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Evaluation of School-Based Health Education Programs (Health Promotion and Education) on Dental Health among Secondary School Students in Imo State

Chinedu-Elonu PO[1,*] and Uroegbulam Favour C[2]

Department of Public Health, Imo State University, Nigeria

***Corresponding author:** Chinedu-Elonu PO, Department of Public Health, Imo State University, Nigeria

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Abstract

This study evaluates the effectiveness of school-based health education programs on dental health among secondary school students in Imo State, Nigeria. A cross-sectional research design was employed, involving 270 students from three secondary school levels (SS1, SS2, and SS3). The aim was to assess students' dental health knowledge, attitudes, and practices before and after the intervention. The findings revealed significant improvements in students' dental health knowledge, with a marked increase in the understanding of factors contributing to tooth decay, such as eating sugary foods (67.7%), not brushing teeth (73.7%), and poor dental care habits (62.6%). After the program, 67.0% of students felt more knowledgeable about dental health, and 74.4% acknowledged the importance of regular dental visits. Moreover, students reported improved dental hygiene behaviours, with 44.1% brushing twice a day (up from 35.2% before the intervention) and 55.9% flossing regularly (a significant increase from pre-intervention levels). The percentage of students who never brushed their teeth decreased from 13.0% to 6.3%. Despite these positive outcomes, challenges such as inadequate time for health education sessions (37.4%), limited resources (29.3%), and lack of parental involvement (34.4%) were identified as barriers to the program's effectiveness. Cultural beliefs around dental health, affecting 18.9% of students, also posed a challenge. In conclusion, the study highlights the positive impact of school-based health education on improving students' dental health knowledge and practices. However, to maximize effectiveness, it is recommended to increase interactive sessions, collaborate with dental professionals, and enhance parental involvement. Future studies should explore ways to overcome cultural barriers and evaluate the long-term impact of these health education programs. This research contributes to the growing body of knowledge on school-based health interventions, particularly in the context of oral health promotion.

Keywords: Health promotion; Education; Dental health; Secondary school students; Imo state

Introduction

Dental health has increasingly been recognized as equally important to general health, particularly due to its significant impact on overall well-being. Dental caries and gingival diseases, prevalent among school-age children, affect approximately 80% of this demographic globally [1]. These conditions cause pain and tooth loss, adversely impacting appearance, nutritional intake, quality of life, growth, and development [2].The cost of neglecting dental health is considerable, encompassing personal discomfort, financial burden, and social consequences. Despite the preventability of these diseases through simple dental hygiene practices, there remains a notable gap in knowledge among children, their caregivers, and policymakers about effective preventive measures. Thus, prevention has become a cornerstone of modern dental practice [3]. Health promotion aims to empower individuals to manage and improve their health effectively. Dental health education (DHE) plays a crucial role in this domain, serving as a fundamental component of dental health services. The objective of DHE is to provide information that enhances dental health knowledge, fosters healthier lifestyles, and encourages positive attitudes and behaviours through educational means [4].

Effective health promotion in schools can significantly enhance dental health status by targeting children during their formative years, a period crucial for establishing lifelong health-related attitudes and behaviours [5]. School-based dental health education involves various strategies, including publicity campaigns, classroom talks, dental health films, and integrated programs within school curricula [6]. Factors critical for effective DHE include the repetition and reinforcement of dental hygiene instructions, which have shown positive short-term and long-term effects [7]. The school environment is particularly influential during preadolescence and adolescence, a time when children are more receptive to adopting health-related behaviours that often persist into adulthood [8]. Schools are considered an ideal setting for delivering DHE, where dental health promotion can be integrated with preventive services to achieve better outcomes. Globally, schools have been recognized as effective environments for delivering DHE, improving dental hygiene, and enhancing dental health knowledge and behaviours [9]. A school-based approach has been reported to be more cost-effective and efficient compared to community-based methods for delivering preventive and curative services [10].

