

## REVIEW ARTICLE



# Knowledge, Attitudes, and Practices Concerning Human Papillomavirus, Cervical Cancer, and its Screening among Female Students of the College of Nursing and Midwifery, Lafia

Ibrahim TL,<sup>1</sup> Bello SO,<sup>1</sup> Audu ES,<sup>1</sup> Jibril KA,<sup>1</sup> Bello AO,<sup>1</sup> Ogunkunle TO<sup>1</sup>

## Abstract

**Background:** Cervical cancer, a preventable disease, remains a major public health issue. Understanding the correlates of awareness, knowledge, and practice is essential for effective intervention. This study evaluated these factors among female health-focused undergraduates in Lafia, Nigeria.

**Methods:** A cross-sectional study was conducted with 100 participants. Data on socio-demographic, awareness, knowledge, and practices related to cervical cancer were collected via a self-administered questionnaire and analysed using the Statistical Package for Social Sciences version 23.

**Results:** Overall awareness was high (94% had heard of cervical cancer), but detailed knowledge was poor, with only 19% achieving a good knowledge score. Misconceptions were common, and preventive practices were low: only 11% had been screened and 14% vaccinated. Bivariate analysis identified significant associations: the type of secondary school attended ( $p = 0.027$ ), mother's education ( $p = 0.033$ ), and family type ( $p = 0.021$ ) were associated with awareness of cervical cancer screening. Paternal education was significantly associated with knowledge level ( $p = 0.036$ ). The uptake of screening was associated with the mother's education ( $p = 0.039$ ) and employment status ( $p = 0.017$ ).

**Conclusion:** This study showed high awareness but poor knowledge and practice of cervical screening among the students. The findings underscore that socio-educational factors, family background, continuous learning and relearning are key to practising what has been learnt. Targeted educational campaigns and strict monitoring are needed to translate awareness into actionable knowledge and improve the uptake of cervical cancer prevention services.

**Keywords:** Cancer, Cervical screening, Human Papillomavirus, Vaccine.

## Introduction

Human Papillomavirus (HPV) is a sexually transmitted infection that has remained a major public health problem globally.<sup>1,2</sup> It is the most prevalent oncogenic virus, implicated in cancers of the cervix, vagina, vulva, anus, penis, and oropharynx.<sup>3,4</sup> Cervical cancer remains a leading cause of cancer-related mortality among women, with an estimated death occurring every two minutes worldwide.<sup>5,6</sup>

Although it ranks as the fourth most common cancer in women globally, it is the second leading cause of cancer morbidity and mortality among women in sub-Saharan Africa.<sup>7</sup>

The global cancer burden is projected to increase to 28.4 million cases by 2040, representing a 50% rise from 2020, with disproportionately higher increases in developing

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<sup>1</sup>Federal University Teaching Hospital/Federal University Lafia

## Corresponding author

Bello Surajudeen Oyeleke

Department of Paediatrics,

Federal University Teaching Hospital/

Federal University Lafia



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countries (64% to 95%) compared to the developed (32% to 56%) countries.<sup>7,9</sup> Persistent infection with high-risk HPV types is the primary cause of cervical cancer.<sup>8</sup> Of the over 140 identified HPV types, approximately 40 are sexually transmitted; high-risk types 16 and 18 account for more than 70% of invasive cervical cancers worldwide.<sup>5,10</sup> Low-risk types, such as HPV 6 and 11, are associated mainly with benign genital warts. In Nigeria, an estimated 53.1 million women aged 15 years and above are at risk of cervical cancer.<sup>11</sup>

The World Health Organisation (WHO) and the American College of Obstetricians and Gynaecologists (ACOG) recommend prophylactic HPV vaccination for both sexes, with emphasis on vaccination of girls before sexual debut.<sup>12</sup> Despite these recommendations, the burden of HPV infection remains high in sub-Saharan Africa, partly due to a large pool of asymptomatic carriers.<sup>13</sup>

Available vaccines include the bivalent (HPV 16 and 18), quadrivalent (HPV 6, 11, 16, and 18), and nonavalent (HPV 6, 11, 16, 18, 31, 33, 45, 52, and 58) formulations, all of which are effective in preventing HPV-related genital warts and cancers in both males and females.<sup>7,12,13</sup> Additional preventive strategies include cervical cancer screening, health education, and modification of known risk factors such as early sexual debut, multiple sexual partners, high parity, poor genital hygiene, and smoking.<sup>10,14,15</sup>

Knowledge and attitudes play a critical role in influencing disease prevention, vaccine acceptability, and utilisation of screening services.<sup>8,17,18</sup> This study therefore assessed the knowledge of female nursing students regarding HPV vaccination, cervical cancer, and cervical screening tests.

