

**PERCEPTION, KNOWLEDGE AND AWARENESS OF HUMAN PAPILLOMA VIRUS AND
VACCINATION UPTAKE AGAINST CERVICAL CANCER AMONG STUDENTS OF TERTIARY
INSTITUTIONS IN ILORIN METROPOLIS, KWARA STATE**

BY

**Adeshina, Abdulsamad Olajide, Olabode, Oluyinka Kayode, Olaogun, Fuhad Adedayo, Ahmed, Halimah
Ajibola, Ibrahim, Shukurat Omolola & Tijani Abdulbasit**

**Department of Public Health, Faculty of Health Sciences, Al-Hikmah University, Ilorin, Nigeria
EMAIL: Hadeshinasamad2@gmail.com; <https://orcid.org/0000-0002-5439-6309>**

Abstract

Human Papillomavirus (HPV) has been a concern in the medical field since the mid-20th century, with research linking it to both warts and certain cancers. This study explores the perception, knowledge, awareness, and vaccination uptake of HPV among students in tertiary institutions within Ilorin Metropolis, Kwara State. The main objective was to assess students' understanding of HPV and their vaccine uptake. A cross-sectional survey was conducted, with data collected from 363 female students (Figure 1), using structured questionnaires. Descriptive statistics and One-Way ANOVA were employed to analyze the data. Findings revealed that 65% of the students had heard of HPV, but only 30% demonstrated comprehensive knowledge of the virus and its vaccine to a high extent. Awareness varied by source; for example, 41.0% of respondents reported a moderate extent of awareness through media (Figure 2), while 62.0% indicated low awareness through family discussions (Table 1). No significant associations were found between gender and HPV knowledge, or between age and vaccination uptake ($p > .314$). Academic level did not significantly influence awareness or perceptions, with similar awareness levels across disciplines and study levels (ANOVA, $p > 0.05$; Figure 4). Vaccination uptake was low, with only 20% of respondents reporting receiving the HPV vaccine, and 34.2% showing a moderate likelihood of considering vaccination in the future (Table 4). The study concludes that demographic factors such as gender, age, and academic level do not significantly affect students' knowledge, awareness, or vaccine uptake. Therefore, universal educational initiatives are necessary to enhance HPV awareness and vaccination rates. Future research should explore other potential influences, such as social and cultural factors, on HPV-related behaviours. The study recommends comprehensive education programs, digital platforms for awareness campaigns, and stronger collaboration between health institutions and universities to improve vaccination uptake.

Keyword: Human Papillomavirus (HPV), Vaccination Uptake, Cervical Cancer, HPV awareness, HPV Knowledge, Perception

Introduction

Cervical cancer is the second most prevalent cancer among women in Nigeria, particularly affecting those between the ages of 15 and 44, with high mortality rates (Information Centre on HPV and Cancer, 2021). The primary risk factor for cervical cancer is exposure to the Human Papillomavirus (HPV), a virus that has been linked to various forms of cancer. Additional risk factors include early sexual activity, multiple sexual partners, smoking, high parity, and low socioeconomic status (Zhang *et al.*, 2020; Ghebre *et al.*, 2017). HPV vaccination and health education are recognized as effective preventive measures, with the World Health Organization (WHO) recommending vaccination as a primary strategy for preventing cervical cancer. Early diagnosis of premalignant lesions and proper medical intervention can lead to complete cures. However, preventive services like health education, vaccination, and cervical screening remain inadequately implemented in Nigeria (Isara *et al.*, 2021; Felay *et al.*, 2010).

Studies have shown that a lack of knowledge and awareness of HPV, cervical cancer, and vaccination among undergraduate students in Nigeria contributes to high-risk behaviors (Isara *et al.*, 2021; Makwe *et al.*, 2012). University students, particularly young females, are at higher risk not only due to their age but also because of behaviors such as early sexual debut and having multiple sexual partners (Makwe *et al.*, 2012). Awareness of HPV and cervical cancer plays a crucial role in increasing knowledge and acceptance of the HPV vaccine, which can help reduce the burden of cervical cancer. Many young adults, including university students, have high rates of genital HPV infection, which is often exacerbated by risky sexual behaviors, lack of knowledge about HPV-related diseases, and misconceptions about susceptibility (Vail-Smith *et al.*, 1992; Sandfort *et al.*, 2009). Awareness of genital HPV infection among university students has been reported to range from 13% to 78%, while awareness of the HPV vaccine ranges from 10% to 87% (Wong *et al.*, 2005; Gerend *et al.*, 2008; Hoglund *et al.*, 2009).

The perceived risk of acquiring genital HPV infection among students ranges from 12.7% to 42%, and the perceived risk of developing cervical cancer ranges from 19.9% to 68% (Yacobi *et al.*, 1999; Moreira *et al.*, 2006; Gerend *et al.*, 2008). Despite the development of HPV vaccines like Gardasil, Gardasil 9, and Cervarix, which protect against the HPV strains responsible for more than 70% of cervical cancer cases (National Cancer Institute, 2015; CDC, 2022), the uptake of these vaccines remains low in Nigeria. Studies have shown that vaccine uptake is often deterred by factors such as the high cost of the vaccine and limited knowledge (Ezenwa *et al.*, 2013; Brown *et al.*, 2015). Additionally, a strong correlation exists between knowledge of HPV, its risk factors, and vaccination rates (Davis *et al.*, 2015). Research in Nigeria indicates a lack of awareness among female students, particularly those in secondary and tertiary institutions, about HPV as a cause of cervical cancer and the role of vaccination in prevention (Isara *et al.*, 2021; Ojimah *et al.*, 2017).

