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LEVEL OF KNOWLEDGE AND AWARENESS OF HUMAN PAPILLOMAVIRUS AMONG BIOLOGY STUDENTS IN ENUGU STATE'S COLLEGES OF EDUCATION

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Abstract
This study was designed to explore the awareness and understanding of Human Papillomavirus among Biology students in Colleges of Education in Enugu state, Nigeria. A descriptive survey design was adopted. The population of the study comprised 5773 students which is the total population of all students in the two selected colleges of education. The sample size of 284 was derived using Taro Yamen's formula. The instrument for data collection was a questionnaire called Biology Students' HPV/Genital Warts Knowledge Level (BSHPVGWKL). The data collected were analysed using Microsoft Excel, and analyses of mean and standard deviation were carried out.The study revealed that students' knowledge of HPV symptoms was limited to certain signs, excluding severe pain and abnormal bleeding associated with cancer. Additionally, their understanding of HPV transmission did not include intense body contact, while modes such as anal, vaginal, and oral sex were recognized. Students were aware of various control measures, such as maintaining one safe sexual partner, condom use, vaccination, and testing. However, their knowledge of HPV treatment did not encompass Loop electrosurgical excision procedure (LEEP), but included methods like freezing, surgical removal, burning, vaccination, reducing spread with cervarix 2vHPV, and laser therapy. The research findings indicate that students have a relatively good knowledge of the signs and symptoms, modes of transmission, control, and treatment of HPV. However, there are some areas of misconception and lack of understanding, particularly regarding the symptoms and treatment options of HPV, which should be addressed for better education and awareness. Longitudinal study assessing the impact of targeted HPV education interventions on the knowledge and awareness levels among Biology students over time should be conducted.

Keywords: Knowledge, HPV, College of Education, Biology students, Enugu state

Introduction
Human papillomavirus (HPV) is a small DNA virus that infects skin or mucosal cells. It has a circular, double-stranded genome of about 8 kb in length. The genome contains genes for 6 early proteins involved in virus replication and 2 late proteins, L1 and L2, which are responsible for the virus's structure. Some HPV genotypes, out of the 100 known types, can cause cervical cancer, as well as other anogenital cancers and head and neck cancers. The two most common high-risk genotypes, HPV 16 and 18, are responsible for approximately 70% of cervical cancer cases. The global population of women aged 15 and above, who are at risk of developing cervical cancer, is estimated to be 2972.8 million. In 2020, there were approximately 604,127 new cases of cervical cancer and 341,831 deaths from the disease. Around 80% of these cases occurred in developing countries. HPV 6 and 11, classified as low-risk genotypes, can cause genital warts, a non-cancerous condition that affects the external genitalia and causes significant discomfort. HPV is highly contagious, with the

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highest incidence occurring soon after the initiation of sexual activity, and most people acquire the infection at some point in their lives (WHO, 2018; ACS, 2021; ASHA, 201; WHO, 2021).

HPV is one of the most prevalent sexually transmitted infections globally and is primarily transmitted through sexual contact or skin-to-skin contact with an infected individual. Condoms do not provide complete protection against HPV, and the virus can still be transmitted even in monogamous relationships. Furthermore, HPV can survive on surfaces and objects for extended periods, as it is resistant to drying and disinfection. Consequently, HPV can also be transmitted through contaminated objects or materials. Direct contact with cuts or abrasions from an infected person can also result in transmission, and in rare cases, mother-to-child transmission can occur during childbirth (WHO, 2018; ACS, 2021; ASHA, 201; WHO, 2021).

