RESEARCH PAPER

Prevalence and Risk Factors of Oral Diseases in Adolescents: A Community-Based Study

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ABSTRACT
Oral diseases continue to pose a major public health challenge among adolescents, particularly in communities where limited awareness, inadequate oral hygiene practices, and restricted access to dental care intersect. This study investigates the **prevalence and risk factors of oral diseases among adolescents** through a community-based, cross-sectional approach designed to capture variations in behavioral, environmental, and socio-economic determinants. Data were collected from adolescents aged 12 to 18 years using a multi-stage sampling strategy that included structured interviews, clinical examinations based on standardized diagnostic criteria, and assessments of oral hygiene habits. The clinical component focused on identifying dental caries, gingival inflammation, periodontal pockets, malocclusion, fluorosis, and other frequently observed oral health conditions. The study revealed a high burden of preventable oral diseases, with dental caries emerging as the most widespread condition across all age groups. Poor brushing frequency and improper brushing techniques were found to be strongly associated with caries incidence, while gingival diseases were more prevalent among adolescents with irregular professional dental visits and inadequate dietary habits, particularly high consumption of sugar-rich snacks and beverages. Socio-economic factors such as parental education level, household income, and access to sanitary amenities demonstrated a significant influence on oral health outcomes. Adolescents from lower socio-economic backgrounds exhibited disproportionately higher disease prevalence, highlighting persistent inequalities that extend beyond individual behavior. Environmental influences, including water source, fluoride availability, and neighborhood sanitation, also contributed to variations in oral disease patterns. Gender-based differences were observed, with females reporting better oral hygiene practices but still experiencing comparable levels of gingival inflammation, suggesting that hormonal changes during adolescence may play a contributory role. The analysis further underscored the importance of school-based awareness programs, as adolescents who had previously participated in structured oral health education displayed notably lower disease scores. The findings underscore the urgent need for integrated, community-centered interventions that address both behavioral gaps and structural determinants. Strengthening preventive dental services, expanding oral health education, and introducing targeted outreach programs for vulnerable groups are essential steps toward reducing the burden of oral diseases in adolescents. This study contributes evidence for policymakers, school health administrators, and public health planners aiming to reform adolescent oral health strategies within community settings.

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INTRODUCTION

Oral health is an essential component of general well-being, yet it remains one of the most neglected areas of adolescent health in many parts of the world. Adolescence represents a stage of accelerated physical, cognitive, and psychosocial development, during which individuals establish habits that often persist into adulthood. Among these habits, oral hygiene practices, dietary choices, and healthcare-seeking behavior significantly influence the long-term status of oral health. Despite their importance, these behaviors are frequently inconsistent or inadequate among adolescents, making this age group particularly vulnerable to a wide range of preventable oral diseases. The increasing global prevalence of oral diseases in younger populations has generated concern among public health experts, prompting renewed attention toward

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identifying risk factors and designing targeted community-level interventions.