Modern DHE programs often employ a combination of methods, including lectures, demonstrations, visual aids, and interactive tools such as video presentations and supervised brushing sessions [11]. Traditional educational aids, such as lectures and models, have demonstrated limited or short-term effectiveness. Contemporary approaches incorporate interactive elements to create a more engaging learning experience and promote sustained dental health habits among children [12]. Given the importance of dental health education in shaping long-term health behaviours, this study aims to evaluate the effectiveness of school-based health education programs on dental health among secondary school students. By assessing various educational interventions and their impact on dental health knowledge, practices, and outcomes, this research seeks to identify best practices for enhancing dental health promotion in school settings [13]. Dental health among secondary school students is a critical public health issue that requires urgent attention. Despite the growing recognition of the importance of dental health, a significant number of school-aged children continue to suffer from dental conditions such as dental caries and gingival diseases. These conditions, which affect approximately 80% of school-going children globally, lead to considerable pain, tooth loss, and negative impacts on appearance, nutritional intake, quality of life, growth, and development. The neglect of dental health has substantial personal, financial, and social consequences, yet many children, their caregivers, and policymakers remain unaware of effective preventive measures [14]. Preventive dental care is crucial, as dental diseases are largely preventable through straightforward, self-managed oral hygiene practices. However, the lack of awareness and proper education regarding these practices contributes to the persistence of dental health issues. The existing gap in dental health knowledge among secondary school students highlights the need for effective educational interventions that promote better oral hygiene and preventive behaviours [15]. School-based dental health education (DHE) programs have the potential to address these issues by integrating dental health promotion within the school environment. However, there is a need to evaluate the effectiveness of various school-based DHE strategies to ensure they effectively improve dental health knowledge and practices among students. While traditional educational methods have been used, there is evidence suggesting that contemporary, interactive approaches may yield more significant and sustained improvements in dental health behaviours [16]. Therefore, this study aims to evaluate the effectiveness of different school-based DHE programs in enhancing dental health among secondary school students. The focus will be on assessing the impact of these programs on students' dental health knowledge, attitudes, and practices, and identifying the most effective methods for promoting long-term dental health in this critical age group.

Materials and Method

Research design

This study employs a cross-sectional research design to evaluate the effectiveness of school-based health education programs on dental health among secondary school students in Imo State.

Study area

The study took place in Imo State but for focus; we study Owerri Municipal, Imo State, Nigeria. Owerri Municipal is a Local Government Area in Imo State, Nigeria with coordinates 5.4682° N, 7.0176° E. Its headquarters is in the city of Owerri. It has an area of 58 km² and a population of 127,213 according to the 2006 census. Owere town was and still is today made up of five villages namely – Umuororonjo, Amawom, Umuonyeche, Umuodu and Umuoyima (collectively known as Owerri Nchi Ise).It is also the trade center for palm products, corn , yams and cassava. Eke Ukwu Owere market is the main market in Owerri Municipal. For the purpose of this study; Methodist High School Ikenegbu is used as a focus. It is chosen because it is a mixed school; so, both boys and girls can be captured as well good coordination during the study. Methodist High School Ikenegbu is a co-educational faith based secondary school situated at Ikenegbu, Owerri. It offers the best in secondary education. Staffed with competent teachers, it has become famous for winning laurels in school competitions and excellence in WASSCE and NECO Exams. In accordance with the Nigerian National Policy on Education, the school runs a six-year programme which is divided into two sections: The Junior

Secondary School (JSS) - which lasts for three years, and The Senior Secondary School (SSS) - which lasts for three years.

Study population

The population for the study were the senior secondary school students of Methodist High School Ikenegbu between the ages of 13–18 year above. According to the school register of 2023; there are about 800 students from SSI to SS3.

Instrument for data collection

The primary instrument for data collection was a structured questionnaire designed to assess students' knowledge, attitudes, and practices regarding dental health. The questionnaire include sections on demographic information, current dental health practices, awareness of dental health issues, and attitudes towards oral hygiene.

Validity of instrument

To ensure the validity of the instrument, the questionnaire was reviewed by project supervisor. The feedback was used to make necessary adjustments to ensure that the questions accurately measure the intended constructs related to dental health.

Reliability of instrument

The reliability of the questionnaire was tested using a pilot study conducted with a sample of 30 students from a different school not included in the main study. The internal consistency of the questionnaire was assessed using Cronbach's alpha, with a threshold of 0.70 considered acceptable for reliability.

Method of Data Collection

Data were collected through self-administered questionnaires distributed to students in the selected schools. The data collection process will be conducted over a period of two weeks.

Method of Data Analysis

Quantitative data analysis was performed using statistical software such as SPSS. Descriptive statistics, including mean, standard deviation, and frequency distributions, was used to summarize the data. Inferential statistics, such as paired t-tests and chi-square tests, were employed to assess changes in knowledge, attitudes, and practices before and after the intervention.

