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ORIGINAL ARTICLE

HPV Vaccine and Cervical Cancer Screening Uptake among women in Abia State

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Keywords

Cervical Cancer,

HPV,

Vaccine,

Infection,

Pap smear,

Women

ABSTRACT

Background: Cervical cancer is the fourth most common cancer in women, and it is associated with infection by the Human Papillomavirus (HPV). There are effective interventions for the prevention of cervical cancer. However, the uptake of these interventions by women in developing countries is poor. This study assessed the knowledge and practices of cervical cancer preventive measures and uptake of HPV vaccines among women in Abia State.

Method: This was a descriptive cross-sectional study among women in Abia State. Multistage sampling was used to recruit 700 eligible women and an ODK interviewer-based structured questionnaire was used to collect the information. Descriptive, bivariate, and multivariate analyses were done using SPSS version 26. The level of significance was set at 5%.

Results: The mean age of the respondents was 40.3 ± 9.9 years and the proportion of women with good knowledge of HPV infection and vaccine was 22.0% (95% CI: 18.9-25.1). The uptake of Pap smear and HPV vaccine was 7% and 3%, respectively, while predictors of good knowledge for HPV infection and vaccine included higher educational status (aOR = 2.53; 95% CI: 1.73–3.71, p = 0.001), being currently married (aOR = 0.32; 95% CI: 0.18–0.54, p= 0.001) and divorced (aOR = 0.25; 95% CI: 0.13–0.49, p=0.001).

Conclusion: Poor knowledge of HPV infection and vaccines, and poor uptake of Pap smear and HPV vaccine were prevalent among the respondents. We recommend policymakers design health education programmes to improve knowledge and preventive cervical cancer practices.

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INTRODUCTION

Globally, it is known that Cervical Cancer, caused by Human Papillomavirus (HPV), is the fourth most common cancer in women. It is a disease of public health importance with higher

rates of Cervical Cancer burden in Sub-Saharan Africa, Central America and Southeast Asia.[1] More than 90% of deaths from Cervical Cancer occur in low- and middle-income countries (LMICs).[1] Persistent infection with high-risk HPV (hrHPV) can cause abnormal cells to develop, which progresses to cancer transformation of the cervix in approximately 95% of all cases.

Vaccination against HPV has proved to be safe and effective in preventing HPV infection and its related cancers and as of 2022, there were six HPV vaccines globally licensed for use.[2] Additionally, the World Health Organisation (WHO) advocates for Cervical Cancer screening in women using with high-performance tests from the age of 30 years every 5 to 10 years or from the age of 25 years every 3 years for HIV-positive women, respectively.[1] Increasing Cervical Cancer screening is necessary because the HPV vaccinations that are currently available only protect against 70–90% of hrHPV serotypes.[3] However, some of the reasons cited in studies for poor uptake of these preventive measures include a lack of awareness of HPV infection, user fees, and screening measures as negatively affecting utilization.[4,5] Also, misconceptions, societal stigma, and cultural beliefs prevent women from accessing these preventive measures.[6]

Globally, 604,000 new cases of Cervical Cancer and 342,000 related deaths were documented in 2020.[7] In 2020, Nigeria reported 12,078 cases, with more than 75% of deaths among them.[8] Poor uptake of Cervical Cancer screening measures prevents the nation from achieving goals 3, 5, and 10 of the Sustainable Development Goals (SDGs).[9] Disparities are documented as over 90% of deaths due to cervical cancer occur in low- and middle-income countries (LMICs).[9] Also, a rise in Cervical Cancer incidence contributes to the economic burden through loss of productivity and work absenteeism due to illness and premature deaths.[9] And in addition, in resource-constrained settings, it contributes to strains on the healthcare system.[9,10]

Nigeria implemented HPV vaccination for girls aged 9 to 14 years with a national launch on the 24th of October 2023. This aligns with the global commitment to the WHO Global Strategy for eliminating Cervical Cancer as a public health issue.[9] There is a need to provide a pre-implementation baseline assessment of knowledge of HPV infection and vaccine and uptake of Cervical Cancer preventive measures among women in Abia State. This study will provide credible evidence needed to design effective health education policies and strategies to improve the uptake of preventive measures. Also, the findings from this study will provide insight into the achievements made compared to the global benchmarks towards the elimination of cervical cancer. Therefore, this study assessed the knowledge and practices of Cervical Cancer preventive measures and the uptake of the HPV vaccine among women in Abia State.

