

# Oral Health Knowledge Attitude and Behaviour among Secondary School Children: A Quasi-Experimental Study.

\*Henry Uyi **IGBINEDION**,\*\* Ezi Abigail **AKAJI**,  
\*\*\*Felix Nzube **CHUKWUNEKE**, \*\*\*\*Uche Enuma  
**EZEOKÉ**, \*\*\*\*\*Esther Baragha **IGBINEDION**  
[\*Dental Department, Alex Ekwueme Federal University  
Teaching Hospital, Abakaliki  
\*\*Department of Preventive Dentistry, Faculty of  
Dentistry, University of Nigeria/UNTH, Enugu, Nigeria  
\*\*\*Department of Oral and Maxillofacial Surgery,  
Faculty of Dentistry, University of Nigeria/UNTH, Enugu,  
Nigeria  
\*\*\*\*Department of Community Medicine, College of  
Medicine, University  
\*\*\*\*\*Department of Chemical Pathology, Alex  
Ekwueme Federal University Teaching Hospital,  
Abakaliki]

## Correspondence

Dr. Henry U Igbinedion

Dental Department, Alex Ekwueme Federal  
University Teaching Hospital, Abakaliki

Email: [Igbinedionhenry@gmail.com](mailto:Igbinedionhenry@gmail.com)

HU Igbinedion  
<https://orcid.org/0000-0001-7117-9384>  
EA Akaji  
<https://orcid.org/0000-0003-4977-4472>  
FN Chukwuneke  
<https://orcid.org/0000-0002-5397-3469>

## ABSTRACT

**Objective:** Improving oral health knowledge is considered to be a prerequisite for oral health-related behaviour. The aim of this study is to determine the effectiveness of an oral health education package (OHE package) on oral health knowledge, attitude and practices of senior secondary school students.

**Methods:** This is a quasi-experimental study where schools (experimental and control) were selected in Abakaliki urban area. Baseline data on oral health knowledge, attitude, and behaviour were collected from both groups with an intervention in the experimental group in the form of an OHE package but none in the control. Another set of data was collected from both groups after four months. Knowledge was rated high or low, attitude was rated good or poor, and behaviour was rated good or poor. Descriptive and inferential analyses were performed; while chi-square statistics and fisher exact tests were used for comparisons. The significance for all tests was set at  $\leq 0.05$ .

**Results:** Both groups had a good knowledge of oral health at baseline with significant improvements in the experimental group on all the knowledge questions following the OHE package ( $p < 0.05$ ). Overall attitude in the experimental group improved by 68.1% ( $p = 0.000$ ). Also, there were signs of progress in the behavioral assessments, however, the overall practice level of the experimental group increased marginally by 6.85% ( $p = 0.006$ ).

**Conclusion:** The OHE package improved the oral health knowledge, attitude, and behaviour of the participants considerably. There were positive behavioral outcomes although not commensurate with the level of attitudes improved. To consolidate the gains of this study, regular interventional programmes in the schools, which for emphasis, could be taken further into their curricula are recommended.

**Keywords:** School, Oral Health Education, Knowledge, Attitude and Behaviour

UE Ezeoke  
<https://orcid.org/>  
EB Igbinedion  
<https://orcid.org/0000-0002-9108-4136>  
Received: 16-Nov, 2022  
Revision: 10 Jan, 2023  
Accepted: 29 Jan, 2023

Citation: Igbinedion HU, Akaji EA, Chukwuneke FN, Ezeoke UE, Igbinedion EB. Oral health knowledge attitude and behaviour among secondary school children: a quasi-experimental study. *Nig J Dent Res* 2023; 8(1):20-29. <https://dx.doi.org/10.4314/njdr.v8i1.5>

