KNOWLEDGE AND ACCEPTABILITY OF THE HUMAN PAPILLOMA VIRUS VACCINE AMONG STUDENTS IN TERTIARY INSTITUTIONS IN LAGOS, NIGERIA.

BY

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DECLARATION

I hereby declare that this work is original and has neither been presented to any other faculty for the purpose of the award of a degree nor has it been submitted elsewhere for publication.

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CERTIFICATION

We certify that this work was carried in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan under our supervision.

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DEDICATION

This work is dedicated to my husband, B.O Nwachukwufor his undying love and support and to Rev. Father Justin Ileka for his passion for education.

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ABSTRACT

Provision of Human Papillomavirus (HPV) vaccines in low and middle income countries is a critical pillar for meeting the global action for closing the cancer divide. However, high cost of vaccine and vaccine delivery, low awareness and knowledge of cervical cancer and HPV infection and failure of cervical cancer to be recognized as a major health concern poses a problem to this achievement. This study was aimed at assessing the knowledge of cervical cancer, HPV infection and HPV vaccine, and acceptability of HPV vaccine among students in tertiary institutions in Lagos.

The study was a cross sectional survey and a multi-stage sampling technique was used to select 997 students in tertiary institutions. A self administered questionnaire was used to elicit information on awareness, knowledge of cervical cancer, knowledge of HPV infection and vaccine, and willingness to receive the HPV vaccine. Data was analyzed using descriptive statistics; frequencies and percentages, and using inferential statistics; Chi square and logistic regression at 5% level of significance.

The respondents were aged 15 to 40 years with a median age of 22 years. Majority were Christians (71.0%) and single (94.7%). Compared to respondents who were aware of cervical cancer (67.2%), only 36.1% of the respondents had ever heard of HPV infection. The commonest source of information of HPV was school (30.8%). Majority of the respondents had poor knowledge of cervical cancer (24.8%) and HPV (14.8%). Only 1.3% of the respondents had ever received the HPV vaccine and very few (7.2%) were willing to receive the vaccine. High cost (63.3%) was the major reason of willingness to receive the vaccine. Respondents aged 20 to 24 years (OR= 3.4, CI=1.26- 8.91), in a polytechnic (OR=6.8, CI=7.49- 94.45) and those who had good knowledge of cervical cancer (OR=3.4, CI=1.59- 7.37) were more likely to have good knowledge of HPV infection and vaccine while accounting students (OR=0.27, CI=0.09- 0.77) were less likelyto have good knowledge of HPV infection and vaccine. Likewise, polytechnic students (OR=5.7, CI=1.68- 18.99),engineering students (OR= 3.8, CI=1.15- 12.33), those with income greater than 20000 naira (OR=3.97, CI=1.30-12.06) and respondents having previous history of STI (OR=2.9, CI=1.28- 6.38) were more likely to be willing to receive the HPV vaccine while respondents from Igbo ethnic group (OR= 0.26, CI=0.10- 0.67) were less likely to be willing to receive the HPV vaccine.

Generally, knowledge of students in Nigeria tertiary institution in Lagos about HPV infection and cervical cancer was very low, so was willingness to receive the HPV

vaccine. Knowledge of HPV infection and cost reduction of the HPV vaccine are important factors that can influence willingness to accept the vaccine. Nigeria needs to partner with foreign agencies to ensure cost reduction of the HPV vaccine.

Key words: Human papilloma virus, tertiary institution students, acceptability, Nigeria

Word count: 449

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LIST OF ACRONYMS

HPV: Human Papilloma Virus

STD: Sexually Transmitted Disease

STI: Sexually Transmitted Infection

WHO: World Health Organization

WHIM: warts, hypogammaglobulinemia, immunodeficiency, myelokathexis

DNA: Deoxyribonucleic acid

CDC: Center for Disease and Control

FDA: Food and Drug Administration

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Cervical Cancer is listed among the top five cancers that affect women globally (Blackman et al., 2013). Cervical Cancer is the second most common cancer among women worldwide next only to breast cancer (National Cancer Institute, 2004). There were about 500000 new cases and more than 250000 deaths recorded as a result of this preventable disease in 2009 (Hoque 2013). The crude incidence rate of cervical cancer is 19.3 in Nigeria, 19.9 in Western Africa and 15.8 worldwide. Cervical cancer ranks as the second most frequent cancer among women between 15 and 44 years of age in Nigeria (Amosu et al., 2011; Aminu et al., 2014).

Human Papilloma Virus (HPV), a sexually transmitted virus has been implicated as the causative agent (Ugwu et al., 2012). HPV infection is the most prevalent sexually transmitted disease (STD) in the world (Ugwu et al., 2012) and it is estimated that 50% to 80% of sexually active women are infected at least once in their lifetime (Makwe et al., 2012; Wright et al., 2014).

The new preventive strategy for cervical cancer is directed at immunization against this HPV infection prior to the first sexual exposure as a form of primary prevention or to screen for evidence of pre-invasive lesions of the cervix as a form of secondary prevention (Ugwu et al., 2012). The high risk HPV types 16 and 18 contribute to about 70% of cervical cancer cases. Clinical trial studies have demonstrated that two vaccines Gardasil and Cervarix have almost 100% efficacy in preventing persistent infection and the development of precancerous lesions caused by HPV 16 and HPV 18 (Hoque et al., 2013).Several recent developments have emphasized HPV vaccine as an important prevention strategy. The 2009 WHO position paper on HPV vaccines recommended they be included in routine national immunization programs as public health priority (Perlman et al., 2014).

Students of tertiary institutions are more sexually active than the general population and are at risk of contracting STIs (Hoque 2013). They also fall among the age group recommended to be vaccinated. The objective of this study is therefore to determine

the knowledge and acceptability of the HPV vaccine among students in tertiary institutions in Lagos, Nigeria.

1.2 Statement of the problem

Cervical cancer ranks the second most frequent cancer among women aged 15 – 44 years of age (Aminu et al., 2014) in Nigeria and current estimates indicates that every year 14,550 women are diagnosed with cervical cancer and 9,659 die from the disease (Odetola et al., 2012). In recent times, statistics available have shown that in Nigeria, cervical cancer accounts for about 15 percent of female cancers as compared to 3.6 percent in developed countries. Consequently, cervical cancer kills a woman every hour in the country (Amosu et al., 2011).

In Nigeria, HPV prevalence is high across all female ages but it is highest among persons 15 – 23 years (Ezenwa et al., 2013). Prevalence of sexually transmitted infections (STIs) is highest in the 15 – 24 years age group because they are exposed to multiple risks and opportunities, and about 80 percent of all people who had sex would have come in contact with HPV which is a STI that can either produce vaginal wart or lead to cervical cancer (Odetola et al., 2012). University students and young adults have a high prevalence of genital HPV infection because of their risky sexual behavior, lack of knowledge of HPV and misconception about susceptibility (Makwe et al., 2012).

1.3 Justification for the study

There is an increase in the incidence of cancer of the cervix with young women developing the disease at an early age (Arulogun et al., 2012). The projected number of new cervical cancer cases in Nigeria in year 2025 is 22,914 and the projected number of deaths in 2025 is 15,251 (Odetola et al., 2012). This clearly shows that cervical cancer is a serious public health concern in Nigeria. Most studies carried out in Nigeria involved mainly healthcare workers, mothers, medical students and only 2 studies, one in the Northern state by Iliyasu et al ., 2010 and the other in Lagos by Makwe et al ., 2012, involved female students only. There are limited studies among undergraduates in Tertiary Institutions in Nigeria and these are the sexually active groups (Hoque 2013).

Furthermore there is no known study in Nigeria involving male youths. With the introduction of the HPV vaccine Gardasil which is recommended for both males and females and HPV being a sexually transmitted infection which is associated with cancer of the cervix, vaginal, anus, vulva, penis, urethra, mouth, throat, tongue or tonsils, it is therefore imperative to include male participants in studies on HPV as this would provide baseline data for future studies and vaccination programs and serve as guide to policy makers and administrators.

1.4 Objectives

1.4.1 General objectives

This study determined the level of knowledge and acceptability of the HPV vaccine among students in tertiary institutions in Lagos State, Nigeria.

1.4.2 Specific Objectives

The specific objectives were to:

1. Assess the knowledge of cervical cancer and HPV among students of tertiary institutions.
2. Identify the factors influencing students' knowledge of HPV.
3. Determine the willingness to receive the HPV vaccine.
4. Identify the factors influencing willingness to receive the HPV vaccine.

1.5 Research Questions

1. What is the knowledge on cervical cancer and HPV among students of tertiary institutions?
2. What are the factors influencing the students' knowledge?
3. Are the students willing to receive the HPV vaccine?
4. What are the factors influencing willingness to have the vaccine

CHAPTER TWO

LITERATURE REVIEW

2.1 Epidemiology of Cervical Cancer

Cervical cancer is an important health problem worldwide, being the second most common cancer among women worldwide (Arulogun et al., 2012; Hoque 2013, Underwood et al., 2010) and listed among the top five cancers that affect women globally (Blackman et al., 2013). Cervical cancer, once the most common cause of cancer among women of childbearing age (Underwood et al 2010), is also the leading cause of death per annum in women aged 35 – 45 years (Ojiyi et al., 2013) and the third leading cause of cancer death in women worldwide (Underwood et al., 2010). It affects women in their reproductive years at a time when they have young families or are still desirous of childbearing (Arulogun et al., 2012). As stated by Elit et al., 2009, cervical cancer affects relatively young women compared with other cancers. It is a preventable disease (Hoque 2013, Ojiyi et al., 2013), but has continued to pose a huge management challenge to the modern day gynaecologist. EM Donadiki et al., 2013 noted that a previous Human Papillomavirus [HPV] is required for the development of cervical cancer.

Ojiyi et al., 2013 stated that on worldwide basis, cervical cancer constitutes approximately 6% of all cancers in women. According to reports disseminated by the American Cancer Society and World Health Organization (WHO), an estimated 555,100 new cases of cervical cancer were expected to be diagnosed and an estimated 309,800 deaths due to cervical cancer were expected to occur worldwide (American cancer society 2007a, American cancer society 2007b, Boyle and Levin 2008, Underwood et al., 2010). Hoque 2013 and Ojiyi et al., 2013 both stated that there were about 500,000 new cases and more than 250,000 deaths recorded as a result of this preventable disease in 2009, thus correlating with the American Cancer Society and WHO estimates. The reports also noted that the highest incidence rates of cervical cancer worldwide occur in Central America, South America, the Caribbean, Sub-Saharan Africa, and Southern Asia, and that the highest mortality rates of cervical cancer worldwide occur in Africa, Latin America, Asia and India.

Of the estimated 500,000 women affected by cervical cancer each year, 80% of these cases occur in developing countries (Cutts et al., 2007; Ojiyi et al., 2013) and as such it is the leading cause of cancer death in women in these countries (Oguntayo et al., 2011; Aminu et al., 2014). In the United States, cervical cancer has decreased in incidence and mortality since the mid-19th century primarily because of screening (Blackman et al., 2013) and partly owing to a reduction in risk factors (K. Park., 2011). This is not so in developing countries, where the resources are very limited and screening centres are either not available or are sparsely distributed, the screening programs have been unsuccessful and ineffective in reducing the disease burden.Cervical cancer is a significant cause of morbidity and mortality among women in developing countries and the second most common cancer in Nigeria women (Adeoye et al., 2013)

The cervical cancer cytology smear is a commonly used screening method worldwide (WHO, 2002). The screening procedure is simple and straight forward, but can be perceived by women as invasive as it requires a pelvic examination. Lack of awareness of cervical cancer, its preventability and the benefits of the screening procedure, as well as cultural and geographical barriers, may result in poor utilization of screening services, even when these are available (Nguyen et al., 2011). In cases where effective screening programs are available, poor knowledge, and negative health seeking behavior of the populace have led to poor utilization of such services (Arulogun et al; 2012). The imbalances as cited by Hoque are alarming as developed countries have an average screening coverage of 63%, compared to 19% in developing countries. The Sub- Saharan African region, one of the most affected areas of cervical cancer has scarce access to only 5% to the global- cervical cancer prevention resources. Screening is found to be the best method for early detection of cervical cancer, without screening, the cancer is usually present in advanced stages when cure rates are low.

