

Knowledge of Human Papillomavirus Infection and Vaccination, and Practices Regarding Human Papillomavirus Vaccination among Female Health-care Professionals in Sokoto, Nigeria

Mairo Hassan¹, Kehinde Joseph Awosan²

¹Senior Lecturer, Department of Obstetrics and Gynecology, Usmanu Danfodiyo University, Sokoto, Nigeria, ²Senior Lecturer, Department of Community Health, Usmanu Danfodiyo University, Sokoto, Nigeria

Abstract

Introduction: The high human papillomavirus (HPV) infection transmission rates in the less developed regions of the world are believed to be responsible for the concomitantly high burden of cervical cancer in these regions.

Objectives: This study aimed to assess the knowledge of HPV infection and vaccination, and practices regarding HPV vaccination among female health-care professionals in Sokoto, Nigeria.

Materials and Methods: This was a cross-sectional study among 256 female health-care professionals (selected by multistage sampling technique) practicing in the secondary and tertiary health-care facilities in Sokoto metropolis, Nigeria. A structured self-administered questionnaire was used to collect data on the research variables. Data were analyzed using IBM SPSS version 24 statistical computer software package.

Results: The mean age of the respondents was 36.74 ± 8.9 years. Most, 208 (81.3%) of the 256 respondents were married and majority of them (58.6%) were nurses. Less than half of the respondents (47.7%) had good knowledge of HPV infection and only a few of them (7.4%) had good knowledge of HPV vaccination. Uptake of HPV vaccination was low (2.3%) among the respondents, with the main reasons cited being non-availability of the vaccines (42.7%) and lack of awareness (24.8%).

Conclusion: This study showed suboptimal knowledge of HPV infection and low levels of knowledge and uptake of HPV vaccination among the respondents. Government and the Management of Health Institutions should organize periodic training of health-care professionals on the strategies for preventing the transmission of HPV infection and also make HPV vaccines consistently accessible to the target population.

Key words: Health-care professionals, Human papillomavirus infection and vaccination, Knowledge, Practices.

INTRODUCTION

The high human papillomavirus (HPV) infection transmission rates in the less developed regions of the world are believed to be responsible for the concomitantly high burden of cervical cancer in these regions. A meta-analysis

of the cervical HPV prevalence among 1 million women with normal cytological findings in 5 continents showed that sub-Saharan Africa had the highest prevalence (24.0%), followed by Latin America and the Caribbean (16.1%), and with the prevalence in sub-Saharan Africa being more than twice the global prevalence of 11.7%.^[1] Persistent infection with high-risk HPV types is strongly associated with cervical cancer, with an estimated 75% of cases globally attributable to infection with HPV types 16 and 18.^[2] In concomitance with the disproportionately high prevalence of HPV infection in the less developed regions, most (>85%) of the cervical cancer cases globally occur in these regions where it accounts for almost 12% of all

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Corresponding Author: Dr. Mairo Hassan, Department of Obstetrics and Gynecology, Usmanu Danfodiyo University, Sokoto, Nigeria.
E-mail: mayroh123@gmail.com

cancers in women, as compared to the more developed regions where it accounts for less than 1% of all cancers in women.^[3]

In Nigeria, cancers attributable to HPV infections constitute a substantial cancer burden in women. Findings from two population-based cancer registries in the country showed that 488 (11.0%) of the 14336 new cancer cases seen from 2012 to 2014 were HPV associated, with cervical cancer being the most common HPV attributable cancer in women ($n = 392$, ASR = 28.3/100,000), and anal cancer being the most common in men ($n = 21$, ASR = 1.2/100,000). The authors submitted that a significant proportion of cancers in Nigerian women would be prevented if strategies such as HPV DNA-based screening and HPV vaccination are implemented.^[4]

Since there is no virus-specific treatment for HPV infection, and with the high prevalence of HPV associated risk behaviors in many sub-Saharan African countries, high coverage (>70%) of full immunization against HPV infection among girls and boys aged 9–14 years (as recommended by the World Health Organization) remains the only feasible option for halting and reversing the persistent rise in the burden of cervical cancer across the continent.^[3]

Although HPV vaccination is known to prevent up to 95% of cervical cancers,^[5] the major challenge remains unavailability of the vaccines in the less affluent countries, as the respective prophylactic HPV vaccines (bivalent, quadrivalent, and nonavalent vaccines) are intended to be administered before the onset of sexual activity (i.e., before first exposure to HPV infection) and according to specified dose schedules to be effective.^[3]