Oral diseases among adolescents typically include dental caries, gingivitis, early periodontal changes, malocclusion, dental erosion, fluorosis, and oral mucosal abnormalities. Among these, dental caries remains one of the most pervasive chronic conditions, often progressing silently until it results in pain, infection, or tooth loss. Adolescents are particularly susceptible due to frequent snacking, increased consumption of sugary beverages, irregular brushing habits, and limited access to preventive dental services. Gingival and periodontal conditions also emerge during this period due to hormonal fluctuations associated with puberty, which amplify inflammatory responses to plaque accumulation. These conditions, if not addressed early, can set the stage for lifelong periodontal complications. The rising popularity of carbonated drinks, processed foods, and fast foods further compounds these risk factors, creating an environment conducive to the development of oral health problems. The burden of oral diseases during adolescence holds implications that extend well beyond physical discomfort. Poor oral health can affect academic performance, social interaction, self-esteem, nutritional intake, and overall quality of life. Persistent toothache or oral discomfort can disturb sleep, reduce concentration levels, and influence participation in school and extracurricular activities. In several communities, adolescents hesitate to seek dental care due to fear, lack of awareness, cultural norms, or financial constraints within the family. As a result, early symptoms often remain unnoticed or untreated until they evolve into severe conditions that require more complex interventions. The incidence of preventable oral diseases during adolescence is thus a reflection not merely of individual behavior, but also of structural barriers embedded within the health system and community environment. Community-based studies play a critical role in uncovering the multifaceted contributors to oral disease prevalence. Unlike clinical studies that focus solely on patients who visit dental facilities, community-based research offers a more representative understanding of oral health across diverse socio-economic and demographic groups. In many low- and middle-income regions, adolescents rarely receive routine dental check-ups, making community-level data indispensable for designing effective health strategies. Such studies allow researchers to examine the interplay between behavioral factors such as tooth-brushing frequency, technique, and use of fluoride toothpaste and broader determinants that include parental education, household income, neighborhood sanitation, and access to clean water. By capturing this spectrum of influences, community-based research provides insights that are essential for public health planning, school-based interventions, and policymaking. Socio-economic factors have long been recognized as powerful predictors of oral disease risk. Adolescents belonging to households with lower income or lower parental education are more likely to experience inadequate oral hygiene, irregular dental visits, and higher consumption of inexpensive, sugar-dense foods. Limited health literacy within families often results in a lack of awareness regarding the importance of preventive oral care. In such contexts, oral health tends to be deprioritized until symptoms of pain or infection emerge. The consequences of these disparities are reflected in oral disease patterns, where vulnerable groups bear a disproportionate burden. Moreover, socio-economic inequalities intersect with environmental conditions such as access to fluoridated water, availability of dental services, and quality of school-based health programs, further shaping the oral health trajectory of adolescents.

Another critical dimension of adolescent oral health is behavior. The shift toward autonomy in adolescence often involves making independent choices regarding hygiene routines and dietary habits. For many adolescents, brushing frequency declines during this stage due to time pressures, disinterest, or lack of supervision. Simultaneously, the consumption of snack foods and sugary drinks, which are often marketed aggressively to younger populations, increases substantially. Peer influence, stress, early experimentation with tobacco, and changing sleep patterns may also contribute to poor oral health practices. Adolescents who engage in sports sometimes consume energy drinks high in sugars and acids, increasing the risks of dental erosion and caries. Recognizing these behaviors and their underlying motivations is crucial to designing interventions that resonate with adolescents' lived realities. In examining oral diseases in adolescents, it is also important to acknowledge the biological transformations taking place during this period. Hormonal changes associated with puberty can lead to heightened gingival sensitivity, making adolescents more prone to inflammation even with modest plaque accumulation. Orthodontic issues often emerge or become pronounced during this age, introducing additional challenges to maintaining oral hygiene. Braces and other orthodontic appliances create niches that trap food particles and plaque, raising the risk of both caries and gingivitis. The interplay between these biological factors and behavioral lapses underscores the need for comprehensive preventive efforts that integrate clinical, behavioral, and educational components. Despite the clear importance of early oral health promotion, many communities continue to lack structured programs that target adolescents. School-based oral health initiatives, when present, are often limited to occasional awareness campaigns or basic screenings, without sustained follow-up or reinforcement of preventive practices. In rural or underserved areas, the absence of dental professionals, coupled with inadequate infrastructure, further restricts opportunities for preventive care. Even where services are available, adolescents may be reluctant to seek help due to fear, stigma, or misconceptions about dental treatment. This reality highlights the necessity of community-engaged approaches that go beyond clinical settings to address the broader determinants of oral health.

The present study was conceived in response to these gaps, aiming to provide a holistic understanding of the

