

RESEARCH ARTICLE

# Knowledge and attitudes of Nigerian final-year pharmacy students towards genital warts and practice regarding human papillomavirus vaccine: A cross-sectional study

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## Keywords

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## Abstract

**Background:** Genital warts are clinical presentations of human papillomavirus (HPV) infection. The study evaluated the knowledge and attitudes of Nigerian final year pharmacy students towards genital warts and practice regarding the HPV vaccine. **Methods:** Data for this cross-sectional study were collected from February 2022 to April 2022 with a 31-item structured self-administered questionnaire and analysed using IBM SPSS Version 25.0. Pearson's Chi-Square was used to test the association between variables. Statistical significance was set as  $p < 0.05$ . **Results:** The study enrolled 620 respondents from 15 universities in Nigeria. Overall, slightly above half of the respondents had good knowledge of genital warts ( $n=344$ , 55.5%). More than half of them had favourable attitudes towards genital warts ( $n=422$ , 68.1%). Few respondents reported that they had been vaccinated against genital warts ( $n=12$ , 1.9%). **Conclusion:** The study revealed that final year pharmacy students in Nigeria showed good knowledge and favourable attitudes towards genital warts and human HPV prevention, which did not translate into good practice. It highlights the need for interventions that would promote good practices towards genital warts prevention.

## Introduction

*Condyloma acuminatum*, more commonly known as genital warts, is one of the most prevalent sexually transmitted infections worldwide (Aşkın, 2017; Yuan *et al.*, 2018; Leslie *et al.*, 2023), caused by human papillomavirus (HPV) strains 6 and 11 (Dareng *et al.*, 2019; Leslie *et al.*, 2023). Vaccination offers protection against these HPV strains and can reduce the incidence of genital warts (Dareng *et al.*, 2019). However, low and middle-income countries have poor HPV vaccination coverage (Bruni *et al.*, 2016). Nigeria has a high prevalence and increased transmission of HPV infection and genital warts (Ashaka *et al.*, 2022; Ohiohin *et al.*,

2022). Although treatments can remove warts, and most genital warts tend to disappear on their own with time, the recurrence rate is high, depending on the patient's age, gender, immune status, condom use, viral load, and history of HPV vaccinations (Leslie *et al.*, 2022). Thus, there is a need to implement measures that will curtail the spread of this virus (Ashaka *et al.*, 2022).

Genital warts can be transmitted by skin-to-skin contact during sexual activity (Dareng *et al.*, 2019). They may appear in various areas, such as the penile shaft, scrotum, vagina, and labia majora. They also populate the anus and vagina's inner surfaces (Leslie *et al.*, 2022). Warts can be flat, dome-shaped, cauliflower-

shaped, or pedunculated and have a wide range of appearances. They may also vary in colour and appearance, ranging from white to pink, purple, red, or brown, and from flat to cerebriform or verrucous (El-Hamd & Aboeldahab, 2018). They have been known to bleed on their own accord and can occasionally cause irritation, inflammation, and pain (Leslie *et al.*, 2022).

Some risk factors for HPV infection and genital warts include sexual promiscuity, multiple sexual partners, and HIV infection (Dareng *et al.*, 2019; Ashaka *et al.*, 2022). Women aged 20 to 24 have the highest infection rates, followed by those aged 15 to 19 (Ohihoin *et al.*, 2022). Since genital warts can affect the quality of life of those infected, it is vital to promote awareness of the signs and symptoms, sexual manifestations, and potential risk factors for these warts to allow for the implementation of efficient preventative measures against the infection (Abu & Aboeldahab, 2018).

Knowledge, attitudes, and practices are essential factors that significantly influence the behaviours of individuals (Amukugo *et al.*, 2018). Undergraduate pharmacy students represent the future of the medical field and may play a crucial role in educating the public about HPV and its screening, prevention, and treatment options (Anene-Okeke *et al.*, 2019). Studies have shown that while knowledge of HPV among these students is moderately high, practice pertaining to HPV prevention is generally low (Amukugo *et al.*, 2018; Anene-Okeke *et al.*, 2019; Oluwole *et al.*, 2019). Hence, this study aimed to evaluate the level of knowledge and attitudes of Nigerian final-year pharmacy students towards genital warts and their practices regarding the human papillomavirus vaccine.

## Methods

### *Study design and setting*

This cross-sectional study was conducted among final-year students of 15 pharmacy schools in Nigerian universities from February 2022 to April 2022. The universities were: 1) Federal-owned are University of Nigeria Nsukka (UNN), University of Uyo (UNIUYO), University of Jos (UNIJOS), University of Benin (UNIBEN), Ahmadu Bello University (ABU), Obafemi Awolowo University (OAU), University of Lagos (UNILAG), University of Port Harcourt (UNIPORT) and Bayero University Kano (BUK); 2) State-owned are Chukwuma Odumegwu Ojukwu University (COOU), Enugu State University of Science and Technology (ESUT) and Delta State University (DELSU); 3) Faith-based private institutions are Madonna University (MU) and Bingham University (BHU); and 4) A non-faith

based private institution is Igbinedion University Okada (IOU).

