

Dental Problems in Underprivileged Children Living in Urban Slums of Nagpur

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Abstract

Background and Objective: Underprivileged children living in urban slums are at increased risk of oral diseases and often have limited access to dental care. This study aimed to identify dental problems among underprivileged children from urban slums of North Nagpur, implement appropriate oral health interventions, and evaluate their short-term benefits. **Materials and Methods:** A community-based intervention study was conducted among 102 underprivileged children. Clinical examination assessed oral health status and treatment needs, while oral hygiene practices and dietary habits were recorded using a structured questionnaire. Oral health education, dietary counselling, preventive measures, and necessary dental treatment were provided through a mobile dental unit. Follow-up assessment was conducted after one month. **Results:** The mean age of the children was 8.75 years, with 60.8% females. Dental caries was the most common oral health problem (38.2%). Twice-daily toothbrushing increased from 18.6% to 31.4%, while frequent sweet consumption decreased from 11.8% to 5.9%. The proportion of children requiring no treatment increased from 46.0% to 57.8%, with a corresponding reduction in preventive/routine and urgent treatment needs. **Conclusion:** Underprivileged children had a considerable burden of oral health problems and unmet treatment needs. The community-based intervention demonstrated favourable short-term improvements in oral hygiene practices, dietary behaviour, and treatment needs, highlighting the importance of continued community-based oral health services for underserved children.

Keywords: Underprivileged children; Urban slums; Dental caries; Oral health; Oral hygiene; Community-based intervention.

1. Introduction

Children from socioeconomically disadvantaged backgrounds experience significant inequalities in access to education, adequate nutrition, healthcare services, and other essential resources required for healthy growth and development, making them particularly vulnerable to poor oral health outcomes and dental neglect.^[1] According to the United Nations Millennium Development Goals (MDG) programme and the Purchasing Power Parity (PPP) International Comparison Program (2019), approximately 80 million people, representing 6.7% of India's population, live below the poverty line.^[2,3] Despite improvements in the availability of dental services over the years, socioeconomic inequalities continue to limit access to oral healthcare among disadvantaged populations because of financial constraints, inadequate awareness, and poor utilization of available services.^[1] Children residing in urban slums are particularly susceptible to oral diseases owing to overcrowded living conditions, poor oral hygiene practices, inadequate health awareness, and limited access to preventive and curative dental care. Furthermore, children in the early adolescent age group may be exposed to deleterious habits such as smoking, tobacco chewing, kharra chewing (which is commonly practiced in Central India), pan chewing, and alcohol consumption under the influence of family members and peers. Early initiation of these habits further increases their risk of developing oral and systemic health problems.^[4,5]

Oral health is an integral component of general health and significantly influences the physical, psychological, and social well-being of children. Poor oral health can adversely affect children's quality of life and academic performance.^[6] Untreated dental conditions often result in pain, discomfort, difficulty in eating, disturbed sleep, and reduced participation in play and other daily activities, thereby affecting normal growth and development.^[7,8] In addition, misconceptions among parents and caregivers regarding the importance of primary teeth remain a major barrier to timely dental care. Many believe that primary teeth will naturally exfoliate and therefore fail to seek professional treatment, allowing preventable oral diseases to progress.^[9] Several epidemiological studies have evaluated the oral health status of children in India; however, comparatively fewer studies have specifically

investigated the oral health status of underprivileged children residing in urban slums, particularly in Central India.^[10,11] While several studies have reported the oral health status of children in India, there remains a need for community-based research that not only identifies oral health problems among underprivileged children but also evaluates practical interventions to improve their oral health outcomes.

The present study focused on children aged 6–12 years, corresponding to the mixed dentition period, which is recognized as a critical stage because of the high prevalence of dental caries and other oral health problems.^[10] Assessing oral health during this period provides an opportunity for early intervention and the implementation of preventive measures that can improve long-term oral health outcomes. Therefore, the present study was undertaken to identify the dental problems among underprivileged children living in urban slums of Central India through registered non-governmental organizations (NGOs), implement appropriate measures to address the identified oral health problems, and evaluate the benefits of these interventions in improving their oral health status.

2. Materials and Methods

2.1 Study design and study setting

A community-based prospective follow-up study was conducted among underprivileged children aged 6–12 years residing in six urban slums of North Nagpur, Maharashtra, India. The children were registered beneficiaries of the non-governmental organization (NGO) Sunshine Foundation India. The study was conducted through oral health camps organized in collaboration with the NGO.

The study protocol was reviewed and approved by the Institutional Ethics Committee of Government Dental College and Hospital, Nagpur (IEC/05/11 dated 24/04/2022). Written informed consent was obtained from the parents or legal guardians of all participating children before enrolment in the study.