prevalence and risk factors associated with oral diseases among adolescents in a community setting. By examining both clinical findings and behavioral, environmental, and socio-economic variables, the study seeks to establish a detailed profile of adolescent oral health within the chosen community. Such an approach recognizes that oral diseases are not isolated medical conditions but are influenced by multiple interconnected factors. Characterizing these factors allows for the identification of high-risk groups, the recognition of patterns unique to the local context, and the development of targeted solutions that align with community needs. Furthermore, documenting adolescent oral health at the community level contributes to the broader global effort to reduce the burden of preventable oral diseases. The World Health Organization has repeatedly emphasized the critical role of early prevention in reducing oral disease prevalence and minimizing healthcare costs over the long term. Community-level data offer a foundation upon which meaningful public health interventions can be built, from awareness campaigns and school programs to policy reforms and service expansion. Identifying risk factors also enables researchers and health professionals to anticipate emerging trends and adapt strategies in response to changing behaviors or environmental conditions. Finally, this study acknowledges the importance of integrating cultural considerations and local practices in shaping oral health behavior. In many communities, traditional beliefs influence dental-care decisions, sometimes deterring adolescents from seeking professional help or encouraging home remedies that may be ineffective. Understanding these cultural contexts is vital to ensuring that interventions are both effective and culturally sensitive. By presenting a community-grounded, nuanced exploration of adolescent oral health, this research aims to contribute meaningful evidence that supports sustainable and equitable oral health improvements.

METHODOLOGY

The methodology for this community-based study was designed to capture a comprehensive and accurate representation of the prevalence and risk factors associated with oral diseases in adolescents. The study focused on evaluating clinical, behavioral, environmental, and socio-economic determinants that shape oral health outcomes. A combination of quantitative clinical examinations and structured interviews was employed to ensure that both observable conditions and underlying influencing factors were adequately investigated. The methodology emphasized transparency, replicability, and adherence to ethical standards throughout all phases of research.

STUDY SETTING AND POPULATION

The study was carried out in a defined community area consisting of mixed socio-economic zones, including both urban and semi-urban sectors. These areas were selected because they reflected diverse living conditions, varying levels of access to healthcare, and different behavioral practices among adolescents. The target population comprised adolescents aged 12 to 18 years enrolled in local schools and those residing permanently within the community. To avoid sampling bias, equal representation from different neighborhoods, school types, and socio-economic groups was ensured.

The selection of adolescents in this age group was deliberate, as this developmental phase is associated with major shifts in dietary behaviors, oral hygiene habits, and psychosocial influences that directly impact oral health. The study aimed to capture these variations and explore how individual, familial, and community-level factors interplay to shape oral disease patterns.

STUDY DESIGN

A **cross-sectional, community-based design** was adopted, allowing the examination of the prevalence of different oral diseases at a single point in time. This design also facilitated the assessment of multiple risk factors simultaneously, enabling the identification of correlations between oral conditions and determinants such as hygiene practices, dietary patterns, access to healthcare, and socio-economic status.

To ensure reliability, the study combined **clinical oral examinations** with **structured questionnaires**, each contributing uniquely to the understanding of oral health status. The questionnaires addressed oral hygiene behavior, diet, parental influence, socio-economic conditions, awareness, and healthcare-seeking habits.

SAMPLE SIZE DETERMINATION

The sample size was calculated using standard epidemiological formulas for cross-sectional surveys. Based on an estimated oral disease prevalence of 40% in the region, a 95% confidence level, and a 5% margin of error, the required sample size was determined to be approximately 370 participants. To compensate for potential non-response or incomplete data, the sample size was increased to 400 adolescents.

A multistage sampling technique was used:

1. **Stage 1:** Random selection of schools and residential blocks.
2. **Stage 2:** Selection of classes or household groups.
3. **Stage 3:** Systematic random sampling of adolescents within selected units.

INCLUSION AND EXCLUSION CRITERIA

To maintain consistency, clear criteria were applied.

INCLUSION CRITERIA

- Adolescents aged 12–18 years
- Residents of the community for at least 12 months
- Consent from parents/guardians and assent from adolescents

EXCLUSION CRITERIA

- Adolescents undergoing orthodontic or systemic medical treatment, which influences oral health

- Individuals with developmental conditions affecting oral examination
- Those unwilling to participate

DATA COLLECTION INSTRUMENTS

Data collection involved two primary tools:

1. **Clinical Oral Examination Protocol**
2. **Structured Questionnaire**

The instruments were prepared following international standards, pilot-tested on 20 adolescents for clarity, and refined before implementation.

CLINICAL EXAMINATION

Clinical examinations were conducted using standardized diagnostic criteria established by the **World Health Organization (WHO) Oral Health Assessment Form for Children and Adolescents** (revised version). The examination included assessment for:

- Dental caries
- Gingival inflammation
- Periodontal pockets
- Dental fluorosis
- Malocclusion
- Oral mucosal lesions
- Tooth wear and erosion

Each examination was carried out under natural daylight or portable dental lamps to ensure accuracy. Disposable gloves, sterilized instruments, and infection-control protocols were strictly followed.

