

# Knowledge of senior secondary school students in Nigeria about Head and Neck Cancer: Implications on prevention strategies

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## Abstract

### Background

The high prevalence of the risk factors of head and neck cancer (HNC) amongst senior secondary (high) school students in Nigeria is an issue of serious public health concern. Therefore, this study aimed to assess the knowledge of HNC among them.

### Methods

This cross-sectional study surveyed 2,530 senior secondary school students in Nigeria, assessed their knowledge of HNC, using a self-administered questionnaire. Data collected were analyzed using the SPSS version 25 software.

### Results

The mean ( $\pm$ SD) age of the respondents was 16.34 ( $\pm$ 2.0) years. More than half (1418; 56.6%) of them were males, 530 (20.9%) were schooling in the north-central geopolitical zone of Nigeria, 1,860 (73.5%) were in public schools, 554 (21.9%) were boarding students, and 817 (33.5%) were in Senior Secondary (SS) 3 class. Only 789 (31.2%) respondents were aware of HNC, out of which: 69.2% of them had below-average scores in their overall assessment on HNC; 256 (32.4%) had ever received education on HNC and 81.2% indicated a positive interest in knowing more about HNC. The factors predicting above-average score on knowledge about HNC among the respondents were: being in SS3 class (OR=1.73; 95% CI=1.17 – 2.56), having been educated about HNC (OR=1.69; 95%CI=1.21 – 2.35) and having the interest to know more about HNC (OR=1.88; 95%CI=1.21 – 2.92). Bivariate analysis showed that these factors had statistically significant association (or relationship) with above-average score on knowledge about HNC ( $p$ values<0.05).

### Conclusion

Majority of the surveyed students were willing to know more about HNC. The use of a properly planned massive school-based HNC education programs may go a long way in educating this population group on HNC.

**Keywords:** Head and neck cancer; awareness; knowledge; students; adolescents; Nigeria

## Introduction

Head and neck cancer (HNC) is a leading cause of cancer-related deaths worldwide, killing about 300,000 people every year, and with over 500,000 people being newly diagnosed of the disease yearly<sup>1,2</sup>.

The risk factors of HNC are tobacco use, alcohol intake, poor oral hygiene, malnutrition (e.g. deficiencies of vitamins C and E, and zinc), infection by pathogenic microbes (e.g. human papillomavirus (HPV), *Helicobacter pylori*, human immunodeficiency virus (HIV), and Epstein-Barr virus (EBV), chronic exposure to toxic chemicals (such as benzene,

mustard gas, and diesel exhaust), and ultraviolet radiation<sup>3-30</sup>. However, tobacco use, alcohol drinking and HPV (usually transmitted through oral sex) are the three major risk factors accounting for the majority of HNC cases globally<sup>3-30</sup>. In Nigeria, the prevalence rate of the three major risk factors of HNC among secondary school-going adolescents had been rising over the years<sup>31-39</sup>. Recent studies show that at least one out of every ten Nigerian secondary school students engage in tobacco smoking, unprotected oral sex, and/or alcohol drinking habits, thereby increasing their risk of developing HNC<sup>31-37</sup>.

Despite the rising prevalence of HNC risk factors among secondary school students, there exists a very low awareness of HNC among them<sup>39,41</sup>; also, the existing literature assessing the knowledge of HNC and its risk factors among secondary school students in Nigeria are very scanty<sup>39,40</sup>.

The alarming rise in the prevalence of HNC risk factors among senior secondary school students in Nigeria necessitates the need for introducing school-based HNC education programs. Unfortunately, very little attention had been paid to school-based HNC education in Nigeria<sup>39</sup>. Due to this lapse, the Tobacco Research and Advocacy Group of Cephas Health Research Initiative developed the initiative to educate millions of secondary school students in Nigeria on HNC risk factors and its prevention. Based on this initiative, this research group conducted this study with the aim of determining the baseline knowledge of senior secondary school students in Nigeria on HNC. This survey was conducted with the ambition of massively educating senior secondary school students in Nigeria on HNC, using the knowledge gaps identified in this study as a guide.