Table 1: Sociodemographic characteristics among the respondents (N=677)

Variables	Frequency	Percentage
Type of Residence		
Urban	378	55.8
Rural	299	44.2
Age		
≤ 29	99	14.6
30-39	226	33.4
40-49	243	35.9
50-59	84	12.4
≥ 60	25	3.7
Mean ± SD	**40.3±9.9**	
Educational status		
No formal education	15	2.2
Primary	50	7.4
Secondary	254	37.5
Tertiary	358	52.9
Marital status		
Single	71	10.5
married	476	70.3
Cohabiting	12	1.8
Divorced	22	3.2
Widowed	60	8.9
Separated	36	5.3
Religion		
Christianity	673	99.4
Islam	3	0.4
Others	1	0.1
Denomination		
Pentecostal	272	40.2
Orthodox	199	29.4
Catholic	196	29.0
Others	4	0.6
Occupational Status		
Civil Servant	222	32.8
Businesswoman	300	44.3
Student	43	6.4
Unemployed	83	12.3
Others	29	4.3
Employment status		
Salary earner	230	34.0
Self employed	317	46.8
Unemployed	130	19.2
Monthly household income (Naira ₦)		
None	189	27.9
<₦50,000	309	45.6
₦50,000 - ₦100,000	151	22.3
>₦100,000 - ₦1,000,000	26	3.8
>₦1,000,000	2	0.3
Number of children		
≤2	229	33.8
3-4	301	44.5
>4	147	21.7

METHODOLOGY

Study design and setting

This was a descriptive cross-sectional study among women living in Abia State from August to September 2023. Abia State is in the southeast geopolitical zone of Nigeria with a projected 2023 total population and women of childbearing age of 4,457,560 and 980,664, respectively. The inhabitants are mainly Christians, and the major occupation is farming. There are 748 public and 200 private health facilities in the state, and reproductive health services are accessible in these facilities. While Pap smear screening is available in some facilities, HPV vaccines obtained for a fee are not accessible in the state.

Study Population

These were women in Abia State up to 18 years of age and were permanent residents for at least 6 months prior to the survey. However, transgender women and those with severe illnesses that could affect the interviewing process were excluded.

Sample size determination

The sample size was calculated using the formula ($n=Z\alpha^2pq/d^2$) with an error margin of 5%, standard normal deviate of 1.96 (Zα), prevalence (p) of good knowledge for HPV infection, and vaccination of 31.2%[11] and '1-p' is denoted as 'q'. A final sample size of 582 was determined at a non-response rate of 15% and a design effect of 1.5.

Sampling technique

The multistage sampling technique was used to recruit 700 eligible women. Using simple random sampling (lottery method), six Local

Government Areas (LGAs) were selected from a sample frame of seventeen LGAs. In each LGA, the total wards were enlisted, and two were selected using simple random sampling, giving a total of 12 wards which served as clusters. The entire households were enlisted from the selected wards, and proportion-to-size sampling was used to select the required number of households in each ward.

Furthermore, a respondent was selected in each household using simple random sampling with a random number list generated in OpenEpi. If more than one eligible respondent was present, random sampling was used to select one of them. For households selected and the respondents absent at the time of data collection, revisits were done a maximum of three times and recruitment of respondents continued until the required sample size was attained.

Study tool and data collection process

A semi-structured interviewer-administered questionnaire, adapted and modified from previous studies[12–14] was used to collect information from the respondents. The reliability and validity of the questionnaire were assessed using content and face validity techniques. The questionnaire had three sections. Section A was on the sociodemographic characteristics of the respondents: age, marital status, religion, denomination, education and income status, and number of living children. Section B comprised of questions on the knowledge of HPV infection and the HPV vaccine. Section C addressed questions on the uptake of HPV vaccination and Pap smear screening. To establish face validity, a pretest was done in an LGA not selected for this study, using 5% of the sample questionnaires. The result of the pretest was used to improve the diction of the questionnaire and the logical sequence of the questions.