DIAGNOSTIC SCALE USED IN THE STUDY

Table 1: Diagnostic Criteria Used for Oral Examination

Condition	Diagnostic Criteria	Scale Used
Dental Caries	Visual/tactile confirmation of an enamel or dentin lesion	WHO Caries Index (DMFT/DMFS)
Gingivitis	Presence of redness, swelling, bleeding on probing	GI Score (0–3)
Periodontal Disease	Pocket depth measurement, mobility	CPI Index
Fluorosis	Enamel discoloration/defects	Dean's Fluorosis Index
Malocclusion	Crowding, spacing, overbite, crossbite	Dental Aesthetic Index
Oral Mucosal Lesions	Ulcers, leukoplakia, fungal patches	WHO Classification

QUESTIONNAIRE ADMINISTRATION

The questionnaire consisted of five sections:

1. **Demographic Information**
2. **Oral Hygiene Behaviors**
3. **Dietary Habits**
4. **Healthcare Access and Utilization**
5. **Environmental and Socio-economic Background**

Questions were a mixture of closed-ended, Likert-scale, and a few open-ended items. The language was simple and age-appropriate. Trained field investigators administered the questionnaire individually to avoid peer influence and ensure confidentiality.

SAMPLE OF BEHAVIORAL MEASURES

Table 2: Selected Variables and Measurement Description

Variable	Description	Type
Tooth-Brushing Frequency	Times per day	Ordinal
Toothpaste Type	Fluoridated / Non-fluoridated	Nominal
Sugary Snack Intake	Frequency per week	Ordinal
Dental Visit Frequency	Never / Yearly / Only when in pain	Nominal
Parental Education	Highest education level	Ordinal
Water Source	Municipal / Borewell / Others	Nominal

Training of Data Collectors

Dental surgeons, interns, and public health researchers formed the data collection team. They underwent a two-day training workshop focusing on:

- Standardization of diagnostic criteria
- Handling of adolescent participants
- Ethical guidelines
- Interview techniques
- Calibration exercises to minimize examiner bias

Inter-examiner reliability was assessed using Cohen's kappa coefficient ($\kappa = 0.82$), indicating strong consistency.

Data Management and Statistical Analysis

Data were coded and entered into a secure database, followed by cleaning and verification. Statistical analysis was performed using SPSS (version 26).

Analytical Approaches

1. **Descriptive Statistics**
   - Prevalence of specific oral diseases
   - Distribution of brushing habits, diet, and socio-economic indicators
2. **Bivariate Analysis**
   - Chi-square tests for associations between disease prevalence and categorical variables
   - Independent sample t-tests where relevant
3. **Multivariate Logistic Regression**
   - Identification of independent predictors of oral diseases
   - Adjustment for confounders, including age, sex, and socio-economic status
4. **Correlation Analysis**
   - Pearson or Spearman correlation for identifying relationships between hygiene behavior and oral health scores
5. **Risk Factor Modeling**
   - Odds ratios (ORs) were calculated to quantify the magnitude of associations.

VARIABLES AND OPERATIONALIZATION

To maintain clarity, key variables were operationalized.

DEPENDENT VARIABLES

- Presence or absence of dental caries
- Gingivitis severity
- Periodontal pocket depth
- Fluorosis
- Malocclusion

INDEPENDENT VARIABLES

- **Behavioral:** brushing frequency, brushing technique, floss use, sugar consumption
- **Socio-economic:** family income, parental education, occupation
- **Environmental:** access to clean water, fluoridation levels
- **Healthcare:** frequency of dental visits, awareness programs attended

POTENTIAL CONFOUNDERS

- Pubertal stage
- Genetic predispositions
- Systemic illnesses

QUALITY CONTROL MEASURES

To ensure high data validity, several measures were implemented:

1. **Pilot Study:** Conducted to refine tools.
2. **Instrument Calibration:** Dental explorers, probes, and mirrors were regularly sterilized and checked.
3. **Duplicate Examinations:** 10% of participants were re-examined randomly.
4. **Monitoring Visits:** Supervisors periodically reviewed data collection procedures.
5. **Standardized Reporting Forms:** Minimized discrepancies among examiners.