## MATERIALS AND METHODS

### Study design

A descriptive cross-sectional school-based study.

### Study Population

The study was conducted among students of the College of Nursing and Midwifery in Lafia, Nasarawa State, North-Central Nigeria. Our study participants comprised female students in their first to third years.

### Sample size determination

A minimum sample size of approximately 100 was calculated based on Fisher's formula, but it adjusts for the population size, given that female students are only a fraction of the students.<sup>19</sup> The confidence level and the margin of error were set at 95% and 5% respectively. The population proportion of 8.4%<sup>20</sup> was the reported prevalence of HPV infection among adolescents in a previous study, while the eligible female students were 598.

### Sampling technique

A convenient sampling technique was used. All female students (100) of the College of Nursing and Midwifery, Lafia, who were present at the school auditorium at an event to commemorate the 2023 edition of the World Antimicrobial Awareness Week (WAAW) were eligible to participate. Twelve (12) students were exempted due to lack of smartphones or uncharged phones.

The study was approved (approval number **FUTHREC/630**) by the research ethics committee of the

Federal University Teaching Hospital (FUTH), Lafia, Nasarawa State. Additionally, the College of Nursing and Midwifery granted permission to conduct the study within the school, and informed consent was obtained from the participating students. The participants' privacy and confidentiality were guaranteed as no identifier could be linked with them.

A self-administered data collection method was used. To ensure that participants are comfortable answering questions concerning their sexual behaviour, an online questionnaire was used for data collection. The link (<https://forms.gle/iEupBShTbZwACW3cA>) to the online questionnaire was shared with the participants after consenting.

The questionnaire consists of four parts. The first part contains sixteen questions about the socio-demographic, sexual, and reproductive health characteristics of respondents. The second part consists of eight questions about participants' awareness of cervical cancer and its preventive strategies (i.e., cervical screening and HPV vaccination). The third part consists of sets of questions (17) to assess the knowledge of participants regarding cervical cancer and its preventive strategies, i.e., causes, risk factors, preventability, vaccine types, coverage, dosage in the country, level and duration of protection and route of administration. The fourth part assesses the current practice of the respondents. The questionnaire was pretested among 5% of the estimated sample size using female medical students of the Federal University, Lafia, to assess clarity and comprehensibility. Participants involved in the pretest were excluded from the final analysis.

### Data scoring, grading, and classification:

There were 17 questions on knowledge, some of which had multiple answers, with a maximum achievable score of 32. Each correct answer was scored one (1), and a wrong answer was scored zero. This knowledge score was used to ensure that true knowledge is reflected, given the propensity for misinformation. A total score amounting to >16 was considered good knowledge, while a total score of ≤16 was considered poor knowledge.<sup>21</sup>

### Data analysis

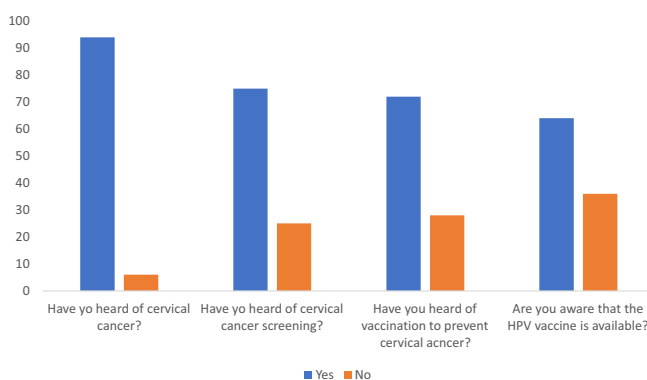
The data was transferred from an Excel spreadsheet into the Statistical Package for Social Sciences (SPSS) version 23. The age of participants, age at onset of menarche, parental educational and employment status and family types were grouped into categories. Data were presented in frequencies and percentages in Tables. Bivariate analysis of the association between the dependent variable (awareness, knowledge and practices regarding cervical cancer and its preventive strategies) and the independent variables, e.g., socio-demographic and sexual and reproductive characteristics, was performed using the chi-square test. The level of statistical significance in all the analyses was set at a p-value of ≤0.05 at a 95% Confidence Interval (CI).