## Material And Methods

This study was a cross-sectional survey of senior secondary school students in Nigeria on their knowledge of HNC. The study forms a part of the multi-year “Campaign for Head And Neck Cancer Education (CHANCE)” Program of the Tobacco Research & Advocacy Group, Cephas Health Research Initiative Inc, Nigeria<sup>39,40,42-52</sup>. The protocol of the study was approved by the University of Ibadan/University College Hospital Ethical Review Board, and it was conducted under the strict guideline of the 1964 Helsinki Declaration.

A total of five, out of the six, geopolitical zones in Nigeria were selected to participate in this study (the five selected geopolitical zones in Nigeria were North-West, North-Central, North-East, South-South, and South-West zones), using simple random sampling technique. From each of the 5 selected zones, a minimum of 2 secondary schools were chosen for the study; choice of participating schools was based on authors’ convenience. Also, at least a single sex school was selected per zone, based on authors’ convenience.

The minimum sample size for this study was calculated using the Kish and Leslie formula:

$$n = \frac{(Z_{\alpha/2})^2 pq}{e^2}$$

In the above formula, n represents the minimum sample size; and 1.96 represents the value of Z score. P stands for prevalence rate of HNC awareness. The value of p is 47.5% and it was derived from a previous study conducted among secondary school students in Ibokun Town, Osun State, Nigeria<sup>40</sup>, while q is the compliment of p (i.e. 1- p). “e” is the margin of error usually estimated at 0.05. From the calculation, a minimum sample size (n) of 383 participants was obtained. However, due to the availability of resources to cater for a larger sample size, we increased our sample size to a minimum of 1,750 participants, with at least 350 participants in each of the 5 selected geopolitical zones.

The study tool was an anonymous structured paper questionnaire which obtained information about the participants’ socio-demographic characteristics (such as age, gender, class, religion, tribe, family background, etc.); awareness of HNC; and knowledge of HNC etiological/risk factors, most common age range and gender affected with

HNC, and the early symptoms of HNC. The questionnaire was developed from previous relevant literatures and approved by a certified health educator before its use for the study<sup>3-37</sup>. In other to determine the participants’ awareness of HNC, using the questionnaire, the participants were asked if they had “ever heard of head and neck cancer before?”, and the options in response to the question was “yes”, “no” and “I don’t know”. Those that chose “yes” were categorized as being aware, and other/no response as “not aware”. Subsequently, only those that were aware of HNC were assessed for their knowledge about HNC. Furthermore, six questions (having 14 correct items) were used to assess the participants’ knowledge of the: risk factors; most commonly affected age range and gender; and the early symptoms of HNC [Table 1]. The score of “1” was given to the respondents for every correct response, while the score of “0” was given for other responses (such as “no”, “I don’t know” or “no response”). The total knowledge score was computed for the participants by summing up all the correct responses. Following this computation, the respondents were then categorized into two (below-average score, average and above) based on how their total knowledge score compared to “7” which is the average of maximum score of “14”. Also, the questionnaire assessed the attitudes of the participants towards acquiring knowledge on HNC by asking if they “would like to know more about HNC”; those that selected the option “yes” (out of the available options: “yes”, “no”, “indifferent”) were considered to show positive attitude towards knowing more about the disease.

A total of 13 secondary schools were eventually chosen for the study. In these selected schools, a total of 3,000 secondary school students in their senior classes (Senior Secondary [SS] class 1, SS 2, and SS 3) were approached as potential study participants. They were informed about the aims and objectives of the study; they were also informed that their participation is strictly voluntary and completely confidential. Only those students (n=2,754) that agreed and gave written informed consent to participate in the study were considered eligible for the study. Each consenting participant was given a self-administered questionnaire to fill out. Out of the 2,754 participants that were given questionnaires to fill, only 2,701 returned theirs.

During the data cleaning process, 171 questionnaires were excluded from the returned 2,701 questionnaires because they were incompletely/inappropriately filled; leaving a total of 2,530 filled questionnaires qualified for data computation and analysis, using the SPSS version 25 software. Descriptive statistics was done to determine the frequency distributions of all variables and also the mean and standard deviation of the age of the respondents. The proportion of the study participants who had “average and above knowledge” of HNC was determined, and Pearson Chi-square test was used to check for significant association between this and other independent variables. Multivariable logistic regression was subsequently carried out using the variables that were independently associated with HNC knowledge at p<0.05.