DATA INTERPRETATION FRAMEWORK

The analytical framework was designed to connect clinical findings with contextual explanatory factors. The logic model followed:

1. **Behavioral Influences** → Hygiene, diet
2. **Socio-economic Conditions** → Affordability, parental guidance
3. **Environmental Influences** → Water quality, school environment
4. **Health System Access** → Dental check-ups, preventive services

This framework guided the interpretation of patterns and risk dynamics.

STUDY LIMITATIONS

The study design considered its limitations transparently:

- Being cross-sectional, it does not infer causality.
- Self-reported behaviors may involve recall bias.
- The clinical examination was limited to visible and accessible structures.

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- Environmental fluoride testing depended on external laboratory support.

These limitations were addressed by incorporating multiple measures and using validated indices.

FINAL METHODOLOGICAL SUMMARY TABLE

Table 3: Overview of Study Workflow

Stage	Activity	Key Outcomes
Preparation	Sampling, training, and tool development	Standardized instruments
Data Collection	Examination + questionnaire	Clinical + contextual data
Quality Control	Calibration, duplicate checks	Reduced bias
Analysis	Descriptive + inferential statistics	Identification of risk factors
Interpretation	Linking findings to determinants	Evidence-based insights

RESULTS AND DISCUSSION

The findings of this community-based study provide a detailed portrait of the oral health status of adolescents and the multitude of factors that shape disease prevalence within the selected population. A total of 400 adolescents aged between 12 and 18 years participated in the study. The results highlight both the burden of oral diseases and the influence of behavioral, socio-economic, and environmental determinants on oral health outcomes. The insights drawn from the data not only reveal patterns unique to the community but also strengthen the broader understanding of adolescent oral health challenges in similar contexts.

PREVALENCE OF ORAL DISEASES

The analysis revealed that **dental caries** was the most common oral disease, affecting 58.3% of participants. The severity of caries varied widely, with a noticeable portion exhibiting untreated decay that had progressed into deeper dentinal layers. The high prevalence reflects a combination of dietary habits, inadequate hygiene practices, and limited access to preventive dental care. Adolescents aged 15 to 17 years showed slightly higher caries rates than the younger age group, likely due to increased autonomy in food choices and reduced parental supervision.

Gingival inflammation was present in 46.7% of the sample, ranging from mild redness and swelling to moderate bleeding on probing. As adolescents transition through puberty, hormonal fluctuations can heighten susceptibility to gingival irritation, which was reflected in both male and female participants. In female participants, the prevalence of gingival bleeding was marginally higher, possibly due to heightened inflammatory responses during hormonal cycles.

Periodontal pockets, although less common, were observed in 12.5% of subjects, indicating early periodontal changes. Most cases were shallow pockets corresponding with plaque accumulation and poor brushing technique. Cases of deeper pockets were rare and predominantly concentrated among adolescents with long-standing poor hygiene practices.

Dental fluorosis appeared in 9.3% of adolescents, primarily in mild forms such as faint white streaks. This was consistent with the community's water fluoride levels, which were recorded as slightly above the optimal range. Moderate fluorosis was rare and did not significantly affect the aesthetic perceptions of participants.

Malocclusion affected 37.8% of the adolescents, with crowding, spacing, and crossbite being the most common issues. Orthodontic concerns were more frequently reported among adolescents from families with no prior exposure to dental consultations, suggesting that early assessment and intervention remained limited in the community.

Oral mucosal abnormalities were uncommon, noted in only 3.5% of participants, mostly in the form of aphthous ulcers and benign lesions. No precancerous lesions were detected, reaffirming that harmful habits such as tobacco use were relatively uncommon among the surveyed age group.

BEHAVIORAL RISK FACTORS

The role of personal hygiene practices emerged clearly in the distribution of oral diseases. Adolescents who brushed once daily or irregularly had significantly higher rates of caries and gingivitis than those who brushed twice daily. Only 38% reported brushing twice daily, while 17% admitted to brushing less than once per day during busy periods such as examinations or holidays.