### *Ethical committee approval*

The study protocol was approved on February 9, 2022, by the Health Research Ethics Committee (HREC) of the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla (NHREC/05/01/2008B-FWA0000245 8-1RB00002323). The objectives of the study were explained to the participants, with oral and written consent obtained from those who agreed to participate. Confidentiality was maintained as the names of the participants were not requested.

### *Eligibility criteria*

The eligibility criteria comprised students of accredited pharmacy schools in Nigeria who were in their final year of study and willing to participate. Students were excluded when they were in lower years of study, other faculties in the university, and postgraduate programmes.

### *Sample size and selection*

The total population of pharmacy students (1703 students) in the 15 universities selected was obtained from the class representatives of the different final-year classes of the pharmacy schools. The recommended minimum sample size calculated using the Raosoft sample size calculator was 314, assuming a 5% margin of error, a 95% confidence interval, and a 50% response rate (Raosoft, 2004). Convenience sampling was employed.

### *Study instrument validation*

Clinical Pharmacists of the Department of Clinical Pharmacy and Pharmacy Management, University of Nigeria Nsukka (UNN) scrutinised the questionnaire and suggested improvements. A pilot study was conducted with ten pharmacy students whose responses were excluded from the final dataset. The results provided information about the average time to complete the questionnaire and possible questions the respondents could ask, so ambiguities were eliminated. The final version of the questionnaire was used for the main study.

### *Data collection*

The study instrument was a 31-item, structured, self-administered questionnaire divided into five parts.

The first part collected participants' demographic details. The second part assessed pharmacy students' awareness of some available HPV vaccines. The third

part focused on participants' knowledge of genital warts. The fourth one examined their attitudes towards genital warts. The last part provided information on pharmacy students' sexual history and vaccination against genital warts.

**Data analysis**

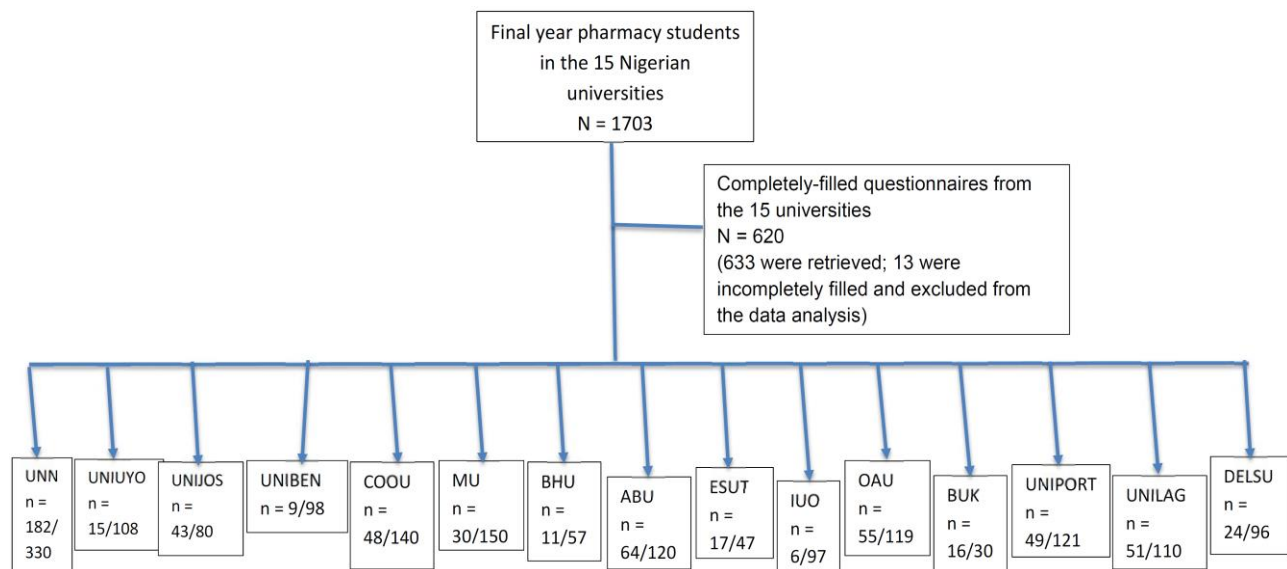
Data were analysed using IBM SPSS Version 25.0 (IBM Corp, Version 25.0, and Armonk, NY, USA). Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to summarise data. Inferential statistics such as Pearson's Chi-Square tested the association between variables, where applicable, with statistical significance set at  $p < 0.05$ .