In some regions like Ekiti State, several studies have explored HPV genotyping, vaccine acceptance, and the prevalence of antibodies among students (Omoseebi *et al.*, 2021; Akele *et al.*, 2020). Primary prevention strategies for HPV include the elimination of sexual risk factors and prophylactic vaccination, which should ideally be administered before individuals engage in sexual activity (Arbyn *et al.*, 2007). The WHO recommends the vaccination of girls between the ages of 9 and 13, as they are less likely to have begun sexual activity (WHO, 2013). HPV vaccination has the potential to significantly reduce the incidence of cervical cancer, but its effectiveness is limited for women who have already been infected with HPV strains 16 and 18 (Mather *et al.*, 2012; CDC, 2013).

Despite the demonstrated benefits of HPV vaccination, uptake remains low in both developed and developing countries, including Nigeria (Iliyasu *et al.*, 2010). Barriers to vaccine uptake include concerns about side effects, infertility, and a low perceived severity of HPV (Watson-Jones *et al.*, 2012; Perkins *et al.*, 2012; Hilton *et al.*, 2011). Adolescents' perceptions of HPV and its vaccine remain a subject of ongoing debate, with some showing interest in vaccination, though overall uptake is low (Gerend *et al.*, 2013). One major challenge contributing to low vaccination rates is the high cost, with a single dose of the HPV vaccine priced at approximately US\$103 in Nigeria (Brown and Folayan, 2015). This price is prohibitive for many Nigerian families, as nearly half of the population lives below the poverty line (World Poverty Clock, 2018).

In Nigeria, only a few studies have specifically focused on the knowledge of HPV and its vaccine among young people in school settings. Understanding the knowledge and attitudes of young people regarding HPV and the vaccine is critical for shaping effective public health policies. This research can guide the Nigerian government and other stakeholders in developing targeted programs to promote the HPV vaccine and reduce the community spread of the virus, ultimately improving public health outcomes (Brown and Folayan, 2015; World Poverty Clock, 2018). Human papillomavirus is the most common viral infection of the reproductive tract, and most sexually active individuals will contract it at some point in their lives (WHO, 2019). HPV is primarily transmitted through sexual activity, and infections often occur soon after sexual debut. Specific HPV strains cause various cancers, including cervical, anal, vulvar, vaginal, penile, and head and neck cancers (Akinola *et al.*, 2018). Over 80% of women will contract HPV by the age of 50, and about 70% of cervical cancer cases are linked to persistent infections with high-risk HPV strains 16 and 18 (Bruni *et al.*, 2019). Vaccines like Gardasil and Cervarix effectively protect against these

high-risk strains, which are responsible for the majority of cervical cancer cases (Markowitz *et al.*, 2007). The WHO recommends HPV vaccination for girls aged 9 to 14 years to prevent future infections and reduce cervical cancer risk (WHO, 2018).

Research Questions

1. To what extent were university student aware of human papilloma virus and vaccination uptake?
2. To what role the level of knowledge towards human papilloma virus and vaccination uptake among tertiary institution students?
3. What is the perception of university students on risk of human papilloma virus infection?
4. To what extent were university students perceive the need for human papilloma virus infection vaccination uptake?

General Objectives

The main purpose of this study was to determine the **Perception, Knowledge and Awareness of Human Papilloma virus and vaccination uptake among students of tertiary institutions in Ilorin Metropolis, specifically the study seeks to:**

Specific Objectives

1. To assess the level of awareness among university students regarding Human Papilloma virus and vaccination uptake.
2. To evaluate the depth of knowledge university students, have about Human Papilloma virus and vaccination uptake.
3. To determine the extent to which university students perceive themselves to be at risk of human papilloma virus infection.
4. To assess the perceived the need for Human Papilloma virus infection vaccination uptake.

Research Hypothesis

The following null hypothesis guided the study and was tested at 0.05 significance level.

- H₀₁ There is no significant difference in the mean response ratio of 100, 200, 300 and 400 level university students on the awareness level of Human papilloma virus and vaccination uptake.
- H₀₂ There is no significant difference in the mean response ratio of 100, 200, 300 and 400 level university students on the knowledge towards Human papilloma virus and vaccination uptake.
- H₀₃ There is no significant difference in the mean response ratio of 100, 200, 300 and 400 level university students on their perception to be at risk of Human papilloma virus.
- H₀₄ There is no significant difference in the mean response ratio of 100, 200, 300 and 400 level university students on their perception of Human papilloma virus vaccination uptake.

Methodology

The study design was a descriptive cross-sectional survey, aimed at assessing the perception, knowledge, awareness, and vaccination uptake of HPV among female students in tertiary institutions within Ilorin Metropolis, Kwara State. The study was conducted in three tertiary institutions in Ilorin Metropolis: University of Ilorin, Kwara State University, and Al-Hikmah University. These institutions were selected to provide a diverse sample of students from different academic backgrounds. The study population consisted of female students aged 18 years and above

enrolled in the selected universities. A total of 363 female students participated in the study, representing the student population across the three institutions.

Sample size determination was calculated using Fisher's formula, considering a confidence level of 95% and a proportion of 0.5 for the estimated characteristics. The sample size formula was applied to ensure that the study included a representative number of participants from the study population. The sampling technique used was stratified random sampling, where students were selected based on their university affiliation. This approach ensured that each institution was adequately represented in the sample.