The sample size was estimated using Epi Info software (Centers for Disease Control and Prevention, Atlanta, GA, USA) based on the findings of a previous follow-up study conducted by Pawar et al.^[12] A minimum sample size of 102 participants was obtained. Participants were recruited using a convenience sampling technique. Children aged 6–12 years belonging to families below the poverty line and possessing a valid yellow or orange ration card were eligible for inclusion. Children who were present on the day of examination and whose parents or legal guardians provided written informed consent were included in the study. Children above the poverty line, those absent on the day of examination, and those whose parents or guardians declined participation were excluded from the study.

2.2 Data collection

Data collection was carried out during two visits at an interval of one month. During the baseline visit, demographic characteristics, dietary habits, and oral hygiene practices were recorded using a structured questionnaire developed by the investigators. The questionnaire was reviewed and validated for its content, clarity, and relevance by subject experts before administration. The validated questionnaire was administered to the parents or guardians under the supervision of two trained investigators.

Following questionnaire administration, the oral health status of the participants was assessed using the WHO Oral Health Assessment Form for Children (2013).^[13] Clinical examinations were performed by experienced dental surgeons using sterilized mouth mirrors, WHO periodontal probes, and disposable wooden tongue depressors under natural daylight with the aid of battery-operated LED torches. Children were examined while seated comfortably in an upright position in a well-ventilated area within the NGO premises. Standard infection control protocols and universal precautions were followed throughout the examination.

2.3 Oral health intervention

Following clinical examination, individualized treatment plans were prepared for children requiring dental care. Basic dental treatment, including glass ionomer cement (GIC) restorations, oral prophylaxis (scaling), and extractions whenever indicated, was provided through a mobile dental unit by experienced dental surgeons. Children requiring specialized or comprehensive dental treatment beyond the scope of the mobile unit were referred to Government Dental College and Hospital, Nagpur, where appropriate treatment was completed within one month. Comprehensive oral health education was provided to all participating children irrespective of their treatment needs. Demonstrations

of the Modified Bass toothbrushing technique were performed using a dental typodont, toothbrushes, educational posters, and jaw models. In addition, oral hygiene instructions, dietary counselling, and habit cessation counselling were provided through interactive educational sessions. Age-appropriate oral health games and educational activities were also conducted to encourage active participation and reinforce oral hygiene practices.

A follow-up oral health camp was conducted one month after the baseline examination. All children who had participated during the initial visit were re-evaluated using the same structured questionnaire and the WHO Oral Health Assessment Form for Children (2013).^[13] Clinical examination was performed following the same standardized protocol. The oral health status of the participants and completion of the recommended treatment were assessed during the follow-up visit.

2.4 Statistical analysis

The collected data were entered into Microsoft Excel and analysed using IBM SPSS software version 21.0. Descriptive statistics were expressed as frequencies and percentages, and the baseline and one-month follow-up findings were compared using these descriptive measures.

3. Results

A total of 102 underprivileged children aged 6–12 years participated in the study. The study population comprised 40 (39.2%) males and 62 (60.8%) females, with a mean age of 8.75 years. More than half of the participants (56%) were studying in Standards I–IV (Table 1).

Table 1: Demographic Data of Participated Children

Characteristic	n (%)
I) Gender	
Male	40 (39.2)
Female	62 (60.8)
II) Age (years)	6–12
Mean (range)	8.75
III) School grade	
UKG–KG2	8 (7.8)
Grades 1–4	57 (55.9)
Grades 5–8	33 (32.3)
Grade 9 and above	4 (3.9)

The oral health status of the participants at baseline and one-month follow-up is presented in Tables 2–3. At baseline, 39 (38.2%) children had a positive deft score, with a total of 88 decayed primary teeth, two filled teeth without recurrent caries, and two teeth missing due to caries. The highest recorded deft score was 8. At the one-month follow-up, the proportion of children with a positive deft score decreased to 28 (27.5%), with 39 decayed primary teeth, six filled teeth with caries, twelve filled teeth without caries, and one tooth missing due to caries. The maximum deft score recorded at follow-up was 6 (Tables 2). Assessment of the permanent dentition revealed a positive DMFT score in 14 (13.7%) children at baseline and 15 (14.7%) children at follow-up. At baseline, all affected permanent teeth were untreated carious teeth. During follow-up, restorations without recurrent caries were observed in some participants, while one participant had a restored tooth with recurrent caries. The permanent first molars were the most commonly affected teeth in all quadrants (Table 3). Among the additional oral findings, gingival bleeding was observed in five children, while enamel hypoplasia was detected in 29 children. Dental erosion, traumatic dental injuries, and oral mucosal lesions were observed in only a few participants.