Studies conducted among health-care professionals in different populations worldwide showed wide variations in the knowledge of HPV infection and vaccination; as well as in the uptake of HPV vaccination, and promotion of HPV vaccination among their clients and patients. A study conducted among physicians in the Western Region of Saudi Arabia reported that less than half of them (48.5%) knew about the HPV vaccine and only 50% of them intended recommending it to their patients.^[6] Similarly, a study conducted among 590 health-care professionals in Delhi, India, reported that while most of the respondents (81.0%) were aware of HPV vaccine, less than half (47%) recommended HPV vaccination for young women.^[7] A study among 602 health-care professionals in 3 of the 6 geopolitical zones in Nigeria reported that while most of the respondents (91.0%) were aware of HPV infection, less than half of them (44.0%) were aware of HPV vaccine.

The most worrisome aspect is the poor knowledge of HPV infection and vaccination, and the abysmally low uptake of HPV vaccination in studies conducted among female health-care professionals across the globe. A study among female nurses in Iran reported that only about a third of respondents (36.7%) knew about HPV infection,^[8] while a recent study among female nurses in Turkey reported that only 2 (1.8%) of 110 participants had received HPV vaccine.^[9] A study among nurses in Nigeria reported that while most of them (85%) were aware of HPV infection, only a quarter of respondents (25.3%) were aware of HPV vaccines.^[10]

Health-care professionals have crucial roles to play in educating their clients, patients, and members of the public on the prevention of HPV infection through avoidance of high-risk behaviors and HPV vaccination. Importantly, female health-care professionals (being at risk of cervical cancer themselves) are expected to be role models in promoting the practices and interventions for the prevention and control of the disease among the patients and clients presenting at their respective health facilities. In addition, adolescent girls and women are more likely to discuss sensitive issues pertaining to their reproductive tract with the female health-care professionals in detail, as compared to the male health-care professionals.

It is therefore not surprising that studies conducted among adolescent girls and women in different populations across the globe (including the developed regions) showed wide variations in the knowledge of HPV infection and vaccination, as well as in the uptake of HPV vaccination, thus mirroring the variations observed among the health-care professionals. While a study among young Australian women reported high uptake (84%) of HPV vaccine,^[11] a study among female high school and university students in Krakow, Poland, reported that 30.1% of respondents did not know that HPV vaccination is a method of preventing cervical cancer, 47.9% did not know where to go and get vaccinated, and most of them (91.5%) had not been vaccinated against HPV.^[12] Similarly, a study conducted among women in Beijing reported that only 26.9% of respondents knew HPV as a risk factor for cervical cancer;^[13] and another study among women attending a tertiary care hospital in Puducherry, India, reported that most of the respondents (97.2%) were unaware of HPV vaccination as prevention for cervical cancer.^[14]

A cause for concern is the predominantly poor knowledge of HPV infection and vaccination, and the abysmally low uptake of HPV vaccination in studies conducted among adolescent girls and women in many countries in sub-

Saharan Africa (including Nigeria), thus reflecting the poor knowledge, acceptance, and promotion of HPV vaccination by the health-care professionals across the continent. A study among Sudanese women reported that less than half (46.6%) were aware of HPV infection, 39.2% were aware of HPV vaccination, and only 11.4% had received HPV vaccine.^[15] A recent community-based study across three states in Nigeria reported that only 31.97% of respondents were aware of HPV infection and less than a fifth of respondents (17.5%) were aware of HPV vaccine.^[16] The enormity of the poor awareness of HPV infection and vaccination being major obstacles to the uptake of HPV vaccination in Nigeria is highlighted in a study among mothers in Lagos, Nigeria, that reported low awareness of HPV infection (27.9%) and HPV vaccination (19.7%), but there was high willingness and intention to vaccinate their adolescent daughters (88.9%) and to recommend the vaccine to others (91.0%).^[17] A previous study among female health-care workers in Sokoto principally examined their knowledge, attitude, and practice regarding cervical cancer and cervical cancer screening,^[18] there is a dearth of literature on the knowledge of HPV infection and vaccination, as well as the uptake of HPV vaccination among women (particularly female health-care professionals) in Sokoto, Nigeria. This study was conducted to assess the knowledge of HPV infection and vaccination, and practices regarding HPV vaccination among female health-care professionals in Sokoto, Nigeria.