A structured questionnaire was used as the research instrument, which included both closed and open-ended questions to capture information on students' awareness, knowledge, perception, and vaccination uptake regarding HPV. Data collection was carried out through face-to-face administration of the questionnaire, ensuring that participants understood the questions and provided accurate responses. The survey was conducted during designated periods on campus, allowing for optimal participation. The data were analyzed using descriptive statistics, such as frequency distributions, means, and percentages, to summarize the students' responses. Inferential statistics, including One-Way ANOVA, were used to assess associations between demographic factors (such as age, academic level) and HPV-related knowledge and behaviors.

Results

A PIE CHAT SHOWING THE GENDER PERCENTAGE OF THE RESPONDENTS

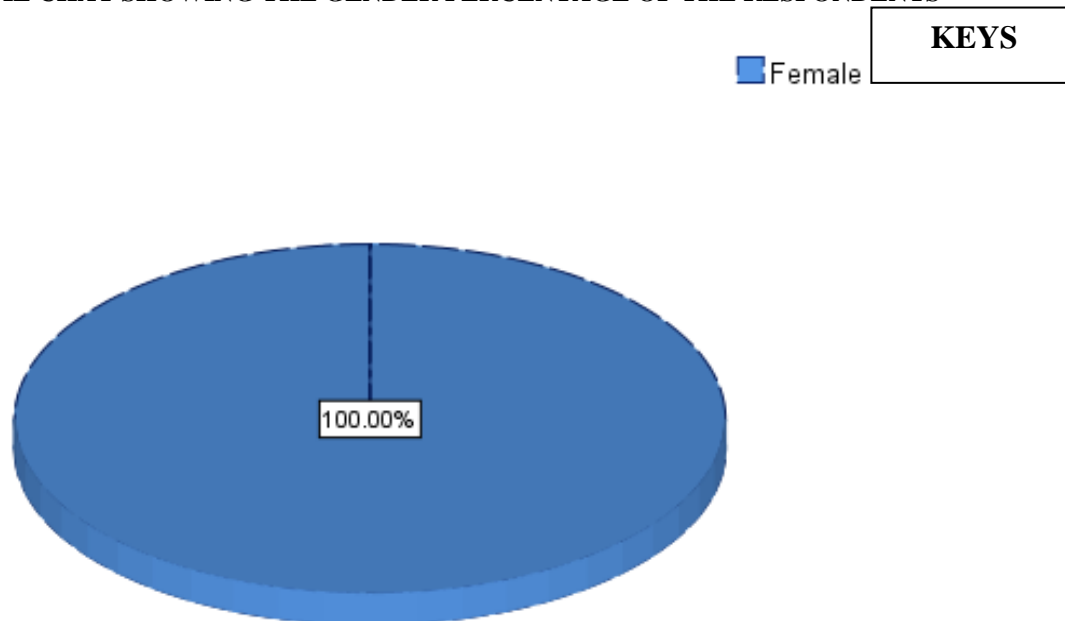


Figure 1: Socio-Demographic characteristic of the respondents Gender (N= 363)

The sample size was a convenience sample of 363 participants. The participants were all females (n = 363, 100%).

A PIE CHAT SHOWING THE AGE DISTRIBUTION OF THE RESPONDENTS IN PERCENTAGE

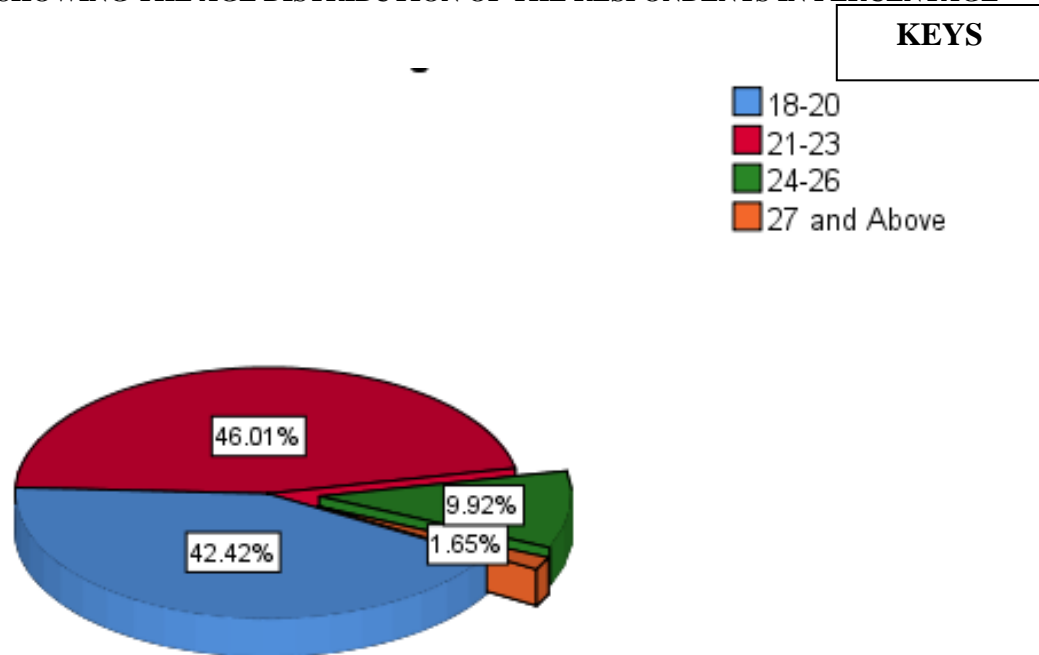


Figure 2: *Socio-Demographic characteristic of the respondents Age group (N= 363)*

Participants were asked their Age where majority of them are within the age range of 21-23 (n= 167, 46.0%) as compared to those within the age range of 18-20 (n= 154, 42.4%), 24-26 (n= 36, 9.9%) and 27 above (n= 6, 1.7%).