Table 2: Total deft of Primary Dentition – First and Second Visit

Visit	Total deft	Decayed teeth count	Filled teeth count	Missing teeth count
First Visit	deft positive in 39 (38%) patients	Caries present in 88 teeth Caries 4 in 4 patients, Caries 6 in 2, Caries 8 in 1 patient	Filled with no caries – 2	Missing due to caries – 2
Second Visit	deft positive in 28 patients (27%)	Caries in 39 teeth Caries 4 in 2 patients and caries 6 in 1 patient	Filled with caries in 6 teeth Filled with no caries in 12	Missing due to caries in 1

Table 3. Total DMFT of Permanent Dentition

Visit	Total DMFT	Frequency	Decayed teeth count	Filled teeth count	Other findings
First visit	DMFT Positive in 14 (all caries-not filled)	13.7%	Caries 1 in 4 patients 2 in 4 3 in 5 4 in 1	0	Unerrupted 8 in 1
Second visit	DMFT in 15 patients	14.7%	Caries 1 in 3 2 in 2 3 in 2	Filled no caries -1 in 2 patients Filled no caries-2 in 5 patients Filled with caries-2 in 1 patient	-

The findings of the oral health questionnaire are summarized in Table 4. The proportion of children brushing their teeth twice daily increased from 19 (18.6%) at baseline to 32 (31.4%) at follow-up, while those brushing once daily decreased from 79 (77.5%) to 70 (68.6%). Nearly all participants reported using a toothbrush and toothpaste for cleaning their teeth during both visits. The proportion of children replacing their toothbrush every three months increased from 53 (52.0%) at baseline to 68 (66.7%) at follow-up, whereas the number replacing the toothbrush only after the bristles became frayed decreased from 40 (39.2%) to 28 (27.5%). Daily consumption of sweet foods more than four times decreased from 12 (11.8%) to 6 (5.9%) following the intervention. A few children reported betel nut chewing during the baseline assessment; however, this habit was not reported during the follow-up visit (Table 4).

Table 4. Oral Health Questionnaire Responses

Question	Response	First visit (n)	First visit (%)	Second visit (n)	Second visit (%)
Q1. How often do you brush your teeth?	Once daily regularly	79	77.5	70	68.6
	Twice daily regularly	19	18.6	32	31.4
	Once daily irregularly	1	0.98	0	-
	Sometimes	3	2.94	0	-
Q2. What method used to clean teeth?	Brush/paste	101	99	102	100
	Dental floss	1	0.98	0	-
	Finger	0	-	0	-
	Water only	0	-	0	-

	Traditional instruments	0	-	0	-
	Other	0	-	0	-
Q3. How often do you change your toothbrush	6 months	8	7.84	4	3.92
	3 months	53	51.96	68	66.66
	1 year	1	0.98	2	1.96
	Till bristles fray	40	39.21	28	27.45
Q4. How do you consume sweet food in a day	1-2 times	57	55.88	67	65.68
	3-4 times	11	10.78	11	10.78
	More than 4 times	12	11.76	6	5.88
	Not specified	22	21.56	18	17.64
Q5. Have you faced any dental problem in past 3 months?	Yes	11	10.78	24	23.52
	No	69	67.64	65	63.72
	if yes, specify-	22 different groups follows: as Caries-9 Dental pain - 6 Pain in jaw-2 Sensitivity-5	21.56 8.8 5.8 1.9 4.9	12 Different groups follows: as Caries-9 Sensitivity-3	12.7 8.82 2.94

The treatments provided during the two outreach camps are presented in Table 5. At baseline, 47 (46.0%) children did not require any dental treatment, which increased to 59 (57.8%) at follow-up. Preventive and routine treatment, primarily comprising glass ionomer cement restorations, was provided to 33 (32.4%) children during the first camp and 21 (20.5%) children during the second camp. Oral prophylaxis and other prompt treatments were performed for 11 (10.7%) and 16 (15.6%) children during the first and second camps, respectively. Three children required urgent treatment because of pain or infection during the baseline visit, whereas none required urgent treatment at follow-up. The number of children referred to Government Dental College and Hospital for comprehensive dental care also decreased from 8 (7.8%) to 6 (5.8%) following the intervention (Table 5).