## Results

The mean (±SD) age of the 2,530 respondents was 16.34 (±2.0) years.

**Table 1. Questions/statements assessing respondents' knowledge on HNC**

S/N	Question/Statement	Correct answer [Ref.]
1	The following can increase one's risk of developing head and neck cancer (HNC):	
i	Excessive exposure to sunlight	Yes [54,59]
ii	Eating hot, spicy foods	Yes [60]
iii	Lack of fruits and vegetables	Yes [11,15,21]
iv	Tobacco use in any form	Yes [3,10]
v	Frequently biting the cheeks or lip	Yes [58]
vi	HPV	Yes [14,55,56]
2	Someone who has had HPV vaccine cannot have HNC	No [53]
3	The gender that most commonly has HNC	Men [54]
4	The age in which HNC is most common	41 years and older [61,64]
5	Most common site of presentation of HNC	Jaws (in Nigerian population) [62,63]
6	The top (four) causes of HNC are:	
i	Smoked tobacco	Yes [54,55]
ii	HPV	Yes [55,56]
iii	Alcohol	Yes [55]
iv	Snuff	Yes [10,55,57]

“Ref.” – Reference; SN – Serial number

**Table 2. Socio-demographic characteristics of respondents**

Characteristics (n=2,530)	Frequency	Percentage (%)
Geo-political zone		
South-west	834	32.9
South-south	385	15.2
North-central	530	20.9
North-west	424	16.8
North-east	357	14.1
School type		
Public	1860	73.5
Private	670	26.5
Mode of studentship		
Boarding	554	21.9
Day	1976	78.1
Class		
SS 3	817	33.5
SS 2	831	34.1
SS 1	791	32.4
Age in categories		
Young adult (20 years and above)	138	5.5

**Table 2 Cont...**

Late Adolescence (15-19 years)	1999	79.7
Early adolescence (10-14years)	372	14.8
Mean Age (±SD)	16.34 (±2.0)	
Gender		
Male	1418	56.6
Female	1088	43.4
Religion		
Christianity	1537	61.1
Islam	959	38.1
Traditional/pagan/others	20	0.8
Family background		
Polygamous/others	743	31.3
Single parent	326	13.7
Monogamous	1307	55.0
Tribe		
Yoruba	884	34.9
Hausa	599	23.7
Igbo	250	9.9
Others	797	31.5

**Table 3. Knowledge of respondents who were aware of HNC**

Variable	Frequency(N=789)	%
The following increases the risk of head and neck cancer (HNC):		
Excessive exposure to sunlight		
No/no response	323	40.9
Yes	466	59.1
Eating hot, spicy foods		
No/no response	443	56.1
Yes	346	43.9
Lack of fruits and vegetables		
No/no response	343	43.5
Yes	446	56.5
Tobacco use in any form		
No/no response	288	36.5
Yes	501	63.5
Frequently biting the cheeks or lip		
No/no response	428	54.2
Yes	361	45.8
HPV		
No/no response	570	72.2
Yes	219	27.8
An HPV positive person will definitely get HNC		
Yes	489	62.0
No/no response	300	38.0
Someone who has had HPV vaccine cannot have HNC		

**Table 3 Cont....**

Yes	553	70.1
No/no response	236	29.9
The gender that most commonly has HNC		
Men	111	14.5
Women	155	20.3
Both men and women equally	329	43.1
I don't know/ I am not sure/ no response	169	22.1
The age in which HNC is most common		
All age groups	274	36.1
<19 years	68	9.0
20-40 years	112	14.8
41 years and older	65	8.6
I don't know/ I am not sure/ no response	240	31.6
Most common site of presentation of HNC		
Lips	172	23.3
Gums	176	23.9
Tongue	122	16.6
Pharynx	56	7.6
Floor of the mouth	24	3.3
Jaws	44	6.0
Anywhere around the mouth	39	5.3
I don't know/ I am not sure/ no response	104	14.1
Top (four) causes of HNC		
Smoked tobacco		
No/no response	454	57.5
Yes	335	42.5
HPV		
No/no response	455	57.7
Yes	334	42.3
Alcohol		
No/no response	480	60.8
Yes	309	39.2
Lack of Vegetables in diet		
No/no response	591	74.9
Yes	198	25.1
Poor tooth-brushing		
No/no response	656	83.1
Yes	133	16.9
Genetic factor		
No/no response	663	84.0
Yes	126	16.0
HIV		
No/no response	678	85.9
Yes	111	14.1
Snuff		