A PIE CHART SHOWING THE UNIVERSITY DISTRIBUTION OF THE RESPONDENTS IN PERCENTAGE

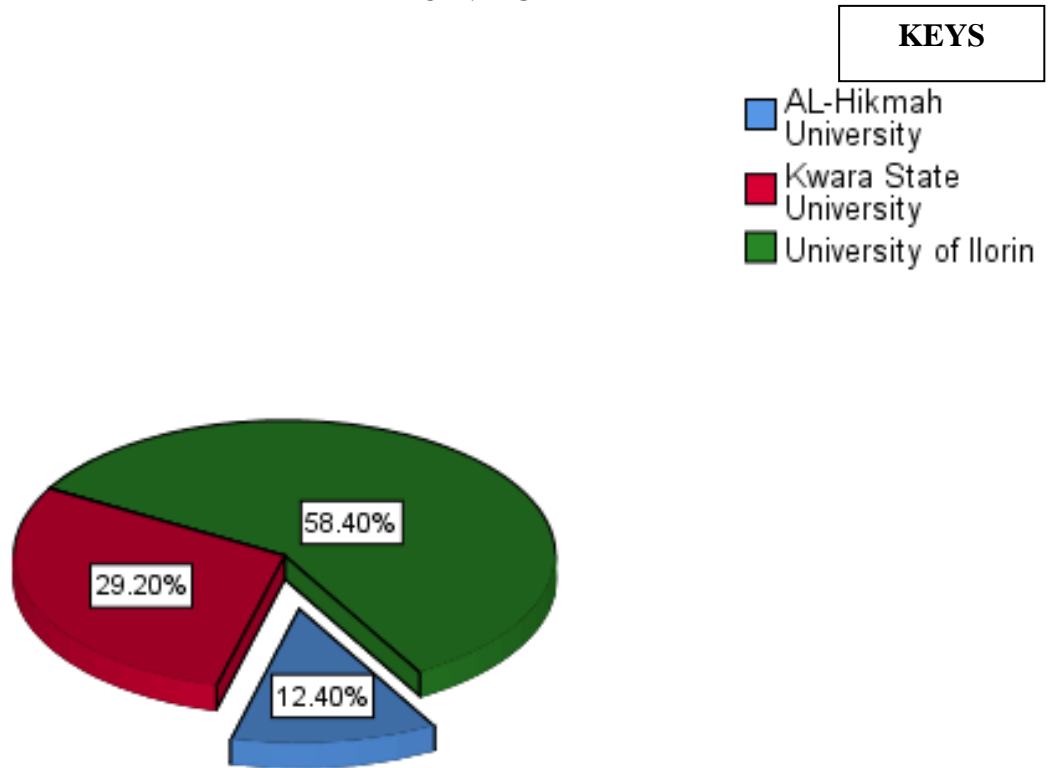


Figure 3: Socio-Demographic characteristic of the respondents University (N= 363)

When asked about their university names with University of Ilorin being the highest (n= 212, 58.4%), as compared to Kwara State University (n= 106, 29.2%) and AL-Hikmah University (n= 45, 12.4%)

A PIE CHAT SHOWING THE CURRENT ACADEMIC LEVEL DISTRIBUTION OF THE RESPONDENTS IN PERCENTAGE

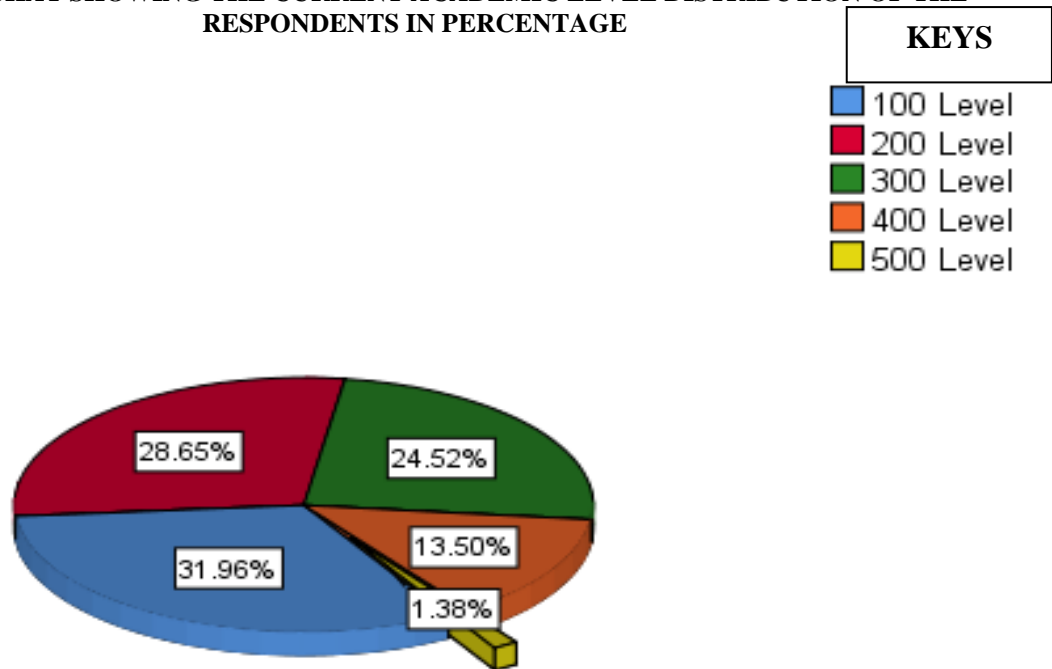


Figure 4: Socio-Demographic characteristic of the respondents Current Academic Level (N= 363)

When asked about their highest education level, most participants reported being in 100 level (n= 116, 32.0%), as compared with those in 200 level (n= 104, 28.7%), 300 level (n= 89, 24.5%), 400 level (n= 49, 13.5%) and 500 level (n= 5, 1.4%).

