Reproductive Health

RESEARCH

Open Access

HPV vaccine knowledge, attitude, and programme satisfaction among parents and caregivers of vaccine recipients in Ogun state Nigeria

Tope Olubodun[1*], Elijah Ayowole Ogunsola[2], Marcellina Olutomi Coker[3], Surajudeen Adekunle Olayinka[2], Waheed Àlàmú Elegbede[2], Joke Oluwatoyin Ojediran[4], Kofoworola B. Olajide[2], Salimat Bola Sanni[2], Temitope Olawumi Oluwadare[2], Oluwaseun Temitope Inetagbo[4], Mobolanle Rasheedat Balogun[5], Onikepe Oluwadamilola Owolabi[6], Catherine Chidimma Anyadiegwu-Bello[4], Olukayode Abiodun Runsewe[2], Abiola Oluwatoyin Temitayo-Oboh[1,7], Tolulope Soyannwo[1], Oluwaseun Bisola Ogunsiji[4] and Aduragbemi Banke-Thomas[8]

Abstract

Introduction Human Papillomavirus is responsible for about 5% of the global cancer burden. In Nigeria, cervical cancer is the second most common cancer among women. The Federal Government of Nigeria and partners recently introduced Human Papillomavirus (HPV) vaccination into routine immunization beginning with 15 States and the Federal Capital Territory. This study assesses HPV vaccine knowledge, attitude and program satisfaction among parents and caregivers of vaccine recipients in Ogun State, Nigeria.

Methods This is a cross-sectional study with sample size of 1012 respondents, carried out during the 5-day HPV immunization campaign in all 20 Local Government Areas in Ogun State, Nigeria. Data was collected using interviewer-administered questionnaires. Univariate analysis was done using frequency tables and bivariate analysis using Chi-square test. Multivariate analysis was carried out to identify the determinants of knowledge of HPV, knowledge of cervical cancer and programme satisfaction.

Results All the respondents had heard of HPV vaccine and 67.5% had heard of cervical cancer. Eighty-two percent of the respondents heard of HPV vaccine for the first-time during the introduction programme. Eighty-two percent of respondents had good knowledge of HPV vaccine and 47.7% had good knowledge of cervical cancer. Forty-four percent of respondents heard about HPV vaccine via town/market announcers, 36.2% via radio, and 28.6% via social media. Common reasons respondents vaccinated their wards include, because there was a campaign (51.8%), to prevent cervical cancer (48.9%), and because it is free (38.3%). Twenty-nine percent were very satisfied with the HPV vaccination program and 63.2% were satisfied. All the respondents had positive attitude towards HPV vaccination, although 94.1% had heard messages discouraging people from vaccinating their wards. Respondents living in rural communities had higher odds of having good knowledge of HPV vaccine (aOR 2.232, 95% CI 1.527–3.263, p-value ≤

*Correspondence:
Tope Olubodun
oluboduntope@gmail.com
Full list of author information is available at the end of the article

0.001). Fathers with tertiary education were more likely to be satisfied with the programme (aOR 5.715, 95% CI 1.142–28.589, p-value = 0.034),

Conclusion Knowledge of HPV vaccination was high and was informed by the HPV vaccination introduction programme. Use of outreaches, awareness drives, and provision of free vaccines should be intensified to further promote HPV vaccine uptake in Nigeria.

Keywords HPV vaccination, Knowledge, Attitude, Satisfaction, Cervical cancer, Nigeria

Plain language summary

Human Papillomavirus (HPV) vaccine was recently introduced into routine immunization in Nigeria, beginning with 15 States in the first phase. This study was carried out among 1012 parents/caregivers of adolescent girls who received the vaccine during the 5 days of the HPV immunization campaign in Ogun State, Nigeria. The study assessed the knowledge of HPV vaccine, attitude towards HPV vaccine and satisfaction with the HPV vaccination introduction programme among these parents/caregivers. Questions were asked using a questionnaire by interviewers. All the respondents had heard of HPV vaccine and majority heard about the vaccine, the first time during the vaccine introduction activities. Most of the respondents had good knowledge of HPV vaccine (82.4%) and 47.7% had good knowledge of cervical cancer. Common sources of information on the HPV vaccine were via town/market announcers, via radio, and via social media. All the respondents had positive attitude towards cervical cancer, even though 94.1% had heard messages discouraging parents from vaccinating their wards. Majority heard such discouraging messages via WhatsApp. Common reasons parents/caregivers vaccinated their wards were: because there was a campaign, to prevent cervical cancer, and because it is free. Majority of respondents were very satisfied with the HPV vaccination program. The HPV vaccination introduction programme contributed to high knowledge of HPV vaccine. Use of outreaches, awareness drives, and provision of free vaccines should be intensified to promote HPV vaccine uptake in Nigeria.