TABLE 5: Treatment Provided in Both Camps

TREATMENTS	FIRST CAMP	Frequency %	SECOND CAMP	Frequency %
No treatment needed	47	46%	59	57.8%
Preventive or routine treatment needed (including GIC restorations)	33	32%	21	20.5%
Prompt treatment (including scaling) needed	11	10.7%	16	15.6%
Immediate (urgent) treatment needed due to pain or infection of dental and/or oral origin	3	2.9%	0	-
Referred for comprehensive evaluation or dental treatment to government dental college and hospital	8	7.8%	6	5.8%

4. Discussion

The present study evaluated the oral health status, oral health-related practices, and treatment needs of underprivileged children aged 6–12 years residing in urban slums of North Nagpur, along with the changes observed following a community-based oral health intervention. A total of 102 children participated in the study, with females comprising 60.8% and males 39.2% of the study population. Attendance was 85% at the first camp and 83% at follow-up, indicating good sustained engagement over the one-month interval, comparable to participation levels reported in other school- and community-based outreach programs for underprivileged children.^[12]

At baseline, 38.2% of children had a positive deft score; this fell to 27.5% at follow-up, most plausibly reflecting the direct effect of GIC restorations delivered through the mobile dental unit. This baseline burden was lower than the 63.6% reported by Jindal et al.^[14] but consistent with the substantial untreated caries load documented among slum-dwelling children by Marya et al.^[11] and with Reddy et al.'s^[15] findings in a comparable Indian school-going population. Contributing factors likely include limited independent brushing ability at this age, frequent sweet consumption, and the thinner enamel of primary compared with permanent teeth.^[14] In the permanent dentition, the proportion of children with a DMFT score of 1 or more rose marginally at follow-up (13.7% to 14.7%), accompanied by an increase in filled teeth. Given the short one-month interval, this is unlikely to represent new caries development and more likely reflects detection of a previously undiagnosed lesion at re-examination, or reclassification of a treated tooth from "decayed" to "filled" following restoration. The lower overall permanent-dentition caries prevalence relative to the primary dentition is consistent with the pattern reported by Jindal et al. and Reddy et al.,^[14,15] and may partly reflect the WHO caries index recording a lesion only once dentin involvement is present, which can underestimate incipient permanent-tooth caries. Enamel hypoplasia was observed in 29 children (28.4%), considerably higher than the 6.2% reported by Al Kamal,^[16] a difference potentially related to maternal or perinatal nutritional vulnerability, a plausible contributor given this population's socioeconomic profile, though maternal or birth history data were not collected in this study.

Oral hygiene practices showed modest improvement following intervention: twice-daily brushing increased from 18.6% to 31.4%, and toothbrush replacement every three months increased from 52.0% to 66.7%, though both remained below levels reported by Singhal et al.^[17] (42% twice-daily) and Bamba et al.^[18] (90% three-month replacement), suggesting this population began from a lower baseline of preventive awareness. Toothbrush and toothpaste use was already near-universal at both visits, similar to Kamran et al.^[19] Daily consumption of sweets more than four times fell from 11.8% to 5.9% following dietary counselling, though remained above levels reported by Singhal et al.^[17] A few children reported betel nut chewing at baseline, with none reporting this habit at follow-up, a promising but preliminary finding given the short, self-reported follow-up interval- against a background prevalence far lower than the 78.09% reported among older students by Snigdha et al.^[20]

Treatment needs declined between the two camps: children requiring no treatment increased from 46.0% to 57.8%, preventive/routine treatment need fell from 32.4% to 20.5%, and urgent treatment need fell from three children to none. This reduction in treatment need is consistent with the sustained benefit reported over a longer follow-up period by Pawar et al.,^[12] whose earlier work also informed the sample size calculation for the present study, and supports outreach camps as a feasible approach to narrowing the treatment gap in similarly underserved populations. Nonetheless, 20.5% and 5.8% of children still required preventive/routine or referral-level care at follow-up, indicating that a single-month intervention could not fully resolve treatment needs in this population.

The present study has certain limitations, including convenience sampling from a single NGO, a short one-month follow-up, and the absence of a control group, which limit generalisability and causal inference. Self-reported behavioural data may be subject to recall and social-desirability bias, and the lack of reported examiner calibration may have introduced measurement variability.

5. Conclusion

Within the limitations of the present study, underprivileged children residing in urban slums of North Nagpur showed a considerable burden of dental caries and other oral health problems, with significant unmet treatment needs. The community-based intervention, comprising oral health education, dietary counselling, screening, and treatment through a mobile dental unit, resulted in favourable short-term improvements in oral hygiene practices, dietary

behaviour, and treatment needs. However, some children continued to require preventive and referral care, emphasising the need for regular oral health education, periodic screening, treatment, and follow-up to improve and sustain oral health in underserved communities.

