



Tropical Journal of

**Obstetrics &
Gynaecology**

ISSN-Print: 0189-5117
Online: 2543-148X

Official Publication of Society of
Obstetrics & Gynaecology of Nigeria

■ Original Article

Knowledge and Attitudes of Surgery Specialists in West Africa towards Human Papillomavirus Vaccination

Umemmuo MU,¹ Iregbu KC,² Oladunni EK,¹ Okpani A³

¹Department of Obstetrics and Gynecology, National Hospital Abuja, Nigeria

²Department of Microbiology, National Hospital Abuja, Nigeria

³Department of Obstetrics & Gynecology, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State

ABSTRACT

Background: Cancer of the cervix is associated with high mortality and morbidity. Human Papilloma Virus (HPV) is a known cause of cancer of the cervix, and the disease is preventable if appropriate actions are taken in good time. All doctors are expected to have good knowledge and usefulness of vaccines, particularly HPV vaccine in their locality. **Aim:** To evaluate the knowledge and attitudes of surgery specialists towards Human Papillomavirus (HPV) vaccination. **Method:** This was a cross-sectional survey of 300 participants at the 2019 West African College of Surgeons (WACS) conference in Dakar Senegal. Data were obtained using self-administered questionnaire. **Results:** Two hundred and sixty-five questionnaires out of 300 were adequately completed; response rate of 88.3%. The mean age of respondents was 50 ± 9.4 years (range: 26-73 years). A total of 180 (67.9%) respondents admitted knowledge of HPV vaccine types; 48 (26.7%) knew of 3 HPV types, 102 (56.7%) knew 2, while 30 (16.7%) participants knew of one type ($\chi^2=115.422$; $P < 0.0001$). Of 265 respondents, 58 (21.9%) had their children vaccinated while 183 (69.1%) had not. Forty-seven parents (17.7%) reported having girls vaccinated, 2 parents (0.8%) reported having boys vaccinated while 9 (3.4%) of respondents reported having both vaccinated. Religion, years of practice, and country of practice had no influence on HPV recommendation. There's a need for more awareness and ad-hoc educational training among doctors across the West African region irrespective of specialist status on the need to undertake vaccine promotion and implementation as an integral component of their work. **Keywords:** Cervical cancer, Human Papillomavirus, Human papillomavirus Specialist Vaccination. **Abbreviations:** GACVS, Global Advisory Committee on Vaccine Safety; HPV, Human Papilloma Virus; HR, High Risk; OHP, Oral Health Professionals; PLWHA, People Living With HIV/AIDS (PLWHA); WACS, West African College of Surgeons; WHO, World Health Organization.

Corresponding Author

Umemmuo Maureen U.
Department of Obstetrics and
Gynaecology, National Hospital,
P.M.B 425, Garki Abuja, Nigeria
E-mail: jeseuandme@yahoo.com
Tel: +234803597434

Introduction

Cervical cancer, though preventable, is the fourth most frequently diagnosed cancer and the fourth leading cause of cancer death in women globally.¹ It is the second most common cause of cancer-related deaths in women in developing countries.^{2,3} Human papillomavirus (HPV) is a common sexually transmitted infection that is implicated in 99.7% of cervical cancers.^{3,4} The HPV vaccine have been shown to prevent most of cervical cancer.^{5,6}

There are more than 118 different types of HPV and approximately 40 types can infect the human anogenital mucosa. Data however, suggest that 14 of these types (HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68) are considered high risk (HR) for the development of cervical cancer and its precursor lesions. Furthermore, HPV types 16 and 18 are regarded as the genotypes most closely associated with progression to cervical cancer.^{3,7,8} HPV-16 is the most carcinogenic and is associated with approximately 60% of all cervical cancers, while HPV-18 accounts for approximately 10% to 15% of cervical cancers.^{7,8}

Three HPV vaccines are now available - a bivalent, quadrivalent, and nonavalent vaccines. All three are highly efficacious in preventing infection with virus types 16 and 18, which are together responsible for approximately 70% of cervical cancer cases globally.³ The vaccines are also highly efficacious in preventing precancerous cervical lesions caused by these virus types. Both the quadrivalent and nonavalent have additional protection against genital warts which is important in People Living With HIV/AIDS (PLWHA). Data from clinical trials and initial post-marketing surveillance conducted in several continents show that all three vaccines are safe.³ The World Health Organization (WHO) considers vaccination coverage adequate when inoculations of the second dose reach 80% in the target populations. HPV vaccination coverage is still lower than desirable in many countries, despite the growing evidence about its benefits.^{9,10,11}