**INTRODUCTION**

Oral diseases are significant public health issues that require care, and the knowledge of oral health is seen as a foundation for healthy behaviour<sup>1</sup> Oral hygiene is an important factor for good oral health which is linked to the overall health and well-being of any individual.<sup>2</sup> Although not much is known about the knowledge, attitudes, and practices relating to oral health among children in developing nations, it is a sign of the success of programmes for oral health education in developed climes.<sup>3</sup> Dental caries and periodontal diseases, the commonest oral health conditions for which people attend the dental clinic can be avoided by adopting measures like educating people about the causes to limit their exposure to the associated risk factors.<sup>4-6</sup> Caries can be prevented if one is armed with information on plaque control through appropriate oral hygiene practices; diet especially frequency and types of sugary foods and drinks; and use of fluoride.<sup>7-9</sup> Gingivitis is the dominant form of periodontal disease and is more prevalent in young people. Among the risk factors are poor oral hygiene, smoking, genetic factors, psychosocial stress, pre-existing conditions, and low level of utilization of dental services.<sup>10</sup> Regular oral hygiene practices like daily brushing and flossing, plaque control programmes, and scaling and root planing are considered preventive and decisive therapies.<sup>11</sup>

Within the context of the knowledge, attitude, and behaviour (K-A-B) model which is based on the fact that an increase in knowledge in an individual leads to change in their behaviour,<sup>12</sup> the transition from a bad to a good attitude can occur if there is enough information and proper motivation which would then translate to good practice.<sup>13</sup> Credible reports from a systematic review of 18 articles that evaluated the effectiveness of school dental health education on oral health status, oral health-related knowledge, and practice showed that OHE had a positive impact on oral health status, knowledge, and practice, such as frequency and duration of brushing, use of fluoride toothpaste, in 6 to 12-year-old children.<sup>14</sup> Edomwonyi et al, in a study conducted in Lagos, Nigeria, observed that OHE intervention had a significant impact on schoolchildren's practices, whether it was administered by the teachers or dental professionals.<sup>15</sup> Furthermore, school health programmes have merits such as cost-effectiveness,<sup>15</sup> a lingering effect until latter years,<sup>16</sup> with a wider reach and improving the health and well-being of students, staff, families, and community

members.<sup>17</sup> It has been estimated that school-based programmes reach one billion children worldwide, and so are platforms for promoting health, and creating awareness of healthy behaviours which is a key component of the preventive programme.<sup>18</sup> Although a good number of studies have been carried out in different parts of the world, just a few were Nigerian-based and virtually none in the South-Eastern part. Hence this study aimed to determine the effectiveness of an oral health education package (OHE package) on oral health knowledge, attitude, and practices of students in secondary schools in an urban city in South-Eastern, Nigeria. The findings will provide baseline information for planning oral health programs among schoolchildren in this environment and increase the awareness of risk factors for the oral conditions the students are exposed to.

**METHODOLOGY**

This study was conducted in Abakaliki the capital and largest town in Ebonyi State, South-Eastern Nigeria. It is located at the intersection of Enugu, Afikpo, and Ogoja Roads. Before it became the State capital, it was a small town known for its overflowing food markets but has grown into a much larger town with modern facilities and a workforce.<sup>19</sup> There were eight public secondary schools, and twenty-five registered private secondary schools at the time of data collection.<sup>20</sup> The study had a quasi-experimental design incorporating pre-intervention, intervention, and post-intervention phases in both the experimental and control groups. The minimum sample size for each group was calculated using the formula:

$$n = \frac{[A+B]^2 [(P_1(1-P_1)+(P_2(1-P_2))]}{[P_1-P_2]^2} \quad .21$$

Where n = the sample size required in each group, p<sub>1</sub> = Proportion of those with good oral health practice in an urban area, p<sub>2</sub> = Expected increase in oral health practice after the intervention, p<sub>1</sub> - p<sub>2</sub> = Size of difference of clinical importance, A= Zα where α = 0.05; Z = 1.96, B= Zβ which is the critical ratio at 1-β. Where β = 20% (i.e. power of 80%) Zβ = 0.84. Since there was no reasonable estimate for p<sub>1</sub>, it was set at 0.5(50%) and p<sub>2</sub> set a 0.65 (65%).

$$n = [1.96+0.84]^2 [(0.5(1-0.5) + (0.65(1-0.35))]^2 = 166. [0.65-0.5]$$

To make room for attrition and non-response, the anticipated response rate was 90%. Therefore the final sample size = 166/0.9 = 184 for each of the groups: - experimental and control. A simple random sampling method was used to

select two schools from the list of secondary schools in the study area, one school as the experimental group and another to serve as the control. Both the experimental and control schools were mixed schools within Abakaliki urban area but in different communities. From each school, 3 classes were selected from Senior Secondary School Forms 1 and 2 (SS1 and SS2). Lastly, all students present in the selected classes were recruited into the study except those who declined. Senior secondary form three (SS3) students were excluded because they were writing their final examination at the time of data collection.