Introduction

Human Papillomavirus (HPV) is considered the most common sexually transmitted viral infection worldwide. Globally, half of all malignancies that are related to infection are caused by HPV [1]. It is estimated that 4.5% of the global cancer burden (630,000 new cancer cases per year) is attributed to HPV infection [2]. Cervical cancer, anal cancer and oropharyngeal cancer are the most common HPV associated cancers. Unlike in high-income countries (HICs) where the incidence of cervical cancer is decreasing, there is a high incidence rate in low- and middle-income countries (LMICs) due to inadequate screening programmes [3]. Cervical cancer accounts for 22% of all female cancers in Africa [4] and is the second commonest cancer among women in Nigeria, with an age-standardized incidence rate (ASIR) of 18.4 per 100,000 and a high age-standardized mortality rate (ASMR) of 13.2 per 100,000. [5]

Primary prevention with HPV vaccination offers the best protection against HPV associated cancers [6]. Three HPV vaccines have been licenced for use—the bivalent vaccine which protects against HPV 16 and 18; the quadrivalent vaccine which protects against HPV 6, 11, 16, 18; and the nonavalent vaccine which protects against HPV 6, 11, 16, 18, 31, 33, 45, 52, 58 [6]. HPV vaccination was first licensed for use in 2006. The United States, Australia, Canada and the United Kingdom were among the first countries to introduce HPV vaccination into routine immunization programmes [7]. With the aid of the Vaccine Alliance (GAVI) funded projects and donation-based programs, by mid-2020, 56 LMICs had introduced HPV vaccination into routine immunization programmes [7].

Nigeria recently introduced the HPV vaccine into routine immunization [8, 9]. Prior to this, awareness of HPV vaccine was very low and it was only available to those who could afford to pay for it, in high-profile private hospitals and pharmacies, and some government hospitals. The introduction of the vaccination is in two phases. The first phase was conducted in 15 priority states and the Federal Capital Territory (FCT), and the next phase will include all other states. The Phase 1 vaccination introduction programme involved a set of pre-implementation planning and awareness generation activities, followed by a five-day vaccination campaign which began on the 24th of October 2023. The one-dose vaccination with Gardasil vaccine was for girls aged 9–14 years and was carried out using outreach approaches in schools and communities, and also in health facilities, during the campaign. After the campaign, the vaccination was limited to health facilities as it is being included in routine immunization schedule [8, 9].

Despite the successes recorded by many LMICs in the introduction of the HPV vaccine, there are still considerable challenges including weak social mobilization, vaccine hesitancy among parents, inadequate financing and health worker training, and problems with logistics [10–12]. Getting feedback from parents and caregivers of vaccine recipients can help understand what is being done right and what can be improved upon. It is imperative to understand parents' knowledge of the HPV vaccine, as this may influence uptake. Attitude towards the vaccine and parent's satisfaction with the programme, can further inform implementation in Phase 1, and guide planning for the second phase. This study therefore aims to assess HPV vaccine knowledge, attitude and program satisfaction among parents and caregivers of vaccine recipients in Ogun State, Nigeria.

Methods

Study setting

Ogun State is located in southwest Nigeria. The language of the majority is Yoruba with scores of dialects. Abeokuta is the most populous city of Ogun State and is the State's capital. Ogun State has 20 Local Government Areas (LGAs) and 236 wards. A total of 280,489 girls out of 500,465 targeted population of girls aged 9 to 14 were vaccinated against HPV during the campaign in Ogun State, Nigeria in October 2023 [13].

Study design and study population

This is an analytical cross-sectional study. The inclusion criteria for respondents was that they be parents and/or caregivers of vaccine recipients who have been living with the vaccine recipient for at least two years. Data collection was carried out during the five-day HPV vaccination campaign from 24th October 2023 to 28th October 2023 and parents/caregivers were recruited at the vaccination sites.

Sample size calculation

The minimum sample size was calculated using the Cochran formulae for descriptive studies $n = Z^2\ pq/d^2$ [14] (Where n = minimum sample size required, Z = standard normal deviate at 95% confidence interval = 1.96, p = proportion of the desired attribute from a previous study, q = 1- p, and d = acceptable error margin = 5%) The sample size was calculated with different p values: awareness of HPV vaccine; awareness of cervical cancer; knowledge of cervical cancer; and attitude towards cervical cancer, all from similar studies in southwest Nigeria. The p that gave the highest sample size was used (i.e. awareness of cervical cancer from a study in Lagos State, southwest Nigeria = 53.5 [15]). Minimum sample size calculated was 382. Due to the multistage sampling applied, the sample size was multiplied by 2.5 to adjust for design effect, and a sample size of 955 was obtained. Compensating for non-response of 10%, sample size came to 1061. After data collection and data cleaning, there were 1012 correctly filled questionnaires which were analysed.