The acceptance of HPV vaccination is directly related to HPV knowledge among health care

providers and potential clients. The healthcare providers are expected to provide the information to their clients. Thus, knowledge and acceptability of HPV vaccine among professionals is important, especially in sub-Saharan African where the highest regional incidence and mortality occurs and most of the countries do not have organized free HPV vaccination programme.² However, acceptability of this vaccine among medical professionals who are expected to play key roles in acceptability of the vaccine among the parents/clients is not well known, particularly in West Africa. This study was designed to evaluate the knowledge, attitudes and acceptability of surgery specialists in the West African sub-region towards HPV vaccination.

Subjects, Materials and Methods

This was a cross-sectional questionnaire-based study. Respondents were specialists in 15 surgery and related specialties who attended the 59th Annual West African College of Surgeons Conference (WACS) between 21 and 24 January 2019 in Dakar, Senegal. West African College of Surgeons consists of seven faculties, namely Anaesthesia, Dental Surgery, Obstetrics & Gynaecology, Ophthalmology, Otorhinolaryngology, Radiology, and General Surgery, and covers 18 countries in West Africa. Verbal informed consent was obtained from each participant before distribution of the questionnaires.

The survey questionnaire was predesigned, pretested, semi-structured and self-administered. It was adapted from a review of relevant literature.^{12,13} and standardised by peer review among specialists. The questionnaire was made available in both English and French languages being the two official languages in the region and participants were allowed to choose the language they were most familiar with. (Appendix 1&2).

Three hundred questionnaires were distributed to delegates through convenient sampling. The questionnaire was divided into different sections: socio-demographic, knowledge, Attitude, Awareness, Practice Perception of specialists towards HPV vaccination. Two hundred and sixty-

five properly completed questionnaires were returned and analysed.

Statistical Analysis

The analysis was done using Statistical Package for the Social Sciences, IL, USA, version 22. Descriptive statistics was generated for the responses. Univariate and multivariate analyses were done and Chi-square was used to determine the statistical significance of observed differences for categorical and continuous variables. The statistical significance was set at $P = 0.05$.

Results

While a total of 300 questionnaires were distributed, 265 (88.3%) participants filled and returned the questionnaires. The 265 Specialists that participated were from, General Surgery 61 (23.0%), Obstetrics and Gynaecology 60(22.6%), urology 21(7.9%), Radiology 17(6.4%), Otorhinolaryngology 16(6.0%), Paediatric Surgery 16 (6.0%), Ophthalmology 15(5.7%), Neurosurgery 12(4.5%), Orthopaedic Surgery 10(3.8%) and others 37(14.%) [Fig 1& 2]

Socio-demographic characteristics

The respondents were in the age range of 28-73years (median 50.0 years). One hundred and eighty-three (79.9%) specialists have been in practice for more than 10 years, 29 (12.7%) for between 6 to 10years, and 17(7.4%) for 1-5 years, Respondents were of different faiths: 205 (77.4%) Christians, 52(19.5%) Muslims, 1 (0.4) Jewish, 1(0.4%) Buddhist, 6(2.3%) others. Of the respondents 239 (90.2%) work in Government or public institutions, 10 (3.8%) in private hospitals, 4(1.5%) mission hospitals, 5 (1.9%) were retired and 7 (2.6%) unknown. (Table 1)

Knowledge of HPV vaccine among specialists

Out of the 265 respondents, 229 (86.4%) know about the HPV vaccine; 183 (69.1%) had been aware that HPV was the causative agent for cancer of the cervix for over ten years while 29 (10.9%) were aware for between 6-10years and 17 (6.4%) between 1-5years. ($X^2=277.113$; $P<0.0001$).

However, there was a high knowledge of causative agent of Cervical Cancer among the Gynaecologist (98.3%). About Thirty-five percent (34.7%) of respondents were aware of the availability of HPV vaccine in hospitals/centre while 65.3% were not aware ($X^2 = 24.758$; $p < 0.0001$).