According to the World Health Organization, the worldwide prevalence of HPV among women is estimated to be 11.7% as of 2017. Latin America and the Caribbean have the second-highest prevalence among women at 16.1%, following Sub-Saharan Africa with 24%. The prevalence of HPV among men is high across all regions, reaching 21%, and tends to peak at a slightly older age compared to women. The prevalence of any HPV type at the penis is 18.7%, while the rates at the scrotum and perineal region are 13.1% and 7.9%, respectively. Men who have had at least three lifetime partners have 4.5 times higher odds of contracting any type of HPV compared to those with fewer partners. Persistent infection with high-risk HPV types significantly increases the risk of developing cervical cancer. Globally, there are approximately 530,000 new cases of cervical cancer each year, resulting in around 266,000 deaths. The distribution of these cases varies by region, with a higher incidence in lower-income regions. It is estimated that one out of every 100 women in developing countries will develop cervical cancer before the age of 75. In the Region of the Americas, around 83,000 women are diagnosed with cervical cancer annually, and over 35,000 women die from the disease. More than half of these women are under the age of 60 (ACS, 2021; ASHA, 201; WHO, 2021; WHO, 2022)**.**

There is a dearth of literature on the Colleges of Education students' awareness of STDs, especially HPV. Therefore, this survey was conducted to explore the awareness and understanding of human papillomavirus among biology students in Enugu State's Colleges of Education. The outcomes of this study will help to inform all relevant stakeholders in the Nigerian public health sector on how to effectively formulate, promote, and implement school health education policies/programs targeted at mitigating the spread of HPV infection among adolescents in Nigeria.

Methodology

Area of Study

The study was carried out in Enugu state. There are four Colleges of Education in Enugu State namely: Federal College of Education, Eha-Amufu, Enugu State; College of Education Technical, Enugu; Peace Land College of Education, Enugu, and The College of Education Nsukka. Out of the four Colleges, The College of Education Nsukka does not offer Education Biology as a course of study. Therefore, the Federal College of Education, Eha-Amufu, Enugu State, and College of Education Technical, Enugu were selected for the study because they have Education Biology students for both N.C.E. and Degree programmes.

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Research design

The design adopted for this research is a descriptive survey design. Descriptive survey design according to (Nworgu, 2015), is a study that aims at collecting data on and describing systematically the characteristics, features, or facts about a given population. The reason for this choice of descriptive design was that the study aimed at collecting data from students considered representative of the population in assessing students' knowledge level of HPV.

The population of the study

The population of the study comprised five thousand, seven hundred and seventy-three (5,773 – total population of all students in the two selected colleges of education). The Federal College of Education, Eha-Amufu has a total number of six hundred and forty-five (645) Education Biology students (N.C.E. – 316 (NCE I – 76, II – 112, NCE III – 128) & Degree – 329 (D I – 54, D II – 97, D III – 106, D IV - 72)) while Enugu State College of Education Technical has a total of three hundred and thirty-six (336) Education Biology students (N.C.E. – 154 (NCE I – 62, NCE II – 47, NCE III – 45) & Degree – 182 (D I – 36, D II – 54, D III – 44 & D IV - 48)). Both Colleges have a total of 981 Education Biology students. We choose N.C.E. II, Degree II, and Degree III students for this study because they have encountered topics such as "Pollution, Sanitation & Personal Hygiene and Disease" in their previous classes.

Sample and Sampling Techniques

The stage one sampling of subjects involved the use of purposive sampling technique in the selection of 981 out of the 5773.

The second stage involved the adoption of the Yamane Taro Formula in selection of 284 subjects.

The sample size of 284 was derived using (Yamane, 1967) formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = Sample size; N = Population of the study - 981; e = Level of significance – 0.05;
1 = Theoretical constant – 1.

Substituting the values in the formula:

$$n = \frac{981}{1 + 981(0.05)^2} = 284$$

The sample of the 284 education biology students from both colleges, in N.C.E. II 60 was sampled from FCE, Eha-Amufu while 28 were sampled from N.C.E. II in ESCT. Degree II & III samples from FCE, Eha-Amufu were 50 and 88 while that of ESCT were 36 and 22.