The total knowledge score was the sum of the correct options for the items testing knowledge of genital warts, with a maximum total knowledge score of 10. Knowledge was categorised as *good* or *poor* such that good knowledge of genital warts referred to those with total knowledge scores  $\geq 5$  (the median score).

Attitudes towards genital warts were assessed using six questions rated on a 4-point Likert scale: The responses were: 1) Strongly disagree; 2) Disagree; 3) Agree; and 4) Strongly agree. Negatively phrased statements had their codes reversed. The total attitude score was the sum of the scores for the different items, with a maximum of 24. Attitude was categorised as *favourable* or *unfavourable*, such that *favourable attitudes* about genital warts referred to those with a total attitude score  $\geq 18$  (the median score).

**Results**

Of the total population of final-year pharmacy students from the 15 universities (1703), 620 completed the questionnaire, representing an overall participation rate of 36.4% (620/1703). Thirteen questionnaires had missing data and were excluded from the analysis (Figure 1).



**Key:** UNN = University of Nigeria Nsukka; UNIUYO = University of Uyo; UNIJOS = University of Jos; UNIBEN = University of Benin; COOU = Chukwuemeka Odumegwu Ojukwu University; MU = Madonna University; BHU = Bingham University; ABU = Ahmadu Bello University; ESUT = Enugu State University of Science and Technology; IUO = Igbinedion University Okada; OAU = Obafemi Awolowo University; BUK = Bayero University Kano; UNIPORT = University of Port Harcourt; UNILAG = University of Lagos; DELSU = Delta State University

**Figure 1: Flow diagram showing number of participants from the different universities**

The participation rate of the 15 universities was as follows: 1) UNN: 55.1% (182/330); 2) UNIUYO: 13.9% (15/108); 3) UNIJOS: 53.8% (43/80); 4) UNIBEN: 9.2% (9/98); 5) COOU: 34.3% (48/140); 6) MU: 20% (30/150); 7) BHU: 19.3% (11/57); 8) ABU: 53.3% (64/120); 9) ESUT: 36.2% (17/47); 10) IUO: 6.2% (6/97); 11) OAU: 46.2% (55/119); 12) BUK: 53.3% (16/30); 13) UNIPORT: 40.5% (49/121); 14) UNILAG: 46.4% (51/110); and 15)

DELSU: 25% (24/96). Most respondents were 21 to 26 years old (n = 526, 84.8%), single (n = 586, 94.5%), and had done Students Industrial Work Experience Scheme/Industrial Training (SIWES/IT) (n=540, 87.1%). Some reported having been diagnosed with genital warts (n=15, 2.4%) (Table I).

**Table I: Demographic details (n = 620)**

| Variables   | n (%)      |
|---|------------|
| <b>Age (in years)</b>                                   |            |
| ≤ 20  | 0 (0.0)    |
| 21 – 23   | 318 (51.3) |
| 24 – 26   | 208 (33.5) |
| 27 – 30   | 77 (12.4)  |
| >30   | 17 (2.7)   |
| <b>Gender</b>   |            |
| Male  | 267 (43.1) |
| Female  | 353 (56.9) |
| <b>University</b>                                       |            |
| University of Nigeria Nsukka (UNN)                      | 182 (29.4) |
| University of Lagos (UNILAG)                            | 51 (8.2)   |
| Chukwuemeka Odumegwu Ojukwu University (COOU)           | 48 (7.7)   |
| Ahmadu Bello University (ABU)                           | 64 (10.3)  |
| Obafemi Awolowo University (OAU)                        | 55 (8.9)   |
| Bingham University (BHU))                               | 11 (1.8)   |
| University of Uyo (UNIUYO)                              | 15 (2.4)   |
| University of Port Harcourt (UNIPORT)                   | 49 (7.9)   |
| Delta State University (DELSU)                          | 24 (3.9)   |
| University of Jos (UNIJOS)                              | 43 (6.9)   |
| Bayero University Kano (BUK)                            | 16 (2.6)   |
| Enugu State University of Science and Technology (ESUT) | 17 (2.7)   |
| University of Benin (UNIBEN)                            | 9 (1.5)    |
| Igbinedion University Okada (IUO)                       | 6 (1.0)    |
| Madonna University (MU)                                 | 30 (4.8)   |
| <b>Marital status</b>                                   |            |
| Single  | 586 (94.5) |
| Married   | 33 (5.3)   |
| Separated/divorced                                      | 1 (0.2)    |
| <b>Religion</b>   |            |
| Christianity  | 533 (86.0) |
| Islam   | 84 (13.5)  |
| Traditional   | 1 (0.2)    |
| None  | 2 (0.3)    |
| <b>I have been diagnosed with genital warts (Yes)</b>   | 15 (2.4)   |
| <b>I have done SIWES/IT (Yes)</b>                       | 540 (87.1) |
| <b>Setting of SIWES/IT</b>                              |            |
| Hospital  | 186 (30.0) |
| Community pharmacy                                      | 334 (53.9) |
| Industry  | 24 (3.9)   |
| Others  | 10 (1.6)   |
| Not applicable  | 66 (10.6)  |