Thirty (11.3%) had knowledge of one type of vaccine, 102 (38.5%) two types of vaccine; 48 (18.1%) three while 85 (32.1%) had no knowledge of any type of HPV vaccine ($X^2=51.121$; $P<0.0001$). Furthermore, out of the 180 respondents who listed the vaccine, 17 (9.4%) listed one vaccine correctly, 37 (20.6%) listed two correctly, 20 (11.1%) listed three correctly, while 106 (58.9%) could not correctly list any of the HPV vaccinations ($X^2=115.422$; $P < 0.0001$). One hundred and fifty-two (56.4%) specialists were not sure of the number of doses of vaccines to be administered; 66 (24.9%) said it was three doses; 34 (12.8%) two doses and 13 (4.9%) one dose ($X^2=169.491$; $P < 0.0001$) [Table 1].

Attitude and Acceptability of HPV Vaccination among specialist

Out of the respondents, 162 (61.1%) have never recommended HPV vaccine to any child or parent. Two hundred and forty-two (91.3%) of the participants support giving the HPV vaccine to girls while 144 (51.3%) believe that giving HPV vaccine to boys can help prevent the cancer of the cervix. Out of the 91 respondents who have recommended or administered HPV vaccine to a child, 11 (4.2%) had received complaints from parents about the side effect of HPV vaccines.

Fifty-eight (21.9%) respondents have administered HPV vaccine to their children, of which 47 (81.0%) administered to their girl-child only; 2 (3.5%) to boys only and 9 (15.5%) administered HPV to both boys and girl children. The reasons for not recommending HPV vaccine were; 5 (1.9%) religion; 11 (4.2%) cost and uncertain side effects while 115 (43.4%) gave no reason and 97 (36.6%) had other personal reasons (>0.05) [Table 3]. There was no statistically significant association between religion, years of practice, country of practice and recommendation of HPV vaccine to

patients, friends, and families. (Table 2 &3).

Awareness of availability HPV vaccination within the respondent's country/centre

Among respondents from Nigeria 73(35.9%) had given or recommended HPV vaccines while 6(26.1%) had done so in Ghana, 6(33.3%) from Senegal, 1(33.3%) from Gambia and other countries 5(29.4%). In all 91(34.3%) of all the specialists from different countries had recommended or administered HPV vaccine to a child.

The proportion of specialists who were aware

of the availability of HPV vaccine in hospitals/centre was significantly less than those who were not aware of the HPV vaccine availability in their; 92(34.5%) of the respondents reported availability of HPV vaccine in their facility. Two hundred and thirty-two participants (87.5%) advocate support for a national HPV Immunization Programme; 223 (84.2%) advocate support for HPV vaccination across West Africa and 173 (65.3%) are willing to contribute towards HPV Immunization Programme. (Table 4 & 5).

Table 1: Knowledge of HPV vaccine among the specialist/respondents.

	Frequency (%)	X ² ; d.f. P value	Decision
When did you become aware that HPV is the causative agent for Cancer of the cervix?			
0	36 (13.6)	277.113;3; <0.0001	The differences in the number of years participants that have known about HPV is statistically significant
1-5 years	17 (6.4)		
6-10years	29 (10.9)		
>10years	183 (69.1)		
Total	265 (100.0)		
Are you aware of HPV Vaccine availability in hospital/center			
Yes	92 (34.7)	24.758; 1; <0.0001	Differences statistically significant
No	173 (65.3)		
Total	265 (100.0)		
Type of HPV vaccine known			
1	30 (11.3)	51.121; 3; <0.0001	Differences in the distributions are statistically significant. About 32% do not know about the type of vaccines used
2	102 (38.5)		
3	48 (18.1)		
None	85 (32.1)		
Total	265 (100.0)		

	Frequency (%)	X ² ; d.f. P value	Decision
No. of Vaccines correctly listed			
Listed one correctly	17 (9.4)	115.422; 3;	Differences in the distributions are statistically significant. Over 58% of those who knew about the vaccines could not list them correctly
Listed two correctly	37 (20.6)	<0.0001	
Listed three correctly	20 (11.1)		
None listed correctly	106 (58.9)		
Total	180 (100.0)		
Vaccination dose schedule			
One dose	13 (4.9)	169.491;3;	Differences in the distributions are statistically significant. Over 56% Do not know the vaccination dose schedule
Two doses	34 (12.8)	<0.0001	
Three doses	66 (24.9)		
Not sure	152 (56.4)		
Total	265 (100.0)		