The participants were assured of confidentiality and informed that participation was voluntary and that the study was solely for research purposes. Ethical clearance was obtained from the Research and Ethics Committee of Ebonyi State University, with permission from the school authorities and parents of students in the selected institutions where the study was carried out.

**Data collection:** The data collection was in phases: pre-intervention (baseline data) and at 4 months post-intervention; the intervention was an oral health education package (OHE package) built around the rational model of health education. The OHE package was designed to fill up the gap detected in the knowledge, attitude and practices during the pre-intervention phase. The package consisted of:

Oral health education was given by the principal researcher assisted by other dental personnel at two weekly intervals. Three sessions were delivered.

An interactive demonstration session on the ideal tooth-brushing technique was explained to them, demonstrated and they were made to practice in school with new toothbrushes given to them.

Distribution of handbills on oral health to reinforce what has been taught.

The oral health talk was on good oral hygiene, the causes of bleeding gum and mouth odour, the processes involved in tooth decay and its associated risk factors, measures of prevention of oral diseases and what to do when they have dental symptoms/complaints(s). The contents of the educational messages included the role of sugar in dental caries, the importance of brushing twice a day with an emphasis on the timing of the tooth brushing, proper tooth brushing technique demonstrated using a dental demonstration model and toothbrush; when to change a toothbrush, the need for regular visit to the dental clinic, and routine

scaling and polishing of the teeth for preventive and therapeutic purposes.

The data collection tool was a pretested self-administered questionnaire in the English language (Appendix I). To establish face and content validity for the instrument, an initial draft of the instrument was administered to a smaller group of students in the same target group who were not part of the study. Their critical appraisal allowed for revision for clarity and reliability. The questionnaire had five parts. Part 1 – elicited the respondents' demographic data; Part 2- their oral health knowledge. Part 3- assessed their attitude toward oral health, Part 4- the practice of oral health, and Part 5- assessed the respondents' socioeconomic status. The maximum score for knowledge was 8 marks. For each correctly answered question, 1 mark was awarded, and 0 mark for the wrong answer. A score of 5 and above was considered high knowledge, while a score of 4 and below was considered poor knowledge. For attitude, the maximum score was 4 marks. Each correctly answered question carried 1 mark, and 0 marks for wrong answers. A score of 3-4 was considered good while a score of 2 and below was considered a poor attitude. For behaviour, the maximum score was 12 marks. Each correctly answered question carried a maximum of 2 marks. One mark was awarded for a partially answered question and 0 mark for wrong answers. A score of 7-12 was considered good behavior, while a score of 6 and below was considered poor behavior.

**Data Analysis:** Data were analyzed using the SPSS Computer Software version 20. The knowledge, attitude, and behaviour variables were multiple constructs and the various determinants for each were scored. Descriptive statistics was performed using frequency tables and simple percentages. Inferential statistics was performed by comparing associations between independent and dependent categorical variables using Chi-square statistics and Fisher's exact test. The significance for all tests was set at  $p \leq 0.05$ .

### RESULTS

A total of 184 questionnaires were administered in both the experimental and control groups. One hundred and seventy-five participants completed pre-intervention and post-intervention rounds in the experimental group (response rate of 95.1%) while 172 did in the control group (response rate of 93.5%). The 16 – 18 years age group had the highest representation in both groups; females and SS1 students were more with an approximate male-

## Oral Health KAB of Secondary school Students

female ratio of 1:2 in both groups. The mean age in the experimental group was 16.9±1.4 years, and 16.7±1.5 years in the control group (Table 1).