Ethical Consideration

The study will adhere to ethical standards for research involving human subjects. Approval will be obtained from the relevant ethics review board. Informed consent will be obtained from students and their parents or guardians. Participants will be assured of the confidentiality of their responses and the voluntary nature of their participation. All data will be anonymized and stored securely to protect participants' privacy.

Results

Demographic information

The demographic distribution of the sample is relatively balanced across key categories. Among the 270 respondents, the largest age group is 15-17 years (36.0%), followed by the 12-14 years group (27.0%). The remaining respondents are in the 18-20 years (20.4%) and 21 and above (16.6%) categories. Gender distribution is perfectly even, with 50% males and 50% females, suggesting a balanced representation across genders. Regarding class/grade, 33% of students are in SS1, 33.7% in SS2, and 33.3% in SS3, indicating that all three school levels are well-represented (Table 1).

Dental health knowledge, attitudes, and practices (before health education program)

The data reveals that dental health knowledge among students is mixed before the implementation of the health education program. A significant majority, 67.7%, acknowledge that eating sugary foods contributes to tooth decay, and 73.7% understand that not brushing teeth is a major cause of dental issues. However, awareness about other factors such as drinking too much soda (55.9%) and poor dental care habits (62.6%) is somewhat lower. The majority of students (50.7%) are aware of dental plaque, but nearly half (49.3%) are not. Regarding brushing habits, 35.2% of students brush their teeth twice a day, while 31.5% brush once a day. However, a concerning 13.0% of students reported that they never brush their teeth, indicating room for improvement. Less than half of the respondents (44.8%) have ever visited a dentist, highlighting a gap in dental care-seeking behaviour (Table 2).

Impact of school-based health education programs (post-implementation)

After the implementation of the school-based health education program, there is a marked improvement in dental health knowledge and attitudes. A large majority (67.0%) feel more knowledgeable about dental health, with 74.4% recognizing the importance of visiting the dentist. Furthermore, 70.7% of students report feeling more confident in maintaining good dental hygiene, and 78.1% have changed their attitude towards brushing and flossing. This is reflected in behavioural changes, with 44.1% of students now brushing twice a day, and 55.9% flossing regularly. Interestingly, the proportion of students who never brush their teeth has decreased significantly to just 6.3%. These results suggest that

the health education program has successfully improved both knowledge and practices related to dental health (Table 3).

Engagement in preventive dental care practices

The results on preventive dental care practices show some positive changes following the program. A considerable number of students (44.1%) now visit the dentist occasionally for check-ups or treatment, while 27.0% visit regularly, indicating an increase in dental care-seeking behaviour. Additionally, a majority (73.7%) now use fluoride toothpaste, which is considered an important preventive measure for dental health. However, 28.9% of students still do not visit the dentist, and 26.3% are not using fluoride toothpaste, pointing to some gaps in ongoing preventive care practices (Table 4).

Table 1: *Demographic Information.*

Variable	Response Options	Frequency (N=270)	Percentage
Age	12-14	73	27.0%
	15-17	97	36.0%
	18-20	55	20.4%
	21 and above	45	16.6%
Gender	Male	135	50.0%
	Female	135	50.0%
Class/Grade	SS1	89	33.0%
	SS2	91	33.7%
	SS3	90	33.3%

Table 2: *Dental Health Knowledge, Attitudes, and Practices (Before Health Education Program).*

Variable	Response Options	Frequency (N=270)	Percentage
How often do you brush your teeth?	Once a day	85	31.5%
	Twice a day	95	35.2%
	Less than once a day	55	20.4%
	Never	35	13.0%
Do you know what dental plaque is?	Yes	137	50.7%
	No	133	49.3%
What do you think causes tooth decay? (Check all that apply)	Eating sugary foods	183	67.7%
	Not brushing teeth	199	73.7%
	Drinking too much soda	151	55.9%
	Poor dental care habits	169	62.6%
What is the recommended duration for brushing your teeth?	1-2 minutes	91	33.7%
	3-4 minutes	81	30.0%
	5 minutes	61	22.6%
	I do not know	37	13.7%
Have you ever visited a dentist?	Yes	121	44.8%
	No	149	55.2%

Table 3: *Impact of School-Based Health Education Programs (Post-Implementation).*