Table 2: Acceptability of HPV vaccine among specialist/respondent

	Total Freq. (%)	Yes Freq. (%)	No Freq. (%)	Don't know/ No response Freq. (%)
Has recommended/administered HPV vaccine to a child?	265 (100.0)	91 (34.3)	162 (61.1)	12 (4.5)
Has recommended the vaccine to patients/friends/family	265 (100.0)	134 (50.6)	115 (43.4)	16 (6.0)
Have you received complaints/reaction about HPV Vaccine from clients/patients?	265 (100.0)	11 (4.2)	231 (87.2)	23 (8.7)
Do you support giving the HPV vaccines to girls?	265 (100.0)	242 (91.3)	14 (5.3)	9 (3.4)
Do you think giving HPV vaccine to boys can help prevent cancer of the cervix	265 (100.0)	144 (54.3)	95 (35.8)	26 (9.8)
My child has received HPV vaccine	265 (100.0)	58 (21.9)	183 (69.1)	24 (9.1)

Table 3: Reasons for not recommending HPV Vaccine

Reasons	Frequency	Percent
It is against my religion	5	1.9
It is expensive	11	4.2
Not aware of the vaccine	26	9.8
Not sure of the side effects	11	4.2
Other reasons	97	36.6
No response	115	43.4
Total	265	100.0

Table 4: Availability of HPV in the country of respondent's country of practice

	Total Freq. (%)	Yes Freq. (%)	No Freq. (%)	Don't know/ No response Freq. (%)
Hospital/Centre has an HPV Immunization Programme	265 (100.0)	71 (26.8)	88 (33.2)	106 (40.0)
Support advocating a national HPV immunization programme	265 (100.0)	232 (87.5)	16 (6.0)	17 (6.4)
Support advocating a West African HPV immunization programme	265 (100.0)	223 (84.2)	20 (7.5)	22 (8.3)
Willing to contribute towards HPV immunization programme	265 (100.0)	173 (65.3)	77 (29.1)	15 (5.7)

Table 5: Awareness of HPV Vaccine availability in hospital/center by area of Specialization

Area of specialization	Aware of HPV Vaccine availability in hospital/center		Total
	No (%)	Yes (%)	
Anaesthesia	9 (81.8)	2 (18.2)	11 (100.0)
CARDIOTHORACIC surgery	4 (80.0)	1 (20.0)	5 (100.0)
General Surgery	41 (67.2)	20 (32.8)	61 (100.0)
NEUROSURGEON	6 (50.0)	6 (50.0)	12 (100.0)
Obstetrics & Gynaecology	34 (56.7)	26 (43.3)	60 (100.0)
ONCOLOGY	5 (100.0)	0 (0.0)	5 (100.0)
Ophthalmology	8 (53.3)	7 (46.7)	15 (100.0)
Oral & Maxillofacial Surgery	3 (50.0)	3 (50.0)	6 (100.0)
ORL	12 (75.0)	4 (25.0)	16 (100.0)
ORTHOPAEDIC SURGERY	8 (80.0)	2 (20.0)	10 (100.0)
Paediatric Surgery	13 (81.3)	3 (18.8)	16 (100.0)
PATHOLOGY	1 (20.0)	4 (80.0)	5 (100.0)
PLASTIC SURGERY	3 (60.0)	2 (40.0)	5 (100.0)
Radiology	11 (64.7)	6 (35.3)	17 (100.0)
Urology	15 (71.4)	6 (28.6)	21 (100.0)
	173 (65.3)	92 (34.7)	265 (100.0)