Table 2 shows knowledge of oral diseases and care among experimental and control groups at baseline and post-intervention. Both groups had good knowledge of the causes of dental caries and periodontal diseases. There was no significant difference in knowledge variables between both groups at baseline ( $p > 0.05$ ), but the post-intervention profile showed otherwise ( $p = 0.00$ ).

The attitudes of the respondents toward oral health at baseline and post-intervention are shown in Table 3. While visiting the dentist was the only variable featuring a significant difference in attitudes between the groups at baseline, the need and the reason for the dental visits between the two groups post-intervention were pronounced ( $p < 0.05$ ).

From Table 4, apart from the frequency of consumption of soft drinks, there was no statistically significant difference in the other behaviour questions between the groups at baseline. Post-intervention, there was an increase in the desired good practice like frequency of teeth brushing, decreased frequency of consumption of soft drinks, and improved method of teeth brushing ( $p < 0.05$ ). Also, the proportion of those with good practice increased significantly post-intervention. Summarily, the comprehensive baseline and post-intervention knowledge, attitude, and behaviour level in the experimental group are in Table 5. Table 6 shows their level of KAB variables according to gender; all the females had good knowledge of oral health ( $p = 0.04$ ) but the attitude level was similar to that of males ( $p = 0.86$ ).

### Tables

**Table 1: Demographic Distribution of the Respondents**

Variable	Study n=175 N (%)	Control n=172 N (%)	$\chi^2$	P-value
<b>Age Group</b>				
13-15yrs	27(15.4)	33(19.2)	1.096	0.578
16-18yrs	127(72.6)	122(70.9)		
19-21yrs	21(12.0)	17(9.9)		
<b>Gender</b>				
Male	57(32.6)	58(33.7)	0.052	0.820
Female	118(67.4)	114(66.3)		
<b>Class</b>				
SS1	98(56.0)	102(59.3)	0.387	0.534
SS2	77(44.0)	70(40.7)		

Table 2: Knowledge of Oral Health at Baseline and Post Intervention of Experimental and Control groups

Variables	At Baseline		p - value	Post Intervention		p-value
	Exp. group n=175 N (%)	Control n=172 N (%)		Exp. group n=175 N (%)	Control n=172 N (%)	
<b>Sweet food cause tooth decay</b>						
Yes						
No	154(88.0) 21(12.0)	149(86.6) 23(13.4)	0.701	170(97.1) 5(2.9)	156(90.7) 16(9.3)	0.012*
<b>Gum bleeding means gum inflammation</b>						
Yes	151(86.3)	145(84.3)	0.602	171(97.7)	141(82.0)	0.000*
No	24(13.7)	27(15.7)		4(2.3)	31(18.0)	
<b>Regular teeth brushing prevent bleeding gum</b>						
Yes	157(89.7)	155(90.1)	0.901	174(99.4)	150(87.2)	0.000*
No	18(10.3)	17(9.9)		1(0.6)	22(12.8)	
<b>Decayed teeth can affect facial appearance</b>						
Yes	160(91.4)	154(89.5)	0.548	175(100)	155(90.1)	0.000*
No	15(8.6)	18(10.5)		0(0.0)	17(9.9)	
<b>Sweet can cause teeth decay</b>						
Yes	161(92)	154(89.5)	0.427	174(99.4)	158(91.9)	0.001*
No	14(8.0)	18(10.5)		1(0.6)	14(8.1)	
<b>Sweet drink / chocolate can damage teeth</b>						
Yes	144(82.3)	138(80.2)	0.624	168(96.0)	141(82.0)	0.000*
No	31(17.7)	34(19.8)		7(4.0)	31(18.0)	
<b>Fluoride use strengthens teeth</b>						
Yes						
No	139(79.4) 36(20.6)	124(72.1) 48(27.9)	0.111	168(96.0) 7(4.0)	136(79.1) 36(20.9)	0.000*