6. REFERENCES

1. da Fonseca MA, Avenetti D. Social determinants of pediatric oral health. *Dent Clin North Am*. 2017;61(3):519-532.
2. Chandy L, Kharas H. What do new price data mean for the goal of ending extreme poverty. Brookings Institution blog. 2014 May 5;5.
3. Mehra P. 8% GDP growth helped reduce poverty: UN report. *The Hindu*. 2016 Apr;2.
4. Deshpande C. Kharra capital: 62% Vidarbha adults consume tobacco. *The Times of India* [Internet]. 2020 Dec 18 [cited 2026 Aug 7].
5. Sharma P, Wadhwan V, Aggarwal P, Sharma N. Adolescent tobacco menace: Attitudes, norms, and parental influence. *Indian journal of dental research*. 2017 Jul 1;28(4):465-9.
6. Kwan SY, Petersen PE, Pine CM, Borutta A. Health-promoting schools: an opportunity for oral health promotion. *Bulletin of the World Health organization*. 2005;83:677-85.
7. Slade GD. Epidemiology of dental pain and dental caries among children and adolescents. *Community dental health*. 2001 Dec;18(4):219-27.
8. Gathecha G, Makokha A, Wanzala P, Omolo J, Smith P. Dental caries and oral health practices among 12 year old children in Nairobi West and Mathira West Districts, Kenya. *The Pan African Medical Journal*. 2012 Jun 22;12:42.
9. Escoffié-Ramirez M, Ávila-Burgos L, Baena-Santillan ES, Aguilar-Ayala F, Lara-Carrillo E, Minaya-Sánchez M, Mendoza-Rodríguez M, Márquez-Corona MD, Medina-Solís CE. Factors associated with dental pain in Mexican schoolchildren aged 6 to 12 years. *BioMed research international*. 2017;2017(1):7431301.
10. Pandey P, Nandkeoliar T, Tikku AP, Singh D, Singh MK. Prevalence of dental caries in the Indian population: A systematic review and meta-analysis. *J Int Soc Prev Community Dent*. 2021;11(3):256-265.
11. Marya C, Kataria S, Nagpal R, Oberoi SS, Dhingra C, Arora D. A cross-sectional study for assessment of untreated dental caries and its consequences among slum-dwelling children. *Int J Clin Pediatr Dent*. 2017;10(1):29-33. doi:10.5005/jp-journals-10005-1402.
12. Pawar H, Saha S, Jagannath G, Kumari M, Narang R, Singh E. Effectiveness of outreach program: a three year follow-up study among 12 years school students in lucknow. *J Clin Diagn Res*. 2015 Jan;9(1):ZC35-8.
13. World Health Organization. Oral health surveys: basic methods. World Health Organization; 2013.
14. Jindal L, Dua P, Mangla R, Gupta K, Vyas D, Gupta P. Dental caries in relation to socioeconomic factors of 6 and 12-year-old schoolchildren of Paonta Sahib, Himachal Pradesh, India: an epidemiological study. *Int J Clin Pediatr Dent*. 2020;13(4):395-398. doi:10.5005/jp-journals-10005-1805.
15. Reddy KS, Reddy S, Ravindhar P, Balaji K, Reddy H, Reddy A. Prevalence of dental caries among 6-12 years school children of Mahbubnagar District, Telangana State, India: a cross-sectional study. *Indian J Dent Sci*. 2017;9(1):1-7. doi:10.4103/0976-4003.201641.
16. Al Kamal A. Enamel Hypoplasia among Tikrit City School Children Aged 6 Years to 13 Years Old. 2017;5:115–120.
17. Singhal K, Prashant MA, Singh V, Choudhary R. Knowledge, attitude and practice of parents about child oral health in Jodhpur City: a questionnaire survey. *Int J Dent Med Res*. 2015;1(6):37-41.
18. Bamba S, Chandra S, Duhan H. A questionnaire-based study to assess the level of awareness among parents about preventive measures and its relationship with dental health status of 6-12 years old children in Panchkula, Haryana, India. *J South Asian Assoc Pediatr Dent*. 2019;2(1):10-13.
19. Kamran A, Bakhteyar K, Heydari H, Lotfi AA, Heydari Z. Survey of oral hygiene behaviors, knowledge and attitude among school children: a cross-sectional study from Iran. 2014.
20. Snigdha S, Bajwa T, Anand S, Mohan L, Goyal K, Mittal M, et al. Cross-sectional study on prevalence of betel nut chewing among the youth of Meghalaya, North East Region of India: development of multifaceted prevention strategy. *Asian Pac J Health Sci*. 2021;8(3):185-190.