The finalized questionnaire was programmed into Android devices using ODK Collect and synced to a central database and administered by the research assistants to the eligible respondents. A total of ten research assistants were recruited for this study and trained within two days. The training focused on the research's interviewing procedures and ethics, and the estimated time for an interview section was 10 to 15 minutes.

Measurement of variables

The outcome variable for this study was knowledge of HPV infection and the HPV vaccine. It was scored and graded on a 36-point scale. Correct responses were scored 1 point, while a wrong response, or 'I don't know' was scored 0 point, giving a minimum and maximum score of 0 and 36 points, respectively. Scores of 18 and above were categorised as having good knowledge, while scores below 18 were categorised as having poor knowledge. The uptake of Pap smear and HPV vaccination was measured with a binary response of 'yes' or 'no'.

Statistical analysis

The data was downloaded from the Kobo Collect server in Excel format. It was cleaned and exported to Statistical Product and Service Solutions (SPSS) version 26 for analysis. Univariate analysis was used to generate the

frequency tables. Categorical variables were compared using the Pearson Chi-square test. Multivariable logistic analysis was done to determine the predictors of knowledge of HPV infection and HPV vaccine. A $p<0.05$ was considered statistically significant at a 95% confidence level.

Ethical approval and consent to participate

Study procedures were approved by the Health Research Ethics Committee of the Federal Medical Centre Umuahia, Abia State, Nigeria, with reference number FMC/QEH/G.596/Vol.10/669. Respondents were informed that their participation was voluntary, and consent was implied upon completion of the questionnaire. They were assured of their confidentiality and the privacy of their information, which was to be used only for the sole purpose of the study.

RESULTS

A total of 677 out of 700 respondents were analysed, with a response rate of 96.7%. Most of the respondents were in the 40-49 age group. The majority had attained tertiary education (52.9%) and were married (70.3%). Most were Christians (99.4%) and mainly belonged to the Pentecostal denomination (40.2%). Most of the respondents were businesswomen (44.3%), self-employed (46.8%) with an income of less than ₦ 50,000 (45.6%) and had 3-4 children (44.5%). **[Table 1]**

The overall prevalence of good knowledge of HPV infection and vaccine was 22.0% (95% CI: 18.9-25.1). The prevalence of good knowledge of HPV infection was 29.8% (95% CI: 26.6-33.2) compared to the knowledge of the HPV vaccine, which was 18.9% (95% CI: 15.8-21.9).

More than one-third of the respondents (35%) had heard of HPV. Most knew that HPV could be transmitted through unprotected sexual intercourse (40.6%), and few mentioned the childbirth canal (13.6%) as a route of transmission of HPV. Less than half of them (40.9%) knew that cervical cancer is the most common HPV-related disease and that HPV is a serious health problem (43.7%). Few of them accurately mentioned the use of condoms (34.6%), vaccination (35.3%), and the avoidance of multiple sexual partners as preventive measures for HPV transmission. A smaller proportion knew that HPV could occur without symptoms (15.1%). **[Table 2]**

Three-quarters of the respondents (74.4%) had never heard of the HPV vaccine and most of the respondents (94.8%) were not aware of the HPV vaccine being available at a cost. Some of the respondents knew that the HPV vaccine does not cure HPV infection (21.6%) and was safe (36.9%). **[Table 3]**

Only 3% of the respondents had ever been vaccinated with the HPV vaccine; concurrently, only 47 (7.0%) respondents had ever been screened using a pap smear test for Cervical Cancer. **[Figure 1]**

Table 2: Respondents' knowledge of HPV infection (N=677)