Exp. refers to Experimental group; \*Statistically significant

www.njdr.com

## Oral Health KAB of Secondary school Students

**Table 3: Attitude toward Oral Health at Baseline and Post Intervention of Experimental and Control groups**

Variables	At Baseline		p -value	Post Intervention		p -value
	Exp. group n=175 N (%)	Control n=172 N (%)		Exp. group n=175 N (%)	Control n=172 N (%)	
<b>Do you think there is need for dental check</b>						
Yes	166(94.8)	158(91.9)	0.262	171(98.3)	159(92.4)	0.009*
No	9(5.2)	14(8.1)		3(1.7)	13(7.6)	
<b>Each person should visit a dentist every 6-12 months</b>						
Agree	90(51.4)	107(62.2)	0.043*	140(80.0)	100(58.1)	0.000*
Disagree	85(48.6)	65(37.8)		35(20.0)	72(41.9)	
<b>People need to see a dentist for routine check and not just when they have teeth problem</b>						
Agree	57(32.6)	69(40.1)	0.144	119(68.0)	77(44.8)	0.000*
Disagree	118(67.4)	103(59.9)		56(32.0)	95(55.2)	
<b>People don't visit the dentist because of lack of dentist &amp; lack of money and not for any other reason</b>						
Agree	128(73.1)	124(72.0)	0.458	123(70.0)	135(78.5)	0.002*
Disagree	47(26.9)	48(28.0)		52(30.0)	37(21.5)	

Exp. refers to Experimental group; \*Statistically significant

**Table 4: Practice of Oral Health at Baseline and Post Intervention of Experimental and Control Groups**

Variables	At Baseline		p -value	Post Intervention		p -value
	Exp. group n=175 N (%)	Control n=172 N (%)		Exp. group n=175 N (%)	Control n=172 N (%)	
<b>Frequency of teeth brushing</b>						
Good practice	166(94.9)	166 (96.5)	0.449	174(99.4)	154(89.5)	0.000*
Bad practice	9(5.1)	6(3.5)		1(0.6)	18(10.5)	
<b>Freq. of consuming Candy/sweet/chocolate</b>						
Good practice						
Bad practice	138(78.9)	126(73.3)	0.221	152(86.9)	148(86.0)	0.825
	37(21.1)	46(26.7)		23(13.1)	24(14.0)	
<b>Freq. of consuming soft drinks</b>						
Good practice	150(85.7)	130(75.6)	0.017*	165(94.3)	142(82.6)	0.001*
Bad practice	25(14.3)	42(24.4)		10(5.7)	30(17.4)	
<b>Method of teeth brushing</b>						
Good practice	17(9.7)	20(11.6)	0.564	46(26.3)	30(17.4)	0.046*
Bad practice	158(90.3)	152(88.4)		129(73.7)	142(82.6)	
<b>Material use in teeth brushing</b>						
Good practice	158(90.3)	145(84.3)	0.094	162(92.6)	157(91.3)	0.659
Bad practice	17(9.7)	27(15.7)		13(7.4)	15(8.7)	
<b>Freq. of changing tooth brush</b>						
Good practice	153 (87.4)	144(83.7)	0.325	150(85.7)	149(86.6)	0.805
Bad practice	22 (12.6)	28 (16.3)		25(14.3)	23(13.4)	

Exp. refers to Experimental group; \*Statistically significant

**Table 5: Baseline and Post Intervention K-A-B Level in the Experimental Group**

Variables	At Baseline N =175 n (%)	Post- intervention N =175 n (%)	% change in good K-A-B	$\chi^2$	p-value
<b>KNOWLEDGE</b>					
Poor knowledge	9(5.1)	2(1.1)		4.599	0.032*
Good knowledge	166(94.9)	173(98.9)	4.21		
<b>ATTITUDE</b>					
Poor attitude	90(51.4)	32(18.3)		42.238	0.000*
Good attitude	85(48.6)	143(81.7)	68.1		
<b>BEHAVIOR</b>					
Poor practice	14(8.0)	3(1.7)		7.481	0.006*
Good practice	161(92.0)	172(98.3)	6.85		