Doctors usually can't explain why one woman develops cervical cancer and another doesn't. Risk factors of cervical cancer include; age, past and or present occurrence of HPV or clinical genital warts (Arulogun et al., 2012; K. Park., 2011), smoking (American Cancer Society, 2014; Gerend et al., 2008), immunosuppression, being overweight, long-term use of oral contraceptives, having multiple full-term pregnancies, being younger than 17 at first full-term pregnancy, poverty, having a

family history of cervical cancer (American Cancer Society, 2014), early age at first intercourse and multiple sexual partners (Gerend et al., 2008).

From the National Cancer Institute, early cervical cancer usually doesn't cause symptoms. When the cancer grows larger, women may notice increased vaginal discharge, pelvic pain, pain during sex, abnormal vaginal bleeding; bleeding that occurs between regular menstrual periods, bleeding after sexual intercourse, douching or a pelvic exam, menstrual periods that last longer and are heavier than before, bleeding after going through menopause (National Cancer Institute 2012).

Cervical Cancer can be diagnosed by:(National Cancer Institute, 2012).

1. having a laboratory test which includes papanicolaou test and HPV test
2. cervical exam using a colposcope
3. tissue sample test.

2.2 Cervical Cancer; Causation

Many studies have tried to show some kind of association between age, reproductive factors, marital factors, educational level, religion, occupation and sexual behaviors with the risk of developing HPV and cervical cancer. These socio-demographic factors may be useful in risk scoring which is important because risk scoring systems have the potential for assisting the targeting of screening resources, as broad-risk targeting of all sexually active women is not a viable option for developing countries due to paucity of both human and financial resources (Ojiyi et al., 2013).

In 1842, Rigoni- Stern formally hypothesized that cervical cancer had an infective sexually transmitted aetiology. Many studies have since then confirmed the veneral nature of cervical cancer and identified other risk factors. The HPV has been shown to be a determinant of the natural history of Cervical Intraepithelial Neoplasia (CIN) (Underwood et al., 2010). The progression rate to cervical cancer when HPV co-exists with CIN is about 21% but only 5% when CIN lesions occur alone (Ojiyi et al., 2013). The National Cancer Institute has confirmed that cervical cancer is an infection-related cancer caused primarily by the Human Papilloma Virus (HPV).

2.3 Prevention of Cervical Cancer

Refraining from all sexual contact involving the genitals is the only absolute way to prevent genital infection by the HPV (American Cancer Society, 2009; Centres for Disease Control, 2007a; Centres for Disease Control, 2007b). Given that complete abstinence is not a desirable or realistic expectation for most adults, other means of reducing risk of acquiring the HPV are recommended. Limiting intimate sexual activity to one, mutually monogamous, uninfected partner will reduce a person's risk of contracting a genital type of the HPV. Limiting the number of sexual partners will, likewise, reduce a person's risk of contracting different strains of the HPV.

Avoiding direct contact with the HPV, which is primarily transmitted by skin-to-skin contact, is deemed to be an effective means of reducing the risk of HPV transmission. Latex condoms have been identified as an effective means for reducing risk of transmitting several sexually transmitted diseases. Consistent and correct use of latex condoms provides some protection against the HPV. However, given that condoms do not cover the vulva, scrotum, perineum, or rectal areas, condoms cannot completely prevent transmission of genital types of the HPV (American Cancer Society, 2009; Centres for Disease Control, 2007a; Centres for Disease Control, 2007b).

2.4 The Human Papilloma Virus

Human papillomavirus (HPV) is a non-enveloped deoxyribonucleic acid (DNA) virus belonging to the family *Papillomaviridae*. This family includes more than 130 geno-types,many of which infect the mucosal areas of the human upper digestive tract and the anogenital region through sexual contact, leading to increased risk of development of cancer (Aminu et al., 2014). Human Papillomaviruses (HPVs) are a group of more than 150 related viruses, certain types of which can cause cancer. They are called papillomaviruses because certain types may cause warts or papillomas, which are benign (non cancerous) growths (American Cancer Society., 2011).

It is well recognized that infection with oncogenic HPV types is a necessary, although not sufficient, cause of virtually all cervical cancer. The 12 HPV types most strongly associated with cervical cancer are 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59. Other potentially carcinogenic HPV types include 26, 53, 66, 67, 68, 70, 73, and 82. Eight HPV types (16, 18, 45, 31, 33, 35, 52, and 58) account for 95 percent of SCCs

positive for HPV deoxyribonucleic acid (DNA). HPV types 16 and 18 alone are responsible for approximately 70 percent of cervical cancer cases. Results from a large international collection of cervical tumour specimens also revealed the presence of HPV DNA in 99.7 percent of cases (Kimberly et al., 2011).

These genotypes are grouped into "high-risk" and "low-risk" according to the degree of risk of development of cancer after infection (Aminu et al., 2014). Some types of HPV are associated with certain types of cancer. These are called "high-risk" oncogenic or carcinogenic HPVs (American Cancer Society., 2011). Infection with the high-risk serotypes of HPV can lead to cervical cancer and are associated with other mucosal anogenital, and head and neck cancers (Aminu et al., 2014).

Genital HPV infection is the most prevalent sexually transmitted disease (STD) in the world (Hoque et al., 2013; Makwe et al., 2012; Gerend et al., 2008).Genital HPV infection is one of the most common sexually transmitted infections in sexually active adolescents and young women. It has been estimated that at least 50% of sexually active adults have had a genital HPV infection and that globally 75% of individuals (males and females) will experience an HPV infection at least once in their lifetime, with the highest rates of infection occurring in those under the age of 25 years (Aminu et al., 2014).

Approximately 60 HPV types cause warts on non-genital skin, such as on the hands, arms, knees, shins, face and feet. With approximately 40 HPV types which affects mucous membranes and cause genital warts or low grade changes, high grade changes, pre-cancer or cancer in the cervix, vaginal, anus, vulva, penis, urethra, mouth, throat, tongue or tonsils.

In addition, there are other HPV types that do not cause warts, cancer or symptoms (Underwood et al., 2010). Infection with the low-risk serotypes is known to cause benign or low-grade cervical tissue changes and genital warts (condylomaacuminata) on the cervix, vagina, vulva, and anus in women and on the penis, scrotum, and anus in men (Aminu et al., 2014). Low risk types, (HPVs 6 and 11) cause genital warts whereas persistent high-risk HPV infection specifically HPV types 16 and 18 has been linked to the development of cervical cancer, anogenital cancers and oropharyngeal cancers (Blackman et al., 2013; Gerend et al., 2008).

About 70% of cervical cancer is caused by HPV type 16 and 18. More than 90% of genital warts are related to low-risk HPV 6 and 11(National Cancer Institute 2004, Ezenwa et al., 2013) but very few will develop cervical cancer. The immune system of most women will usually suppress or eliminate HPVs; only HPV infections that are persistent can lead to cervical cancer (National Cancer Institute). In 2011, more than 12,000 women in the United States are expected to be diagnosed with cervical cancer and more than 4,000 are expected to die from it (American Cancer Society). Nearly half a million women develop cervical cancer each year worldwide and more than a quarter of a million die from it.

2.5 Risk Factors of HPV

Most HPV infections are asymptomatic. Risk factors associated with HPV infection include heterosexuality, high parity, prolonged use of contraceptives, dietary factors, genetic disorders such as WHIM (warts, hypogammaglobulinemia, immunodeficiency, myelokathexis) syndrome (Aminu et al., 2014), early age at first sexual intercourse, smoking, previous history of STIs, co-infection with other sexually transmitted agents such as chlamydia trachomatis and herpes simplex virus may also be associated with risk of HPV infection, multiple sexual partners, characteristics of partners and sexual network, having sex with uncircumcised male, acquisition of new sexual partners, concurrency and serial monogamy (Gerend et al., 2008; Makwe et al., 2012; Underwood et al.,2010; Kimberly et al., 2011). As indicated by Aminu et al., 2014 infection with HPV, diagnosed by detection of antibodies to HPV in the serum or detection of HPV DNA, is the primary risk factor contributing to development of cervical intraepithelial neoplasia and invasive cervix carcinoma. Detection of anti-HPV has been shown to reflect the overall HPV infection rate in a population more effectively than detection of HPV DNA Sexual behaviour is a primary risk factor for contracting the genital type of the HPV (National Comprehensive Cancer network, 2008; Centres for Disease Control, 2007a; Centres for Disease Control, 2007b; Underwood et al., 2010. The genital type of the HPV is usually transmitted skin-to-skin during penetrative vaginal or anal-genital contact. Oral-genital, manual-genital and genital-genital contact can lead to the transmission of the virus. While studies have shown that vertical transmission of the HPV from an infected mother to a newborn, horizontal transmission of the HPV to

children following sexual abuse, and transmission of the HPV following contact with infected secretions without sexual intercourse are possible, they are not common (Underwood et al.,2010). Women with multiple sex partners have a higher risk of contracting HPV than monogamous women. Thus, making individual and group sexual behaviors important in HPV transmission (Makwe et al., 2012).

2.6 HPV Prevalence

A globally HPV prevalence of 11.7% was reported in a meta- analysis conducted by researchers in Spain. The HPV prevalence in North America and Europe was estimated at 11.5% and 14.2% respectively, while the prevalence in Africa was estimated at 21.1% with Sub-Saharan Africa topping the list at 24%.

In Nigeria, HPV prevalence is high across all female ages but it is highest among 15 – 23 years. The incidence of HPV in women with cervical cancer is reported by Ezenwa; Aminu and Thomas et al to be 24.8%. A prevalence of 26.3% for HPV in the general population has been reported in Southern Nigeriawhile HPV prevalence in the general population (among women with normal cytology) is 23.7% (Aminu et al., 2014).

2.7 The HPV Vaccines

HPV is preventable with the use of HPV vaccines. HPV vaccines are prepared from empty protein shells called virus-like particles (VLP) produced using recombinant technology and they are designed to be prophylactic (i.e., to prevent infection and consequent disease). They do not contain any live biological product or DNA, so they are non-infectious (Cutts et al., 2007). Early studies with a monovalent vaccine against HPV 16 have shown that VLP vaccines induce a strong immune response in animal models and humoral immunity in humans. Immune responses to HPV infection are type-specific; therefore, vaccine efficacy can be greatly improved by combining VLPs from several types of HPV into one multivalent vaccine (Ezenwa et al., 2013).

In June of 2006, the Food and Drug Administration licensed the first HPV vaccine. The vaccine is indicated for use among girls and women from 9 to 26 years of age for

the prevention of cervical cancer, precancerous or dys-plastic lesions, and genital warts. While the HPV vaccine does not protect against all types of HPV, it does provide protection against two HPV types which cause 70% of the cases of cervical cancer (i.e., HPV 16 and HPV 18) and two of the HPV types which cause 90% of the cases of genital warts (i.e., HPV 6 and HPV 11) Gerend et al., 2008.

The Food and Drug Administration (FDA) approved two vaccines to prevent HPV infection; Gardasil and Cervarix (National Cancer Institute; Ezenwa et al., 2013; Gerend et al., 2008; Hoque et al., 2013).Both vaccines should be given as a three-shot series.

The quadrivalent vaccine (Gardasil) which targets HPV types 6, 11, 16 and 18 is recommended for females and males aged 9 through 26 while the bivalent vaccine (Cervarix) which targets HPV 16 and 18 is recommended for females aged 10 through 25 (Blackman et al., 2013). The vaccines have been shown to be effective for at least 4 to 6 years, and it is believed they will be effective for longer, however the duration of effectiveness and whether a booster will be needed is unknown (Amosu et al.,2011). The vaccine is available and accessible at some private and public hospitals in Nigeria at a cost range of nine thousand naira to fifteen thousand naira (N9, 000–N15, 000). Despite the prevalence and burden of cervical cancer worldwide with almost 80% occurring in developing countries such as Nigeria, only about 52% of Nigerian women were aware of this deadly disease (Odetola et al., 2012).