Fig. 1: Area of Specialization

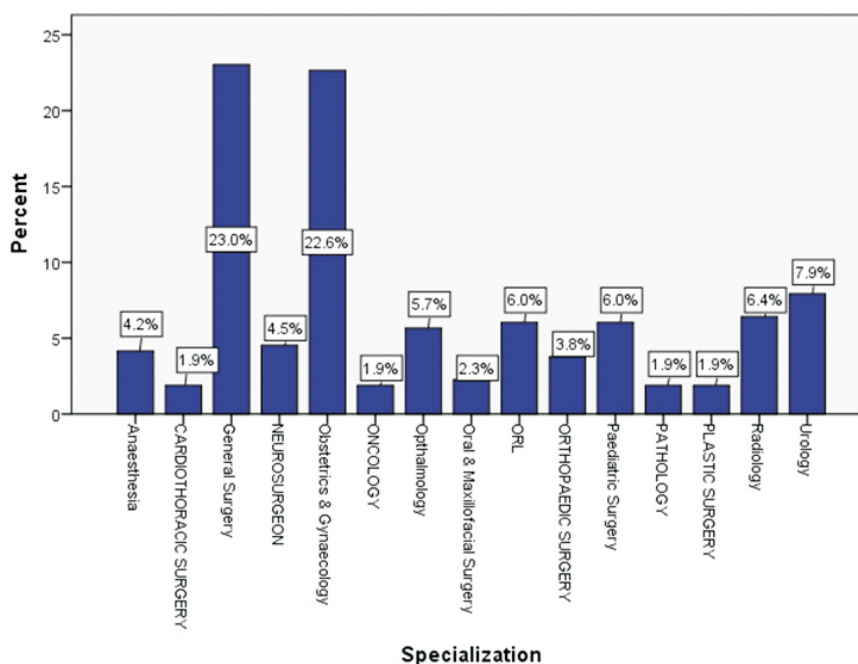
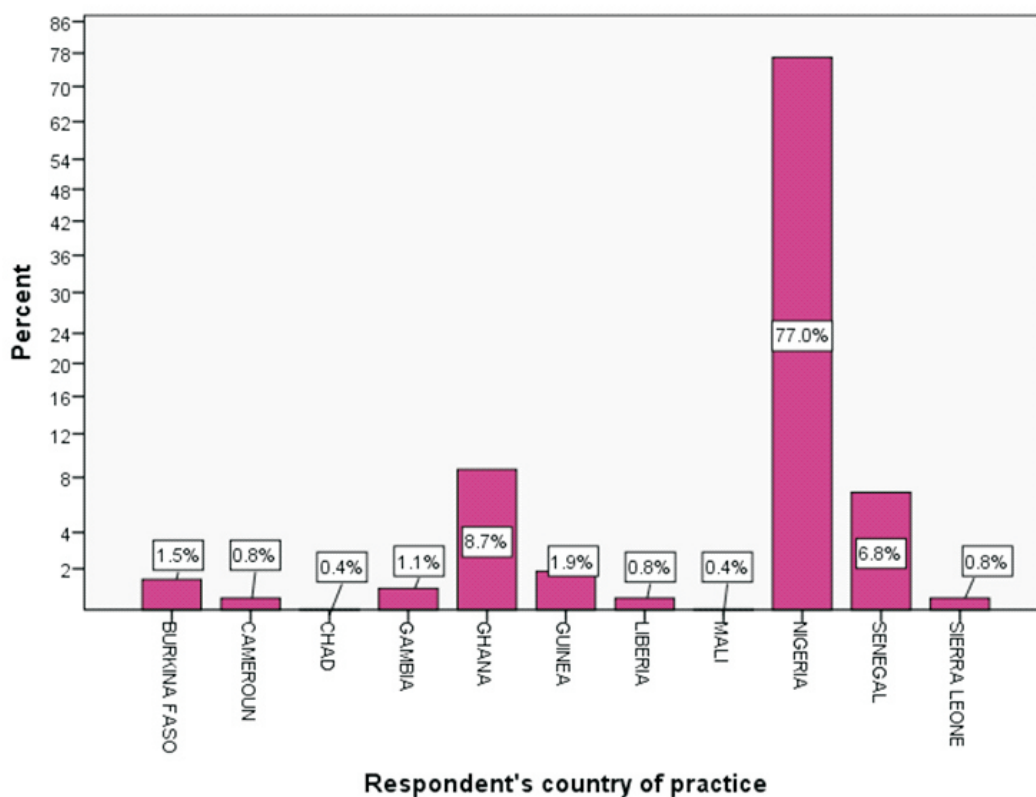


Fig 2: Respondent's country of practice



Discussion

This study has revealed that more than 50% of surgery specialists practising in the West African sub-region do not have substantial knowledge of vaccine schedules. Although most vaccine's types target mainly children and pregnant women, they are critical public health tool which every medical practitioner is expected to be knowledgeable about. Most of the doctors in this study treat mainly adults and may explain the huge gap in knowledge. Besides, vaccination programs are run by public health and community health specialists and none was included in this study since they were not Fellows of the College of Surgeons. This notwithstanding, it is of great concern considering

the pivotal role doctors play in most of the health issues among their patients and the general public.