Sampling

Multi-stage sampling was applied. All 20 LGAs were included in the study. In the first stage, ten wards were selected in each LGA via simple random sampling by balloting. In the second stage, five settlements were selected from each ward using simple random sampling by balloting and in the third stage, one respondent that met the inclusion criteria was selected from one vaccination site randomly in each of the selected settlements.

Data collection

Data was collected using pretested interviewer-administered questionnaires. Questions were derived from tools used in similar studies [16–20] and included questions on socio-demographic characteristics of respondents, knowledge of HPV vaccination, knowledge of cervical cancer, attitude towards HPV vaccination, attitude towards cervical cancer, and satisfaction with the HPV immunization programme. Questionnaires were administered by trained research assistants using the Open Data Kit (ODK) mobile application. The research assistants used in this study were the State Technical Facilitators, the independent monitors and LGA monitoring team. They were trained to administer the questionnaires correctly and to ensure adherence with ethical considerations.

Data analysis

Data cleaning was done in Microsoft Excel 365. Descriptive analysis was carried out using frequency tables. Chi-Square test was used to compare attributes across urban and rural wards.

Knowledge of HPV vaccine was assessed with three questions—benefit of HPV vaccination, number of doses of HPV vaccination required and eligibility for HPV vaccination. The maximum score attainable was 3 and minimum score attainable was 0. This was converted to percentage and scores of ≥ 50% were classified as good knowledge, while scores < 50% were classified as poor knowledge.

Knowledge of cervical cancer was assessed using three questions—knowledge of symptoms of cervical cancer, knowledge of risk factors of cervical cancer, and having heard of cervical cancer screening. A respondent scores one full mark if he/she can mention two correct symptoms of cervical cancer, 0.5 marks if he/she mentions

only one correct symptom and 0 marks if he/she mentions no correct symptom. Similar scoring was used for mention of risk factors of cervical cancer. A respondent scored one mark if he/she was aware of cervical cancer screening and 0 marks if he/she was not aware. The maximum attainable score for knowledge of cervical cancer was 3. This was also converted to percentage and scores of ≥ 50% were classified as good knowledge, and scores < 50% were classified as poor knowledge.

Attitude towards cervical cancer was assessed using five statements on a 5-point Likert scale, and attitude towards HPV vaccination was assessed using seven statements on a 5-point Likert scale. Total scores were calculated and scores at or above the median were considered as positive attitude.

Programme satisfaction was assessed with four questions—confidence in the competence of the vaccinators, confidence in the cleanliness/hygiene of the vaccination procedure, how respondent feels about adequacy of social mobilization and communication activities, and overall satisfaction with the programme.

Variables significantly associated with knowledge of HPV vaccine, knowledge of cervical cancer and overall satisfaction with the programme at bivariate analysis (Chi-Square) with p-value less than 0.05 were imputed into the multivariate model. Binary logistic regression was used to determine the predictors of knowledge of HPV vaccine, knowledge of cervical cancer and overall satisfaction with the programme. Level of statistical significance was set at $p \leq 0.05$.

Data was analysed with Stata 17 (StataCorp LLC, College Station, TX, USA).

Ethical considerations

Ethical approval was obtained from Ogun State Health Research Ethical Review Committee (Approval Number: OGHREC/467/190). Written informed consent was obtained from all participants. All data from the study were handled with confidentiality.

Results

Over a third of respondents (36.1%) were between ages 41 and 50 years. Most of them were female (90.5%), married /co-habiting (78.6%), of Yoruba ethnicity (89%), and Christian (64.5%). Four in ten of the vaccine recipients (42.9%) were aged 8 and 10 years. Most of the respondents were parents of the vaccine recipient (87%). Nine out of ten times (88.7%), a parent made the decision to vaccinate the child. In the urban communities 42% of fathers had tertiary education while in the rural communities, 31.1% of fathers had tertiary education and the difference was statistically significant (Urban 42%, Rural 31.1%, $p < 0.001$). In urban communities, 34.7% of mothers had tertiary education while in the rural communities, 26.6% of mothers had tertiary education (Urban 34.7%, Rural 26.6%, $p = 0.003$) (Table 1).