## RESULTS

A total of 100 female undergraduates of the College of Nursing Sciences, Lafia, participated (age range 16–32 years). Seventy per cent were ≥18 years, 93% were single, 64% practised Christianity, 80% came from monogamous families, and 52% attended private secondary schools. Parental education was high: 80% of fathers and 65% of

**Table 1: Socio-demographic and Reproductive Health characteristics of the respondents**

Variables	Frequency/ percentages (N=100)
<b>Age (Range: 16 – 32 years)</b>	
<18	30
≥18	70
<b>Religion</b>	
Christianity	64
Islam	34
Others	2
<b>Marital status</b>	
Married	7
Single	93
<b>Secondary school type</b>	
Private	52
Public	48
<b>Family type</b>	
Monogamous	80
Polygamous	20
<b>Father's highest education</b>	
Tertiary and beyond	80
Secondary	14
Primary	4
No formal education	2
<b>Mothers highest education</b>	
Tertiary and beyond	65
Secondary	21
Primary	11
No formal education	3
<b>Fathers employment status</b>	
Employed	96
Unemployed	4
<b>Mother's employment status</b>	
Employed	94
Unemployed	6
<b>Coitarche onset</b>	
No	62
Yes	38
<b>Age at Menarche (Range: 7-22 years)</b>	
≤13	67
>13	33



**Figure 1: Awareness of cervical cancer, its screening and HPV vaccination**

mothers had tertiary-level education; >90% of parents were employed. Sixty-seven per cent attained menarche at ≤13 years, while 38% of respondents reported prior sexual

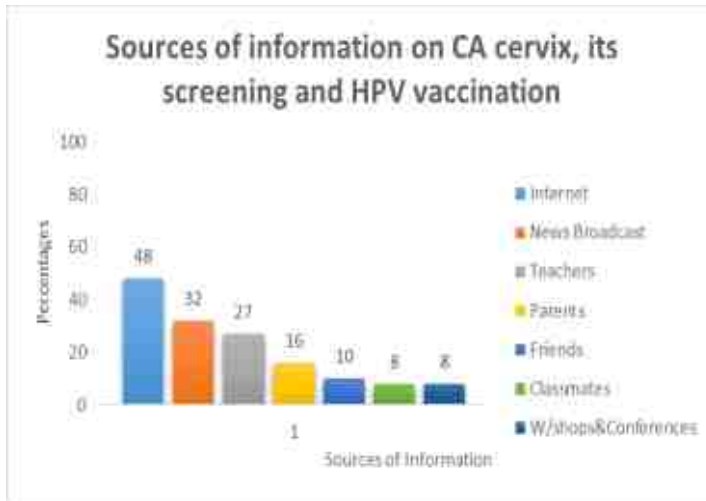
**Table 2a: Knowledge of Cancer of cervix – Causes, screening and prevention**

Variables	Frequency/ percentages (N=100)
<b>What causes Cancer cervix?</b>	
HPV	72
Staphylococcal Aureus	12
Others <sup>1</sup>	27
<b>Is cervical Cancer preventable?</b>	
Yes	90
No	10
<b>What are the preventive measures?</b>	
HPV vaccination	54
Cervical cancer screening	22
Safe Sex	14
I don't know	15
Others <sup>2</sup>	12
<b>How is Cancer of cervix screened for?</b>	
PAP smear	60
Blood testing	33
HPV test in cervical cells	27
<b>Risk factors of Cancer of cervix?</b>	
Multiple sexual partners	59
Bacterial infection	45
Increasing age	27
Hereditary	21
Early marriage	15
Multiparity	11
Others <sup>3</sup>	10
<b>Signs and symptoms of Cancer of cervix?</b>	
Painful sex	54
Postcoital bleeding	53
Vaginal discharge	50
<b>Is HPV Vaccination 100% protective?</b>	
Yes	43
No	57
<b>The vaccine in Nigeria protects against how many HPV strains?</b>	
One	32
Two	37
Three	12
Four	19
<b>How many doses of the HPV vaccine is recommended in Nigeria?</b>	
Single	77
Multiple doses	23
<b>The vaccine is recommended for both boys and girls in Nigeria?</b>	
Yes	30
No	70