CHAPTER THREE

METHODOLOGY

3.1 Study Design

The study was a descriptive cross-sectional survey that assessed the knowledge and awareness of the human papilloma virus infection, cervical cancer and acceptability of the HPV vaccine among tertiary institution students aged 15 to 40 years in Lagos state.

3.2 Study Area

The study was carried out in Lagos state. Lagos is located in south-western Nigeria (Wright et al., 2014). It is the most populous city in Nigeria and the second fastest-growing city in Africa. The latest reports estimate the population at 21 million making Lagos the largest city in Africa (Campbell, 2012).Lagos is made up of diverse cultural, religious and social background ensuring diversity in the study population.

3.3 Study Population

The study was carried out on male and female undergraduates currently enrolled in three randomly selected government owned tertiary institutions in Lagos.

3.3.1 Eligibility Criteria

To be eligible for this study, respondents had to be undergraduate students in specified selected departments.

3.4 Sample Size Determination

Sample size estimation for cross- sectional study at 95% Confidence level was used to calculate the minimum sample size

$$n = \frac{(Z\alpha/2)^2 * pq}{d^2}$$

Where:

n is the desired sample size.

z is the standard normal deviate set at 1.96 [corresponding to 95% confidence interval];

p is the proportion in the target population estimated to have a particular characteristic, the proportion of student with HPV knowledge as obtained from a previous study in Lagos, Nigeria was given as 17.7% [Makwe et al., 2012].

q = 1-p

d is the precision at 2.5% level.

p = 17.7%

q = 1- P = 82.3%

d = 2.5%

$$n = \frac{(Z\alpha/_2)^2 * pq}{d^2}$$

$$n = \frac{1.96^2 * 0.177 * 0.823}{0.025*0.025}$$

$$= 895.38$$

Adjusting for non-response rate of 10% using the formula 1/1- f (n)

Where f is estimated non response rate

(1/1 - 0.1)(895.38) = 994.87

Sample size of 997 was used for the study

3.5 Sampling Techniques

A total of 997 participants were recruited by employing a multi stage sampling technique.This was divided into four stages;

Stage 1 : Three governments owned tertiary education institutions were selectedout of seven using simple random sampling (balloting).

Stage 2 : Two faculties were selected from each institution through balloting.

Stage 3 : Adepartment was then selectedfrom each faculty through balloting.

Stage4: proportional allocation was employed to select total number of students for the three/ four levels of schooling in the departments.

Proportional allocation: $\frac{\text{Total number of students in selected levels}}{\text{Total number of students in all the selected levels}} \times \text{sample size}$

The total numbers of students required in each level were selected from their classrooms through random sampling. Students willing to participate were counted and asked to pick a number from a box. Those that picked odd numberswere selected for the study. Students not selected were apologized to and appreciated.

3.6 Training of Research Assistants

Six research assistants were recruited to assist with data collection. Fluency in both Yoruba and English language was a prerequisite for recruitment. Educational qualification of the assistants was at least secondary level. The training of the research assistants was conducted by me over a period of two days. The training focused on interpersonal and communication skills, after which general overview of the study aims and objectives was discussed. A copy of the questionnaire and flyers on HPV infection compiled from Centre for Disease Control website was distributed to each assistants and each section of the questionnaire was discussed and issues arising clarified. Assistants were asked to go through the materials for better understanding and a pretest was carried out the next day.

3.6.1 Pre-Test of Survey Instrument

The questionnaire was pretested using 10% of the total sample size (n= 100) to validate the instrument. This was done by administering the questionnaire to students in mathematics education department in University of Lagos to avoid bias. The pre-test was carried out for the following reasons: to test for reliability of the instrument, familiarize the research assistants with the nature of the research and correct any lapse in the training received, determine the respondents understanding of the instrument and trends in participants' response, discern the duration required in administering the questionnaire and time convenient for respondents to participate in the study, and to make any necessary adjustments to the questionnaire and/or data collection process.

3.7 Data Collection

Aim and objectives of the study was explained to the respondents and their informed consent obtained before a self- administered, anonymous and pretested questionnaire with both close ended and open ended questions was administered by the trained research assistants to the respondents. The questions were adapted and modified from previous studies by Makwe et al., 2012, Dondaki et al., 2013 and Hoque et al., 2013. Permission to use class period was first sort from the various lecturers.

Data collected was in six (6) sections. These included socio-demographic characteristics, cervical cancer knowledge, HPV knowledge, HPV vaccine knowledge, sexual history and vaccine acceptability.

3.7.1 Study Variables

Dependent Variables: The dependent variables were respondents' HPV knowledge, history of HPV vaccination and vaccine acceptability.

Independent Variables: The independent variables included: age, gender, religion, institution type, sexual history, educational level, educational background, family/friend's history of STIs, socio-economic status.

3.8 Data Management and Analysis

Results were entered and cleaned immediately using Statistical Package for the Social Sciences (SPSS) version 20. This is done to reduce missing data. To assess knowledge of cervical cancer, knowledge score was calculated from 23 cervical cancer related questions with one point allocated for each right answer and zero point for any wrong answer. Knowledge score range used was 0 – 11 (poor knowledge), and 12 – 23 (good knowledge).

For HPV and HPV vaccine, knowledge score was calculated from 10 HPV related questions with one point allocated for each right answer resulting in a score range of 0 – 10 where 0 – 4 was poor knowledge and 5 – 10 was for good knowledge. History of HPV vaccination and willingness to be vaccinated was assessed by questions "have you ever received the HPV vaccine" and"are you willing to receive the HPV vaccine

if you haven't respectively''. Respondents were first briefed on the importance and cost of the vaccine before answering this section.

Bivariate analysis was done using Chi square or Fisher's exact test to identify factors that were associated with knowledge of cervical, HPV infection and vaccine and, willingness to be receive the HPV vaccine. This was done by analyzing the association between socio demographic characteristics and sexual history with knowledge of cervical, HPV infection and vaccine and, willingness to receive the HPV vaccine.A P value of < 0.05 was considered statistically significant for variables to be included in a multiple logistic regression analysis. This was carried out to examine the degree of relationship between predictor variables and the outcome variables by controlling confounders.

3.9 Ethical Considerations

Ethical approval for study implementation was obtained from the Health Research and Ethics, of the Lagos State University Teaching Hospital (LASUTH), Lagos State. Participants were informed of the purpose, objectives and potential benefits of the research. Respondents were also assured of the utmost respect of their confidentiality and inconveniences. An informed consent form made available in English was signed by all participants and participation was made voluntary.All forms and documents were stripped of participant's names. Only concerned individuals were allowed to handle documents containing participants' information.

Beneficence to participants:

All participants were given counsel on the importance of the HPV vaccine, cervical cancer screening and maintaining a healthy Lifestyle.

CHAPTER FOUR

RESULTS

4.1 Socio- Demographic Characteristics of Respondents

The socio- demographic characteristics of the respondents is shown in Table 1. All 997 respondents were undergraduate students in Lagos state. More than half of the respondents were females (63%). The age range was 15 to 40 years with a median of 22years.Christian religion was practiced by majority of the respondents (71.8%). Unmarried students constituted 94.7% of which majority (70.2%) were currently in a relationship. The predominant ethnic group of the respondents was Yoruba (43.9%). Most (83.2%) of the respondents were currently not working or running a business, and half (57.2%) had a monthly allowance less than or equal to ten thousand naira.

Table 1 Socio- Demographic Characteristics of the Respondents

Characteristics	Frequency (997)	Percentage % (100)
Age in years		
15 – 19	163	16.3
20 – 24	603	60.5
25 and above	231	23.2
Sex		
Male	369	37.0
Female	628	63.0
Religion		
Christianity	716	71.8
Islam	264	26.5
Traditional	17	1.7
Marital status		
Single	944	94.7
Married	53	5.3
In a relationship currently, if not married*		
Yes	663	70.2
No	281	29.8
Ethnic group		
Yoruba	438	43.9
Igbo	385	38.6
Hausa	158	15.9
Others**	16	1.6
Working?		
Yes	167	16.8
No	830	83.2
Monthly income/allowance		
≤ 10000	570	57.2
10001 – 20000	177	17.8
> 20000	43	4.3
Don't know	207	20.7

Median age of respondents is 22 years

Mean income of respondent is 9568.35 ± 9758.60

*N = 944 respondents currently not married

**Includes respondents from Edo, Ijaw and Igala

4.1.1 Socio- Demographic Characteristics of Respondents' Parents

Table 2 shows the socio- demographic characteristics of respondents' parents. Almost half of the respondent's parents had secondary education (47.4 % of their fathers' and 46.1% of their mothers').More than half were self- employed (56.3% of their fathers' and 67.8% of their mothers'), about two thirds (69.3%) were in a monogamous marriage.

Table 2 Socio- demographic characteristics of respondents' parents

Characteristics	Frequency (997)	Percentage % (100)
Father's educational level		
None	52	5.3
Primary	107	10.7
Secondary	473	47.4
Tertiary	365	36.6
Mother's educational level		
None	44	4.4
Primary	197	19.8
Secondary	460	46.1
Tertiary	296	29.7
Father's occupation		
Civil servant	330	33.1
Self-employed	561	56.3
Unemployed	42	4.2
Retired	64	6.4
Mother's occupation		
Civil servant	182	18.3
Self-employed	676	67.8
Unemployed	122	12.2
Retired	17	1.7
Family type		
Monogamous	691	69.3
Polygamous	306	30.7

4.2 Sexual History of Respondents

Respondents' sexual history is shown in Table 3. Among the participants who responded yes to having any previous sexual experience (56.8%), the age at first intercourse ranged between 15 to 19 years (67.1%). Very few made use of condoms (29.2%) or contraceptives (9.7%) always. More than half of the respondents responded no to ever contracting a sexually transmitted disease (64.2%) or genital wart/HPV (52.2%).

Table 3 Sexual history of respondents

Characteristics	Frequency (997)	Percentage% (100)
Previous sexual experience		
Yes	566	56.8
No	431	43.2
Age at first intercourse (years)*		
10 – 14	19	3.4
15 – 19	380	67.1
≥20	167	29.5
Number of sexual partners*		
1	171	30.2
2	212	37.5
≥3	183	32.3
Ever used condoms*		
Always	165	29.2
Never	109	19.3
Sometimes	292	51.6
Ever used contraceptives*		
Always	55	9.7
Never	366	64.7
Sometimes	145	25.6
Ever contracted STI		
Yes	124	12.4
No	640	64.2
Don't know	233	23.4
Ever contracted genital wart/HPV		
Yes	38	3.8
No	520	52.2
Don't know	439	44.0

*566 respondents that responded yes to previous sexual experience

Mean age at first intercourse = 18± 2.2 years

4.3 Awareness of Cancer of the Cervix

Table 4 shows results relating to awareness of cervical cancer. About two third of the respondents (67.2%) had heard of cervical cancer. More than half (59.6%) had heard of cervical cancer screening and very few (27.3%) knew someone having cervical cancer.

Table 4 Awareness of cancer of the cervix

Characteristics	Frequency (997)	Percentage % 100
Ever heard of cervical cancer		
Yes	670	67.2
No	281	28.2
Don't know	46	4.6
Know someone with cervical cancer		
Yes	272	27.3
No	536	53.7
Don't know	189	19.0
Ever heard of cervical cancer screening		
Yes	595	59.6
No	227	22.8
Don't know	175	17.6

4.3.1 Respondents Source of Information on Cervical Cancer

Figure 1 shows respondents source of information on cervical cancer. Among those who have ever heard of cervical cancer, the common sources of information were health provider (31.5%) and school (30%), followed by the media/internet (21.8%).