\*Significant

**Table 6: Knowledge, Attitude and Practice of Experimental group according to gender**

K-A-B Variables		Gender		p-value*
		Male (N =57) n (%)	Female (N = 118) n (%)	
Knowledge level	Poor	2(3.5)	0(0.0)	0.041
	Good	55(96.5)	118(100)	
Attitude level	Poor	10(17.5)	22(18.6)	0.860
	Good	47(82.5)	96(81.4)	
Behaviour level	Poor	1(1.8)	2(1.7)	0.977
	Good	56(98.2)	116(98.3)	

\*Fishers exact test

### DISCUSSION

This study aimed at determining the effects of an oral health education package on the knowledge, attitude, and behaviour of secondary school students in the urban area of the state. The ratio of females to males seen in both groups was similar to the demography of an Ibadan-based study.<sup>22</sup> Barring other factors, Bature and Nwosu, had observed that the locality of the current study is fraught with a high incidence of male children dropping out of school due to poverty and the urgent need to go into business.<sup>23</sup> Generally, good oral health knowledge increased to 98.9% in the experimental group at the end compared to 94.9% at baseline ( $p = 0.032$ ) as more precise answers were recorded - a pointer that aetiologies of gum bleeding and tooth decay were better understood. It could be inferred that the knowledge level was positively influenced by the oral health intervention consistent with similar studies.<sup>24-26</sup> While 79.4% of the experimental group knew from the beginning that fluoride strengthens teeth, more of them were abreast of this information at the end. The need for regular use of fluoride to fortify tooth enamel cannot be over-emphasized and is considered an economic and central component in strategies for preventing dental caries.<sup>27</sup> Our observations agreed with those from the study in Karachi where 88.4% of students had good knowledge of the causes, signs, and prevention of dental caries, and 96% of the causes and prevention of periodontal diseases.<sup>28</sup> As regards attitude, a high proportion of the respondents in both groups saw the need for a regular dental check at the beginning but may have had the wrong reasons for not visiting the dentist. There was a significant improvement in attitude in the experimental group following the intervention in conformity with preventative rather than symptom-based visits. This was in tune with the observations by Cheah et al, where more than half of their participants (60.8%) were primed for a regular dental check but divergent from findings by Onwudi et al, where the majority of both teachers and students showed no compliance.<sup>29,30</sup> Furthermore, the practice level also improved marginally (6.85% overall) in the experimental group, and this calls for more efforts towards achieving the optimal level of practice. However, we noted that the demonstrated tooth-brushing method in the experimental group reflected a significant difference at the end of the study. Possibly, the demonstration exercise cast in the similitude of the "tell, show and do technique"

which is one of the most effective means of learning played out here.<sup>31</sup> This pattern resonates with findings in India where pretest and posttest oral hygiene practices of school-aged children have significant differences but discordant with that in Pakistan where only 9% of students had good practice post-intervention.<sup>24,32</sup> It is pertinent to iterate that the relationship between knowledge, attitude, and behavior is not always linear as some social and environmental factors may be co-actors in determining behavioral change arising from knowledge.<sup>30</sup> This could account for the variances in behaviours in our experimental group as the percentage change in behaviour was not commensurate with that of attitude. We also noted that OHE had a greater effect on the knowledge, attitude and behaviour of females than males; this is in agreement with the trends in similar studies.<sup>13,22,32</sup> The present study is not without limitation; apart from the recall bias that might have trailed the responses to some questions, the study was conducted in two urban schools in Abakaliki affecting the generalizability of our findings. It no doubt thrives on the strength of selecting both the experimental and control groups under similar conditions of class, age, and location for a good match. It also sensitized the children to key information on oral health, this could be further developed in future studies or programmes. Schools serve as an important platform for promoting dental health, being the most formative time in a child's life when they form beliefs, attitudes, and abilities that will last a lifetime; repeated oral health lessons in classes if built into their curricula will further sustain the gains in line with the World Health Organization Global school health initiative.<sup>18</sup>

### CONCLUSION

The oral health K-A-B parameters improved significantly in the experimental group at the end of the study compared to the control group. The improvements in practices were more visible in the method of tooth brushing which had a demonstration session driving home the importance of the "tell, show and do" blueprint. This could be sustained through regular school-based OHE, and further strengthened by integrating basic oral health education in their curricula at an early stage, with follow-ups in higher classes to produce an oral health-friendly attitude and healthier behaviours.