**Table 3 Cont....**

No/no response	688	87.2
Yes	101	12.8
Have you been educated about HNC?		
Yes	256	32.4
No/not sure	533	67.6
Would like to know more about HNC		
Yes	641	81.2
No/indifferent	148	18.8

**Table 4. Knowledge scores of those respondents who claimed awareness on HNC**

Total knowledge score on HNC (N=789)		
Average & above average (≥ 7)	243	30.8
Below average (< 7)	546	69.2
Mean	5.4	
SD	2.54	

**Table 5. Factors associated with having average or above average HNC knowledge scores HNC among the respondents**

Variables	Having average or above average HNC Knowledge of score		
	Frequency (%)	χ <sup>2</sup> value	P-value
Gender		0.70	0.403
Male	147 (32.1%)		
Female	94 (29.3%)		
School type		0.32	0.569
Public	174 (31.4%)		
Private	69 (29.4%)		
Mode of studentship		2.57	0.109
Boarding	47 (26.0%)		
Day	196 (32.2%)		
Class		7.11	0.029*
SS 3	103 (35.8%)		
SS 2	67 (28.3%)		
SS 1	56 (25.3%)		
Age in categories		5.56	0.062
Young adult (20 years and above)	22 (44.0%)		
Late Adolescence (15-19 years)	194 (30.8%)		
Early adolescence (10-14years)	26 (25.2%)		

**Table 5 Cont....**

Tribe		5.95	0.114
Yoruba	86 (32.0%)		
Hausa	66 (31.1%)		
Igbo	28 (41.2%)		
Others	63 (26.3%)		
Have been educated about HNC		6.23	0.013*
Yes	94 (36.7%)		
No/ not sure	149 (28.0%)		
Would like to know more about HNC		9.47	0.002*
Yes	213 (33.2%)		
No/indifferent	30 (20.3%)		

\*-Significant

**Table 6. Correlates of average and above average HNC knowledge score among respondents**

Variables	Average and above average knowledge score	
	OR	95% CI
Class		
SS 3	1.73	1.17 – 2.56
SS 2	1.16	0.76 – 1.76
SS 1	1.00 (Ref)	
Have you been educated about HNC?		
Yes	1.69	1.21 – 2.35
No/ not sure	1.00 (Ref)	
Would like to know more about HNC		
Yes	1.88	1.21 – 2.92
No/indifferent	1.00 (Ref)	



Figure 1. Respondents’ response to the question: Have you heard of head and neck cancer (HNC) before

More than half (56.6%) of them were males, 55% were from monogamous family background, 20.9% were schooling in the north-central geopolitical zone of Nigeria, 73.5% were in public schools, 21.9% were boarding students, and 33.5% were in senior secondary class 3 (SS 3) (Table 2).

Only 789 (31.2%) respondents were aware of HNC (Figure 1). According to these respondents, tobacco smoking (42.5%), HPV (42.3%) and alcohol (39.2%) were selected as the three most common causes of HNC. Amidst other

findings, 70.1% of them believed that someone who had been vaccinated against HPV cannot develop HNC while 31.6% did not know the age at which HNC is common (Table 3). Furthermore, overall assessment of those respondents who were aware of HNC showed that the majority (69.2%) of them had below-average scores (Table 4).

Bivariate analysis showed statistically significant relationships between respondents’ knowledge of HNC and their class level; previous education on HNC; and the willingness to know more about HNC (p-values<0.05) (Table 5). Similarly, following multivariate analysis, factors predicting having above-average knowledge score about HNC among the respondents were: being in SS3 class (OR=1.73; 95% CI=1.17 – 2.56), having been educated about HNC (OR=1.69; 95%CI=1.21 – 2.35) and having the interest to know more about HNC (OR=1.88; 95%CI=1.21 – 2.92) – as shown in Table 6.