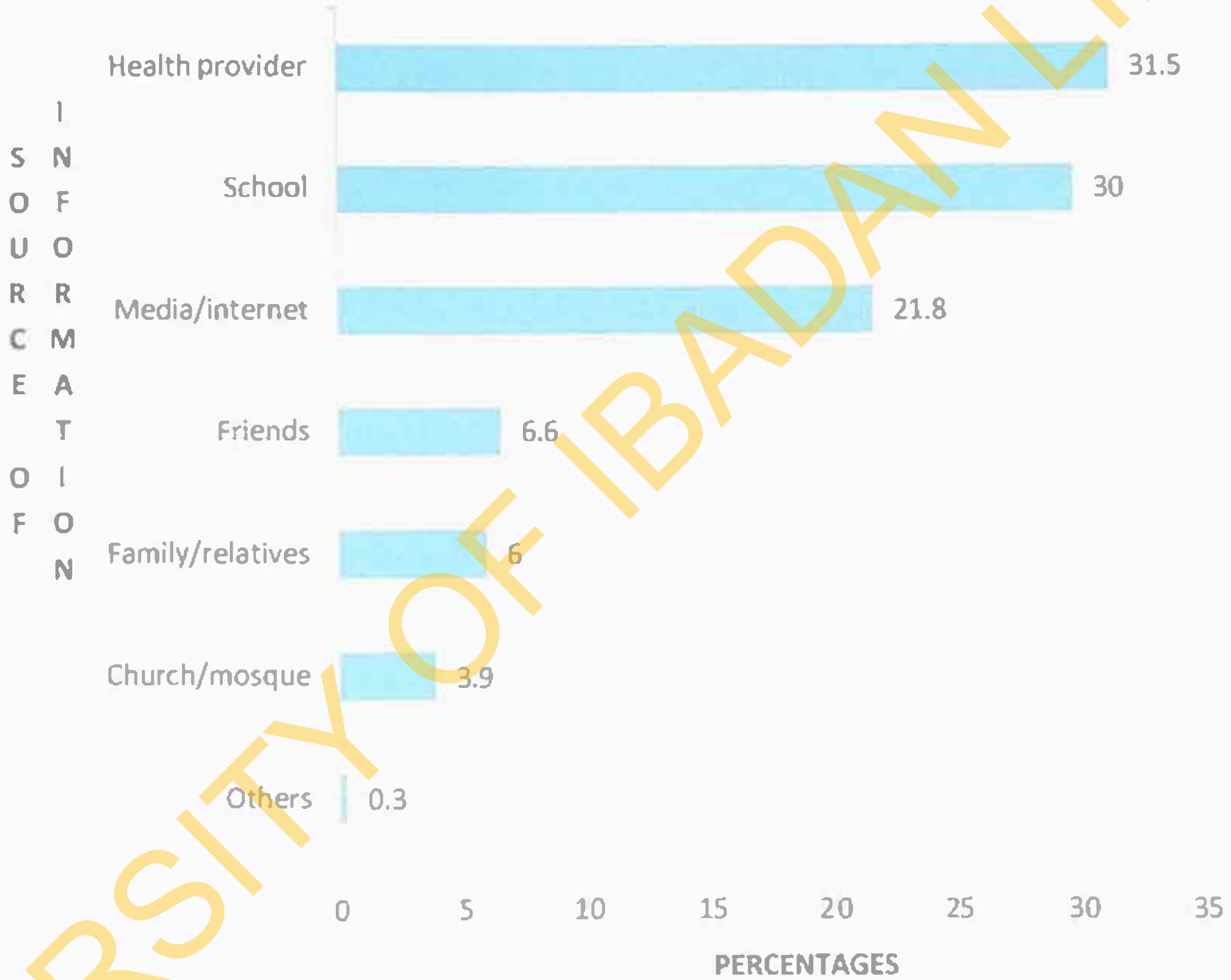

Figure 1 Respondents source of information on cervical cancer

*others were fliers and billboards.

4.4 Respondents Knowledge of Cervical Cancer

Table 5 shows participants response to a list of knowledge questions on cervical cancer. Less than half of the respondents knew that cervical as the second most common female reproductive cancer (40.9%), and that all women were at risk of cervical cancer (43.4%). About one- third of the respondents (37.1%) knew that cervical cancer is caused by a sexually transmitted infection and more than half (56.6%) mentioned that cervical cancer could be prevented. When probed about the symptoms associated with cervical cancer, few of the respondents correctly mentioned bleeding after menopause(46.6%), bleeding after sexual intercourse (33%), pain during sexual intercourse (37.7%), unusual vaginal discharge (36.5%) and pelvic pain (32.3%). While 25.7% knew that abdominal pain was not a symptom of cervical cancer.

About one third of the respondents mentioned the HPV infection (30.4%), smoking (32.7%), hereditary (33.7%) and contraceptive use for a long time (39.5%) as risk factors of cervical cancer. Few correctly stated that alcohol intake (38.5%) and hypertension (41.2%) were not risk factors while very few knew multiple sexual partners (26.3%) and early age at first intercourse (20.4%) were risk factors of cervical cancer.

Knowledge of diagnosis of cervical cancer revealed that less than half of the respondents knew that Pap smear (35.9%), cervical examination (44.4%) and tissue sample test (35.7%) were used in diagnosing cervical cancer. Few correctly stated that urine test (21.6%) and blood test (28.8%) were not methods of diagnosing cervical cancer.

Table 5 **Respondents knowledge of cervical cancer**

Knowledge of cervical cancer	Knowledgeable n(%)	Not knowledgeable n(%)
Cervical cancer is the second most common female reproductive cancer	408 (40.9)	589 (59.1)
All women are at risk of cervical cancer	433 (43.4)	564 (56.6)
Cervical cancer is caused by a sexually transmitted infection	370 (37.1)	627 (62.9)
Cervical cancer can be prevented	564 (56.6)	433 (43.4)
Symptoms		
Bleeding after menopause	465 (46.6)	532 (53.4)
Bleeding after sexual intercourse	329 (33.0)	668 (67.0)
Pain during sexual intercourse	376 (37.7)	621 (62.3)
Abdominal pain	356 (35.7)	741 (74.3)
Unusual vaginal discharge	364 (36.5)	633 (63.5)
Pelvic pain	322 (32.3)	675 (67.7)
Risk factors		
The HPV infection	303 (30.4)	694 (69.6)
Smoking	384 (38.5)	613 (61.5)
Multiple sexual partners	262 (26.3)	735 (73.7)
Hereditary	336 (33.7)	661 (66.3)
Hypertension	411 (41.2)	586 (58.8)
Early age at first intercourse	263 (26.4)	734 (73.6)
Oral contraceptive for a long period	394 (39.5)	603 (60.5)
Diagnosis		
Urine test	215 (21.6)	782 (78.4)
Pap smear	358 (35.9)	639 (64.1)
Cervical examination	443 (44.4)	554 (55.6)
Tissue sample test	356 (35.7)	641 (64.3)
Blood test	287 (28.8)	710 (71.2)

4.4.1 Respondents Overall Knowledge of Cervical Cancer

The overall analysis of knowledge of respondents shows that 24.8% had good knowledge and 75.2% had poor knowledge of cervical cancer. Respondents mean knowledge score was 8.14± 5.41 of 23.

Table 6 Respondents overall Knowledge of Cervical Cancer

Characteristics	Frequency N= 997	Percentage % (100)
Poor Knowledge (0 – 12)	750	75.2
Good Knowledge (13 – 23)	247	24.8

Mean score = 8.14± 5.41

4.5 Awareness of HPV Infection and HPV Vaccine

Table 7 shows awareness HPV infection and HPV vaccine among the respondents. About one- third of the respondents (36.1%) had heard of HPV infection and few (1.6%) knew anyone that had ever suffered from genital wart/HPV. Of those who had heard of HPV infection, 76.4% had heard about the HPV vaccine.

Table 7 Respondents awareness of HPV infection and HPV vaccine

Characteristics	Frequency (997)	Percentage% 100
Ever heard of HPV infection		
Yes	360	36.1
No	559	56.1
Don't know	78	7.8
Know anyone that ever suffered from genital wart/ HPV		
Yes	16	1.6
No	425	42.6
Don't know	556	55.8
Ever heard of HPV Vaccine*		
Yes	275	76.4
No	81	22.5
Don't know	4	1.1

*360 respondents who ever heard of HPVinfection.

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Don't know	78	7.8
Know anyone that ever suffered from genital wart/ HPV		
Yes	16	1.6
No	425	42.6
Don't know	556	55.8
Ever heard of HPV Vaccine*		
Yes	275	76.4
No	81	22.5
Don't know	4	1.1

*360 respondents who ever heard of HPVinfection.

4.5.1 Source of Information on HPV Infection.

Figure 2 shows respondents source of information on HPV infection. Among those who had ever heard of HPV infection. The common sources of information were school (30.8%), the media/internet (27.8%) and health provider (25%).

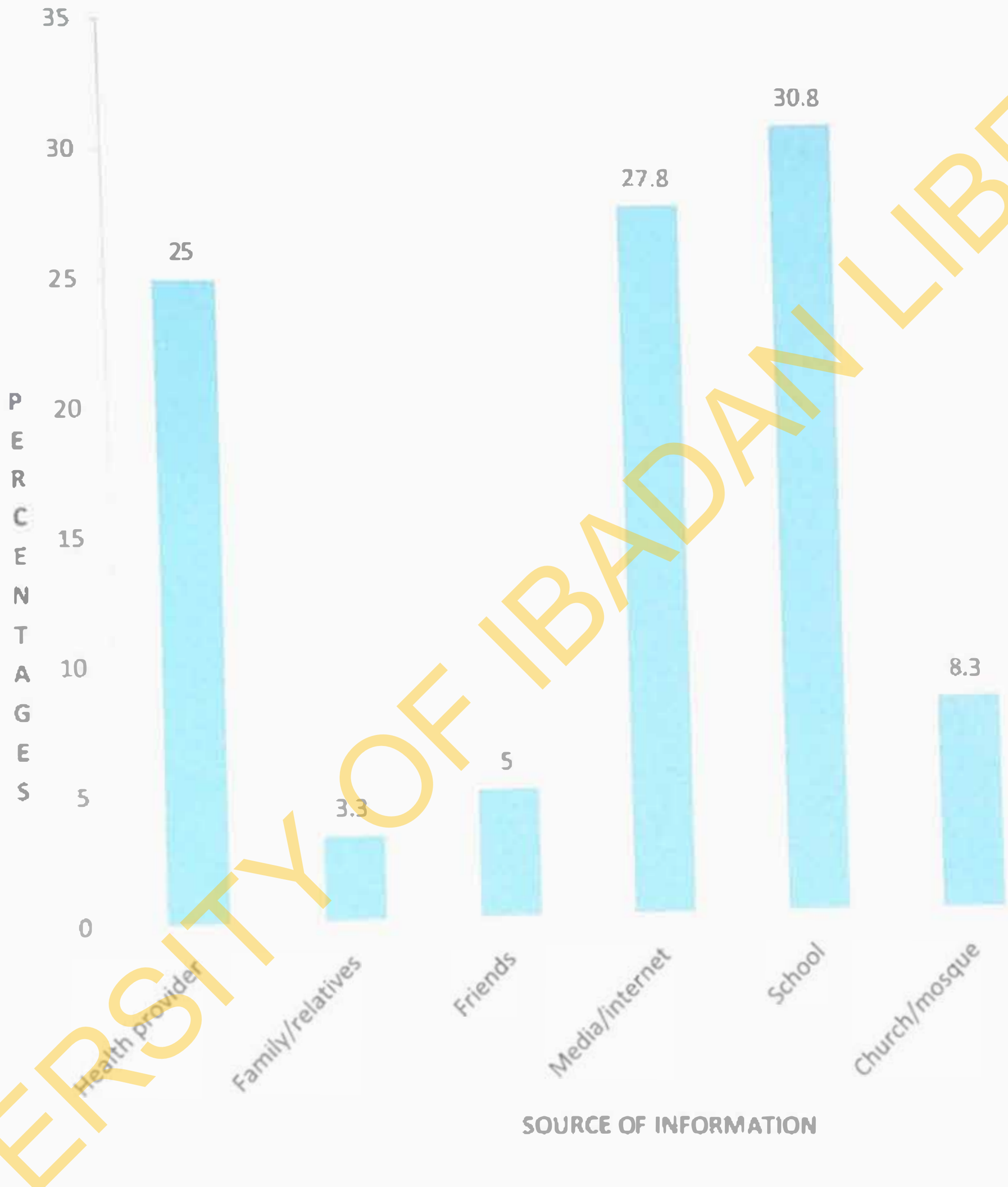

Figure 2 Respondents source of information on HPV

4.6 Knowledge of HPV Infection among all Respondents

Table 8 shows participants' responses to a list of knowledge questions on HPV infection. Less than half of the respondents agreed that HPV infection was a sexually transmitted disease (45.6%) and could cause genital warts (34.5%) with 29.5% agreeing that certain types of HPV could cause cervical cancer. Very few respondents opined that a person's chances of getting HPV increases with the number of sexual partners (18.9%) and that an abnormal Pap test result may indicate an HPV infection (19.2%) while 22.6% incorrectly mentioned that most types of HPV cannot clear on their own.