Instrument for data collection

The instrument for data collection was a questionnaire called Biology Students' HPV/Genital Warts Knowledge Level (BSHPVGWKL). Questionnaire items were constructed to afford an answer to the research questions formulated to guide the study. The questionnaire consists of five sections. Section A sought information on What is the level of knowledge of students on the signs and symptoms of HPV. Section B sought information on what extent to which students know the modes of transmission of HPV. Section C sought information on what extent are students aware of the control of HPV. Section D sought information on what is

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treatment available for HPV.Four-point scale rating of Strongly Disagree (SD), Disagree (D), Agree (A) and Strongly Agree (SA) with values of 1, 2, 3, and 4 respectively.

Validity of the instrument
The research instrument was subjected to face validation by giving it to an expert from Measurement and Evaluation and another from Biology Education, all in F.C.E., Eha-Amufu. They were asked to validate the instrument concerning the appropriateness of language used in terms of clarity of statement and adequacy of items of the instrument. The experts also checked whether the instrument was capable of answering the questions. Based on the experts, corrections, comments, observations, suggestions, and amendments were made to the instruments before a final copy was produced for the study.

Reliability of the instrument
The instrument was trialed on a sample of twenty (20) Degree III Education Biology students, in Peace Land College of Education, Enugu which is not part of the sampled college for the study. The data obtained from the respondents were subjected to the Cronbach Alpha formula because the instrument was non-dichotomously scored. A reliability coefficient of 0.086 was obtained for the computation which shows that the instrument is reliable.

Method of data collection
The researchers visited the sample colleges to distribute and collect the data for the study. During the course of the visit, copies of the instrument were administered to the students by the researchers. The administration of the instrument was done once in each school and retrieval of the achievement test was on the spot.

Method of Data Analysis
The data collected from the respondents were keyed into a Microsoft Excel sheet, and analyses of mean and standard deviation were carried out. A four-point scale of Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA). The scaling statement and the nominal values are SD= 1; D= 2; A= 3; and SA= 4. Therefore Mean = 4+3+2+1 divided by 4 = 2.50. Therefore, 2.50 was the cut-off point for deciding on each item. Any item whose weighted mean was 2.50 and above was considered as agreement while any item that was less than 2.50 was regarded as disagreement.

Results
The findings and results of the data collected are presented in the tables below as they reflect answers to the research questions.

Research question 1: What is the level of knowledge of students on the signs and symptoms of HPV?
Table 1 shows the level of knowledge of students on the signs and symptoms of HPV. The mean score of item 3 is below the benchmark for acceptance of any item. This implies that respondents disagreed with the assertion that the symptoms of HPV include severe pains to abnormal bleeding when cancerous. The mean scores of items 1 and 2 were above the 2.50 benchmark for acceptance of any item. This implies that the respondents agreed that the knowledge of students on the signs and symptoms of HPV includes itchy or sore warts at the tip and shaft of the penis or scrotum and painless skin lesions around the vulva or clitoris. Also, items 4 and 5 were above the 2.50 benchmark for acceptance of any item. This implies that the respondents agreed that knowledge of students on the signs and symptoms of HPV include cauliflower-like clusters or flat flesh-colored bumps in the vulva or vagina and pubic

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regions and moist or pink-colored swelling in the thighs or laps. The standard deviation of items 1 to 5 was relatively high (> 0.5) which implies that the individual responses deviated from the mean.

Table 1: Mean rating and standard deviation on the level of knowledge of students on the signs and symptoms of HPV

S/N	ITEMS	SD	D	A	SA	N	MEAN	SD	REMARKS
1.	Itching or sore warts at the tip and shaft of the penis or scrotum.	32	67	95	90	284	2.85	0.86	Accept
2.	Painless skin lesion around the vulva or clitoris.	38	99	121	26	284	2.50	0.94	Accept
3.	Severe pains to abnormal bleeding when cancerous.	24	124	127	9	284	2.42	1.04	Reject
4.	Cauliflower-like clusters or flat flesh-colored bumps in the vulva or vagina and pubic region.	31	95	148	10	284	2.50	1.03	Accept
5.	Moist or pink-colored swelling in the thighs or laps.	38	88	135	23	284	2.50	0.96	Accept

Research question 2: To what extent are students sent to know the modes and transmission of HPV?