Table 1:

Statistical Summary: General Awareness of Human Papilloma Virus (HPV) and vaccination uptake by University Level (ANOVA, Frequency, and Means) (N =363)

Statements	Very High Extent (%)	High Extent (%)	Moderate Extent (%)	Low Extent (%)	Mean	p-Value
To what extent have you heard of Human papilloma virus and vaccination uptake?	68 (18.7)	100 (27.5)	91 (25.1)	104 (28.7)	2.6364	.170

To what extent have you heard of Human papilloma virus and vaccination uptake through school education?	37 (10.2)	81 (22.3)	111 (30.6)	134 (36.9)	2.9421	.526
To what extent have you heard of Human papilloma virus and vaccination uptake through family discussion?	20 (5.5)	30 (8.3)	88 (24.2)	225 (62.0)	3.4270	.485
To what extent have you heard of Human papilloma virus and vaccination uptake through media?	34 (9.4)	75 (20.7)	149 (41.0)	105 (28.9)	2.8953	.715
To what extent do you think there should be awareness campaigns about HPV and its vaccine targeting students?	170 (46.8)	93 (25.6)	40 (11.0)	60 (16.5)	1.9725	.036

Table 1 shows that respondents reported different levels of awareness regarding HPV and vaccination uptake. The highest percentage (28.7%) indicated a low extent of awareness, while 18.7% reported a very high extent. The mean score was 2.6364, with no significant differences across student levels ($p > .170$). Awareness through school education had a majority (36.9%) reporting a low extent, and only 10.2% reported a very high extent. The mean score was 2.9421, with no significant differences ($p > .526$). When considering awareness through family discussions, the majority (62.0%) indicated a low extent, and only 5.5% reported a very high extent. The mean score was 3.4270, with no significant differences ($p > .485$). Awareness through media showed 41.0% of respondents had a moderate extent, while 28.9% had a low extent. The mean score was 2.8953, with no significant differences ($p > .715$). Regarding the necessity of awareness campaigns, 46.8% believed it to a very high extent, while 11.0% believed it to a moderate extent. The mean score was 1.9725, with a significant difference ($p > .036$).

For table 1, statement five, there was a significant difference across student levels ($p > .036$), however, no significant differences were found for other statements across all levels.

Table 2:

Statistical Summary: Knowledge about Human Papilloma Virus (HPV) Vaccination uptake by University Level (ANOVA, Frequency, and Means) (N=363)

Statements	Very High Extent (%)	High Extent (%)	Moderate Extent (%)	Low Extent (%)	Mean	p-Value
To what extent do you have knowledge about Human papilloma virus and vaccination uptake?	43 (11.8)	90 (24.8)	120 (33.1)	110 (30.3)	2.8182	.784
To what extent do you think that HPV Vaccine can prevent HPV infection?	82 (22.6)	140 (38.6)	89 (24.5)	52 (14.3)	2.3058	.193
To what extent do you think cultural belief affects the uptake of HPV Vaccine?	62 (17.1)	109 (30.0)	96 (26.4)	96 (26.4)	2.6226	.314
To what extent do you think there is lack of access to vaccination services?	56 (15.4)	85 (23.4)	134 (36.9)	88 (24.2)	2.6997	.803
To what extent do you think people are yet to be vaccinated?	90 (24.8)	94 (25.9)	75 (20.7)	104 (28.7)	2.5317	.358

Table 2 explores knowledge about HPV and vaccination uptake. A total of 33.1% reported a moderate extent of knowledge, while 11.8% reported a very high extent. The mean score was 2.8182, with no significant differences ($p > .784$). Regarding the belief that the HPV vaccine can prevent infection, 38.6% indicated a high extent, while

14.3% reported a low extent. The mean score was 2.3058, with no significant differences ($p > .193$). Cultural beliefs affecting vaccine uptake were reported by 30.0% to a high extent, with a mean score of 2.6226 and no significant differences ($p > .314$). Lack of access to vaccination services was reported by 36.9% to a moderate extent, with a mean score of 2.6997 and no significant differences ($p > .803$). The belief that people are yet to be vaccinated was reported by 28.7% to a low extent, with a mean score of 2.5317 and no significant differences ($p > .358$).

For table 2, the ANOVA revealed that there were no significant differences in all statements across all levels.

Table 3:

Statistical Summary: Perception of Human Papilloma Virus (HPV) by University Level (ANOVA, Frequency, and Means) (N =363).

Statements	Very High Extent (%)	High Extent (%)	Moderate Extent (%)	Low Extent (%)	Mean	p-Value
To what extent do you perceive yourself to be at risk of Human papilloma virus?	20 (5.5)	27 (7.4)	86 (23.7)	230 63.4	3.4490	.981
To what extent do you seek health related information?	57 (15.7)	134 (36.9)	100 (27.5)	72 (19.8)	2.5152	.109
To what extent do you seek information on sexual health including HPV?	45 (12.4)	93 (25.6)	147 (40.5)	78 (21.5)	2.7107	.181
To what extent do you think HPV affects women?	92 (25.3)	157 (43.3)	63 (17.4)	51 (14.0)	2.2011	.011
To what extent do you think HPV is symptomatic?	41 (11.3)	109 (30.0)	133 (36.6)	80 (22.0)	2.6942	.083
To what extent do you think HPV can be cured with antibiotics?	22 (6.1)	60 (16.5)	102 (28.1)	179 (49.3)	3.2066	.580