Table 8 **Knowledge on HPV infection among all respondents**

N= 997

Characteristics	Agree n (%)	Undecided n (%)	Disagree n (%)
HPV is a sexually transmitted disease	455 (45.6)	480 (48.1)	62 (6.3)
Certain types of HPV can cause cervical cancer	294 (29.5)	624 (62.6)	79 (7.9)
A person's chances of getting HPV increases with the number of sexual partners	188 (18.9)	645 (64.7)	164 (16.4)
Most types of HPV cannot clear on their own	225 (22.6)	617 (61.9)	155 (15.5)
HPV can cause genital warts	344 (34.5)	556 (55.8)	97 (9.7)
An abnormal pap test result may indicate an HPV infection	191 (19.2)	662 (66.4)	144 (14.4)

4.7 Knowledge of HPV vaccine among all respondents

Table 9 shows respondents knowledge of HPV vaccine. Most of the respondents had no idea of the number of vaccines that were available (71.6%) or if any of the vaccines were recommended for males (72.2%). Likewise 72.9% had no idea of the age group the vaccine was recommended and only 8.6% knew the number of doses recommended were three.

Table 9 Knowledge of HPV vaccine among all respondents

Characteristics	Frequency (997)	Percentage 100%
How many HPV vaccines are available		
None	21	2.1
One	30	3.0
Two	51	5.1
Three	181	18.2
Don't know	714	71.6
Are any recommended for males		
Yes	156	15.6
No	121	12.1
Don't know	720	72.2
Age group recommended for vaccine		
< 9 years	20	2.0
9 – 26 years	48	4.8
18 – 26 years	202	20.3
Don't know	727	72.9
Number of doses recommended		
One	36	3.6
Two	32	3.2
Three	86	8.6
Four	100	10.0
Don't know	743	74.5

4.8 Respondents Overall Knowledge of HPV Infection and HPV Vaccine

The overall analysis of knowledge of respondents shows that 14.8% had good knowledge and 85.2% had poor knowledge of HPV infection and vaccine. Respondents mean knowledge score was 1.97 ± 2.1 of 10.

Table 10 Respondents knowledge of HPV infection and HPV vaccine

Characteristics	Frequency N= 997	Percentage % (100)
Poor Knowledge (0 – 4)	849	85.2
Good Knowledge (5 – 10)	148	14.8

Mean score = 1.97 ± 2.1

4.9 Respondents Knowledge of Cervical Cancer Assessed by Socio Demographic Variables.

A decreasing trend of knowledge was seen with increasing age group as age group 15-19 (34.4%) had better knowledge compared to 25 and above. Male respondents (29.5%) had a slightly better knowledge compared to females (22.0%) and those currently in a relationship (31.8%) had far better knowledge than those who were not (9.3%). The Christians (26.8%) were more knowledgeable than those who practiced traditional religion (11.8%).

University students (33.5%) were seen to have far better knowledge compared those in college of education (3.4%). There was a huge gap in knowledge among the faculties and departments, as basic medical science respondents (42.7%) had better knowledge than business administration (1.6%) and physiology (42.7%) had better knowledge than biology education respondents.An increasing trend of knowledge with increasing level/year of study was observed as level/year 4 respondents (44.7%) were more knowledgeable than level/year 1 (19.7%).

Table 11 knowledge of cervical cancer assessed by socio demographic variables.

Characteristics	Good Knowledgen(%)	Poor Knowledgen(%)	X^2	P- value
Age (years)				
15- 19	56(34.4)	107(65.6)		
20- 24	139(23.1)	464(76.9)	9.6	.008*
25 and above	52(22.5)	179(77.5)		
Sex				
Male	109(29.5)	260(70.5)		
Female	138(22.0)	490(78.0)	7.1	.008*
Marital status				
Single	237(25.1)	707(74.9)		
Married	10 (18.9)	43(81.1)	1.1	.306
In a relationship**				
Yes	211(31.8)	452(68.2)		
No	26(9.3)	255(90.7)	53.5	.000*
Ethnic group				
Yoruba	97 (22.1)	341(77.9)		
Igbo	112(29.1)	273(70.9)	7.1	068
Hausa	33 (20.9)	125(79.1)		
Others***	5 (31.2)	11(68.8)		
Religion				
Christianity	192(26.8)	524(73.2)		
Islam	53 (20.1)	211(79.9)	6.3	.043*
Traditional	2 (11.8)	15 (88.2)		
Institution				
University	147(33.5)	292(66.5)		
Polytechnic	92 (28.4)	232(71.6)	77.4	000*
College of education	8 (3.4)	226(96.6)		
Faculty				
Science	6 (5.5)	103 (94.5)		
Engineering	42(21.8)	151(78.2)		
Biz management	38 (24.2)	119(75.8)	106.1	000*
Basic med science	105(42.7)	141 (57.3)		
Biz admin	2 (1.6)	123 (98.4)		
Science tech	54(32.3)	113 (67.7)		
Department				
Science lab tech	54(32.3)	113 (67.7)		
Physiology	105(42.7)	141 (57.3)		
Accounting	40(14.2)	242(85.8)	87.1	000*
Biology	6 (5.5)	103 (94.5)		
Computer engineering	42 (21.8)	151 (78.2)		
Year/Level				
Year/level 1	58 (19.7)	236(80.3)		
Year/level 2	63 (21.2)	234(78.8)		
Year/level 3	59 (23.0)	197(77.0)	38.3	000*
Year/level 4	67 (44.7)	83 (55.3)		

*significant associations
** 944 respondents who were single
***include Ijaw,Igala,Edo

4.9.1 Respondents Knowledge of Cervical Cancer assessed byParents' Socio Demographic characteristics.

Table 12 shows respondents' knowledge of cervical cancer assessed byparents' socio-demographic characteristics. Only mothers' educational level was significant. Respondents whose mother had attained tertiary education (33.4%) were more knowledgeable compared to those with no education (13.6%).

Table 12

Knowledge of cervical cancer assessed by parents' socio-demographic characteristics.

N= 997

Characteristics	Good Knowledge n(%)	Poor Knowledge n(%)	X^2	P- value
Fathers' educational level				
None	10 (19.2)	42(80.8)		
Primary	23 (21.5)	84 (78.5)		
Secondary	109(23.0)	364(77.0)	5.4	.147
Tertiary	105(28.8)	260(71.2)		
Mothers' educational level				
None	6 (13.6)	38 (86.4)		
Primary	33 (16.8)	164(83.2)		
Secondary	109(23.7)	351(76.3)	21.9	.000*
Tertiary	99(33.4)	197(66.6)		
Fathers' occupation				
Civil servant	85(25.8)	245(74.2)		
Self employed	136(24.2)	425(75.8)		
Unemployed	6 (14.3)	36(85.7)	4.2	.243
Retired	20 (31.2)	44(68.8)		
Mothers' occupation				
Civil servant	35 (19.2)	147 (80.8)		
Self employed	183(27.1)	493(72.9)		
Unemployed	27 (22.1)	95(77.9)	6.9	.075
Retired	2 (11.8)	15(88.2)		
Family type				
Monogamous	172(24.9)	519(75.1)		
Polygamous	75 (24.5)	231(75.5)	0.1	.898

*significant association

4.10 Respondents' Knowledge of Cervical Cancer assessed by Sexual History.

Respondents who had sexual experience (30.2%) had better knowledge than those without sexual experience (17.6%). Those who made use of condoms (38.7%) and contraceptives (49.7%) sometimes were more knowledgeable compared to those who always made use of condoms (20.6%) and contraceptives (18.2%). Also, a huge gap in knowledge was noticed among respondents who had ever contracted STI (38.7%) and genital wart/HPV infection (60.5%) and those who didn't know if they had ever contracted STI (15.9%) or genital wart/HPV infection (16.4%).

Table 13 Respondents knowledge of cervical cancer by sexual history.

N= 997

Characteristics	Good knowledge n(%)	Poor knowledge n(%)	X^2	P value
Sexual experience				
Yes	395(69.8)	171(30.2)		
No	355(82.4)	76 (17.6)	20.8	.000*
Number of sexual partners**				
1	126(73.7)	45 (26.3)		
2	143(67.5)	69 (32.5)	1.9	.395
3 or more	126(68.9)	57 (31.1)		
Condom use**				
Always	131 (79.4)	34 (20.6)		
Never	85 (78.0)	24 (22.0)	20.7	.000*
Sometimes	179(61.3)	113(38.7)		
Contraceptive use**				
Always	45 (81.8)	10 (18.2)		
Never	277(75.7)	89 (24.3)	35.9	.000*
Sometimes	73 (50.3)	72 (49.7)		
Ever contracted STI				
Yes	76 (61.3)	48 (38.7)		
No	478(74.7)	162(25.3)	22.9	.000*
Don't know	196(84.1)	37 (15.9)		
Ever contracted genital wart/HPV				
Yes	15 (39.5)	23 (60.5)		
No	368(70.8)	152(29.2)	48.1	.000*
Don't know	367(83.6)	72 (16.4)		

*significant association

**among 566 respondents who answered yes to having sexual experience

4.11 Knowledge of HPV Infection and HPV Vaccine Assessed by Socio-demographic Characteristics.

Respondents who were 20- 24 years (17.1%) had better knowledge than 25 years and above (10%). Those who were married (35.8%) had better knowledge than those who were not (13.7%). Likewise, those in a relationship (15.4%) had better knowledge than those who were not (9.6%). Polytechnic students (34%) had a far better knowledge than university (8%) and college of education students (1.3%). There was a huge gap in knowledge among respondents in faculties and departments as those in science technology (43.1%) had better knowledge than business administration (.8%) and science laboratory technology (43.1%) had better knowledge than biology education (1.8%). Year/level 2 respondents (19.2%) were more knowledgeable than respondents from other levels.

Table 14 Respondents' Knowledge of HPV infection and HPV vaccine by socio-demographic variables.

Characteristics	Good Knowledgen(%)	Poor knowledgen(%)	X^2	P- value
Age (years)				
15- 19	22(13.5)	141(86.5)	6.9	.030*
20- 24	103(17.1)	500(82.9)		
25 and above	23(10.0)	208(90.0)		
Sex				
Male	45(12.2)	324(87.8)	3.2	.071
Female	103(16.4)	525(83.6)		
Marital status				
Single	129(13.7)	815(86.3)	19.5	.000*
Married	19 (35.8)	34 (64.2)		
In a relationship**				
Yes	102(15.4)	561(84.6)	5.6	.018*
No	27(9.6)	254(90.4)		
Ethnic group				
Yoruba	65(14.8)	373(85.2)	3.4	.335
Igbo	50(13.0)	335(87.0)		
Hausa	30(19.0)	128(81.0)		
Others	3(18.8)	13(81.2)		
Religion				
Christianity	99(13.8)	617(86.2)	4.1	.127
Islam	44(16.7)	220(83.3)		
Traditional	5(29.4)	12(70.6)		
Institution				
University	35(8.0)	404(92.0)	144.0	.000*
Polytechnic	110(34.0)	214(66.0)		
College of education	3(1.3)	231(98.7)		
Faculty				
Science	2(1.8)	107(98.2)	174.8	.000*
Engineering	5(2.6)	188(97.4)		
Biz management	38(24.2)	119(75.8)		
Basic med science	30(12.2)	216(87.8)		
Biz admin	1(0.8)	124(99.2)		
Science tech	72(43.1)	95(56.9)		
Department				
Science lab tech	72(43.1)	95(56.9)	144.7	.000*
Physiology	30(12.2)	216(87.8)		
Accounting	39(13.8)	243(86.2)		
Biology	2(1.8)	107(98.2)		
Computer engineering	5(2.6)	188(97.4)		
Year/Level				
Year/level 1	55(18.7)	239(81.3)	21.2	.000*
Year/level 2	57(19.2)	240(80.8)		
Year/level 3	18(7.0)	238(93.0)		
Year/level 4	18(12.0)	132(88.0)		

*significant associations
** 944 respondents who were single

4.11.1 Knowledge of HPV Infection and HPV Vaccine Assessed by Working status and Parents' Socio- demographic Characteristics.