Variables	Frequency	Percentage (%)
Ever heard about HPV		
Yes	237	35.0
No	311	45.9
Not sure	129	19.1
Transmission routes of HPV		
Unprotected sexual Intercourse	275	40.6
Blood transfusion	58	8.6
Use of public toilets	62	9.2
During Childbirth (MTCT)	92	13.6
I do not know	362	53.5
HPV is the most common viral infection of the reproductive tract		
Yes	159	23.5
No	518	76.5
Cervical cancer is the most common HPV-related disease		
Yes	277	40.9
No	400	59.1
Classification of HPV		
Bacteria	100	14.8
Fungi	50	7.4
Protozoa	15	2.2
Virus	512	75.6
HPV is a serious health problem		
Yes	296	43.7
No	32	4.7
I do not know	349	51.6
Most at risk of being infected with HPV		
Sexually active men only	10	1.5
Sexually active women only	101	14.9
Both sexually active men and women	269	39.7
I do not know	297	43.9
Diseases related to HPV		
Bladder cancer	34	5.0
Genital Warts	130	19.2
Anal Cancer	48	7.1
Vulval Cancer	59	8.7
Penile Cancer	40	5.9
HIV/AIDs	56	8.3
Hepatitis	37	5.5
Infertility	38	5.6
Oesophageal Cancer	21	3.1
Oral cancer	21	3.1
Cervical cancer	215	31.8
Vaginal cancer	134	19.9
I do not know	309	45.6
Measures to prevent the transmission of HPV		
Use of Condoms during sexual intercourse	234	34.6
Vaccination against HPV	239	35.3
Delayed onset of sexual relations	51	7.5
Good personal Hygiene	108	16.0
Avoidance of MSPs	168	24.8
Use of Antibiotics	59	8.7
Use of birth control pills	15	2.2
No prevention measures	13	1.9
I don't Know	279	41.2
HPV can occur without symptoms		
Yes	102	15.1
No	174	25.7
Not sure	401	59.2

Table 3: Respondents knowledge of HPV vaccine (N=677)

Variables	Frequency	Percentage (%)
Ever heard about the HPV vaccine		
Yes	173	25.6
No	504	74.4
Not sure		
Aware of any fees paid for HPV vaccine in Nigeria		
Yes	35	5.2
No	642	94.8
HPV vaccination part of RI in Nigeria		
Yes	94	13.9
No	583	86.1
The BEST recommended time to receive the HPV vaccine		
Before the first sexual intercourse	214	31.8
When sexually active	89	13.1
After childbearing	29	4.3
I do not know	345	51.0
HPV vaccine cures HPV		
Yes	87	12.9
No	146	21.6
I do not know	444	65.6
HPV vaccine is safe		
Yes	250	36.9
No	13	1.9
I do not know	414	61.2
Benefits of HPV vaccine outweighs the risks		
Yes	370	54.7
No	307	45.3
Diseases prevented by HPV vaccine		
Bladder cancer	27	4.0
Genital Warts	110	16.2
Anal Cancer	43	6.4
Vulval Cancer	60	8.9
Penile Cancer	27	4.0
HIV/AIDs	42	6.2
Hepatitis	32	4.7
Infertility	37	5.5
Oesophageal Cancer	17	2.5
Oral cancer	22	3.2
Cervical cancer	216	31.9
Vaginal cancer	132	19.5
I do not know	325	48.0

From the binary logistic regression, respondents with tertiary education had higher odds of having good knowledge compared to their counterparts (COR = 3.05; 95% CI: 2.01–4.67). Additionally, respondents with higher income were more likely to have good knowledge compared to those in the lower income group. ₦50,000-₦100,000 (COR = 1.68; 95% CI: 1.08–2.61)], above ₦100,000 000 (COR = 2.74; 95% CI: 1.12–6.43). However, there was a 43% decrease in the odds of having good knowledge for respondents who were salary earners compared to others (COR = 0.57; 95% CI: 0.33–0.99). Respondents who were married,

as well as those who were divorced, were less likely to have good knowledge. Married (COR=0.42; 95% CI: 0.24-0.74), Divorced (COR=0.37; 95% CI: 0.18-0.76)

Multivariable analysis showed higher educational status (aOR = 2.53; 95% CI: 1.73–3.71, p = 0.001) and marital status [(married; aOR = 0.32; 95% CI: 0.18–0.54, p= 0.001) and (divorced; aOR = 0.25; 95% CI: 0.13–0.49, p=0.001)] were the predictors of good knowledge of HPV infection and vaccine **[Table 4]**