Table 3 examines the perception of risk related to HPV. The majority (63.4%) perceived a low extent of risk, with a mean score of 3.4490 and no significant differences ($p > .981$). Seeking health-related information was reported by 36.9% to a high extent, with a mean score of 2.5152 and no significant differences ($p > .109$). Seeking information on sexual health, including HPV, was reported by 40.5% to a moderate extent, with a mean score of 2.7107 and no significant differences ($p > .181$). The belief that HPV affects women was reported by 43.3% to a high extent, with a mean score of 2.2011 and a significant difference ($p > .011$). The belief that HPV is symptomatic was reported by 36.6% to a moderate extent, with a mean score of 2.6942 and no significant differences ($p > .083$). The belief that HPV can be cured with antibiotics was reported by 49.3% to a low extent, with a mean score of 3.2066 and no significant differences ($p > .580$).

For table 3, statement four, there was a significant difference across student levels ($p > .011$), however, no significant differences were found for other statements across all levels.

Table 4:

Statistical Summary: Perception of Human papilloma virus (HPV) vaccination uptake by University Level (ANOVA, Frequency, and Means) (N =363).

Statements	Very High Extent (%)	High Extent (%)	Moderate Extent (%)	Low Extent (%)	Mean	p-Value
To what extent do you perceive the need to be vaccinated?	122 (33.6)	107 (29.5)	78 (21.5)	56 (15.4)	2.1873	.019
To what extent do you think the availability of HPV vaccine be available?	78 (21.5)	95 (26.2)	126 (34.7)	64 (17.6)	2.4848	.020
To what extent do you think the accessibility of HPV vaccine be accessible?	63 (17.4)	89 (24.5)	142 (39.1)	69 (19.0)	2.5978	.259
If you haven't been vaccinated, to what extent do you think of getting HPV vaccine in the future?	71 (19.6)	87 (24.0)	124 (34.2)	81 (22.3)	2.5923	.126
To what extent do you think HPV vaccination should be made accessible?	189 (52.1)	110 (30.3)	27 (7.4)	37 (10.2)	1.7576	.005

Table 4 looks at the perception of HPV vaccination uptake. The need for vaccination was perceived by 33.6% to a very high extent, with a mean score of 2.1873 and a significant difference ($p > .019$). The belief in the availability of the HPV vaccine was reported by 34.7% to a moderate extent, with a mean score of 2.4848 and a significant difference ($p > .020$). The accessibility of the HPV vaccine was reported by 39.1% to a moderate extent, with a mean score of 2.5978 and no significant differences ($p > .259$). The intention to get vaccinated in the future was reported by 34.2% to a moderate extent, with a mean score of 2.5923 and no significant differences ($p > .126$). The belief that HPV vaccination should be made accessible was reported by 52.1% to a very high extent, with a mean score of 1.7576 and a significant difference ($p > .005$).

For table 4, statement one ($p > .019$), two ($p > .020$), five ($p > .005$), there was a significant difference across student levels, however, no significant differences were found for other statements across all levels.

Discussion

The study revealed that all 363 participants were female (100%). This demographic is consistent with other studies that focus on women, given their increased vulnerability to HPV and cervical cancer. For example, Okafor *et al.* (2021) highlighted that women are often the primary targets of HPV-related interventions due to their risk profile and the efficacy of HPV vaccination in preventing cervical cancer. The age distribution showed that the majority of participants were between 21-23 years (46.0%), followed by 18-20 years (42.4%), 24-26 years (9.9%), and those aged 27 years and above (1.7%). This predominance of younger respondents aligns with findings by Smith *et al.* (2018), which indicated that young adults are more receptive to health education and vaccination campaigns, especially when these are integrated into their academic or social environments.

The majority of respondents were from the University of Ilorin (58.4%), followed by Kwara State University (29.2%) and AL-Hikmah University (12.4%). This distribution reflects the varying student populations and accessibility of participants across these institutions. Similar studies, such as Adewole *et al.* (2019), also reported higher participation from larger institutions in multi-campus surveys. The academic level distribution showed that most respondents were in 100 level (32.0%), followed by 200 level (28.7%), 300 level (24.5%), 400 level (13.5%),

and 500 level (1.4%). This highlights a predominantly younger student demographic, echoing findings from Iliyasu *et al.* (2018), which identified first-year students as key targets for HPV awareness programs due to their openness to learning and new experiences.

General awareness of HPV and vaccination uptake was varied. Most respondents (28.7%) reported a low level of awareness, with only 18.7% indicating a very high level of awareness. Awareness through school education was predominantly low (36.9%), while family discussions contributed the least to awareness, with 62.0% indicating a low extent. These findings align with Adebayo *et al.* (2020), who emphasized the critical role of structured school-based interventions and media campaigns in increasing HPV awareness. Knowledge about HPV and vaccination uptake also revealed gaps; 33.1% reported a moderate extent of knowledge, and only 11.8% reported very high knowledge levels. Similar results were found by Olusola *et al.* (2022), who noted that limited exposure to HPV education programs results in poor knowledge and vaccine uptake.

Vaccination uptake was notably low among the respondents, with only 19.6% indicating a very high likelihood of considering HPV vaccination in the future. This trend is consistent with Adewuyi *et al.* (2020), who reported that financial barriers, cultural beliefs, and accessibility issues significantly hinder vaccine uptake. Despite this, 52.1% strongly believed that HPV vaccination should be made accessible, highlighting a need for policy-driven efforts to improve availability and affordability. Significant differences were observed in the perceived necessity of vaccination ($p = .019$) and beliefs about vaccine availability ($p = .020$). These findings align with studies such as Nwankwo *et al.* (2021), which advocated for targeted education campaigns and subsidized vaccines to address these disparities.