**Discussion**

Head and neck cancer is a notorious group of diseases that is affecting both the youth and the elderly<sup>1-4,6</sup>. There is an increasing prevalence of HNC among the youth due to the risky behaviors they indulge themselves in, coupled with their lack of knowledge of the disease<sup>6,31-41</sup>. Whilst several studies had explored HNC risk factors among secondary school students in Nigeria, only very little had explored their knowledge of the disease<sup>31-41</sup>. In this study, we surveyed 2,530 senior secondary school students to assess their knowledge of HNC. The rationale for conducting this study is to determine the baseline knowledge of senior secondary school students in Nigeria on HNC and identify their knowledge gaps, with the ambition of massively educating them on HNC in future.

The findings obtained in this study were noteworthy. Firstly, majority of the respondents had never heard of HNC. The awareness rate recorded in this study is lower than that reported in some similar studies conducted among adolescents and young adults in Nigeria [39,40]. Although the awareness rates recorded in those studies<sup>39,40</sup> were higher than that reported in this present study, yet the HNC awareness rate they reported was below 50%.

Many young persons in Nigeria lacked adequate knowledge of HNC disease<sup>39,40,47</sup>, while the lifetime prevalence rate of the risk factors for HNC among Nigerian adolescents is a problem of public health concern<sup>31-39</sup>. In this study, our data showed that many of the surveyed respondents lacked adequate knowledge of HNC risk factors and the manifestations; from this, it can be affirmed that many Nigerian adolescents do not know about HNC risk factors, despite its high prevalence among them<sup>31-39</sup>. In order to curb this situation, it is highly recommended that organized school-based HNC education programs are conducted for Nigerian adolescents so that they can be more knowledgeable about HNC.

It is also noteworthy that those respondents: in higher classes; who had received education on HNC disease before; and who were willing to know more about HNC were more likely to be more knowledgeable about HNC than those in other categories. However, the explanations to support these observations are reasonable: it is expected that those respondents in higher classes should generally be more knowledgeable than those in lower classes; likewise, those respondents who had received HNC education before or

who had definite interest in knowing more about HNC are supposed to be more knowledgeable than those who were not.

However, it is also important to mention that many of the youth that participated in the survey had some misconceptions about HNC despite claiming the awareness of the disease (see Table 2). In Nigeria, HNC education is not an integral part of the secondary school educational curriculum. Those respondents who were aware of HNC most probably got to know about the disease outside curricular events such as school-based or community-based HNC education programs, media, clinicians, friends, and others. Hence, it can be validly suggested that some of these respondents might have been imparted with incomplete or erroneous information about HNC, or forgotten part or all of what they learned about HNC.

Having a sound knowledge of a disease is important in the prevention of such disease<sup>39</sup>. If Nigerian adolescents can be adequately educated on HNC, they will be well-informed about the risk factors and manifestations of the diseases; hence, making them better equipped for prevention and early self-detection of HNC. However, research has shown that HNC education is a very effective and exciting experience among Nigerian adolescents<sup>39</sup>.

This study has its limitations. First, the sampling technique used in the participating school selection was convenience sampling technique – a non-probability sampling technique. This sampling technique did not give all eligible schools an equal chance of participating in the study. Second, not all the 6 geopolitical zones in Nigeria were included in this study (5 zones were included in the study) due to financial limitations. Third, being a cross-sectional study, this study cannot establish a causal relationship between the respondents' characteristics and their knowledge level regarding HNC.

Notwithstanding these limitations, this study is believed to be the first survey to assess HNC knowledge among secondary school students in Nigeria, at a large scale. Also, this study was conducted during the period when only very little public health efforts have been channeled towards HNC education in Nigeria; hence, the findings obtained in this study provided a baseline data on the HNC knowledge level among senior secondary school students in Nigeria.

In conclusion, this study shows that the majority of senior secondary school students in Nigeria have sub-optimal knowledge of HNC. Hence, the authors of this study recommend the use of a properly planned school-based HNC education programs among in-school adolescents in Nigeria.

### Conflict of Interest

Authors have none to declare.

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### Authors' Contribution

The Study conceptualization: KKK and OFF; Protocol design: KKK and OFF; Data collection: All authors; Data management: OFF; Manuscript drafting: KKK and OFF; Review of final draft: All authors. Acceptance of final draft: All authors. KKK and OFF contributed equally to the study.

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