MATERIALS AND METHODS

Study Design and Population

This cross-sectional study was carried out among female health-care professionals practicing in the secondary and tertiary health-care facilities in Sokoto metropolis, Nigeria, in April and May 2018. All those that consented to participate in the study were considered eligible for enrolment into the study.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 243 using the statistical formula for calculating sample size in cross-sectional studies,^[19] a 49.2% prevalence of immunization of adolescent daughters with HPV vaccine among female health-care workers from a previous study,^[20] a precision level of 5%, and an adjustment for a finite population of 658 female health-care professionals (obtained from institutional records). It was reviewed upward to 260 in anticipation of 95% participant response rate.

The eligible participants were selected by a multistage sampling technique. At the first stage, 1 of 2 tertiary health-care facilities (Usmanu Danfodiyo University Teaching Hospital [UDUTH], Sokoto), and 1 of

3 secondary health-care facilities (Maryam Abacha Women and Children Hospital, Sokoto) were selected by simple random sampling using the ballot option. At the second stage, whereas 6 of the 24 departments involved in clinical services at UDUTH, Sokoto, were selected by simple random sampling using the ballot option, selection of participants in the 3 units at the Maryam Abacha Women and Children Hospital, Sokoto, was done by systematic sampling technique using the staff list in the respective units to constitute the sampling frame. At the third stage, selection of participants in the selected departments at UDUTH was done by systematic sampling technique using the staff list in the respective departments to constitute the sampling frame. Proportionate allocation of the study participants was done based on the staff strength in the selected departments.

Data Collection and Analysis

A structured, self-administered questionnaire was developed after a thorough review of relevant literature and used to obtain information on the sociodemographic characteristics of the study participants, their knowledge of HPV infection and vaccination, and their practices regarding HPV vaccination. It was reviewed by researchers in the Department of Obstetrics and Gynecology, Usmanu Danfodiyo University, Sokoto, Nigeria. Corrections were made based on their inputs on content validity. The questionnaire was pretested on 15 female health-care professionals at Women and Children Welfare Clinic, Sokoto, Nigeria. The questions were well understood and no modification was necessary. Four resident doctors assisted in questionnaire administration after pre-training on conduct of survey research, the objectives of the study, selection of study subjects, and questionnaire administration.

Data were analyzed using the IBM SPSS version 24 computer statistical software package. Respondents' knowledge of HPV infection was scored and graded on a 19-point scale. One point was awarded for a correct response, while a wrong response or I don't know response received no points. This gives a minimum score of "0" and a maximum score of "19" points. Those that scored ≥ 12 of 19 points were considered as having "good" knowledge, while those that scored < 12 of 19 points were graded as having "poor" knowledge. Respondents' knowledge of HPV vaccination was scored and graded on an 11-point scale. One point was awarded for a correct response, while a wrong response or I don't know response received no points. This gives a minimum score of "0" and a maximum score of "11" points. Those that scored ≥ 7 of 11 points were considered as having "good" knowledge, while those that scored < 7 of 11 points were graded as having "poor" knowledge. Frequency distribution tables

were constructed and cross-tabulations were done to examine the relationship between categorical variables. The Chi-square test was used for bivariate analysis involving categorical variables, while multivariate logistic regression analysis was used to determine the predictors of good knowledge of HPV infection and vaccination. All levels of significance were set at $P < 0.05$.

Ethical Consideration

Institutional ethical clearance was obtained from the Ethical Committees of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria, and Sokoto State Ministry of Health, Sokoto, Nigeria. Permission to conduct the study was obtained from the Management of the selected hospitals; informed written consent was also obtained from the participants before data collection.

RESULTS

Sociodemographic Characteristics of Respondents

Two hundred and fifty-six out of the 260 questionnaires administered were adequately completed and used for analysis, giving a response rate of 98.5%. The respondents ages ranged from 21 to 59 years (mean = 36.74 ± 8.90); and a larger proportion of them were in the 30–39 years age group (35.5%), followed by those in the 40–49 years age group (28.5%). Most of the respondents were married (81.3%) and majority of them were Muslims (69.9%). Majority of respondents had bachelor or post-graduate degree (62.2%) and were nurses (58.6%). A larger proportion of respondents (47.3%) have spent less than a decade in practice (47.3%) as shown in Table 1.