SIWES = Students Industrial Work Experience Scheme; IT = Industrial Training

Few respondents were aware of some popular brands of vaccines for genital warts: Cervarix (n=170, 27.4%) and Gardasil (n=94, 15.2%). More than half of them knew that genital warts are caused by HPV (n=476, 76.8%), and 18.7% stated that there is no cure for genital warts (n=116, 18.7%). After categorisation into “good” or “poor” knowledge, 55.5% (n=344) exhibited good knowledge of genital warts (Table II).

**Table II: Awareness of some vaccines and knowledge of genital warts (n = 620)**

| Variables   | n (%)      |
|---|------------|
| <b>Awareness of some vaccines (Yes)</b>   |            |
| Cervarix  | 170 (27.4) |
| Gardasil  | 94 (15.2)  |
| <b>Knowledge of genital warts [Correct option]</b>  |            |
| Genital warts are caused by the human papilloma virus (HPV) [True]  | 476 (76.8) |
| Men are more vulnerable to the complications of genital warts than women [False]                                    | 239 (38.5) |
| Genital warts cannot be transmitted through anal sex [False]  | 386 (62.3) |
| Smoking is a risk factor for genital warts [True]   | 135 (21.8) |
| Genital warts are transmissible to others only when the infected person has visible warts or other symptoms [False] | 266 (42.9) |
| Genital warts are cancerous [False]   | 206 (33.2) |
| Having other viral infections e.g. HIV or herpes can increase the risk of developing genital warts [True]           | 495 (79.8) |
| One cannot get genital warts from kissing [False]   | 146 (23.5) |
| Genital warts can occur at any age [True]   | 393 (63.4) |
| There is no cure for genital warts [True]   | 116 (18.7) |

The total knowledge score was the sum of the correct options for the items testing knowledge of genital warts, with maximum total knowledge score of 10.

Knowledge was categorised as good or poor such that good knowledge of genital warts referred to those with total knowledge scores  $\geq 5$  (the median score).

Slightly above half of the respondents had good knowledge of genital warts (n = 344; 55.5%).

The majority of the respondents agreed that they would encourage their children to be vaccinated against genital warts before the onset of sexual activity (n=557, 89.9%) and were interested in participating in public health campaigns that enlighten the public about genital warts (n=558, 90.0%). Close to a third of the respondents reported that they cannot marry any person who has been previously diagnosed with genital warts (n=190, 30.7%). After categorisation into *favourable* or *unfavourable* attitudes, more than half of the respondents had favourable attitudes towards genital warts (n=422, 68.1%) (Table III).

**Table III: Attitudes towards genital warts (n = 620)**

| Variables  | n (%)             |               |               |                |
|--|-------------------|---------------|---------------|----------------|
|  | Strongly disagree | Disagree      | Agree         | Strongly agree |
| * All patients with genital warts are sexually promiscuous   | 111<br>(17.9)     | 335<br>(54.0) | 150<br>(24.2) | 24<br>(3.9)    |
| I would encourage my children to be vaccinated against genital warts before the onset of sexual activity     | 15<br>(2.4)       | 48<br>(7.7)   | 370<br>(59.7) | 187<br>(30.2)  |
| * Only those at risk for sexually transmitted diseases should be vaccinated to prevent genital warts         | 158<br>(25.5)     | 345<br>(55.6) | 94<br>(15.2)  | 23<br>(3.7)    |
| *If I have genital warts, I would look for ways to treat myself without seeing a Physician or telling anyone | 324<br>(52.3)     | 224<br>(36.1) | 61<br>(9.8)   | 11<br>(1.8)    |
| * I cannot marry any person who has been previously diagnosed of genital warts                               | 97<br>(15.6)      | 333<br>(53.7) | 153<br>(24.7) | 37<br>(6.0)    |
| I am interested in participating in public health campaigns that enlighten the public about genital warts    | 19<br>(3.1)       | 43<br>(6.9)   | 337<br>(54.4) | 221<br>(35.6)  |

+ Reversed items such as: Strongly disagree (coded as "4"); Disagree (coded as "3"); Agree (coded as "2"); Strongly agree (coded as "1").

Most of those who reported having had sex before the survey were aged 16-25 (n=231, 89.6%), and 19.6% (n=56) reported never having used condoms. Few respondents declared having been vaccinated against genital warts (n=12, 1.9%) (Table IV).