<sup>1</sup>(HIV, Tuberculosis, other organisms); <sup>2</sup>(Abstinence, improved vaginal hygiene, Drugs); <sup>4</sup>(Family planning, Affliction, use of condom).

activity **Table 1**. Awareness of cervical cancer was high: 94% had heard of cervical cancer, 75% were aware of cervical cancer screening, 72% had heard about vaccination to prevent cervical cancer, and 64% knew the HPV vaccine was available in Nigeria **Figure 1**. Common information sources included the internet, news broadcasts and teachers **Figure 2**.

Knowledge about cervical cancer and its prevention was mixed. Seventy-two per cent correctly identified HPV as the



**Figure 2:** Bar charts showing the sources of information on cervical cancer, its screening and HPV vaccination

**Table 2 b: Knowledge of Cancer of cervix – Causes, screening and prevention**

Variables	Frequency/percentages (N=100)
<b>It is recommended for girls aged 9 – 14 years</b>	
Yes	78
No	22
<b>The vaccine protects against genital warts</b>	
Yes	56
No	44
<b>The vaccine protects against other types of cancer</b>	
Yes	45
No	55
<b>Route of vaccine administration</b>	
Intramuscular	43
Intravenous	19
Intradermal	14
Subcutaneous	12
Oral	12
<b>Duration of vaccine protection?</b>	
Life long	62
5 years	19
10 years	19
<b>Booster doses are required?</b>	
Yes	55
No	45

Ca = Cancer

**Table 3: Cervical cancer screening and HPV vaccine practices among respondents**

Variables	Frequency	Percentages
<b>Have you been screened?</b>		
Yes	11	11.0
No	89	89.0
<b>Have you been vaccinated?</b>		
Yes	14	14.0
No	86	86.0
<b>Reasons for not vaccinating? (n = 86)</b>		
Unaware its available	33	38.4
Fear of side effects	28	32.6
Doubtful efficacy	13	15.1
High cost	12	13.9
<b>If the vaccine is made freely available, will you receive it?</b>		
Yes	85	85.0
No	15	15.0
<b>If No, why? (n = 15)</b>		
Am not just interested	8	53.3
Still concerned about its safety and side effects	4	26.7
I don't think I need it	2	13.3
Not sure if it works	1	6.7

cause, and 90% believed cervical cancer is preventable. However, misconceptions were frequent (12% attributed the disease to Staphylococcus aureus; 33% thought “blood testing” is a screening method). Regarding prevention and screening: 54% listed HPV vaccination as preventive, 60% identified Pap smear, and 27% mentioned HPV testing of cervical cells **Table 2**. On vaccine specifics, 78% correctly indicated vaccination is recommended for girls aged 9-14 years, but only 30% knew it is also recommended for boys. Most respondents (77%) believed a single dose is recommended in Nigeria, and 43% perceived the vaccine as 100% protective. Routes and duration of protection were variably reported (48% identified intramuscular administration; 62% believed protection is lifelong). Using the predefined scoring system (maximum score 32), 19% of

participants achieved a “good knowledge” score while 81% had “poor knowledge”.

Reported practices were low: only 11% (n = 11) reported having ever been screened for cervical cancer, and only 14% (n = 14) reported having received HPV vaccination; 86% (n = 86) were unvaccinated. Among the 86 respondents who had not been vaccinated, the commonest reasons were unawareness that the vaccine was available (33; 38.4%) and fear of side effects (28; 32.6%); cost (12; 13.9%) and doubt about efficacy (13; 15.1%) were less frequent barriers. If the vaccine were made freely available, 85% said they would receive it; 15% said they would not (primary reasons: lack of interest or safety concerns). **Table 3**.

Bivariate analysis identified several significant associations: type of secondary school attended ( $p = 0.027$ ), mother's education ( $p = 0.033$ ) and family type ( $p = 0.021$ ) were associated with awareness of cervical cancer/screening, while father's education was associated with knowledge level ( $p = 0.036$ ). Screening uptake was associated with the

mother's education ( $p = 0.039$ ) and the mother's employment status ( $p = 0.017$ ). Other socio-demographics and reproductive variables showed no statistically significant associations with awareness, knowledge or vaccination status **Table 4**.