Awareness of HPV by Respondents

Mostly, 235 (91.8%) of the 256 respondents had heard of HPV. Furthermore, 188 (80.0%) of the 235 respondents that had heard of HPV obtained information about it through lectures, while about a tenth of them (26 [11.1%]) obtained information about it from their colleagues. Only a few respondents (19 [8.14%]) obtained information about HPV from the mass media [Table 2].

Respondents' Knowledge of HPV Infection

Less than half, 122 (47.7%) of the 256 respondents had good knowledge of HPV infection. Whereas, majority of respondents (55.1%) knew HPV as the most common viral infection of the female reproductive tract, only about a fifth of them (21.9%) knew HPV 16 and 18 as the most frequent HPV types worldwide. In addition, only about two-thirds and less (24.2–68.4%) knew its routes of transmission. Majority of respondents (72.3%) knew that HPV can cause cervical cancer, but less than half of respondents knew the other cancers caused by

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (%) <i>n</i> =256
Age group (years)	
20–29	64 (25.0)
30–39	91 (35.5)
40–49	73 (28.5)
50–59	28 (10.9)
Marital status	
Single	42 (16.4)
Married	208 (81.3)
Separated	1 (0.4)
Widowed	5 (2.0)
Religion	
Islam	179 (69.9)
Christianity	77 (30.1)
Level of education	
Diploma	76 (29.7)
Associate degree	21 (8.2)
Bachelor	101 (39.5)
Post-graduate	58 (22.7)
Cadre	
Doctor	49 (19.1)
Nurse	150 (58.6)
Laboratory scientist	39 (15.2)
Others (pharmacist, radiographer etc.)	18 (7.0)
Length of practice (years)	
<10	121 (47.3)
10–19	80 (31.3)
20–29	34 (13.3)
≥30	21 (8.2)

Table 2: Awareness of HPV by respondents

Variables	Frequency (%)
Ever heard of HPV (<i>n</i> =256)	
Yes	235 (91.8)
No	21 (8.2)
Source of information (<i>n</i> =235)	
Radio/Television	15 (6.4)
Newspaper/Magazine	4 (1.7)
Lecture	188 (80.0)
Friends	2 (0.9)
Colleagues	26 (11.1)

HPV: Human papillomavirus

it. Whereas, majority of respondents knew that HPV infection can be prevented by having sex with only one faithful partner (70.7%) and immunization with HPV vaccine (67.6%), less than half of them knew the other methods of preventing the transmission of the infection [Table 3].

Respondents' Knowledge of HPV Vaccination

Only a few 19 (7.4%) of the 256 respondents had good knowledge of HPV vaccination. Whereas, majority of respondent knew that HPV vaccination should be recommended for both males and females (51.2%), and it should be given before onset of sexual activity (61.7%), only about a third of them (31.6%) knew

that individuals aged 9 to 26 years are eligible for HPV vaccination. Less than a third of respondents (28.9%) knew that HPV vaccination offers herd immunity (i.e. protects those who have not been vaccinated, if a sufficient proportion of the population at risk has been vaccinated), and only a few respondents (16.0% and below) knew the recommended doses for the subgroups of those eligible for HPV vaccination. Furthermore, less than half of respondents (40.6%) knew that the vaccine cannot treat women who have developed HPV-related diseases [Table 4].

Factors Influencing Respondents' Knowledge of HPV Infection and Vaccination

Good knowledge of HPV infection was associated with the respondents' age, level of education, cadre, and length of practice. The proportion of respondents with good knowledge of HPV infection was significantly

higher ($P < 0.05$) among those that were aged 40 years and above (54.2%) as compared to those that were aged less than 40 years (37.6%), those with Bachelor or Post-graduate degree (54.1%) as compared to those with diploma or associate degree (37.1%), doctors (87.8%) as compared to nurses and those in the other cadres (38.2%), and those that have practiced for <10 years (54.5%) as compared to those that have practiced for 10 years and above (41.5%) as shown in Table 5. In multivariate logistic regression analysis, the only predictor of good knowledge of HPV infection among the respondents was their cadre. Being a doctor was associated with an 11.674 fold (adjusted odds ratio [aOR]: 11.674, 95% confidence interval (CI): 4.566–29.850, $P < 0.001$) greater likelihood of having good knowledge of HPV infection [Table 6].