A large proportion of respondents who had done SIWES/IT (n 310, 57.4%) had good knowledge of genital warts compared to those who had not (n=34, 42.5%) ( $\chi^2 = 6.269, p = 0.012$ ) (Table V).

A large proportion of respondents from UNIBEN (n= 8, 88.9%) had favourable attitudes towards genital warts compared to the other universities: Madonna (n=25, 83.3%), IUO (n=5, 83.3%), UNIUYO (n=12, 80.0%), UNIPORT (n=39, 79.6%), COOU (n=38, 79.2%), DELSU (n=19, 79.2%), UNILAG (n=38, 74.5%), ESUT (n=12, 70.6%), UNIJOS (n=30, 69.8%), OAU (n=33, 60.0%), ABU (n=37, 57.8%), Bingham (n=6, 54.5%), BUK (n=8, 50.0%) ( $\chi^2 = 26.433, p = 0.023$ ) (Table V).

A large proportion of those who were Christians (n=526, 98.7%) had not been vaccinated against genital warts compared to their Muslim counterparts (n=79, 94.0%) ( $\chi^2 = 8.287, p = 0.04$ ) (Table V).

A large proportion of those who had been diagnosed with genital warts (n=2, 13.3%) had been vaccinated against genital warts compared to those who had not been diagnosed (n=10, 1.7%) ( $\chi^2 = 10.521, p = 0.001$ ) (Table V).

**Table IV: Sexual history and practice regarding vaccination against genital warts (n = 620)**

| Variables  | n (%)      |
|--|------------|
| <b>Previously had sex (n = 620)</b>  |            |
| Yes  | 274 (44.2) |
| No   | 346 (55.8) |
| <b>Age at first sex (n = 258)</b>  |            |
| ≤ 10   | 4 (1.6)    |
| 11 – 15  | 11 (4.3)   |
| 16 – 20  | 131 (50.8) |
| 21 – 25  | 100 (38.8) |
| ≥ 26   | 12 (4.7)   |
| <b>Sexual intercourse in the past 6 months (n = 276)</b>                   |            |
| Yes  | 199 (72.1) |
| No   | 77 (27.9)  |
| <b>Consistency with use of condoms during sexual intercourse (n = 286)</b> |            |
| Always   | 89 (31.1)  |
| Sometimes  | 141 (49.3) |
| Never  | 56 (19.6)  |
| <b>Vaccination against genital warts (n = 620)</b>                         |            |
| Yes  | 12 (1.9)   |
| No   | 608 (98.1) |