**Table 4: Factors affecting Cancer cervix and its prevention**

Variables	$\chi^2$	p value
<b>Awareness of cervical cancer</b>		
Age	0.540	0.665
Marital status	0.480	1.000
Type of secondary school attended	5.892	<b>0.027</b>
Father's highest education	2.862	0.345
Mother's highest education	1.061	0.869
Father's employment status	0.266	1.000
Mother's employment status	0.407	1.000
Family type	1.596	0.345
Age at menarche	0.770	0.661
Onset of Coitarche	0.390	0.671
<b>Awareness of cervical cancer screening</b>		
Age	0.063	0.801
Marital status	0.051	1.000
Type of secondary school attended	0.001	1.000
Father's highest education	7.457	0.065
Mother's highest education	8.701	<b>0.033</b>
Father's employment status	0.001	1.000
Mother's employment status	0.236	1.000
Family type	5.333	<b>0.021</b>
Age at menarche	0.337	0.539
Onset of Coitarche	0.509	0.475
<b>Awareness of the preventive vaccine for Ca cervix</b>		
Age	1.597	0.206
Marital status	0.824	0.396
Type of secondary school attended	0.038	0.844
Father's highest education	0.820	0.959
Mother's highest education	1.222	0.795
Father's employment status	1.000	0.574
Mother's employment status	0.407	0.674
Family type	0.068	0.436
Age at menarche	0.013	0.909
Onset of Coitarche	0.566	0.452
<b>Awareness of vaccine availability</b>		
Age	1.000	0.317
Marital status	1.540	0.263
Type of secondary school attended	3.185	0.074
Father's highest education	4.010	0.295
Mother's highest education	3.180	0.380
Father's employment status	2.751	0.132
Mother's employment status	0.020	1.000
Family type	0.011	0.917
Age at menarche	0.152	0.697
Onset of Coitarche	2.495	0.114
<b>Knowledge of Cancer cervix and its prevention (score)</b>		
Age	1.637	0.201
Marital status	2.784	0.124
Type of secondary school attended	0.202	0.653
Father's highest education	9.902	<b>0.036</b>
Mother's highest education	1.205	0.801
Father's employment status	0.097	1.000
Mother's employment status	1.497	0.353
Family type	1.316	0.348
Age at menarche	1.514	0.218
Onset of Coitarche	0.874	0.350

**Have you been screened?**

Age	2.573	0.166
Marital status	0.083	1.000
Type of secondary school attended	0.032	0.858
Father's highest education	2.379	0.522
Mother's highest education	8.372	<b>0.039</b>
Father's employment status	0.515	1.000
Mother's employment status	9.917	<b>0.017</b>
Family type	0.026	1.000
Age at menarche	2.595	0.171
Onset of Coitarche	1.436	0.231

**Have you been vaccinated?**

Age	0.253	0.754
Marital status	0.001	1.000
Type of secondary school attended	0.545	0.460
Father's highest education	5.182	0.143
Mother's highest education	1.154	0.841
Father's employment status	0.678	0.635
Mother's employment status	0.038	1.000
Family type	0.748	0.471
Age at menarche	0.054	1.000
Onset of Coitarche	0.614	0.443

**DISCUSSION**

This study assessed knowledge, attitudes, and practices related to HPV, cervical cancer, and screening among female students of the College of Nursing and Midwifery, Lafia. Despite a relatively educated parental background and high general awareness of cervical cancer, substantial gaps were identified in detailed knowledge and preventive practices, highlighting a disconnect between awareness and effective action.

Awareness of cervical cancer (94%) and its preventability was high among respondents, comparable to findings from similar studies among medical students in Nigeria and other sub-Saharan African countries, where awareness levels often exceed 80%.<sup>23,24</sup> This high awareness is likely attributable to respondents' health-related training and exposure to health information through formal education, the internet, and mass media, which were the dominant sources of information in this study. However, awareness alone did not translate into accurate knowledge or optimal preventive practices.