From Table 15, it can be seen that respondents' who were working were two times (25.7%) more knowledgeable compared to those who weren't (12.7%) and respondents whose father were retired (31.2%) had better knowledge than others'

Table 15 **Respondents' Knowledge of HPV infection and HPV vaccine by working status and parents' socio-demographic characteristics.**

Characteristics	Good knowledge n(%)	Poor knowledge n(%)	X^2	P value
Working?				
Yes	43(25.7)	124(74.3)		
No	105(12.7)	725(87.3)	18.9	.000*
Fathers' educational level				
None	5(9.6)	47(90.4)		
Primary	18(16.8)	89(83.2)		
Secondary	31(12.9)	412(87.1)	4.9	.174
Tertiary	64(17.5)	301(82.5)		
Mothers' educational level				
None	7(15.9)	37(84.1)		
Primary	29(14.7)	168(85.3)		
Secondary	69(15.0)	391(85.0)	0.1	.995
Tertiary	43(14.5)	253(85.5)		
Fathers' occupation				
Civil servant	40(12.1)	290(87.9)		
Self employed	79(14.1)	482(85.9)		
Unemployed	9(21.4)	33(78.6)	17.3	.001*
Retired	20(31.2)	44(68.8)		
Mothers' occupation				
Civil servant	33(18.1)	149(81.9)		
Self employed	93(13.8)	583(86.2)		
Unemployed	18(14.8)	104(85.2)	3.2	.361
Retired	4(23.5)	13(76.5)		
Family type				
Monogamous	105(15.2)	586(84.8)		
Polygamous	43(14.1)	263(85.9)	0.2	.358

* Significant association

4.12 Knowledge of HPV Infection assessed by HPV Vaccine and Sexual History, and Knowledge of Cervical Cancer.

Knowledge of HPV infection and HPV vaccine was assessed by sexual history and knowledge of cervical cancer in table 16. The variables that were significantly associated with knowledge of HPV infection and HPV vaccine were condom use, ever contracted STI and knowledge of cervical cancer. Better knowledge was seen among respondents who never made use of condoms (21.1%) than those who always (18.8%) or sometimes (9.9%) used condoms. Also those who had ever contracted STI (23.4%) had better knowledge than those who had never contracted STI (12.8%). Furthermore, respondents with good knowledge of cervical cancer (26.7%) had better knowledge than their counterpart (10.9%).

Table 16 Respondents' Knowledge of HPV Infection and HPV Vaccine by Sexual History and Knowledge of Cervical cancer.

Characteristics	Good knowledge n(%)	Poor knowledge n(%)	X^2	P value
Sexual experience				
Yes	83(14.7)	483(85.3)		
No	65(15.1)	366(84.9)	0.03	.854
Number of sexual partners**				
1	30(17.5)	141(82.5)		
2	30(17.5)	182(85.8)		
3 or more	23(12.6)	160(87.4)	1.8	.402
Condom use**				
Always	31(18.8)	134(81.2)		
Never	23(21.1)	86(78.9)		
Sometimes	29(9.9)	263(90.1)	11.01	.004*
Contraceptive use**				
Always	12(21.8)	43(78.2)		
Never	50(13.7)	316(86.3)		
Sometimes	21(14.5)	124(85.5)	2.5	.280
Ever contracted STI				
Yes	29(23.4)	95(76.6)		
No	82(12.8)	558(87.2)		
Don't know	37(15.9)	196(84.1)	9.4	.009*
Ever contracted genital wart/HPV				
Yes	6(15.8)	32(84.2)		
No	68(13.1)	452(86.9)		
Don't know	74(16.9)	365(83.1)	2.7	.257
Knowledge of cervical cancer				
Poor knowledge	82 (10.9)	668(89.1)		
Good knowledge	66 (26.7)	181(73.3)	36.6	.000*

*significant associations

**among 566 respondents who answered yes to having sexual experience

4.13 Determinants of Knowledge of HPV Infection and HPV Vaccine.

Respondents who were aged 20 – 24 years were 3.4 times more likely to have good knowledge of HPV infection and vaccine than those between 15 – 19 years (OR =3.4, 95%CI: 1.26 – 8.91). Likewise, respondents with good knowledge of cervical cancer were 3·4 times more likely to have good knowledge of HPV infection and vaccine compared to respondents with poor knowledge of cervical cancer (OR= 3.4, 95%CI· 1.59 – 7.37).

Furthermore, among the Institutions and Faculties, Polytechnic students were 6.8 times more likely to have good knowledge of HPV infection and vaccine compared to University students (OR= 6.8, 95%CI: 7.49 -94.45) and Accounting students were less likely to have good knowledge of HPV infection and vaccine compared to Science laboratory technology students (OR= 0.26, 95%CI: 0.09- 0.76).

Table 17 **Multiplelogistic regression of predictors of HPV infection and HPV vaccine knowledge.**

Characteristics	OR	95 % CI		Significance
		Lower	Upper	
Age group (years)				
20 -24	3.35	1.2	8.80	.015*
25 and above	1.94	.55	6.72	.297
15 – 19(REF)	1			
In a relationship				
Yes	.82	.27	2.51	.737
No (REF)	1			
Institution				
Polytechnic	6.75	7.49	94.45	.000*
College of education	3.89	.18	83.74	.386
University (REF)	1			
Department				
Physiology	6.87	.84	55.93	.072
Accounting	.26	.09	.76	.015*
Biology education	.54	.03	7.96	.655
Science lab tech. (REF)	1			
Year/level of study				
Year/level 2	.86	.40	1.84	.701
Year/level 3	.42	.15	1.14	.092
Year/level 4	.43	.14	1.34	.148
Year/level 1 (REF)	1			
Working?				
Yes	1.32	.47	3.70	.595
No (REF)	1			
Fathers' occupation				
Self employed	1.74	.79	3.82	.168
Unemployed	3.26	.75	14.17	.115
Retired	1.89	.55	6.45	.305
Civil servant (REF)	1			
Contraceptive use				
Always	1.62	.55	4.77	.374
Sometimes	.86	.36	2.05	.738
Never (REF)	1			
Ever contracted STI				
Yes	1.45	.680	3.09	.336
No (REF)	1			
Knowledge of cervical cancer				
Good knowledge	3.43	1.59	7.37	.002*
Poor knowledge (REF)	1			

*statistically significant predictors

4.14 Respondents Willingness to Receive the HPV Vaccine

Table 18 shows respondents who have ever received the HPV vaccine, reason for not receiving the vaccine and willingness to receive the vaccine among those who haven't. Only 1.3% of the respondents have received the HPV vaccine and of those who haven't, just 7.2% were willing to receive the vaccine. For respondents who were not willing to receive the vaccine, vaccine been too expensive (63.3%) was the major reason for not wanting the vaccine.

Table 18 Respondents willingness to receive the HPV vaccine

Characteristics	Frequency (997)	Percentage % (100)
Ever received HPV vaccine		
Yes	13	1.3
No	984	98.7
Reason for not receiving the vaccine among those who haven't.*		
No reason	271	27.5
Not needed/necessary	261	26.5
Lack of knowledge	190	19.3
Too expensive	165	16.8
Not sexually active	68	6.9
Safety concerns	29	2.9
Willing to receive vaccine*		
Yes	71	7.2
No	913	92.8
Reason for not been willing to receive the HPV vaccine**		
Too expensive/cost	578	63.3
No reason/no idea	145	15.9
Not needed/not interested	129	14.1
Should be free	23	2.5
Not infected	11	1.2
Safety concerns/ side effects	10	1.1
Not sexually active	7	.8
Not available	6	.7
Don't like it	2	.2
Not now	2	.2

*among 984 respondents who responded no to having received vaccine

**among 913 respondents who weren't willing to receive the HPV vaccine

62.7% of the respondents were willing to receive the vaccine if free or at a reduced cost.

4.15 Willingness to Receive the HPV Vaccine According to Socio-demographic Variables.

Table 19 shows that the female respondents (9.9%) were more willing to receive the vaccine compared to males (2.7%). Likewise those who were married (17.3%) were more willing compared to singles (6.7%) and respondents who were from other ethnic groups (Ijaw, Igala, Edo) were four times (12.5%) more willing compared to Igbos (3.9%) to receive the vaccine.

A huge difference was seen among the faculties/departments as respondents in science technology/science laboratory technology (12.6%) were far more willing compared to those in science/biology education (1.9%). Year/level 1 (9.0%) and year/level 2 (9.6%) respondents were more willing compared to those in year/level 3 (5.5%) and year/level4 (2.7%). Income was seen to influence willingness, as those with income greater than 20000 naira (21.4%) were more willing compared to those with lesser income.

Table 19 **Willingness to receive the HPV vaccine according to socio demographic variables.**

Characteristics	Are you willing to receive the HPV vaccine.n(%) Yes	No	X^2	P- value
Age (years)				
15- 19	14(8.6)	148(91.4)		
20- 24	48(8.1)	544(91.9)	4.9	.084
25 and above	9(3.9)	221(96.1)		
Sex				
Male	10(2.7)	356(97.3)		
Female	61(9.9)	557(90.1)	17.5	.000*
Marital status				
Single	62(6.7)	870(93.3)		
Married	9(17.3)	43(82.7)	8.4	.004*
Ethnic group				
Yoruba	37(8.5)	397(91.5)		
Igbo	15(3.9)	367(96.1)		
Hausa	17(11.2)	135(88.8)	12.6	.004*
Others**	2(12.5)	14(87.5)		
Religion				
Christianity	43(6.1)	667(93.9)		
Islam	27(10.4)	232(89.6)	5.4	.067
Traditional	1(6.7)	14(93.3)		
Institution				
University	22(5.0)	415(95.0)		
Polytechnic	34(10.8)	281(89.2)		
College of education	15(6.5)	217(93.5)	9.3	.009*
Faculty				
Science	2(1.9)	105(98.1)		
Engineering	13(6.7)	180(93.3)		
Biz management	14(9.0)	142(91.0)		
Basic med science	9(3.7)	235(96.3)		
Biz admin	13(10.4)	112(89.6)		
Science tech	20(12.6)	139(87.4)	18.6	.002*
Department				
Science lab tech	20(12.6)	139(87.4)		
Physiology	9(3.7)	235(96.3)		
Accounting	27(9.6)	254(90.4)		
Biology	2(1.9)	105(98.1)		
Computer engineering	13(6.7)	180(93.3)	18.4	.001*
Year/Level				
Year/level 1	26(9.0)	262(91.0)		
Year/level 2	27(9.2)	265(90.8)		
Year/level 3	14(5.5)	240(94.5)	8.9	.030*
Year/level 4	4(2.7)	146(97.3)		
Income				
≤10000	36(6.4)	527(93.6)		
10001 =20000	11(6.2)	165(93.8)		
≥20000	9(21.4)	33(78.6)	13.5	.004*
Don't know	15(7.4)	188(92.6)		

*significant associations

**include ijaw, igala and edo

4.15.1 Willingness to Receive the HPV Vaccine According to Sexual History and Respondents' Knowledge.

Contraceptive use and ever contracting STI was seen to influence willingness, as those who never used contraceptives (18.5%) were more willing compared to those who sometimes used contraceptives (5.0%) and respondents who had ever contracted STI (16.1%) were far more willing compared to those who had not contracted STI (7.3%) to receive the HPV vaccine.