Patients have great trust in the doctors irrespective of their areas of specialization and may be confronted with questions of vaccination by any patient at any time. In a study in Slovenia, providers' recommendations were found to be one of the most important factors in parents' decision to vaccinate their children.¹⁴ Although the final decision whether to vaccinate or not lies with parents, it is the responsibility of doctors as healthcare professionals to provide them with the necessary information on which to base their decisions to vaccinate their children.¹⁵ Coming from the community service perspective, every doctor is

expected to be an advocate of vaccination against preventable diseases irrespective of specialty or patients' focus. The seeming low level of knowledge about vaccine schedules is accompanied by low knowledge of the HPV vaccine as seen in this study, where only 21.9% had caused their children to be vaccinated, thus falling far short of the WHO recommendation of 80% coverage.¹⁰ Despite having been around for more than ten years, the acceptance of HPV vaccine has remained low.¹⁴

Side effects and safety concerns were advanced by respondents as reasons for not vaccinating their children. Incidentally, the Global Advisory Committee on Vaccine Safety (GACVS) which is an independent expert clinical and research advisory body, after review of multiple large and high-quality safety studies that were carried out on several million vaccinated individuals, concluded that HPV vaccines are extremely safe.¹⁶

This study revealed a negative attitude towards HPV vaccine by the respondents despite their knowledge of HPV as a cause of cancer of the cervix. Many were unaware of the availability of the vaccine in their practice centres or the dosing schedule. This could be an extension of the general poor knowledge towards vaccines generally and the HPV vaccine in particular. This poor knowledge reflects in the failure of the doctors to educate or disseminate information on the usefulness of vaccines, especially HPV vaccines to their patients; it also explains why over 60% of the respondents have never recommended or administered HPV vaccine to any child. Out of the 34% that had administered or recommended HPV vaccine to any child, about 43% were understandably Obstetricians and Gynaecologists, showing poor knowledge of HPV vaccine among other surgery specialties. Majority of the respondents agreed that giving HPV vaccination to boys could help prevent cancer of the cervix, similar to findings in a study among Israeli healthcare workers.¹⁸ There was a statistically significant relationship between the respondent's specialisation and practice of recommending HPV vaccine to patients, friends and families with more recommendations from

Obstetrician and Gynaecologists ($p=0.001$). This is in contrast with reports from Slovenia and Serbia, where the level of knowledge and trust in HPV vaccine was relatively poor among the Slovenian and Serbian Gynaecologists.^{15,17} However, in those reports, both healthcare professionals and the general public participated in the study and the number of participants that were Gynaecologist was small.

Comparing the practice of HPV vaccination among specialists from different countries, there was no significant relationship between country of practice and recommendation of HPV vaccine to patients, friends and families ($P= 0.563$). In one report, it was found out that recommendations by health professionals reinforced the validity of the immunization program and increased vaccination coverage.¹⁹ In another report, HPV educational intervention among oral health professionals (OHP) was well received and successful at improving self-reported knowledge, comfort level, and preparedness of OHPs in discussing HPV with their patients.²⁰ Similar findings were also noted in a study by another report among dental professionals.²¹

There's a need for more vaccine awareness and education among doctors whether specialist or non-specialist across the West African region in view of their crucial role in vaccine dissemination and acceptability. Ad-hoc educational and training interventions are recommended to address the gap in knowledge among surgery specialist and medical professionals in general.

This study had some limitations: Firstly, the respondents were only surgery specialists. There's need for a larger study involving the physicians, nurses, and other health disciplines. Secondly, most of the respondents (75%) were from Nigeria, which may well have skewed the results. There should be better representatives from other West African countries in future studies.

Acknowledgment

The authors wish to express appreciation to Professors JD Seffah (Ghana) and Jean Lankonde (Burkina Faso) for assisting at the concept and

translation respectively, and some of the organizers of the WACS conference who help in the distribution and collection of the questionnaires. A special thanks to Prof E.A Ameh (Nigeria) for his useful advice.