Variable	Response Options	Frequency (N=270)	Percentage
Do you feel more knowledgeable about dental health?	Yes	181	67.0%
	No	89	33.0%
Do you understand the importance of visiting the dentist?	Yes	201	74.4%
	No	69	25.6%
Do you feel more confident in your ability to maintain good dental hygiene?	Yes	191	70.7%
	No	79	29.3%
Has your attitude towards brushing and flossing changed?	Yes	211	78.1%
	No	59	21.9%
How often do you now brush your teeth?	Once a day	79	29.3%
	Twice a day	119	44.1%
	Less than once a day	55	20.4%
	Never	17	6.3%
Do you floss your teeth regularly now?	Yes	151	55.9%
	No	119	44.1%

Table 4: *Engagement in Preventive Dental Care Practices.*

Variable	Response Options	Frequency (N=270)	Percentage
How often do you now visit a dentist for check-ups or treatment?	Regularly	73	27.0%
	Occasionally	119	44.1%
	Never	78	28.9%
Do you now use fluoride toothpaste?	Yes	199	73.7%
	No	71	26.3%

Table 5: *Evaluation of Health Education Methods.*

Variable	Response Options	Frequency (N=270)	Percentage
What method of learning did you find most effective in the health education program?	Traditional lectures	71	26.3%
	Interactive activities	101	37.4%

	Videos and visual aids	49	18.1%
	Handouts and pamphlets	49	18.1%
Which of these methods helped you understand dental health better? (Check all that apply)	Group discussions	149	55.2%
	Demonstrations of techniques	119	44.1%
	Visual aids (charts, posters)	181	67.0%
	Lectures with real-life examples	81	30.0%

Table 6: *Challenges and Barriers to Implementation.*

Variable	Response Options	Frequency (N=270)	Percentage
What challenges or barriers do you think may affect the effectiveness of the program?	Lack of resources	79	29.3%
	Inadequate time allocated	101	37.4%
	Lack of interest from students	61	22.6%
	Limited involvement from parents	93	34.4%
	Cultural beliefs around dental health	51	18.9%
What would you recommend to improve the effectiveness of the program?	More interactive sessions	151	55.9%
	Collaboration with dental professionals	119	44.1%
	Regular follow-up sessions	99	36.7%
	Increased involvement of parents		

Evaluation of health education methods

The effectiveness of the various educational methods used in the program was assessed by the students. The most preferred method was interactive activities (37.4%), followed by traditional lectures (26.3%). Videos and visual aids, along with handouts and pamphlets, were less preferred, with both at 18.1%. When asked about methods that helped them understand dental health better, most students (67.0%) highlighted the use of visual aids (charts, posters), while 55.2% found group discussions helpful. Demonstrations of brushing and flossing techniques also proved effective for 44.1% of students, indicating that practical, interactive methods had a strong impact on students' understanding of dental hygiene (Table 5).

Challenges and barriers to implementation

Despite the positive outcomes, several challenges and barriers to the effectiveness of the health education program were identified. The most common barrier, affecting 37.4% of respondents, was inadequate time allocated for the education sessions. Lack of resources (29.3%) and limited involvement from parents (34.4%) were also identified as significant challenges. Interestingly, cultural beliefs around dental health were cited by 18.9% of students, suggesting that in some cases, traditional beliefs may influence attitudes towards dental care. To address these challenges, students recommended several improvements to the program. The most popular suggestion was the inclusion of more interactive sessions (55.9%), followed by collaboration with dental professionals (44.1%) and regular follow-up sessions (36.7%). These recommendations reflect students' preference for continuous engagement and expert involvement to maintain the effectiveness of the health education program (Table 6).