Table 20 Willingness to receive the HPV vaccine according to sexual history and respondents' knowledge.

Characteristics	Are you willing to receive the HPV vaccine.n(%) Yes	No	X^2	P- value
Sexual experience				
Yes	40(7.2)	518(92.8)		
No	31(7.3)	395(92.7)	.004	.948
Age at first intercourse (years)				
10 -14	2 (10.5)	17(89.5)		
15 -19	19(5.0)	361(95.0)	18.7	.000*
20 and above	27(16.2)	140(83.8)		
Number of sexual partners				
1	14(8.2)	157(91.8)		
2	18(8.5)	194(91.5)	.03	.983
3 or more	16(8.7)	167(91.3)		
Condom use				
Always	13(8.2)	145(91.8)		
Never	10(9.2)	99(90.8)	1.7	.428
Sometimes	17(5.8)	274(94.2)		
Contraceptive use				
Always	10(18.5)	44(81.5)		
Never	23(6.3)	340(93.7)	11.9	.003*
Sometimes	7(5.0)	134(95.0)		
Ever contracted STI				
Yes	20(16.1)	104(83.9)		
No	64(7.3)	809(92.7)	10.9	.002*
Ever contracted genital wart/HPV				
Yes	1(2.8)	35(97.2)		
No	38(7.4)	479(92.6)	1.1	.577
Don't know	32(7.4)	399(92.6)		
Knowledge of cervical cancer				
Poor	53(7.1)	690(92.9)		
Good	18(7.5)	223(92.5)	.03	.861
Knowledge of HPV				
Poor	57(6.8)	786(93.2)		
Good	14(9.9)	127(90.1)	1.8	.178

*significant association

4.16

Determinants of Willingness to Receive the HPV Vaccine.

The Igbos were less likely to be willing to receive the HPV vaccine compared to the Yorubas (OR= 0.26, 95%CI: 0.10- 0.67).Among the institutions, respondents from polytechnics were 5.7 times more likely to be willing to receive the HPV vaccine compared to respondents from universities (OR= 5.7, 95%CI: 1.68- 18.99). Likewise respondents in faculty of engineering were 3.8 times more likely to be willing to receive the HPV vaccine compared to respondents in faculty of science education (OR= 3.8, 95%CI: 1.15- 12.33). Furthermore, respondents with income > 20000 naira were 4 times more likely to be willing to receive the HPV vaccine compared to respondents with income ≤ 10000 naira (OR= 4.0, 95%CI: 1.30- 12.06) and respondents who had contracted a STI were 2.9 times more likely to be willing to receive the HPV vaccine compared to those who had never contracted STI (OR= 2.9, 95%CI: 1.28- 6.38).

Table 21 **Multiple logistic regression of predictors of willingness to receive the HPV vaccine.**

Characteristics	Odd ratio	95% C.I.		Significance
		Lower	Upper	
Sex				
Female	1.91	0.86	4.24	0.107
Male (REF)	1			
Marital status				
Married	.87	0.30	2.49	0.804
Single (REF)	1			
Ethnic group				
Igbo	.26	0.10	0.67	0.005*
Hausa	1.79	0.74	4.29	0.190
Others**	2.35	0.35	15.84	0.378
Yoruba (REF)	1			
Institution				
Polytechnic	5.65	1.68	18.99	0.005*
College of education	1.82	0.41	6.38	0.484
University (REF)	1			
Faculty				
Engineering	3.76	1.15	12.33	0.028*
Business management	0.35	0.10	1.23	0.104
Basic med science	3.41	0.77	12.80	0.11
Science (REF)	1			
Level of study				
Year/level 2	0.39	0.15	0.99	0.05
Year/level 3	1.15	0.44	3.00	0.767
Year/level 4	0.35	0.09	1.38	0.136
Year/level 1(REF)	1			
Income				
10,001- 20,000	1.16	0.45	3.02	0.747
>20,000	3.97	1.30	12.06	0.015*
Don't know	0.50	0.15	1.62	0.251
<10,000(REF)	1			
Age at first intercourse (years)				
15- 19	0.37	0.06	2.15	0.273
20 and above	1.00	0.17	5.78	0.997
10- 14 (REF)	1			
Contraceptive use				
Always	1.20	0.43	3.36	0.726
Sometimes	1.33	0.54	3.27	0.527
Never (REF)	1			
Ever contracted STI				
Yes	2.86	1.28	6.38	0.01*
No (REF)	1			

*significant associations

** include ijaw, igala and edo

CHAPTER FIVE
DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

This study was aimed at assessing knowledge of cervical cancer, HPV infection and HPV vaccine, and acceptability of the HPV vaccine among students in tertiary institutions in Lagos, Nigeria. There was low acceptability of the HPV vaccine due to cost of the vaccine, but most were willing to receive the vaccine if it were free or at a much reduced price. Study also found that there was poor knowledge of cervical cancer and HPV infection and vaccine among the respondents and that ethnic group, institution, faculty, income and previous history of STI were significantly associated with willingness to receive the vaccine while, age, institution, department and knowledge of cervical cancer were significantly associated with knowledge of HPV infection and vaccine among the students.

The respondents were aged 15 to 40 years with a median age of 22 years. The mean age at first sexual intercourse in this study was 18.3 years; this was consistent with a study carried out in South Africa were mean age at first sexual intercourse was 18.2 years (Hoque et al., 2013). Thus showing that these students are sexually active and at risk of contracting sexually transmitted infections, emphasizing the need to be knowledgeable about the HPV infection and HPV vaccines. Furthermore half of the respondents had monthly allowance less than or equal to ten thousand naira and majority of the respondents were Christians. The respondents were mainly unmarried and consisted mainly of females.

More than half of the respondents had heard of cancer of the cervix, this is inconsistent with the study by Iliyiasu et al in 2010, on cervical cancer among tertiary institution students in Northern Nigeria were awareness was relatively poor (35.5%). This could be due to cultural differences among the respondents as the northern state is made up more of Hausa and Muslims. Health provider, school and media/internet being the major source of information about cervical cancer may also account for the improvement in awareness among the students as compared to those in Northern states. There may be need to improve the health and educational systems in the Northern states to increase awareness and knowledge of cervical cancer. However, findings in this study were similar to previous studies, Hoque, 2013, Makwe et al.,

2012 and Hoque et al., 2013 where awareness of cervical cancer was 53.3%, 56.4% and 58.9% respectively. Despite high awareness of cervical cancer, respondents had very low knowledge of cervical cancer. Findings from this present study provide support for the hypothesis that greater awareness does not necessarily imply correct knowledge (Gerend and Magloire, 2008).

Respondents' knowledge of symptoms, risk factors and diagnosis of cervical cancer in this study is low and consistent with finding from Akujiobi et al., 2008; Dhendup et al., 2014; Hoque et al., 2013 and Makwe et al., 2012. . Only few knew that smoking, having multiple sexual partners, early age at first intercourse, contraceptive use for a long time, HPV infection and family history of cervical cancerwere risk factors of cervical cancer.There was misconception about the diagnosis of cervical cancer as more than half of the respondents opined that urine test and almost half opined that blood test was used in diagnosing cervical cancer. It is important that students are aware of the symptoms, risk factors and diagnosis of cervical cancer, so as to know what signs to look out for and adopt behavioral modifications, thereby reducing morbidity and mortality rate from this deadly disease. Lack of knowledge exposes them to these risk factors thereby increasing their odds of contracting this deadly disease. Also poor knowledge of the symptoms of cervical cancer would make them seek medical attention at a stage when the cancer must have progress to a terminal stage were its now life threatening.

Respondents aged 15 to 19 years, males, those in a relationship and respondents who were Christians were seen to have good knowledge of cervical cancer compared to their counterparts. It could be said that the younger respondents and males are more internet prone that their counterparts and also those in a relationship are more curious about their sexuality and sexual health. Likewise, university students, respondents in basic medical sciences/physiology, year 4 students and respondents whose mothers' had attained tertiary education were more knowledgeable than their counter parts.

There was low awareness and poor knowledge of HPV infection and vaccine among students in this study. This is similar to findings in studies carried out in Nigeria and South Africa where there was low awareness and poor knowledge of HPV (Ilyasu et al., 2016; Makwe et al., 2012; Hoque et al., 2013; Chikandiwa et al., 2013). But contrary to studies carried out by Gerend et al in 2008 and Vogtmann et al in 2011

where awareness of HPV was 78% and 83.1% respectively. A low level of awareness on HPV infection and knowledge though expected since information on HPV infections is still relatively new in Nigeria (Makwe et al., 2012) is worrisome and shows that there is still a great dearth of information on HPV related issues despite the high rate of high- risk sexual behaviors among students and high prevalence of HPV infection in the country. Lack of awareness and poor knowledge of HPV predisposes individuals to the infection as they do not have information that will prompt appropriate health seeking attitudes and practices.

Contrary to previous findings, willingness to vaccinate was very low among respondents with only 7.2% of study participants being willing to receive the HPV vaccine. Previous studies conducted among university students have reported a willingness to receive vaccine ranging from 60% to 84% (Chikandiwa et al., 2013; Gerend and Magloire, 2008; Iliyasu et al., 2010; Makwe et al., 2012; Hoque et al., 2013). This present study involved male participants and the cost and benefits of the HPV vaccine were explained to participants before they responded to the vaccine acceptability section. This may account for students refusal to receive the vaccine, as the major reason for not being willing to receive the vaccine was its cost. When respondents were asked if they will be willing to receive the vaccine if provided free or at a reduced cost, majority expressed their willingness to receive the vaccine. This is worrisome as it shows that apart from lack of knowledge of HPV vaccine, cost of vaccine is a contributory factor to non acceptance of the vaccine by students.

Respondents with income greater than twenty thousand naira were more likely to be willing to receive the vaccine. Cost of the vaccine could account for this finding. Also respondents who had ever contracted a sexually transmitted infection were more willing to receive the vaccine than those who had not. Being knowledgeable about the harm and risks of STIs could account for this finding. This shows that the respondents probably have a misconception of the HPV infection and there is an urgent need for the HPV vaccine to be subsidized to increase acceptability and affordability of the vaccine by students in tertiary institutions.

5.2 Strengths and Limitations

The study is one of the first that involved male participants on HPV vaccine among tertiary institution students in Nigeria. The strength of this study lies in the fact that, respondents were given a brief explanation on the HPV vaccine before they were asked questions on acceptability. Despite this, limitations of the study include; the selection of students physically present on the day of sampling, thus students with high absenteeism rate would have being excluded; also some respondents were not willing to provide some information such as income, age at first sexual intercourse and number of sexual partners as they felt this information was too confidential. However, efforts were made to reduce this problem by assuring them of confidentiality of information provided.It is also important to note that the students in government owned tertiary institutions may not be representative of students in private owned tertiary institutions and therefore knowledge may differ among these students.

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The study is one of the first that involved male participants on HPV vaccine among tertiary institution students in Nigeria. The strength of this study lies in the fact that, respondents were given a brief explanation on the HPV vaccine before they were asked questions on acceptability. Despite this, limitations of the study include; the selection of students physically present on the day of sampling, thus students with high absenteeism rate would have being excluded; also some respondents were not willing to provide some information such as income, age at first sexual intercourse and number of sexual partners as they felt this information was too confidential. However, efforts were made to reduce this problem by assuring them of confidentiality of information provided.It is also important to note that the students in government owned tertiary institutions may not be representative of students in private owned tertiary institutions and therefore knowledge may differ among these students.

5.3 Conclusion

This study reveals that knowledge of cervical cancer and HPV infection and vaccine among students in tertiary institutions in Lagos is low. Campaigns to further increase understanding of the prevalence and consequences of cervical cancer and HPV are needed in view of poor knowledge demonstrated by tertiary institution students as it plays an important role in the prevention of HPV infection. It is perhaps assumed that these students should have better knowledge compared to ordinary men and women in the community due to their potential to attain a higher education.Institutions and health care workers therefore need to focus on providing information and educating young adults and youths on HPV, emphasizing their susceptibility and severity of the consequences.