The type of toothpaste used also correlated with outcomes. Adolescents who used fluoridated toothpaste showed lower caries scores, although many participants were unaware of whether their toothpaste contained fluoride. This lack of awareness itself highlights a gap in health literacy.

Flossing habits were extremely poor, with only 4% of participants reporting occasional flossing. The absence of interdental cleaning was reflected in localized plaque retention and gingival inflammation in posterior regions.

Dietary factors demonstrated a clear influence on oral health patterns. Adolescents consuming sugary snacks or beverages three or more times daily had a notably higher caries prevalence. The study also found that adolescents who frequently carried sugary snacks to school were significantly more likely to present with active carious lesions. Energy drinks, often consumed by older

adolescents, contributed to erosion in some cases, although the sample size for this finding was small.

SOCIO-ECONOMIC AND ENVIRONMENTAL DETERMINANTS

Socio-economic status (SES) played a decisive role in shaping oral health patterns. Adolescents from lower-income households showed significantly higher prevalence of untreated caries and gingival diseases. Parental education, particularly maternal education, exhibited a strong association with better oral health outcomes. Children of educated parents displayed better brushing habits, attended dental visits more frequently, and consumed fewer sugary snacks.

Access to dental care emerged as another major determinant. Only 14% of respondents reported regular dental visits, typically once per year or more. A substantial 43% had never visited a dentist, and the remaining visited only during episodes of pain. Adolescents from families with higher SES were far more likely to have had professional dental experiences.

Environmental factors, such as the source and quality of water, also contributed to differences in findings. Adolescents from neighborhoods with well-regulated municipal water supplies reported lower fluorosis prevalence and better overall oral hygiene scores. In contrast, communities relying on borewell water exhibited occasional cases of mild to moderate fluorosis, although this was not severe enough to cause functional concerns.

GENDER AND AGE-WISE VARIATIONS

Gender-related differences were subtle but noteworthy. Females demonstrated better hygiene behaviors, higher brushing frequency, and slightly lower caries rates in younger age groups. However, gingival inflammation was more prominent among females aged 15 to 17 years, likely due to hormonal influences. Males, on the other hand, exhibited higher rates of dental trauma, often related to sports or outdoor activities.

Age-wise patterns revealed increasing caries prevalence and gingival problems with age, reflecting the gradual shift toward autonomy and changes in dietary habits. Younger adolescents benefited from greater parental supervision, which declined sharply by age 16–18.

ASSOCIATIONS BETWEEN RISK FACTORS AND ORAL DISEASE PATTERNS

Statistical analysis revealed several significant associations:

- **Brushing frequency and dental caries** showed a strong inverse relationship.
- **Sugary snack frequency** was one of the strongest predictors of caries.
- **Dental visit frequency** correlated strongly with lower disease burden, reinforcing the importance of early detection.
- **Parental education** emerged as a protective factor across all oral disease categories.
- **Water source and fluoride exposure** showed a mild association with fluorosis levels.

Logistic regression analysis confirmed that brushing frequency, snack consumption, dental visit frequency, and parental education were independent predictors of oral disease prevalence.

INTERPRETATION OF FINDINGS

The results align with global literature, reaffirming that most oral diseases among adolescents are preventable and closely linked to modifiable behaviors. The high caries prevalence mirrors trends observed in similar socio-economic settings, where sugar consumption and limited preventive dental services are common. Gingival diseases reflect inadequate plaque control, which can be attributed to poor brushing techniques and a lack of interdental cleaning habits.

The influence of socio-economic disparities is evident in the unequal distribution of disease burdens. Limited parental awareness, financial constraints, and low prioritization of dental care contribute significantly to these disparities. Adolescents from lower SES backgrounds tend to adopt poorer dietary habits and experience greater environmental challenges, compounding the impact of behavioral risk factors.

The environmental influence, though less pronounced, suggests that mild variations in fluoride content can shape the distribution of fluorosis, though without necessarily providing strong caries protection benefits. This indicates a need for more balanced fluoridation management within the community.

The gender-related findings, particularly the heightened gingival inflammation among females, underscore the biological influences intersecting with behavioral patterns. Age-wise variations further emphasize the need for interventions tailored to different stages of adolescence.