Good knowledge of HPV vaccination was associated with the respondents' marital status, level of education, and cadre. The proportion of respondents with good knowledge of HPV vaccination was significantly higher ($P < 0.05$) among those that were married (9.1%) as compared to those that were single, separated, or widowed (0%), those with Bachelor or Post-graduate degree (11.9%)

Table 3: Respondents' knowledge of HPV infection

Variables	Frequency (%) (n=256)
Knowledge of transmission of HPV	
Knew HPV as the most common viral infection of the female reproductive tract	141 (55.1)
Knew HPV 16 and 18 as the most frequent HPV types worldwide	56 (21.9)
Knew that HPV can be transmitted through:	
Open-mouthed kissing	62 (24.2)
From an infected mother to her baby during delivery	97 (37.9)
Contact with infected genital skin, mucous membrane, and bodily fluid	153 (59.8)
Sexual intercourse	175 (68.4)
Oral sex	97 (37.9)
Knew that both males and females can become infected with HPV	161 (62.9)
Knowledge of diseases caused by HPV	
Knew that most people with genital HPV infection are asymptomatic	168 (65.6)
Knew that HPV can cause the following diseases:	
Oropharyngeal cancer	77 (30.1)
Cervical cancer	185 (72.3)
Genital warts	122 (47.7)
Anogenital cancer	88 (34.4)
Knew that cervical cancer is caused by HPV types 16 and 18	77 (30.1)
Knew that anogenital wart is caused by HPV types 6 and 11	64 (25.0)
Knowledge of HPV prevention	
Knew that HPV infection can be prevented by:	
Sexual abstinence	113 (44.1)
Having sex with only one faithful partner	181 (70.7)
Consistent use of condom	113 (44.1)
Immunization with HPV vaccine	173 (67.6)
Knowledge grading	
Good	122 (47.7)
Poor	134 (52.3)

HPV: Human papillomavirus

Table 4: Respondents' knowledge of HPV vaccination

Variables	Frequency (%) (n=256)
Knew that HPV vaccines offer herd immunity (i.e., protect those who have not been vaccinated if a sufficient proportion of the population at risk has been vaccinated)	74 (28.9)
Knew the following types of HPV vaccines:	
Bivalent	58 (22.7)
Quadrivalent	31 (12.1)
Nonavalent	23 (9.0)
Knew that both males and females should be vaccinated	131 (51.2)
Knew that individuals aged 9 to 26 years are eligible for HPV vaccination	81 (31.6)
Knew that HPV vaccination should be done before onset of sexual activity	158 (61.7)
Knew that 2 doses of vaccines are recommended for individuals aged 9 to 14 years	26 (10.2)
Knew that 3 doses of vaccines are recommended for individuals aged 15 years and above	41 (16.0)
Knew that 3 doses of vaccines are recommended for immune-compromised individuals	27 (10.5)
Knew that HPV vaccines cannot treat women who have developed HPV related disease	104 (40.6)
Knowledge grading	
Good	19 (7.4)
Poor	237 (92.6)

HPV: Human papillomavirus

Table 5: Distribution of respondents' knowledge of HPV infection and vaccination by their sociodemographic characteristics

Sociodemographic variables	Knowledge of HPV infection and vaccination			
	Knowledge of HPV infection n=256		Knowledge of HPV vaccination n=256	
	Good n (%)	Poor n (%)	Good n (%)	Poor n (%)
Age (years)				
<40	84 (54.2)*	71 (45.8)	15 (9.7)	140 (90.3)
40 and above	38 (37.6)	63 (62.4)	4 (4.0)	97 (96.0)
	$\chi^2=6.731, P=0.009$		$\chi^2=2.909, P=0.088$	
Marital status				
Single, separated, and widowed	26 (54.2)	22 (45.8)	0 (0)	48 (100.0)
Married	96 (46.2)	112 (53.8)	19 (9.1)*	189 (90.9)
	$\chi^2=1.004, P=0.316$		$\chi^2=4.736, P=0.030$	
Religion				
Islam	92 (51.4)	87 (48.6)	15 (8.4)	164 (91.6)
Christianity	30 (39.0)	47 (61.0)	4 (5.2)	73 (94.8)
	$\chi^2=3.338, P=0.068$		$\chi^2=0.795, P=0.373$	
Level of education				
Diploma and associate	36 (37.1)	61 (62.9)	0 (0)	97 (100.0)
Bachelor and post-graduate	86 (54.1)*	73 (45.9)	19 (11.9)*	140 (88.1)
	$\chi^2=6.959, P=0.008$		$\chi^2=12.520, P<0.001$	
Cadre				
Doctors	43 (87.8)*	6 (12.2)	18 (36.7)*	31 (63.3)
Nurses and others	79 (38.2)	128 (61.8)	1 (0.5)	206 (99.5)
	$\chi^2=39.061, P<0.001$		$\chi^2=0.75.781, P<0.001$	
Length of practice				
<10	66 (54.5)*	55 (45.5)	6 (5.0)	115 (95.0)
≥10	56 (41.5)	79 (58.5)	13 (9.6)	122 (90.4)
	$\chi^2=4.366, P=0.037$		$\chi^2=2.026, P=0.115$	