Table 2 shows the extent students know the modes of transmission of HPV. The mean scores of items 2, 3, 4, and 5 were above the 2.50 benchmark for acceptance of any item. This result implies that respondents agreed students know that from pregnant mother to child, anal sex, vaginal sex, and through oral sex, are all modes of transmission of HPV. However, the mean score of item 1 was below the benchmark for acceptance of any item. This implies that respondents disagreed with the assertion that modes of transmission of HPV include intense body contact with the infected person. The standard deviation of item 2 was relatively low (< 0.5), which implies that the individual response did not deviate much from the mean while that of 2, 3, 4, and 5 were relatively high (>0.5) which implies the individual responses deviated from the mean.

Table 2: Mean rating and standard deviation on the extent students know the modes of transmission of HPV.

S/N	ITEMS	SD	D	A	SA	N	MEAN	SD	REMARKS
1.	Intense body contact with an infected person.	149	64	47	24	284	1.81	0.99	Reject
2.	From Pregnant mother to Child	6	76	96	106	284	3.06	0.43	Accept
3.	Through Anal sex	7	65	159	53	284	2.83	1.04	Accept
4.	Through Vaginal sex	48	94	106	36	284	2.50	0.89	Accept
5.	Through Oral sex	42	55	87	100	284	2.86	0.85	Accept

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Research question 3: To what extent are students aware of the control of HPV?

Table 3 shows the extent students are aware of the control of HPV. The mean scores of items 1, 2, and 3 were above the 2.50 benchmark for acceptance of any item. This implies that respondents agreed that students were aware that maintaining one safe sexual partner, wearing condoms, and getting vaccinated are ways of controlling HPV. Also, the mean scores of items 4 and 5 meet up with the 2.50 benchmark for acceptance of any item. This result implies that respondents agree that students were aware of the control of HPV like avoiding direct contact and getting tested. The standard deviation of all items was relatively high (>0.5 < 1) which implies that the individual responses deviated from the mean.

Table 3: Mean rating and standard deviation on the extent students are aware of the control of HPV.

S/N	ITEMS	SD	D	A	SA	N	MEAN	SD	REMARKS
1.	Maintaining one safe sexual partner	44	70	73	97	284	2.79	0.84	Accept
2.	Wearing of condoms	36	56	72	120	284	2.97	0.88	Accept
3.	Getting Vaccinated	42	62	83	97	284	2.82	0.84	Accept
4.	Avoid direct contact with infected persons	59	59	77	89	284	2.69	0.82	Accept
5.	Getting tested	13	54	81	136	284	3.19	0.96	Accept

Research question 4: What are the treatments available for HPV?

Table .4 shows the level of student knowledge on the treatment of HPV. The mean score of item 4 is below the 2.50 benchmark for acceptance of any item. This implies that respondents disagreed with students' knowledge of the treatment of HPV including Loop electrosurgical excision procedure (LEEP). However, the mean scores of items 1, 2, 3, 5, 6, and 7 meet up with the 2.50 benchmark for acceptance of any item. This result implies that respondents agreed that the student's knowledge of the treatment of HPV includes Freezing with liquid nitrogen (cryotherapy), surgical removal, burning with electrical current, the use of quadrivalent HPV vaccine, reducing the spread with cercaria 2vHPV and the use of laser therapy. The standard deviation of item 3 was relatively low which implies that the individual responses did not deviate much from the mean while that of items 1,2,4,5,6 and 7 were relatively high (>0.5 < 1) which implies that the individual responses deviated from the mean.

Table 4: Mean rating and standard deviation on the level of student knowledge on the treatment available for HPV.