**Table V: Association between demographics, knowledge, attitudes, and vaccination against genital warts (n = 620)**

| Variables             | Knowledge     |               | $\chi^2$ | p     | Attitudes     |               | $\chi^2$ | p      | Vaccinated  |               | $\chi^2$ | p     |
|-----------------------|---------------|---------------|----------|-------|---------------|---------------|----------|--------|-------------|---------------|----------|-------|
|                       | Poor          | Good          |          |       | In favour     | Not in favour |          |        | Yes         | No            |          |       |
| <b>Age (in years)</b> |               |               | 6.474    | 0.091 |               |               | 5.932    | 0.115  |             |               | 0.619    | 0.892 |
| ≤ 20                  | 0<br>(0.0)    | 0<br>(0.0)    |          |       | 0<br>(0.0)    | 0<br>(0.0)    |          |        | 0<br>(0.0)  | 0<br>(0.0)    |          |       |
| 21 – 23               | 133<br>(41.8) | 185<br>(58.2) |          |       | 229<br>(72.0) | 89<br>(28.0)  |          |        | 7<br>(2.2)  | 311<br>(97.8) |          |       |
| 24 – 26               | 90<br>(43.3)  | 118<br>(56.7) |          |       | 130<br>(62.5) | 78<br>(37.5)  |          |        | 4<br>(1.9)  | 204<br>(98.1) |          |       |
| 27 – 30               | 43<br>(55.8)  | 34<br>(44.2)  |          |       | 53<br>(68.8)  | 24<br>(31.2)  |          |        | 1<br>(1.3)  | 76<br>(98.7)  |          |       |
| > 30                  | 10<br>(58.8)  | 7<br>(41.2)   |          |       | 10<br>(58.8)  | 7<br>(41.2)   |          |        | 0<br>(0.00) | 17<br>(100.0) |          |       |
| <b>Gender</b>         |               |               | 1.005    | 0.316 |               |               | 0.994    | 0.319  |             |               | 0.473    | 0.492 |
| Male                  | 125<br>(46.8) | 142<br>(53.2) |          |       | 176<br>(65.9) | 91<br>(34.1)  |          |        | 4<br>(1.5)  | 263<br>(98.5) |          |       |
| Female                | 151<br>(42.8) | 202<br>(57.2) |          |       | 246<br>(69.7) | 107<br>(30.3) |          |        | 8<br>(2.3)  | 345<br>(97.7) |          |       |
| <b>University</b>     |               |               | 12.054   | 0.602 |               |               | 26.433   | 0.023* |             |               | 15.968   | 0.315 |
| UNN                   | 90<br>(49.5)  | 92<br>(50.5)  |          |       | 112<br>(61.5) | 70<br>(38.5)  |          |        | 1<br>(0.5)  | 181<br>(99.5) |          |       |
| UNILAG                | 17<br>(33.3)  | 34<br>(66.7)  |          |       | 38<br>(74.5)  | 13<br>(25.5)  |          |        | 2<br>(3.9)  | 49<br>(96.1)  |          |       |
| COOU                  | 22<br>(45.8)  | 26<br>(54.2)  |          |       | 38<br>(79.2)  | 10<br>(20.8)  |          |        | 1<br>(2.1)  | 47<br>(97.9)  |          |       |
| ABU                   | 24<br>(37.5)  | 40<br>(62.5)  |          |       | 37<br>(57.8)  | 27<br>(42.2)  |          |        | 1<br>(1.6)  | 63<br>(98.4)  |          |       |
| OAU                   | 23<br>(41.8)  | 32<br>(58.2)  |          |       | 33<br>(60.0)  | 22<br>(40.0)  |          |        | 1<br>(1.8)  | 54<br>(98.2)  |          |       |
| BHU                   | 6<br>(54.5)   | 5<br>(45.5)   |          |       | 6<br>(54.5)   | 5<br>(45.5)   |          |        | 0<br>(0.00) | 11<br>(100.0) |          |       |
| UNIUYO                | 25<br>(40.0)  | 9<br>(60.0)   |          |       | 12<br>(80.0)  | 3<br>(20.0)   |          |        | 0<br>(0.00) | 15<br>(100.0) |          |       |
| UNIPORT               | 25<br>(51.0)  | 24<br>(49.0)  |          |       | 39<br>(79.6)  | 10<br>(20.4)  |          |        | 1<br>(2.0)  | 48<br>(98.0)  |          |       |
| DELSU                 | 8<br>(33.3)   | 16<br>(66.7)  |          |       | 19<br>(79.2)  | 5<br>(20.8)   |          |        | 0<br>(0.00) | 24<br>(100.0) |          |       |
| UNIJOS                | 24<br>(55.8)  | 19<br>(44.2)  |          |       | 30<br>(69.8)  | 13<br>(30.2)  |          |        | 2<br>(4.7)  | 41<br>(95.3)  |          |       |
| BUK                   | 7<br>(43.8)   | 9<br>(56.2)   |          |       | 8<br>(50.8)   | 8<br>(50.0)   |          |        | 2<br>(12.5) | 14<br>(87.5)  |          |       |
| ESUT                  | 7<br>(41.2)   | 10<br>(58.8)  |          |       | 12<br>(70.6)  | 5<br>(29.4)   |          |        | 0<br>(0.00) | 17<br>(100.0) |          |       |
| UNIBEN                | 3<br>(33.3)   | 6<br>(66.7)   |          |       | 8<br>(88.9)   | 1<br>(11.1)   |          |        | 0<br>(0.00) | 9<br>(100.0)  |          |       |
| IUO                   | 3<br>(50.0)   | 3<br>(50.0)   |          |       | 5<br>(83.3)   | 1<br>(16.7)   |          |        | 0<br>(0.00) | 6<br>(100.0)  |          |       |
| MU                    | 11<br>(36.7)  | 19<br>(63.3)  |          |       | 25<br>(83.3)  | 5<br>(16.7)   |          |        | 1<br>(3.3)  | 29<br>(96.7)  |          |       |

**Table V: Association between demographics, knowledge, attitudes, and vaccination against genital warts (n = 620) (Continued)**