Conflict of interest: None declared

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2020. *CA: A Cancer Journal for Clinicians*. 2020 Jan;70(1):7-30.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians*. 2021 May;71(3):209-49
3. WHO. Immunization, Vaccines and Biologicals. Updated Feb. 2018 <https://www.who.int/immunization/diseases/hpv/en/>. Assessed 20th March, 2020.
4. Sherman SM, Bartholomew K, Denison HJ, Patel H, Moss EL, Douwes J, Bromhead C. Knowledge, attitudes and awareness of the human papillomavirus among health professionals in New Zealand. *PLoS one*. 2018;13(12).
5. Brisson M, Kim JJ, Canfell K, Drolet M, Gingras G, Burger EA, Martin D, Simms KT, Bénard É, Boily MC, Sy S. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *The Lancet*. 2020 Feb 22;395(10224):575-90.
6. Sundström K, Elfström KM. Advances in cervical cancer prevention: Efficacy, effectiveness, elimination? *PLoS Med* 2020;17(1):e1003035. <https://doi.org/10.1371/journal.pmed.1003035>
7. de Sanjose S, Quint WG, Alemany L, Geraets DT, Klaustermeier JE, Lloveras B, Tous S, Felix A, Bravo LE, Shin HR, Vallejos CS. Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. *The lancet oncology*. 2010 Nov 1;11(11):1048-56.
8. WHO. Human papillomavirus (HPV) and cervical cancer. Updated 24th January 2019. [https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-\(hpv\)-and-cervical-cancer](https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer). Assessed 5th April 2020
9. Kops NL, Hohenberger GE, Bessel M, Horvath JD, Domingues C, Maranhão AG, de Souza FM, Benzaken A, Pereira GE, Wendland EM. Knowledge about HPV and vaccination among young adult men and women: Results of a national survey. *Papillomavirus Research*. 2019 Jun 1;7:123-8.
10. WHO/ Immunization, Vaccines and Biologicals database, as of 31 March 2017. Available at http://www.who.int/entity/immunization/monitoring_surveillance/VaccineIntroStatus.pptx. Accessed 5th April 2020.
11. Global Advisory Committee on Vaccine Safety Statement on the continued safety of HPV vaccination. Available at http://www.who.int/vaccine_safety/committee/topics/hpv/GACVS_Statement_HP12_Mar_2014.pdf?ua=1, accessed April, 2020.
12. Ndikom CM, Oboh PI. Perception, acceptance and uptake of Human papillomavirus vaccine among female adolescents in selected secondary schools in Ibadan, Nigeria. *African Journal of Biomedical Research*. 2017;20(3):237-44.
13. Masika MM, Ogembo JG, Chabeda SV, Wamai RG, Mugo N. Knowledge on HPV vaccine and cervical cancer facilitates vaccine acceptability among school teachers in Kitui County, Kenya. *PLoS One*. 2015;10(8).
14. Cervantes JL, Doan AH. Discrepancies in the evaluation of the safety of the human papillomavirus vaccine. *Memorias do Instituto Oswaldo Cruz*. 2018;113(8).
15. Troha M, Šterbenc A, Mlakar M, Poljak M. Human papillomavirus (HPV) infection and vaccination: knowledge and attitudes among healthcare professionals and the general public in Slovenia. *Acta Dermatovenerol APA*. 2018;27:59-64.
16. Meeting of the Global Advisory Committee on Vaccine Safety, 78 June 2017. *Wkly Epidemiol Rec*. 2017;92:393402.
17. Stamenkovic Z, Matejic B, Djikanovic B, Zaric M. Gynecologists' knowledge, attitudes, and intentions

- toward human papillomavirus vaccination in Serbia. *J Low Genit Tract Dis.* 2017;21:911.
18. Pereira JE, Gomes JM, Costa AD, Figueiredo FW, Adami F, Santos EF, Sorpreso IC, Abreu LC. Knowledge and acceptability of the human papillomavirus vaccine among health professionals in Acre state, western Amazon. *Clinics.* 2019;74.
 19. Khamisy-Farah R, Adawi M, Jeries-Ghantous H, Bornstein J, Farah R, Bragazzi NL, Odeh M. Knowledge of Human Papillomavirus (HPV), Attitudes and Practices Towards Anti-HPV Vaccination Among Israeli Pediatricians, Gynecologists, and Internal Medicine Doctors: Development and Validation of an Ad Hoc Questionnaire. *Vaccines.* 2019 Dec;7(4):157.
 20. Shukla A, Nyambose J, Vanucci R, Johnson LB, Welch K, Lind E, Villa A. Evaluating the effectiveness of human papillomavirus educational intervention among oral health professionals. *J of Canc Educ.* 2019 Oct 1;34(5):890-6.
 21. Patel, S, Koskan, A, Spolarich, A, Perry, M, Flood, T. Dental professionals' knowledge, attitudes, and practice behaviors related to human papillomavirus vaccination. *J Public Health Dent.* 2020; 80: 61 69. <https://doi.org/10.1111/jphd.12350>.