Older respondents, polytechnic students and respondents with good knowledge of cervical cancer were seen to have better knowledge of HPV infection and vaccine. This study also showed that willingness to receive the HPV vaccine was very low among the students with high cost of vaccine being the major reason for lack of willingness. Respondents with income greater than twenty thousand naira were more willing to receive the vaccine thus corroborating that cost was a major reason for vaccine acceptability.

5.4 Recommendations

Cooperation between healthcare providers, institutes and themedia in promoting HPV awareness and knowledge by offeringadequate information on campuses would increase the level of knowledgeabout HPV vaccination and, as a result, vaccine uptake among tertiary institution students.There is urgent need to formulate policy which would integrate HPV vaccine into the existing national immunization scheme at a highly subsidized rate.

Policy makers must ensure that there is continuous education of youths and young adults as the public needs to become more informed about this vaccine preventable disease, thereby increasing the knowledge and acceptability of the HPV vaccine. This can be done by incorporating health talks on vaccine preventable diseases such as cervical cancer and HPV infection among school curriculums in both secondary and tertiary levels.

5.5 Suggestions for further study

There is need to carry out a similar study on students in private owned tertiary institutions to compare data and increase generalisability of results.

Research should also be carried out on students in secondary schools in Lagos to determine knowledge of HPV infection and vaccine acceptability among adolescents.

More research involving male participants should be conducted in other regions of the country.

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APPENDIX I

QUESTIONNAIRE

KNOWLEDGE AND ACCEPTABILITY OF THE HUMAN PAPILLOMAVIRUSVACCINE AMONG STUDENTS IN TERTIARY INSTITUTIONS IN LAGOS STATE.

Good day, my name is Evelyn Chikezie, a postgraduate student of the Faculty of Public Health, University of Ibadan, Oyo state, Nigeria. This questionnaire will elicit information on the knowledge and acceptability of the HPV vaccine among students in tertiary institutions in Lagos and would take approximately 15minutes to fill. The questionnaire is divided into segments that ask questions on your knowledge of cervical cancer, HPV and acceptability of the HPV vaccine.

All information provided will be confidential and used for research purposes only. You will not be required to provide your name or address, so please be truthful. Completion of this questionnaire is voluntary and you have the right to decline at any time during this process.

Thank you for your assistance.

By signing below, you have agreed to partake in the study.

.....

Signature of Participant

.....

Interview Date

QUESTIONNAIRE

Each section consists of questions to access a particular behaviour. Kindly read each question carefully and pick the answer that is true for you. Tick (√) your answer as shown in the example below.

This is not a test, and there are no right or wrong answers. Remember, your answers will be kept private.

EXAMPLE: I am a (a) Boy [ ] (b) Girl [√]

Serial No _____ Date _____

SECTION A (SOCIO- DEMOGRAPHIC CHARACTERISTICS)

1. Age at last birthday _____ years
2. Date of birth DD/MM/YYYY __/__/____
3. Sex 1. Male [ ] 2. Female [ ]
4. Marital status 1. Single [ ] 2. Married [ ] 3. Divorced/separated [ ]
   4. Widowed [ ] 5. Co-habilitating [ ]
5. If not married are you in a relationship currently 1. Yes [ ] 2. No [ ]
6. The highest level of education obtained by your father is
   1. None [ ] 2. Primary [ ] 3.Secondary [ ] 4. Tertiary [ ]
7. The highest level of education obtained by your mother is
   1. None [ ] 2. Primary [ ] 3.Secondary [ ] 4. Tertiary [ ]
8. What is your fathers' occupation
   1. Civil servant [ ] 2. Self-employed [ ] 3. Unemployed [ ] 4.Retired [ ]
   5. Others (please specify).....
9. What is your mothers' occupation
   1. Civil servant [ ] 2. Self-employed [ ] 3. Unemployed [ ] 4. Retired [ ]
   5. Others (please specify) .....
10. Which of these best suits your parents' marriage practice
    Monogamous [ ] 2. Polygamous [ ]3. Others (please specify).....
11. What ethnic group do you belong to 1. Yoruba [ ] 2. Igbo [ ] 3. Hausa [ ] 4. Others (please specify).....
12. What religion do you practice 1. Christianity [ ] 2. Islam [ ] 3. Traditional 5. Others (please specify).....
13. What is your institutional type 1. University [ ] 2. Polytechnic [ ] 3. College of education [ ]
14. What level are you currently in 1. Year/level 1 [ ] 2. Year/level 2 [ ]
    3. Year/level 3[ ] 4. Year/ level 4 [ ] 5. Others (please specify)

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   5. Others (please specify).....
9. What is your mothers' occupation
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13. What is your institutional type 1. University [ ] 2. Polytechnic [ ] 3. College of education [ ]
14. What level are you currently in 1. Year/level 1 [ ] 2. Year/level 2 [ ]
    3. Year/level 3 [ ] 4. Year/level 4 [ ] 5. Others (please specify)

15. What kind of programme are you currently running 1. Full time [ ] 2. Part time [ ] 3. Distance learning [ ] 4. Others (please specify).....
16. What faculty are you in (example science, art, social sciences etc).....
17. What is your department/course of study .....
18. Are you currently working or running any business 1. Yes [ ] 2. No [ ]
19. What is your monthly income/ allowance in naira .....

SECTION B (CERVICAL CANCER KNOWLEDGE)

20. Have you ever heard of cervical cancer before now 1. Yes [ ] 2. No [ ] 3. I don't know/ I am not sure [ ]
21. If yes, what is your source of information 1. Health provider [ ] 2. Family/ relatives 3. Friends [ ] 4. Media / internet [ ] 5. School [ ] 6. Church/ mosque [ ] 7. Others (please specify).....

		Yes	No	Don't know/not sure
22.	Do you know someone with cervical cancer			
23.	Ever heard of cervical cancer screening before now			
24.	Cervical cancer is the seeond most common female reproductive cancer			
25	All women are at risk of cervical caneer			
26	Cervical cancer is caused by a STI (sexually transmitted infection)			
27.	Cervical cancer can be prevented			

28. Symptoms of cervical include (please tick all that apply)

	Yes	No	Don't know/not sure
A. bleeding after menopause	[ ]	[ ]	[ ]
B. bleeding after sexual intercourse	[ ]	[ ]	[ ]
C. pain during sexual intercourse	[ ]	[ ]	[ ]
D. abdominal pain	[ ]	[ ]	[ ]
E. unusual vaginal discharge	[ ]	[ ]	[ ]
F. pelvic pain	[ ]	[ ]	[ ]

29. Risk factors for cervical cancer are (please tick all that apply)

	Yes	No	Don't know/not sure
A. Human papillomavirus infection	[ ]	[ ]	[ ]

B. alcohol intake [ ] [ ] [ ]

C. smoking [ ] [ ] [ ]

D. multiple sexual partners [ ] [ ] [ ]

E. hereditary [ ] [ ] [ ]

F. hypertension [ ] [ ] [ ]

G. age at first intercourse [ ] [ ] [ ]

H. use of contraceptive pills for a long time [ ] [ ] [ ]

30. Cervical cancer can be diagnosed by (please tick as appropriate)

	Yes	No	Don't know/not sure
A. urine test	[ ]	[ ]	[ ]
B. Pap test/ pap smear	[ ]	[ ]	[ ]
C. cervical examination	[ ]	[ ]	[ ]
D. tissue sample test	[ ]	[ ]	[ ]
E. blood test	[ ]	[ ]	[ ]

SECTION C (HPVKNOWLEDGE)

31. Have you ever heard of the Human papillomavirus (HPV) before now

1. Yes [ ] 2. No [ ] 3. I don't know/ I am not sure [ ]

32. If yes, what is your source of information 1. Health provider [ ] 2. Family/ relatives 3. Friends [ ] 4. Media / internet [ ] 5. School [ ] 6. Church/ mosque [ ] 7. Others (please specify).....

33. Do you know whether any family member/friend has ever suffered from genital wart or HPV infection 1. Yes [ ] 2. No [ ] 3. Don't know/not sure [ ]

		Agree	Undecided	Disagree
34.	HPV is a sexually transmitted infection			
35.	Certain types of HPV can cause cervical cancer			
36.	A person's chances of getting HPV increases with the number of sexual partners they have.			
37.	Most types of HPV cannot clear up on their own			
38.	HPV can cause genital warts			
39.	An abnormal Pap test result may indicate an HPV infection			

SECTION D (HPV VACCINE KNOWLEDGE)

40 Have you ever heard of the HPV vaccines before now 1. Yes [ ] 2 No [ ] 3 Don't know/not sure [ ]

41. If yes, what is your source of information 1. Health provider [ ] 2. Family/ relatives [ ] 3. Friends [ ] 4. Media / internet [ ] 5. School [ ] 6. Church/ mosque [ ] 7. Others (please specify).....

42. How many HPV vaccines are available?

1. None [ ] 2. One [ ] 3. Two [ ] 4. Three [ ] 5. I don't know [ ]

43. Are any of the vaccines(s) recommended for males 1. Yes [ ] 2. No [ ] 3. Don't know/not sure [ ]

44. Do you know which age group the vaccine is recommended for

1. less than 9 [ ] 2. 9 – 26 years [ ] 3.18 – 26 years [ ] 4. Don't know/not sure [ ]

45. The number of doses recommended for a female is

1. one [ ] 2. Two [ ] 3.Three [ ] 4.Four [ ] 5. Don't know/not sure [ ]

SECTION E (SEXUAL HISTORY)

46. Do you have any previous sexual experience 1. Yes [ ] 2. [ ] (if yes please answer questions 47 – 50, if no please don't answer questions 47 – 50)

47. What is your age at first sexual intercourse in years .....

48. Number of lifetime sexual partners .....

49. Have you ever made use of condoms 1. Always [ ] 2. Never [ ] 3. Sometimes [ ]

50. Have you ever made use of hormonal contraceptives 1. Always [ ] 2. Never [ ] 3. Sometimes [ ]

51. Have you ever suffered from any sexually transmitted infection 1. Yes [ ] 2. No [ ] 3. I don't know/ I am not sure [ ]

52. Have you ever suffered from genital wart or have you been diagnosed with HPV infection 1. Yes [ ] 2. No [ ] 3. I don't know/ I am not sure [ ]

SECTION F (VACCINE ACCEPTABILITY)

53. Have you ever received the HPV vaccine1. Yes [ ] 2. No [ ]

54. If no, what is your reason for not receiving the vaccine

1. Not needed/necessary [ ] 2. Not sexually active [ ] 3. Lack of knowledge[ ] 4. Safety concern [ ] 5. Too expensive [ ] 6. No reason [ ]

55. The HPV vaccine currently cost about 20,000 naira per dose. Will you be willing to pay for the vaccine 1. Yes [ ] 2. [ ]

56. If no, why? .....

57. Are you interested in receiving the vaccine if provided at a reduced cost

1. Yes [ ] 2. No [ ]

58. If yes at what cost will you be willing to receive the vaccine ? ..... Naira per dose.

59. If no why? .....

APPENDIX II

Proportional allocation of students

Procedure:

Institutions	Institution Selected	Faculty selected	Department Selected	Levels in each department	Total no of students in each level	Total no of students required using proportional allocation
Lagos state University	University of Lagos	Basic medical sciences	Physiology	1 2 3 4	100 122 143 82	55 67 79 45
University of Lagos		Engineering/ technology	Computer engineering	1 2 3 4	78 78 93 102	43 43 51 56
Lagos state polytechnic	Lagos state polytechnic	ScienceTech nology	Science laboratory technology	1 2 3 4	92 106 65 40	51 58 36 22
Yabatech		Management	Accountancy	1 2 3 4	92 82 62 49	51 45 34 27
Adeniranog unsanya college of education	Federal college of education akoka	Management	Accountancy	1 2 3	89 84 54	49 46 30
Federal college of education akoka		Science	Biology	1 2 3	82 69 47	45 38 26
Michael Otedola college of primary education, Epe						