| Variables  | Knowledge     |               | $\chi^2$ | p      | Attitudes     |               | $\chi^2$ | p     | Vaccinated  |               | $\chi^2$ | p      |
|--|---------------|---------------|----------|--------|---------------|---------------|----------|-------|-------------|---------------|----------|--------|
|  | Poor          | Good          |          |        | In favour     | Not in favour |          |       | Yes         | No            |          |        |
| <b>Marital status</b>                                  |               |               | 1.958    | 0.376  |               |               | 1.350    | 0.509 |             |               | 3.140    | 0.208  |
| Single   | 258<br>(44.0) | 328<br>(56.0) |          |        | 401<br>(68.4) | 185<br>(31.6) |          |       | 10<br>(1.7) | 576<br>(98.3) |          |        |
| Married  | 17<br>(51.5)  | 16<br>(48.5)  |          |        | 20<br>(60.6)  | 13<br>(39.4)  |          |       | 2<br>(6.1)  | 31<br>(93.9)  |          |        |
| Separated or divorced                                  | 1<br>(100.0)  | 0<br>(0.0)    |          |        | 1<br>(100.0)  | 0<br>(0.0)    |          |       | 0<br>(0.00) | 1<br>(100.0)  |          |        |
| <b>Religion</b>  |               |               | 0.943    | 0.815  |               |               | 1.411    | 0.703 |             |               | 8.287    | 0.040* |
| Christianity   | 239<br>(44.8) | 294<br>(55.2) |          |        | 366<br>(68.7) | 167<br>(31.3) |          |       | 7<br>(1.3)  | 526<br>(98.7) |          |        |
| Islam  | 36<br>(42.9)  | 48<br>(57.1)  |          |        | 54<br>(64.3)  | 30<br>(35.7)  |          |       | 5<br>(6.0)  | 79<br>(94.0)  |          |        |
| Traditional  | 0<br>(0.0)    | 1<br>(100.0)  |          |        | 1<br>(100.0)  | 0<br>(0.0)    |          |       | 0<br>(0.00) | 1<br>(100.0)  |          |        |
| None   | 1<br>(50.0)   | 1<br>(50.0)   |          |        | 1<br>(50.0)   | 1<br>(50.0)   |          |       | 0<br>(0.00) | 2<br>(100.0)  |          |        |
| <b>Have you ever been diagnosed with genital warts</b> |               |               | 1.983    | 0.159  |               |               | 0.460    | 0.498 |             |               | 10.521   | 0.001* |
| Yes  | 4<br>(26.7)   | 11<br>(73.3)  |          |        | 9<br>(60.0)   | 6<br>(40.0)   |          |       | 2<br>(13.3) | 13<br>(86.7)  |          |        |
| No   | 272<br>(45.0) | 333<br>(55.0) |          |        | 413<br>(68.3) | 192<br>(31.7) |          |       | 10<br>(1.7) | 595<br>(98.3) |          |        |
| <b>Have you done SIWES/IT</b>                          |               |               | 6.269    | 0.012* |               |               | 0.397    | 0.529 |             |               | 0.227    | 0.633  |
| Yes  | 230<br>(42.6) | 310<br>(57.4) |          |        | 370<br>(68.5) | 170<br>(31.5) |          |       | 11<br>(2.0) | 529<br>(98.0) |          |        |
| No   | 46<br>(57.5)  | 34<br>(42.5)  |          |        | 52<br>(65.0)  | 28<br>(35.0)  |          |       | 1<br>(1.2)  | 79<br>(98.8)  |          |        |

\*p < 0.05 is statistically significant

SIWES = Students Industrial Work Experience Scheme; IT = Industrial Training

UNN = University of Nigeria Nsukka; UNILAG = University of Lagos; COOU = Chukwuemeka Odumegwu Ojukwu University; ABU = Ahmadu Bello University; OAU = Obafemi Awolowo University; BHU = Bingham University; UNIUYO = University of Uyo; UNIPORT= University of Port Harcourt; DELSU = Delta State University; UNIJOS= University of Jos; BUK = Bayero University Kano; ESUT = Enugu State University of Science and Technology, UNIBEN = University of Benin; IUO = Igbinedion University Okada; MU = Madonna University

## Discussion

This study assessed the level of knowledge, attitude, and practice towards HPV and genital warts prevention among final-year pharmacy students in 15 Nigerian universities. It revealed that good knowledge and favourable attitudes towards genital warts and human papillomavirus (HPV) prevention in this population did not translate into good practice.

The majority of respondents were aged 21-26 years. Given that the Nigerian 6-3-3-4 educational system mandates a minimum age of 16 for university enrolment, this result was expected. Consistent with several other studies among undergraduates, the vast

majority of participants in the current study were also single (94.5%) (Amukugo *et al.*, 2018; Anene-Okeke *et al.*, 2019; Shetty *et al.*, 2019).

Few students reported that they had been diagnosed with genital warts. In contrast, a cohort study on the prevalence of anogenital warts among Nigerians of the same age range reported a higher value of 54% (Adebajo *et al.*, 2022). This difference could be explained by the high burden of HIV, which is a risk factor for HPV infection and genital warts, among participants of the cohort study (Dareng *et al.*, 2019; Ashaka *et al.*, 2022).

Most respondents had their SIWES/IT in hospital or community pharmacy settings and better knowledge of

genital warts than those who did not. Previous studies have shown that the SIWES programme improves the knowledge and competencies of Nigerian students (Akinremi *et al.*, 2018; Amorha *et al.*, 2018), emphasising the importance of exposing students to out-of-classroom experiences (Amorha *et al.*, 2018).