The level of HPV awareness in this study (51.9%) was higher than the one-third reported among secondary school students in Ethiopia<sup>22</sup> and the 45.6% reported in India<sup>18</sup>, likely reflecting differences in study populations. Approximately two-thirds of respondents correctly identified the association between HPV infection and cervical cancer. Awareness of HPV vaccine availability was also high, as expected, among healthcare students. In contrast, poor awareness of both HPV infection and HPV vaccination has been reported among secondary school students in Lagos, Nigeria.<sup>9</sup> Conversely, a study among medical doctors in Zambia documented higher levels of awareness than observed in the present study, underscoring the influence of professional training and clinical exposure.<sup>2</sup>

Although nearly three-quarters of respondents correctly identified HPV as the causative agent of cervical cancer, misconceptions persisted. A notable proportion attributed cervical cancer to bacterial infection or incorrectly identified blood testing as a screening modality. Similar misconceptions have been reported among healthcare trainees in Nigeria,

India, and Saudi Arabia,<sup>24,25,26</sup> suggesting persistent gaps in foundational reproductive health education even among health-oriented student populations. Knowledge of HPV vaccination was also incomplete and sometimes inaccurate. While most respondents correctly identified the recommended vaccination age for girls, only a minority knew that vaccination is also recommended for boys. Misunderstanding regarding vaccine dosing, route of administration, and duration of protection was also common. Similar findings have been documented among nursing students and young women in Nigeria and Ghana, where HPV vaccine knowledge remain low despite high awareness.<sup>24,27</sup> Consequently, only 19% of participants achieved a "good knowledge" score, underscoring the need for structured, curriculum-based HPV education rather than reliance on informal information sources.

Despite high awareness of the HPV vaccine and its benefits, only a quarter of participants had received it. This could be largely attributed to misinformation, poor perception of its need, and fear of side effects, consistent with earlier studies.<sup>20,22</sup> The low screening rate is particularly concerning given that over one-third of respondents reported prior sexual activity, placing them at risk of HPV infection.

Among unvaccinated respondents, lack of awareness of vaccine availability and fear of side effects were the predominant barriers, while cost and doubts about efficacy were less frequently cited. These findings align with prior Nigerian studies in which misinformation, safety concerns, and limited access were major deterrents to HPV vaccine uptake.<sup>20,22,24</sup> Encouragingly, willingness to receive the vaccine increased substantially if it was offered free of charge, supporting evidence that cost remains a critical structural barrier. This finding reinforces the importance of integrating HPV vaccination into publicly funded immunisation programs.

Socio-demographic factors played a measurable role. Maternal education and employment status were significantly associated with awareness and screening uptake, consistent with literature demonstrating the strong

influence of maternal health literacy and socioeconomic empowerment on women's preventive health behaviours.<sup>28</sup> The association between the type of secondary school attended and awareness suggests that early educational environments contribute meaningfully to health knowledge acquisition. In contrast, reproductive factors such as age at menarche and sexual activity were not significantly associated with knowledge or practices, indicating that exposure alone does not guarantee engagement with preventive services.

Overall, the findings reveal a paradox of high awareness coexisting with poor knowledge depth and very low preventive practices, even among future healthcare providers. This gap has critical implications, as nursing and midwifery students are expected to serve as frontline educators and advocates for cervical cancer prevention. Strengthening HPV-related content within nursing and midwifery curricula, alongside practical exposure to screening services and targeted risk communication, is therefore essential.

### Limitations

This study is subject to limitations inherent to its cross-sectional design, which precludes causal inference, and its use of a convenience sample recruited during WAAW, which may affect the generalizability of findings. Nonetheless, these limitations were mitigated by calculating *a priori* minimum sample size, applying clear inclusion and exclusion criteria, and employing appropriate statistical methods, which collectively strengthen the internal validity and reliability of the results.

### Conclusion

There is a good level of awareness regarding cervical cancer and the role of HPV and cervical screening. This, however, does not translate to utilisation of the cervical screening tests, HPV vaccination and limiting sexual partners due to misinformation and lack of deeper understanding. Continued health education, female education, training and retraining, with monitoring and evaluation, are advocated.

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### Conflict of interest

No conflict of interest

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#### Authors' contribution

ITL, BSO and OTO conceived, designed the study and participated in data collection. BSO and OTO analysed the date. BSO wrote the initial draft of the manuscript. ITL, AES, JKA, BAO and OTO substantially revised the initial manuscript draft. All autho