	120	120	120	120
	INTENSITY	Correlation Coefficient	.882	.558	1.000	-.075	.941	.199	.154	.180	.097
		p Value	.000	.000		.415	.000	.029	.094	.049	.290
		N	120	120	120	120	120	120	120	120	120

Spearman's correlation analysis demonstrated a strong positive correlation between the Child-OIDP percentage score and Total Raw Score ($r = 0.901$, $p < 0.001$), Intensity ($r = 0.882$, $p < 0.001$), and Number of Performances Affected ($r = 0.543$, $p < 0.001$). A weak positive correlation was observed between the Child-OIDP percentage score and DMFT score ($r = 0.238$, $p = 0.009$) as well as Plaque Index ($r = 0.195$, $p = 0.033$). No statistically significant correlation was found between the Child-OIDP percentage score and Age ($p = 0.560$), Gender ($p = 0.214$), Socioeconomic Status ($p = 0.544$), DEFT score ($p = 0.918$), or Gingival Index ($p = 0.331$).

The Number of Performances Affected showed a moderate positive correlation with Total Raw Score ($r = 0.610$, $p < 0.001$) and Intensity ($r = 0.558$, $p < 0.001$), and a weak positive correlation with DMFT score ($r = 0.230$, $p = 0.011$) and Gingival Index ($r = 0.284$, $p = 0.002$). However, no significant correlation was observed with Age ($p = 0.271$), Gender ($p = 0.290$), Socioeconomic Status ($p = 0.570$), DEFT score ($p = 0.547$), or Plaque Index ($p = 0.388$).

Intensity demonstrated a very strong positive correlation with Total Raw Score ($r = 0.941$, $p < 0.001$), and a weak positive correlation with DMFT score ($r = 0.199$, $p = 0.029$) and Plaque Index ($r = 0.180$, $p = 0.049$). No statistically significant association was observed between Intensity and Age ($p = 0.954$), Gender ($p = 0.796$), Socioeconomic Status ($p = 0.415$), DEFT score ($p = 0.094$), or Gingival Index ($p = 0.290$).

Discussion

The present study evaluated the relationship between clinical oral health status, socioeconomic background, and oral health-related quality of life among school children aged 10–14 years using the Child-Oral Impacts on Daily Performances (Child-OIDP) index. The findings demonstrated that oral conditions exerted a considerable influence on children's daily activities, with the majority of participants reporting little (46.7%)-to-moderate (21.7%) intensity impacts. These results support studies done by Allen et. al. and Purohit et. al. indicating that oral diseases extend beyond clinical manifestations and significantly affect functional, psychological, and social dimensions of health among children and adolescents [3, 4].

In the present study, the mean DMFT and deft scores were 1.61 ± 1.83 and 1.54 ± 2.09 , respectively, indicating the main cause as untreated dental disease. Similar findings have been reported among Indian school children by Kanungo et al., who observed a DMFT score of 1.28 ± 1.79 this showed a significant association between dental caries prevalence and Child-OIDP scores among 12-year-old children in Bhubaneswar [5]. Likewise, Gherunpong et al. reported that children with higher levels of untreated caries experienced significantly greater impacts on daily performances, particularly those related to eating and oral hygiene maintenance [11]. The relationship observed in this study signifies the role of dental caries as one of the most important determinants of impaired oral health in children.

The prevalence pattern of daily performance impacts observed in this study is consistent with previous literature. Eating was the most frequently affected activity (56.7%), followed by cleaning teeth (45.0%). Similar findings have been documented in Thailand, Brazil and Sudan where eating difficulties consistently emerged as the most prevalent Child-OIDP domain affected by oral diseases [11,

12, 13]. The predominance of eating-related impacts may be attributed to pain, discomfort, and reduced masticatory efficiency associated with untreated carious lesions and pulpal involvement. Oral hygiene practices are similarly affected because children experiencing dental pain or gingival inflammation often avoid brushing due to discomfort.

Dental caries (35.0%) and toothache (25.8%) were identified as the leading self-reported causes of oral impacts. These findings closely relate with the global systematic review conducted by Purohit et al., which concluded that untreated dental caries remains the most common oral condition negatively influencing daily performances among children and adolescents worldwide [4]. Collectively, these findings emphasize the importance of early detection and management of dental caries to minimize its broader consequences on quality of life.

Interestingly, psychosocial domains such as studying (6.7%) and social contact (8.3%) were less frequently affected in the present study. Similar observations were reported by Yusuf et al. during the validation of the Child-OIDP instrument, where functional limitations were found to precede psychosocial consequences in younger age groups [7]. This pattern may reflect developmental characteristics of children aged 10–14 years, who may be more aware of pain and functional limitations than social or emotional consequences. However, studies conducted among older adolescents have demonstrated stronger psychosocial impacts, suggesting that age-related differences may influence the perception and reporting of oral health problems [14, 15].

The mean Child-OIDP raw score in the present study was 14.89 ± 6.21 , indicating a moderate level of oral impact. This value appears higher than those reported in several international studies. For example, Castro et al. reported lower average Child-OIDP raw score of 7.1 among Brazilian adolescents [13]. Although children from lower socioeconomic backgrounds demonstrated less favourable clinical indicators and marginally higher Child-OIDP scores, socioeconomic status was not significantly associated with oral health related quality of life outcomes in the analyses. This finding aligns with the observations of Mohamed and Vettore, who suggested that socioeconomic position may exert indirect rather than direct effects on quality of life through intermediate factors such as oral health behaviours, access to care, and clinical disease burden [6]. Similar findings have been reported in urban populations where educational opportunities and healthcare access are relatively comparable across socioeconomic groups [16]. The absence of significant socioeconomic differences in the present study may therefore reflect the urban setting of Pune City, where public and private healthcare services are relatively accessible to most residents.

A notable finding of the present study was the significant association between oral hygiene indicators and Child-OIDP severity. Both Plaque Index and Gingival Index demonstrated strong correlations with Child-OIDP scores, while multivariable analysis identified Plaque Index as a significant predictor of moderate-to-severe impacts. Similar relationships have been reported by Krisdapong et al., who found that poor oral hygiene and gingival inflammation were associated with reduced quality of life among children [17]. Likewise, Piovesan et al. demonstrated that gingival

bleeding and visible plaque accumulation significantly increased the probability of reporting daily performance limitations among children^[18].

Gender was not significantly associated with Child-OIDP impacts after multivariable adjustment, although female participants demonstrated slightly higher odds of moderate-to-severe impacts. Previous studies have reported inconsistent findings regarding gender differences. While some investigations have found higher impact scores among girls due to greater health awareness and aesthetic concerns, others have observed no significant gender-related differences after controlling for clinical factors^[14, 19].

Overall, the findings reinforce the importance of integrating patient-reported outcome measures with conventional clinical indicators in public health dentistry. Assessing both disease experience and its impact on daily functioning provides a more comprehensive understanding of children's oral health needs and can support the development of targeted preventive and therapeutic interventions. Such an approach aligns with contemporary patient-centered models of care and contributes to more effective oral health planning and resource allocation.

Conclusion

In conclusion, this study documents a notable burden of oral health problems among 10–14-year-old school children in Pune City, with clear linkages to impaired daily performances. While socioeconomic gradients were evident in trends, they did not reach statistical significance. Female gender and poorer periodontal health were identified as key factors associated with greater impacts.

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