The study also assessed the awareness of two popular HPV vaccines, Cervarix and Gardasil, and showed poor awareness among final-year pharmacy students in Nigeria. A similar study conducted among medical students in India showed poor awareness of HPV vaccines among the respondents (18.7%) (Choudhary *et al.*, 2018). However, another study among medical students in South India showed higher awareness (50%) of HPV vaccines (Shetty *et al.*, 2019). Similarly, a systematic review of the awareness of HPV vaccines for undergraduate students in China revealed a high awareness rate (44.47%) of HPV vaccines among medical-related students (Yin *et al.*, 2021). A low HPV vaccine awareness is particularly worrisome, as insufficient information about HPV vaccines has been implicated as one of the reasons for non-vaccination with the HPV vaccine (Oluwole *et al.*, 2019), further corroborating poor HPV prevention practices among Nigerian final-year pharmacy students.

Although most respondents knew that HPV causes genital warts, only about 20% knew genital warts could not be cured, suggesting a potential misconception of genital warts among the respondents. Indeed, there is no cure for genital warts despite available treatments for managing the spread of genital warts and curtailing their spread (Kim *et al.*, 2023). This misconception might affect pharmacy students' ability to make informed decisions on their sexual health and provide proper counselling to patients they encounter in the future. Hence, it is imperative to dispel these misconceptions to enable the provision of accurate information on genital warts.

Most respondents agreed that they would encourage their children to be vaccinated against genital warts before the onset of sexual activity, highlighting the recognition among respondents of the significance of vaccination as a preventive measure against genital warts. Parental vaccine reluctance has been described as the primary barrier to HPV vaccination. However, appropriate education helps overcome this impediment (Jin *et al.*, 2023).

Furthermore, most respondents expressed their interest in participating in public health campaigns that enlighten the public about genital warts. These campaigns serve to increase the awareness of a disease state. Final-year pharmacy students' willingness to engage in these campaigns provides an opportunity for future practicing pharmacists to deepen their

involvement in community health services (Onah *et al.*, 2023).

More than half of the participants claimed to have never had sex, consistent with the results of similar research among undergraduate Nigerian students (Anene-Okeke *et al.*, 2019). In contrast, findings from a study among Namibian undergraduates showed that most respondents were sexually active (Amukugo *et al.*, 2018). However, few of those sexually active were consistent with the use of condoms during sexual activities. Others seldomly or never used condoms, placing themselves at higher risks of contracting HPV and genital warts.

Positive practice towards HPV prevention was further assessed by the uptake of the HPV vaccine, with few respondents reporting having been vaccinated with the HPV vaccine. This result corroborates the low vaccination rates reported in previous studies among female undergraduates in Lagos, Nigeria (2.6%), female adolescents in Ibadan (4.1%) (Ndikom & Oboh, 2017; Oluwole *et al.*, 2019), and undergraduate students in China (9.5%) (Liu *et al.*, 2020). In contrast, a study in the United States reported a considerably high uptake of the HPV vaccine (43.4% for females and 26.7% for males) (Barnard *et al.*, 2017). The students surveyed in this study had poor practices regarding HPV and genital warts, contrasting with the impressive levels of knowledge and attitudes they displayed.

### **Limitations**

This study has some limitations. Analysing the changes in respondents' perceptions over time was impossible due to its cross-sectional design. Furthermore, the results might not be generalisable to the general population since the study was performed among students with a medical background. The poor response rate from all 15 universities makes it difficult for this study to represent all Nigerian final-year pharmacy students since there were 23 Pharmacy Schools in Nigeria at the time the study was conducted. Furthermore, recall and social acceptability biases might be present as responses were based on past experiences.

It is essential to incorporate education and training that encompasses preventative health measures to promote positive HPV prevention practices among pharmacy students and reduce the risk of genital warts and the transmission of human papillomavirus (HPV).

The findings of this study stress the need for improved knowledge of genital warts among pharmacy students, which could lead to informed practice regarding HPV prevention. There should be no disconnect between knowledge and practice. Student-friendly approaches



can be employed during lectures or seminars to improve knowledge, attitudes and practices regarding HPV prevention. The use of social media, including mounting informative messages at designated areas in the faculty, might be helpful.

Future studies can involve other faculties, including non-medical specialities. Genital warts are highly prevalent sexually transmitted infections, and measures to curtail HPV infections should extend to disciplines.

## Conclusion

The study revealed that final-year pharmacy students in Nigeria had good knowledge and favourable attitudes towards genital warts and human papillomavirus (HPV) prevention, which did not translate into good practice. The community's health could be jeopardised if these future health educators are not adequately informed. Hence, there is a need for interventions to promote awareness and good practices towards genital wart prevention among pharmacy students.

## Conflict of interest

The authors declare no conflict of interest.

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