### Source of support

Nil

### Conflict of Interest

None declared

REFERENCES

1. Jin LJ, Lamster IB, Greenspan JS, Pitts NB, Scully C, Warnakulasuriya S. Global burden of oral diseases: emerging concepts, management and interplay with systemic health. *Oral Dis.*, 2016; 22(7): 609-19.
2. Shenoy RP, Sequeira PS. Effectiveness of a school dental education program in improving oral health knowledge and oral hygiene practices and status of 12- to 13-year-old school children. *Indian J Dent Res.* 2010 Apr-Jun;21(2):253-9. doi: 10.4103/0970-9290.66652.
3. Blaggana A, Grover V, Anjali, Kapoor A, Blaggana V, Tanwar R, Kaur H, Haneet RK. Oral Health Knowledge, Attitudes and Practice Behaviour among Secondary School Children in Chandigarh. *J Clin. Diagn. Res.* 2016 Oct;10(10):ZCo1-ZCo6. doi: 10.7860/JCDR/2016/23640.8633.
4. Akaji EA, Ikechebelu QU, Osadolor OO. Assessing dental caries and related factors in 12-year old Nigerian Schoolchildren: Report from a South-eastern State. *Euro. J. Gen. Dent.* 2020; 9:11-16. DOI: 10.4103/ejgd.ejgd\_89\_19.
5. Joshi N. Rajesh R, Sunitha M. Prevalence of dental caries among school children in Kulasekharam village: A correlated prevalence survey. *J Indian Soc. Pedod. Prev. Dent.* 2005; 23(3): 138-40.
6. Akaji EA, Chukwunke FN, Okeke UF. Attendance Pattern amongst Patients at the Dental Clinic of the University of Nigeria Teaching Hospital, Enugu, Nigeria. *Niger. J. Med.* 2012; 21(1): 74-7.
7. Goodwin M., Patel, D.K., Vyas, A., Khan, A.J., McGrady, M.G. & Boothma, N. Sugar before bed: a simple dietary risk factor for caries experience. *Comm. Dent. Health*, 2017; 34: 8-13.
8. Kanduti D, Sterbenk P, Artnik B. & Fluoride, C. (2016). A Review of Use and Effect on Health. *Materia Socio-medica*, 2016; 28(2): 133-7.
9. Uwayezu D, Gatarayihya A, Nzayirambaho M. Prevalence of dental caries and associated risk factors in children living with disabilities in Rwanda: a cross-sectional study. *Pan Afr Med J.* 2020 Jul 17; 36:193. doi: 10.11604/pamj.2020.36.193.24166.
10. Umoh AO, Azodo CC. Prevalence of gingivitis and periodontitis in an adult male population in Nigeria. *Niger. J. Basic Clin. Sci.* 2012; 9:65-9.
11. Sambunjak D, Nickerson JW, Poklepovic T, Johnson TM, Imai P. and Tugwell P. Flossing for the management of periodontal diseases and dental caries in adults. *The Cochrane Library* 2011.
12. Whitehead D. Health Promotion and Health Education; advancing concepts. *J. Adv. Nurs.* Aug 2004 Aug.; 43(3): 311-20.
13. Al-Darwish, MS. Oral health knowledge, behaviour and practices among school children in Qatar. *Dent. Res. J.* 2016; 13(4): 342-53.
14. Geetha Priya PR, Asokan S, Janani RG, Kandaswamy D. Effectiveness of school dental health education on the oral health status and knowledge of children: a systematic review. *Indian J Dent Res.* 2019; 30: 437-49.
15. Edomwonyi AI, Adeniyi AA, Adedigba MA, Oyapero A. Use of teachers as agents of oral health education: Intervention study among public secondary school pupils in Lagos. *J Family Med Prim Care* 2020; 9:2806-13.
16. Blaggana A, Grover V, Anjali, Kapoor A, Blaggana V, Tanwar R, Kaur H, Haneet RK. Oral Health Knowledge, Attitudes and Practice Behaviour among Secondary School Children in Chandigarh. *J. Clin. Diagn. Res.* 2016 Oct, Vol-10(10): ZCo1-ZCo6: 1-6.
17. Ehizele A, Chiwuzie J, Ofili A. Oral health knowledge, attitude and practices among Nigerian primary school teachers. *Int. J. Dent Hyg.* 2011 Nov; 9(4):254-60.
18. Kwan SYL, Petersen PE, Pine CM, Borutta A. Health-promoting schools: an opportunity for oral health Promotion *Bull. World Health Organi* |September 2005; 83(9): 677-85.
19. Towns & Villages Profile - Ebonyi State Government. Available from: <https://ebonyistate.gov.ng › town>. [Last cited on 2022 December 21st]
20. Ministry of Education, Ebonyi State Registry, 2018.
21. Araoye, M.O. (2004) Sample Size Determination in Research Methodology with Statistics for Health and Social Sciences. Nathadex Publishers, Ilorin, 115-121.
22. Ogundele BO and Ogunsile SE. Dental health Knowledge, Attitude and Practice on the Occurrence of Dental Caries Among Adolescents in a Local Government Area (LGA) of Oyo State. *Asian J. Epidemiol.* 2008; 1(2): 64 -71.
23. Bature JN, Nwosu NUV. Management of Boy Child School Drop Out In South-East Nigeria:

## Oral Health KAB of Secondary school Students

- Issues And Challenges. *J. Educ. Found.* 2015; 5: 81-92.
24. Brar SPS, Maheshwari SK. Effectiveness of learning package on knowledge related to oral hygiene practices among school-age children. *Int J Health Sci Res.* 2018; 8(12):75-80.
  25. Haque SE, Rahman M, Itsuko K, Mutahara M, Kayako S, Tsutsumi A, Islam MJ, Mostofa MG. Effect of a school-based oral health education in preventing untreated dental caries and increasing knowledge, attitude, and practices among adolescents in Bangladesh. *BMC Oral Health* 16, 44 (2016). <https://doi.org/10.1186/s12903-016-0202-3>
  26. Swe KK, Soe AK, Aung SH, Soe HZ. Effectiveness of oral health education on 8- to 10-year-old school children in rural areas of the Magway Region, Myanmar. *BMC Oral Health* 21, 2 (2021). <https://doi.org/10.1186/s12903-020-01368-0>
  27. Ani FE, Akaji EA, Uguru NP, Ndiokwelu EM. Fluoride content of commercial drinking water and carbonated soft drinks available in Southeastern Nigeria: Dental and Public Health Implications. *Niger. J Clin. Pract.* 2020; 23: 65 - 70.
  28. Vakani F, Basaria N, Katpar S. Oral hygiene KAP assessment and DMFT scoring among children aged 11-12 years in an urban school of Karachi. *J. Coll. Physicians Surg. Pak.* 2011 Apr;21(4):223-6.
  29. Cheah WL, Tay SP, Chai SC, Bong CS, Luqmanul HB, Zhuleikha BJ. Oral health knowledge, attitude and practice among secondary school students in Kuching, Sarawak. *Arch. Orofac. Sci.* 2010; 5: 9-16.
  30. Onwudi HI, Taiwo AO, Stellamaris OC. Oral health knowledge, attitude, and practices among secondary school teachers and students in Ekiti State. *Niger J Exp Clin Biosci* 2017;5:16-24.
  31. American Academy of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. *The Reference Manual of Pediatric Dentistry.* Chicago, Ill.: Am Acad Paediatr Dent; 2021:306-24.
  32. Imran SS, Ramzan M, Nadeem S. Knowledge and Practice of Oral Health among higher Secondary School Students. *Biomedica* 2015; 31(2): 137-40.
  33. Schrader PG, and Lawless KA. The knowledge, attitudes, & behaviors approach how to evaluate performance and learning in complex environments. *Perform. Improv.* September 2004; 43 (9): 8-15. DOI: 10.1002/pfi.414043