*Statistically significant. HPV: Human papillomavirus

Table 6: Predictors of good knowledge of HPV infection and vaccination among the respondents

Variables	Adjusted odds ratio	95% CI		P value
		Lower	Upper	
Knowledge of HPV infection				
Age (below 40 versus 40 years and above)	1.477	0.684	3.191	0.320
Education level (diploma and associate versus bachelor and post-graduate)	0.859	0.487	1.516	0.601
Cadre (doctors versus nurses and others)*	11.674*	4.566	29.850	<0.001
Length of practice (below 10 versus 10 years and above)	1.547	0.732	3.268	0.253
Knowledge of HPV vaccination				
Marital status (single, separated, and widowed versus married)	0.000	0.000		0.997
Education level (diploma and associate versus bachelor and post-graduate)	0.000	0.000		0.996
Cadre (doctors versus nurses and others)	72.857*	9.198	577.114	<0.001

*Statistically significant, CI: Confidence interval, HPV: Human papillomavirus

as compared to those with diploma or associate degree (0%), and doctors (36.7%) as compared to nurses and those in the other cadres (0.5%) as shown in Table 5. In multivariate logistic regression analysis, the only predictor of good knowledge of HPV vaccination among the respondents was their cadre. Being a doctor was associated with a 72.857 fold (aOR: 72.857, 95% CI: 9.198–577.144, $P < 0.001$) greater likelihood of having good knowledge of HPV vaccination [Table 6]

Respondents' Risk Perception of HPV Infection and Practices Regarding HPV Vaccination

Whereas majority, 141 (55.1%) of the 256 respondents perceived themselves to be at risk of HPV infection, only a few of them have ever had HPV vaccination (2.3%) or had the vaccine administered to their adolescent daughters (2.3%). The main reasons cited for not accepting HPV vaccination were non-availability of the vaccines (47.2%) and lack of awareness (24.8%). Other reasons cited for not accepting HPV vaccination are as shown in Table 7. Only 31 (12.1%) of the 256 respondents have ever recommended HPV vaccination to their clients or their friends/neighbors' adolescent daughters. There was no association between uptake

Table 7: Respondents' risk perception of HPV infection and practices regarding HPV vaccination

Variables	Frequency (%)
Perceived self at risk of HPV infection (n=256)	
Yes	141 (55.1)
No	115 (44.9)
Have ever had HPV vaccination (n=256)	
Yes	6 (2.3)
No	250 (97.7)
Have ever had HPV vaccine administered to adolescent daughters (n=256)	
Yes	6 (2.3)
No	250 (97.7)
Main reason for not accepting HPV vaccination (n=250)	
Not aware of the vaccine	62 (24.8)
Vaccine is not available	118 (47.2)
Fear of adverse reaction	15 (6.0)
I am too old to take the vaccine	37 (14.8)
Daughter is not of age	12 (4.8)
No felt need	6 (2.4)
Have ever recommended HPV vaccination to their clients or their friends/neighbors' adolescent daughters (n=256)	
Yes	31 (12.1)
No	225 (87.9)

HPV: Human papillomavirus

of HPV vaccination and any of the respondents' sociodemographic variables.

DISCUSSION

This study assessed the knowledge of HPV infection and vaccination, and practices regarding HPV vaccination among female health-care professionals in Sokoto, Nigeria. Although awareness of HPV infection was high among the respondents in this study (91.8%), similar to the finding in studies conducted among health-care professionals in other centers in Nigeria,^[10,21] less than half of them (47.7%) have good knowledge of it. This is of serious concern considering the high burden of cervical cancer in Nigeria, with an estimated 14,089 new cases and 8240 deaths from the disease each year; and the fact that health-care professionals cannot educate their patients and clients on HPV infection and its prevention if they lack adequate knowledge of its transmission.