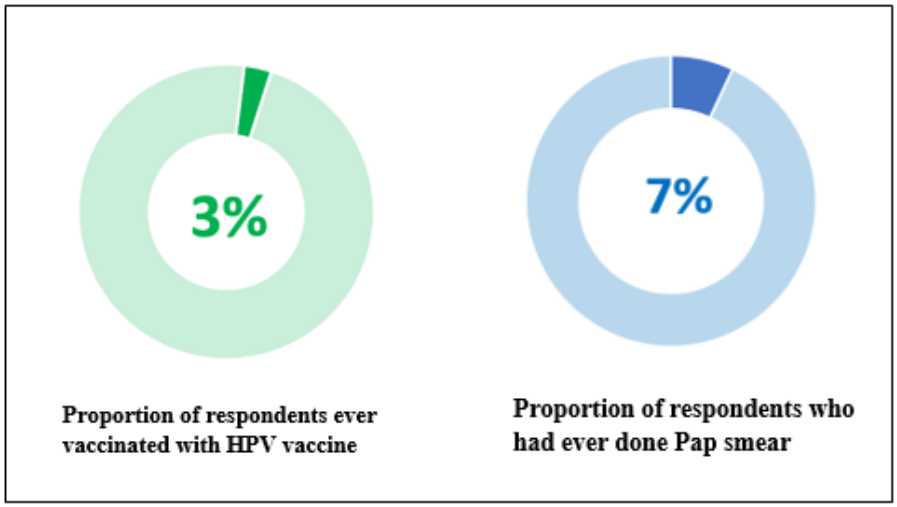

Figure 1: Uptake of preventive measures of cervical cancer among the respondents

DISCUSSION

This study assessed the knowledge and uptake of cervical cancer preventive measures among women in Abia State. The respondents had a low level of knowledge about HPV infection and vaccination, as well as poor adherence to preventive measures. The predictors for good knowledge of HPV infection and vaccine included educational and marital status.

In this study, close to one-third of the respondents had good knowledge about HPV infection. This contrasts with previous research in Nigeria, where a much lower proportion of people with good knowledge of HPV infection was documented[15] and a higher rate in a recent study.[16] However, it concurs with the findings of a study conducted in Ethiopia, where the prevalence of poor knowledge of HPV infection was high.[12] Also, in this study, one in five respondents had good knowledge of HPV vaccine. This result is similar to the findings of a study done in Nigeria.[16] This is expected, considering the inadequate awareness campaigns for cervical cancer and the absence of the HPV vaccine from the national immunization schedule as of the point when this study was conducted.

In this study, respondents were more likely to have good knowledge if they attained tertiary education. This is concurrent with findings from studies in Nigeria, Ethiopia and the US.[16–18]

Highly educated women tend to have access to information, including medical research and recommendations from health authorities. High educational status also contributes to health literacy, enhancing women's understanding of the importance of HPV vaccines. The critical thinking needed to evaluate the benefits and risks associated with vaccines is inherent in educated individuals, preventing judgments based on myths or misinformation.[19]

Married and divorced respondents had lower odds of good knowledge of HPV infection and vaccine. This contrasts with a study in rural Uganda, where the divorced were more knowledgeable about HPV.[20] Another study in the US reports that married women were more likely to have heard of HPV and the HPV vaccine.[21] The cultural context, male dominance and sole decision-making from male partners on sexual issues play a crucial role.[22] This tends to stigmatize women seeking information on such topics, creating a knowledge gap. Also, it is known that married women prioritize different health issues due to the responsibility of family care and work or changes in life changes for the divorced. Additionally, household dynamics can contribute to challenges in accessing healthcare services where health education on prevailing conditions, including HPV, is usually provided. Also, they are more likely to believe the misconceptions associated with HPV and its vaccines as they are raising their family size and would not want to experience infertility. The perception of a low risk of contracting HPV could also affect their interest in acquiring knowledge.