S/N	ITEMS	SD	D	A	SA	N	MEAN	SD	REMARKS
1.	Freezing with liquid nitrogen (cryotherapy)	30	68	81	105	284	2.92	0.87	Accept
2.	Surgical Removal of warts	41	68	88	87	284	2.78	0.84	Accept
3.	Burning with electrical current	24	60	80	120	284	3.04	0.40	Accept
4.	Loop electrosurgical excision procedure (LEEP)	114	89	66	15	284	1.94	0.92	Reject

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5	Quadrivalent HPV vaccine (Garda87l 4vHPV) is used in treating HPV	41	53	92	98	284	2.87	0.86	Accept
6.	Reducing the spread of HPV with (Cercarix 2vHPV) vaccine	49	56	67	112	284	2.85	0.76	Accept
7.	The use of laser therapy	63	64	76	81	284	2.62	0.82	Accept

Discussion

The present study investigates the level of awareness and understanding of Human Papillomavirus (HPV) among biology students in Enugu State's colleges of education, aiming to identify potential gaps in knowledge and educational needs surrounding this prevalent sexually transmitted infection. By examining the knowledge base of future educators, this research provides valuable insights for designing effective educational interventions to promote HPV awareness and prevention in Nigeria.

The study's results indicate that Education Biology students possess a moderate level of knowledge regarding the signs and symptoms of HPV and Genital warts. Surprisingly, a considerable number of Education Biology students were unaware of the potential consequences of HPV infection, such as severe bleeding or the development of cancer. Nonetheless, many students demonstrated accurate identification of the signs and symptoms associated with HPV. These findings align with (Sharma *et al.*, 2020; Wang *et al.*, 2021; Thanasa *et al.*, 2022; Bocquier *et al.*, 2023).

In terms of knowledge about transmission modes, the study found that only a few participants possessed a comprehensive understanding. While a majority correctly identified sexual intercourse as a mode of HPV transmission, some erroneously considered oral sex as a means of transmission, while others were unaware of the oral transmission route altogether. Additionally, only a small number of participants were knowledgeable about the virus's potential transmission through skin-to-skin contact. These findings are consistent with a study conducted by (Jenitha *et al.*, 2020; Wang *et al.*, 2021; Thanasa *et al.*, 2022).

Understanding the control measures for HPV is crucial in curbing the spread of the disease in Enugu State. This study surveyed 284 Education Biology undergraduate students from colleges of education in Enugu State, Nigeria. The results indicated an adequate level of student knowledge regarding HPV control measures. These findings are in line with (Ali *et al.*, 2020; Wang *et al.*, 2021; Thanasa *et al.*, 2022).

Regarding treatment options, a noteworthy finding from this study was that a considerable number of students were unaware of the available treatments for HPV. It is important to note that there are currently no specific treatments that can cure HPV infections. However, various treatment options exist to manage symptoms and reduce the risk of complications such as cervical cancer. These options encompass surgical interventions and vaccines. These findings correspond with a study conducted by (Deshmukh *et al.*, 2021; Obayi *et al.*, 2022; John-Akinola *et al.*, 2022).

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Conclusion

The research findings indicate that students have a relatively good knowledge of the signs and symptoms, modes of transmission, control, and treatment of HPV. However, there are some areas of misconception and lack of understanding, particularly regarding the symptoms and treatment options of HPV, which should be addressed for better education and awareness.

Educational implications of the study

The findings of this study have profound implications for education, offering invaluable insights for students, teachers, parents, society, and individuals susceptible to HPV. By examining the level of knowledge among biology students in colleges of education regarding HPV, this study establishes a strong empirical foundation. These findings empower students to deepen their understanding and engage in comprehensive research on HPV, equipping them with the necessary knowledge to prevent falling victim to these conditions. Furthermore, the study enlightens educators about the crucial significance of sex education, encouraging them to prioritize the topic of HPV and recognize its utmost importance. The implications extend beyond educational institutions, benefiting society as a whole by fostering the development of informed individuals and creating a society free from HPV-related complications. The promotion of education regarding HPV vaccinations, safe sexual practices, and regular screening for HPV infections assumes a vital role in reducing the prevalence of genital warts and mitigating HPV-related complications.

Recommendation for Further Study

Longitudinal study assessing the impact of targeted HPV education interventions on the knowledge and awareness levels among Biology students over time should be conducted. This could help evaluate the effectiveness of educational programs and provide insights for developing tailored health education strategies in colleges.

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