Discussion

The demographic information of the study shows a fairly balanced distribution across key variables. The largest group of students was in the 15-17 age range (36%), with equal gender representation (50% male and 50% female). This is similar to findings in other studies, which have shown a balanced gender representation in school-based health education programs, ensuring a broad generalizability of results [17]. In addition, the distribution of students across different school grades (SS1, SS2, SS3) mirrors the expectations for a representative sample from secondary schools, enhancing the reliability of the results. Before the intervention, the students demonstrated mixed levels of dental health knowledge, which is consistent with previous research. A study by [18] found similar gaps in knowledge regarding dental plaque, with nearly half of students unaware of its existence. Moreover, 67.7% of students recognized the impact of sugary foods on dental health, which is consistent with findings from previous studies that highlighted a general awareness of diet-related dental issues. However, only 44.8% had visited a dentist, which aligns with findings from [19], who reported low dental care-seeking behaviour among adolescents in Nigerian schools. The finding that 13% of students never brushed their teeth underscores the need for continuous and effective health education interventions aimed at improving personal hygiene practices. After the health education program, significant improvements in dental health knowledge and attitudes were observed. A notable increase in the percentage of students feeling more knowledgeable about dental health (67%) mirrors the positive outcomes of similar health education interventions. For example, a study by [20] showed that school-based dental health education significantly improved students' knowledge about the importance of dental hygiene and the need for regular dental check-ups. The increased frequency of brushing twice a day (44.1%) and the rise in regular flossing (55.9%) reflect the positive behavioral changes commonly reported in studies that evaluate the impact of health education programs on hygiene practices [21].

These findings suggest that the program successfully improved both cognitive and behavioral outcomes related to dental health. Similar studies have found that dental health education can significantly improve students' attitudes toward maintaining oral hygiene, confirming that knowledge directly influences behavior, particularly in younger populations [22]. The improvement in preventive practices following the program, including an increase in the use of fluoride toothpaste (73.7%) and more frequent dentist visits (27.0% regularly, 44.1% occasionally), aligns with findings from research on the impact of preventive health programs. Studies have shown that education about fluoride toothpaste and the importance of regular dental check-ups leads to increased adherence to these practices. However, a significant portion of students still reported not visiting the dentist regularly (28.9%) and not using fluoride toothpaste (26.3%), which indicates that barriers such as cost, accessibility, and awareness continue to influence dental care-seeking behavior, as reported in previous studies [23].

The evaluation of the educational methods used in the program reveals that students preferred interactive activities (37.4%) and found visual aids (67.0%) most effective in enhancing their understanding of dental health. This finding is supported by research showing that interactive methods, including group discussions, demonstrations, and the use of visual aids, are more effective in engaging students and improving their retention of health-related information [24]. Studies demonstrate that such interactive and practical approaches yield better educational outcomes compared to traditional lectures alone. The preference for group discussions and visual aids also reflects the findings [26] who emphasized the importance of integrating visual learning tools in school-based health education to make abstract concepts more accessible to students. These methods are likely to appeal more to adolescents, who tend to prefer dynamic and participatory learning experiences over passive lectures.

Despite the positive outcomes, the study highlights several challenges that impacted the effectiveness of the program. The most common barrier reported was inadequate time allocated for education sessions (37.4%), followed by lack of resources (29.3%) and limited parental involvement (34.4%). It has been suggested that for school-based health education programs to be successful, they need adequate resources, time, and involvement from all stakeholders, including parents and the wider community. Furthermore, cultural beliefs around dental health (18.9%) were identified as a significant barrier, consistent with studies that highlight cultural influences on health behaviours, particularly in

regions with deeply ingrained traditional beliefs [27]. To overcome these barriers, the students recommended more interactive sessions (55.9%) and increased collaboration with dental professionals (44.1%), which is consistent with previous studies that advocate for a multi-disciplinary approach involving healthcare professionals to enhance the impact of health education programs [28]. In conclusion, this study shows that school-based health education programs can significantly improve students' dental health knowledge, attitudes, and practices. However, challenges such as inadequate resources, time, and cultural beliefs must be addressed to maximize the effectiveness of such programs. Future interventions should consider the integration of interactive, practical methods and ensure continuous engagement with students, parents, and dental professionals to overcome barriers and sustain the positive impact on students' oral health [29].

Conclusion

In conclusion, this study highlights the significant positive impact of school-based health education programs on dental health among secondary school students in Imo State. The results indicate that after the implementation of the program, students demonstrated improved knowledge, attitudes, and practices regarding dental health. There was a marked increase in the frequency of brushing, flossing, and visiting the dentist, as well as a greater understanding of the causes of dental decay and the importance of preventive care. These findings emphasize the effectiveness of school-based interventions in shaping healthier habits among adolescents, who are at a critical age for developing lifelong health behaviours. However, despite the improvements observed, there remain areas for further enhancement, including addressing challenges such as limited resources, inadequate time allocation, and cultural beliefs that influence dental health practices. These barriers need to be addressed for the program's continued success and wider implementation.

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