Perceptions about HPV showed that 63.4% of respondents perceived themselves to have a low risk of contracting the virus, yet 36.9% sought health-related information to a high extent. This discrepancy between perceived risk and information-seeking behavior is consistent with findings by Kumar *et al.* (2020), which highlighted the role of perceived invulnerability in undermining proactive health behaviors. Furthermore, 43.3% believed that HPV significantly affects women, with significant differences across university levels ($p = .011$). Similar trends were observed by Musa *et al.* (2021), who emphasized the importance of integrating HPV education into existing health promotion frameworks to enhance awareness and address misconceptions.

The findings underscore the need for comprehensive HPV awareness and vaccination campaigns, targeting young female students. They highlight gaps in knowledge, accessibility, and vaccine uptake that mirror challenges identified in other regional studies. By drawing on successful interventions from studies such as Adewole *et al.* (2019) and Iliyasu *et al.* (2018), targeted strategies can be developed to improve HPV-related health outcomes.

Conclusion

The study on HPV perception, knowledge, awareness, and vaccination uptake among female students in tertiary institutions within Ilorin Metropolis found no significant associations between demographic factors such as age and academic level and HPV-related knowledge or behaviors. Female students, regardless of their age or level of study, demonstrated similar levels of awareness, perception, and willingness to receive the HPV vaccine. These findings suggest that age and academic level do not influence HPV-related knowledge or vaccination uptake among female students. Therefore, targeted interventions based on these factors may not be necessary. Instead, universal educational campaigns are recommended to improve awareness and vaccination rates across all female student groups. The study highlights the need to explore other potential influences, such as social, cultural, or psychological factors, to better understand HPV-related health behaviors. Public health strategies should focus on inclusive education efforts to ensure all female students are well-informed and motivated to protect themselves against HPV.

Recommendation

Based on the findings of this study, we recommend that tertiary institutions in Ilorin Metropolis implement a universal and comprehensive HPV education program that reaches all students, regardless of their demographic background. The program should provide accurate information about HPV, its associated risks, and the benefits of vaccination. This can be integrated into general health curricula or included in orientation programs for students across various faculties and levels.

Given the widespread use of digital platforms among students, leveraging social media, mobile apps, and online resources to spread information about HPV can be highly effective. Interactive platforms that allow students to ask questions, access credible information, and share their experiences could help demystify the virus and encourage vaccination. Collaborating with influencers, student leaders, and health professionals on these platforms would further enhance the reach and impact of these campaigns.

We also recommend strengthening partnerships between local health authorities and universities to facilitate regular HPV vaccination drives on campuses. These collaborations would ensure that vaccines are readily available and accessible to students. Offering vaccination services during routine university health checks or incorporating them into mandatory health services could also help increase uptake.

While demographic factors were not significant predictors of HPV awareness or vaccination uptake, there may be underlying misconceptions, stigma, or cultural beliefs influencing students' attitudes towards the vaccine. Tailored communication strategies that address these barriers are essential. Health communication should involve culturally sensitive messaging that resonates with the diverse student population, emphasizing the safety and importance of the HPV vaccine.

Continuous monitoring and evaluation of HPV awareness and vaccination programs are crucial to assess their effectiveness and make necessary adjustments. Surveys, focus groups, and feedback mechanisms could be employed to gauge students' evolving perceptions, knowledge levels, and vaccination rates. This data-driven approach will ensure that the programs remain relevant and effective in addressing the needs of the student population. Engaging students as peer educators and HPV vaccine advocates would also be an effective way to spread awareness and encourage vaccination. By training student leaders and health ambassadors to lead these initiatives, a supportive environment can be created where discussions about HPV are normalized and encouraged.

By adopting these recommendations, we believe that tertiary institutions in Ilorin Metropolis can make significant strides in improving knowledge, perception, and vaccination rates for HPV among their students. These efforts will be essential in safeguarding the health of the student population and reducing the prevalence of HPV-related diseases in the long term.

Future studies should explore the social, cultural, and psychological factors that may influence the perception, knowledge, and vaccination uptake of Human Papillomavirus (HPV) among tertiary students. While this study identified no significant demographic predictors of these variables, qualitative research or mixed-methods approaches may offer deeper insights into underlying barriers. Additionally, longitudinal studies could assess changes in HPV awareness and vaccination rates over time, particularly after targeted interventions. Expanding research to include male students and other educational institutions beyond Ilorin Metropolis would provide a broader understanding of HPV-related behaviors among university populations.