Considering the high prevalence of HPV infection and cervical cancer in Nigeria, and the absence of any specific drug treatment for the virus, the documented high potency of HPV vaccination in preventing cervical cancer is reassuring, as it is known to prevent up to 95% of cervical cancers.^[5] The low level of good knowledge of HPV vaccination (7.4%) among the respondents in this study, in which only about a fifth and less of them (9.0-22.7%) knew the 3 prophylactic HPV vaccines (bivalent,

quadrivalent, and nanovalent), about half (51.2%) knew that it is recommended for both males and females, and less than a fifth (16.0%) knew the recommended doses for the subgroups of those eligible for HPV vaccination, therefore, constitutes a serious threat to the prevention and control of HPV infection and cervical cancer in the study area.

The worrisome aspect is the fact that reports from studies conducted among medical students in sub-Saharan Africa suggest that sufficient attention was not given to the prevention and control of HPV infection and cervical cancer in their training curriculum, despite the high burden of cervical cancer across the continent. A study conducted among female medical and dental students in a tertiary institution in Benin City, Nigeria, reported that only about a third of respondents (31.2%) had good knowledge of HPV infection and vaccination.^[22] Another study conducted at the Mulago Hospital, Uganda,^[23] reported that only 14% of final year medical students felt skilled enough to perform speculum examination of the vagina, and 87% of them had never performed a Pap smear (to screen for cervical cancer). These findings confirm the multidimensional challenges facing cervical cancer prevention across sub-Saharan Africa, as students graduate from the medical schools with poor knowledge of HPV infection and vaccination, insufficient skills on cervical cancer screening, and inadequate promotion of cervical cancer prevention practices among their clients and patients when they start practicing. It is therefore necessary for the training institutions to review their curricula to address these deficiencies, while the Management of the Healthcare Facilities should organize periodic continuing medical education programs for their staff to enable them effectively prevent and control the prevalent diseases in their respective communities. The need for these interventions is further supported by the finding in this study, in which being a doctor was the sole predictor of good knowledge of HPV infection and vaccination among the respondents, with doctors having an 11.674 fold, and a 72.857 fold greater likelihood of having good knowledge of HPV infection and vaccination, respectively, as compared to the other cadres of staff; and it could be related to the depth of the medical training curricula (both undergraduate and post-graduate), and their practice environment that involves continuous in-service training (at the ward rounds, seminars, mortality reviews, etc.).

The very low uptake of HPV vaccination (2.3%) among the respondents in this study, with the main reasons cited being non-availability of the vaccines (42.7%) and lack of awareness (24.8%), essentially reflects the situation across sub-Saharan Africa. A systematic review

of the knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-Saharan Africa revealed high levels of willingness and acceptability of HPV vaccine but low levels of knowledge and awareness of cervical cancer.^[24] An international comparison of HPV infection and vaccination showed higher levels of HPV awareness among men and women in the United States of America, than the United Kingdom and Australia. In addition, implementation of vaccination programs, availability of HPV vaccines, and their promotion by the pharmaceutical companies varied across the countries, and this was believed to be responsible for the higher levels of awareness of the vaccines in the United States as compared to the other countries.^[25]

The poor awareness and uptake of HPV vaccines by the respondents in this study could be responsible for the low proportion (12.1%) of those that had recommended it to their clients or friends/neighbors' adolescent daughters. Similar to the finding in this study, a nationwide survey among primary care pediatrician in Italy reported poor implementation of the WHO's guideline to recommend HPV vaccines to boys and girls aged 9–14 years; while most of the respondents (77.4%) always recommend the vaccine to 11–12 year old girls, only 18.4% of respondents always recommend it to 11–12 year old boys.^[26] The findings of this study underscore the need for Government and the Management of Health Institutions to organize periodic training of health-care professionals on the strategies for preventing the transmission of HPV infection and also make HPV vaccines consistently accessible to the target population.

CONCLUSION

This study showed suboptimal knowledge of HPV infection and low levels of knowledge and uptake of HPV vaccination among the respondents. Government and the Management of Health Institutions should organize periodic training of health-care professionals on the strategies for preventing the transmission of HPV infection and also make HPV vaccines consistently accessible to the target population.

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