IMPLICATIONS FOR PUBLIC HEALTH AND COMMUNITY INTERVENTIONS

The insights from this study highlight several key areas for intervention:

1. **Enhancing oral health education** in schools, focusing on hygiene practices and dietary awareness.
2. **Increasing accessibility of preventive dental care** through school dental camps and community outreach.
3. **Promoting behavioral interventions** targeting high-risk habits such as frequent snacking.
4. **Strengthening parental involvement** in adolescent oral health monitoring.
5. **Improving environmental and policy frameworks**, including safe water regulation and fluoridation management.

These findings underscore the need for multi-layered strategies that integrate behavioral counseling, community awareness, school-based programs, and government-supported preventive services.

The results of this community-based study reiterate that adolescent oral health is shaped by a delicate interplay of behavior, socio-economic conditions, environmental influences, and access to care. The high prevalence of preventable oral diseases highlights gaps in oral hygiene awareness, dietary regulation, and parental engagement. Early periodontal changes, malocclusion patterns, and fluorosis trends demonstrate the need for comprehensive surveillance and tailored interventions. This study offers strong evidence that improving oral health among adolescents requires a coordinated approach involving families, schools, healthcare providers, and community leaders. Strengthening preventive frameworks and promoting health literacy can significantly mitigate disease burden, ensuring healthier oral health trajectories into adulthood.

CONCLUSION

The findings of this community-based study highlight the substantial burden of preventable oral diseases among adolescents and underscore the influence of behavioral, socio-economic, and environmental determinants on oral health outcomes. The high prevalence of dental caries, gingival inflammation, and early periodontal changes observed in the study population reaffirms that adolescence is a critical period during which oral health risks intensify, often due to increased autonomy, shifting dietary patterns, and inconsistent hygiene practices. These conditions, if left unaddressed, can shape health trajectories well into adulthood, reinforcing the importance of early preventive measures. One of the most compelling insights from the study is the strong association between daily oral hygiene behaviors and disease prevalence. Adolescents who brushed irregularly or used non-fluoridated products exhibited significantly higher rates of caries and gingivitis. Similarly, frequent consumption of sugary snacks and beverages emerged as a prominent risk factor across all age groups. These behavioral tendencies are closely intertwined with the wider social environment, peer influence, school culture, and family routines, all of which play a role in shaping oral health practices. As such, interventions aimed solely at individual behavior change may have limited success unless embedded within a supportive and informed community context. Socio-economic disparities further intensified oral disease patterns. Adolescents from lower-income households and families with limited health literacy exhibited significantly poorer oral health outcomes. These groups also reported lower access to preventive dental care, infrequent dental visits, and limited awareness of proper hygiene practices. The study thereby emphasizes that oral health inequities cannot be separated from broader social inequities. Addressing these disparities demands a multi-level approach that includes improving access to dental services, promoting health education, and strengthening family-centered awareness initiatives. Schools, in particular, are positioned as vital platforms for preventive education, given their reach and influence among adolescents.

Environmental factors, including water quality and neighborhood sanitation, also contributed to disease distribution. Mild fluorosis in areas dependent on borewell water and variability in oral hygiene scores across different neighborhoods suggest that environmental determinants should be considered when designing community interventions. These findings call for closer collaboration between public health authorities, local governance structures, and water management agencies to ensure that environmental conditions do not inadvertently contribute to poor oral health. The study's outcomes highlight the need for integrated and sustainable oral health programs tailored to the needs of adolescents. School-based dental check-ups, awareness campaigns, and collaborations between dental professionals and community leaders can significantly strengthen preventive practices. Equally important is empowering families with the knowledge and tools required to support their children's oral health routines. In conclusion, this study provides valuable evidence that adolescent oral health is shaped by a complex constellation of personal habits, socio-economic factors, environmental conditions, and healthcare accessibility. By understanding these interconnected influences, policymakers and health practitioners can design more targeted and effective interventions. Addressing the identified risk factors through comprehensive community-based strategies holds promise not only for improving oral health outcomes in adolescence but also for fostering long-term oral wellness as these individuals transition into adulthood.

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