Few respondents (7%) had ever been screened for Cervical Cancer using the pap smear test. Higher proportions of Pap smear uptake have been documented among studies conducted in Abuja (23.5%)[23], Lagos (22.9% and 29%)[3,24]. It is known that misconceptions about the cause of Cervical Cancer, undesirable level of awareness, poorly structured programmes and the absence of well-integrated programmes are some of the factors affecting the uptake of Pap smears.[23] Additional barriers, as noted in a systematic review, included financial constraints, health system-related factors such as geographical accessibility, attitude of healthcare workers and poor resource settings.[25]

Similarly, uptake of HPV vaccination was abysmally poor (3%) among the respondents. This is concurrent with the findings of a study among women in Lagos and female healthcare professionals in Sokoto State, where low uptake of the HPV vaccination was found.[3,26] Fear and concerns about the side effects of the HPV vaccine emanating from misinformation and vaccine hesitancy have been reported as common barriers to the uptake of HPV vaccine among women.[3] Also, low uptake of the HPV vaccine could be attributed to a lack of recommendation from healthcare providers, sexual promiscuity beliefs, challenges to vaccine availability and cost. Multifaceted strategies such as public education campaigns to raise awareness and counter misinformation, policies to reduce cost,

and engaging healthcare providers to recommend the HPV vaccine should be encouraged strongly. We also recommend that screening be more accessible through mobile health clinics and available at reduced or no cost, addressing cultural and social barriers through community engagement and support.

This was a cross-sectional study, so temporality could not be established. It also relied on self-reported responses and had an increased likelihood of recall bias. However, the sample was representative and suitable for surveying cervical cancer preventive measures.

Table 4: Predictors of good knowledge of HPV infection and vaccination among the respondents

Variables	Knowledge		COR (95%CI)	P value	aOR (95%CI)	P value
	Good (%) 149 (22.0)	Poor (%) 528 (78.0)				
Age group						
<30	70 (21.5)	255 (78.5)	1		1	
≥30	79 (22.4)	273 (77.6)	1.05(0.72 – 1.54)	0.775	1.12(0.79-2.06)	0.526
Educational level						
Tertiary	109 (30.4)	249 (69.6)	3.05(2.01-4.67)	**0.001**	2.53(1.73-3.71)	**0.001**
Secondary	40 (12.5)	279 (87.5)	1		1	
Marital Status						
Married	100 (20.5)	388 (79.5)	0.42(0.24-0.74)	**0.010**	0.32(0.18-0.54)	**0.001**
Divorced	22 (18.6)	96 (81.4)	0.37(0.18-0.76)	**0.003**	0.25(0.13-0.49)	**0.001**
Single	27 (38.0)	44 (62.0)	1		1	
Employment status						
Salary earner	69 (31.1)	153 (68.9)	1.44 (0.85-2.46)	0.148	1.35 (0.81-2.26)	0.251
Self employed	50 (15.2)	279 (84.8)	0.57 (0.33-0.99)	**0.030**	0.87 (0.53-1.41	0.566
Unemployed	30 (23.8)	96 (76.2)	1		1	
Monthly household income (Naira ₦)						
< ₦50,000	95 (19.1)	403 (80.9)	1		1	
₦50,000 – ₦100,000	43 (28.5)	108 (71.5)	1.68 (1.08-2.61)	**0.013**	1.44 (0.91-2.27)	0.115
> ₦100,000	11 (39.3)	17 (60.7)	2.74 (1.12- 6.43)	**0.009**	2.06 (0.88-4.79)	0.092

CONCLUSION

The proportion of women with good knowledge of HPV infection and vaccine was low, as was their uptake of cervical cancer preventive measures. The predictors of knowledge of HPV infection and vaccine included educational status and marital status. We recommend the design of public health education campaigns and sensitization programmes by stakeholders in the Ministries of Health and Women Affairs, Non-Governmental Organizations (NGOs), and other partner agencies, targeting poorly educated women and women in marital relationships on the importance of utilizing the uptake of Pap smears and HPV vaccine.

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Conflict of interest: None

Authors' contribution: CIA: Study conceptualization and design, data collection, analysis and interpretation, and drafting of the manuscript. KUK and MI: Study design, data collection, interpretation of results and revision of manuscript. APB: Study design, data collection, analysis, interpretation, and revision of manuscript. All authors read and approved the final manuscript.

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