References

- Adebayo, S. O., Oladimeji, R., & Fakunle, A. (2020). *Impact of school-based health education on HPV knowledge and attitudes among adolescents in West Africa*. *International Journal of Health Promotion and Education*, 58(2), 104-112.
- Adewole, A.O., Bello, O., & Ogunleye, F. (2019). *Assessing HPV awareness and vaccination status among female university students in Nigeria*. *African Journal of Health Research*, 12(3), 45-55.
- Adewuyi, O., Afolabi, K., & Yusuf, T. (2020). *Barriers to HPV vaccination uptake: A cross-sectional study among Nigerian youth*. *Journal of Public Health in Africa*, 11(1), 89-98.
- Akinola, O. (2018). *Human papillomavirus infection and its association with head and neck cancers in Nigeria*. *Journal of Cancer Research and Clinical Oncology*, 144(6), 1145-1153.
- Arbyn, M. (2007). *Vaccination against human papillomavirus to prevent cervical cancer*. *Cochrane Database of Systematic Reviews*, 2, CD007526.
- Brown, B., & Folayan, M. O. (2015). *Barriers to HPV vaccination in Nigeria*. *Journal of African Health Sciences*, 15(3), 823-828.
- Bruni, L. (2019). *Global prevalence and genotype distribution of cervical human papillomavirus in women with normal cytology: a meta-analysis*. *The Lancet Infectious Diseases*, 19(2), 160-169.
- Centers for Disease Control and Prevention (CDC). (2012). *HPV vaccine: What you need to know*. Retrieved from <https://www.cdc.gov/hpv>
- Centers for Disease Control and Prevention (CDC). (2022). *HPV and cancer: HPV vaccination*. Retrieved from <https://www.cdc.gov/hpv>
- Davis, T.C. (2015). *The influence of health literacy on vaccine uptake*. *Vaccine*, 33(1), 8-13.
- Ezenwa, M. (2013). *Knowledge and awareness of human papillomavirus and cervical cancer among Nigerian university students*. *Journal of Clinical Oncology*, 31(8), 1412-1419.
- Felay, T. (2010). *Challenges in cervical cancer prevention in sub-Saharan Africa*. *The Lancet Oncology*, 11(1), 48-57.
- Gerend, M.A. (2008). *Correlates of human papillomavirus vaccination among university students*. *Journal of American College Health*, 56(6), 613-619.
- Ghebre, R. (2017). *The impact of socioeconomic status on HPV vaccine uptake in sub-Saharan Africa*. *Journal of Public Health Policy*, 38(4), 567-577.
- Hilton, L. (2011). *Adolescent perceptions of HPV vaccination: Barriers and facilitators*. *Vaccine*, 29(31), 4765-4772.

- Iliyasu, Z. (2010). *Knowledge, attitudes, and practices related to cervical cancer and HPV vaccination among Nigerian women*. *Journal of Cancer Education*, 25(3), 442-448.
- Iliyasu, Z., Abubakar, I. S., & Umar, A. (2018). *HPV awareness and vaccine acceptance among undergraduate students in Northern Nigeria: A pilot study*. *Vaccine*, 36(9), 1250-1256.
- Information Centre on HPV and Cancer. (2021). *HPV and cancer statistics*. Retrieved from <https://www.hpvcentre.net>
- Isara, A. (2021). *Perception and knowledge of human papillomavirus and cervical cancer among undergraduate students in Nigeria*. *Nigerian Journal of Clinical Practice*, 24(1), 45-52.
- Kumar, P., Singh, S., & Kaur, R. (2020). *Perceived susceptibility to HPV and its influence on vaccination intentions among young women: A mixed-methods study*. *BMC Public Health*, 20(1), 210.
- Makwe, C. (2012). *Knowledge and awareness of cervical cancer and human papillomavirus among university students in Nigeria*. *African Journal of Reproductive Health*, 16(3), 127-133.
- Mather, T. (2012). *Human papillomavirus vaccination as a primary prevention method for cervical cancer*. *The Lancet Oncology*, 13(1), 1-2.
- Musa, A.A., Lawal, T., & Ibrahim, H.A. (2021). *Cultural influences on HPV vaccine acceptance in Nigeria: Evidence from qualitative research*. *Journal of Epidemiology and Community Health*, 75(7), 670-675.
- National Cancer Institute. (2015). *HPV vaccines: An overview*. Retrieved from <https://www.cancer.gov>
- Nwankwo, K., Eze, C.C., & Anene, F. (2021). *Improving HPV vaccine uptake through targeted education campaigns: Evidence from a Nigerian university*. *Health Education Research*, 36(2), 134-144.
- Okafor, C.N., Chukwuma, O., & Okeke, U. (2021). *HPV vaccine: Bridging knowledge and uptake gaps in rural Nigeria*. *Global Health Action*, 14(1), 189-200.
- Olusola, A.O., Taiwo, A., & Bamidele, R. (2022). *Knowledge and attitude towards HPV vaccination among female university students in Southwestern Nigeria*. *Pan African Medical Journal*, 42(10), 450.
- Onowhakpor, A. (2016). *HPV knowledge and vaccination uptake among Nigerian medical and dental students*. *Nigerian Medical Journal*, 57(5), 286-290.
- Perlman, S. (2014). *Global HPV vaccine uptake and knowledge in young women*. *Journal of Global Health*, 4(2), 020406.
- Sandfort, T. (2009). *Sexual behavior and HPV awareness among adolescents*. *Journal of Adolescent Health*, 45(5), 465-472.
- Smith, J.K., Oluwole, F.A., & Onyekwere, A. (2018). *The role of age and education in HPV vaccine awareness among Nigerian women*. *Journal of Women's Health and Development*, 27(4), 367-374.

- Trottier, H. (2006). *Prevention of HPV-related cancers through vaccination*. *Vaccine*, 24(S3), 11-25.
- Vail-Smith, K. (1992). *University students' knowledge and awareness of HPV infection*. *Journal of American College Health*, 41(5), 217-221.
- World Health Organization (WHO). (2013). *HPV vaccination: Key facts and information*. Retrieved from <https://www.who.int>
- World Health Organization (WHO). (2018). *Human papillomavirus vaccines: The global impact*. Retrieved from <https://www.who.int>
- World Poverty Clock (2018). *Poverty statistics in Nigeria*. Retrieved from <https://www.worldpovertylock.org>
- Yacobi, L. (1999). *Perception of risk and sexual behavior related to HPV infection among university students*. *International Journal of STD & AIDS*, 10(9), 593-599.
- Zhang, L. (2020). *Socioeconomic and behavioral factors affecting HPV vaccination in developing countries*. *International Journal of Infectious Diseases*, 95, 159-164.