Most of the respondents heard of HPV vaccine, the first time, during the vaccine introduction activities (82.6%) and, most also heard of cervical cancer for the first time, during the vaccine introduction activities (55.4%). Majority of respondents heard of HPV vaccination via town announcers/market announcers. In rural communities, 52.5% of respondents heard via town announcers/market announcers while in urban communities, 35.5% (Urban 35.5%, Rural 52.5%, $p < 0.001$) heard via this means. Forty-one percent of urban dwellers heard via radio, while 31.9% of rural dwellers heard via radio (Urban 41%, Rural 31.9%, $p = 0.003$). Other common sources of information were social media (Urban 29.4%, Rural 27.8%, $p = 0.584$) and Banners/posters/handbills (Urban 22.8%, Rural 29.1%, $p = 0.023$). Proportion of respondents with good knowledge of HPV vaccine were higher in rural communities than in urban communities (Urban 77.4%, Rural 86.8%, $p < 0.001$). There was no statistically significant difference in proportion of respondents with good knowledge of cervical cancer across urban and rural communities (Urban 45.2%, Rural 49.9%, $p = 0.148$) (Table 2).

In urban and rural communities, 49.0% and 49.9% agreed respectively, that cervical cancer is a severe disease ($p = 0.320$). In urban and rural communities, 12.5% and 12.1% agreed respectively, that cervical cancer cannot be prevented, but is rather attributed to fate ($p = 0.511$). In urban and rural communities respectively, 35.5% and 35.3% agreed that they had concerns about the safety of HPV vaccine ($p = 0.018$). Also, 20.1% of respondents in urban communities and 22.8% in rural communities agreed they had doubts about the effectiveness of the vaccine ($p = 0.036$). Fifty-nine percent of urban dwellers and 53.4% of rural dwellers however agreed that they are likely to recommend HPV vaccination to others ($p = 0.034$). All the respondents had positive attitude towards cervical cancer and HPV vaccine (Table 3).

The commonest reasons for vaccinating wards include: To prevent cervical cancer (48.9%), because there is an ongoing campaign (48.2%), because it is free (38.3%), I heard about it and felt I should bring my ward (25.9%), and a health worker advised for it (18.3%) (Table 4).

Seventy percent of the respondents were confident in the competence of the vaccinator, 74.9% were confident in the cleanliness of procedures, 52.9% perceived social mobilization efforts as adequate and 35.0% as somewhat adequate. Sixty-three percent were satisfied with the overall programme and 29.4% were very satisfied. There was no statistically significant difference in confidence in competence of vaccinator, cleanliness of the procedures

Table 1 Description of select characteristics

Variables	Total sample		Urban	Rural	p-value
	Freq (%)	(n = 1012)	Freq (%)	Freq (%)	
			(n = 473)	(n = 539)	
Age of respondent (years)					
20–30	99	9.8	34 (7.2%)	65 (12.1%)	**0.042**
31–40	415	41	197 (41.6%)	218 (40.4%)	
41–50	365	36.1	183 (38.7%)	182 (33.8%)	
61–72	133	13.1	59 (12.5%)	74 (13.7%)	
Sex of respondent					
Female	916	90.5	432 (91.3%)	484 (89.8%)	0.405
Male	96	9.5	41 (8.7%)	55 (10.2%)	
Marital status					
Single	121	12	45 (9.5%)	76 (14.1%)	**0.005**
Married/ Cohabiting	795	78.6	369 (78%)	426 (79%)	
Divorced/ Separated	59	5.8	37 (7.8%)	22 (4.1%)	
Widowed	37	3.7	22 (4.7%)	15 (2.8%)	
Ethnicity					
Yoruba	901	89	421 (89%)	480 (89.1%)	**0.001**
Ibo	50	4.9	35 (7.4%)	15 (2.8%)	
Hausa	20	2	8 (1.7%)	12 (2.2%)	
Others	41	4.1	9 (1.9%)	32 (5.9%)	
Religion					
Christianity	653	64.5	302 (63.8%)	351 (65.1%)	0.276
Islam	332	32.8	162 (34.2%)	170 (31.5%)	
Traditional	27	2.7	9 (1.9%)	18 (3.3%)	
Age of VR (years)					
8–10	434	42.9	217 (45.9%)	217 (40.3%)	0.188
11–12	339	33.5	152 (32.1%)	187 (34.7%)	
13–20	239	23.6	104 (22%)	135 (25%)	
Respondent's relationship with VR					
Parent	880	87	413 (87.3%)	467 (86.6%)	0.483
Sibling	27	2.7	11 (2.3%)	16 (3%)	
Grandparent	31	3.1	14 (3%)	17 (3.2%)	
Other relative	30	3	18 (3.8%)	12 (2.2%)	
Neighbour/ Friend	11	1.1	3 (0.6%)	8 (1.5%)	
Other guardian	33	3.3	14 (3%)	19 (3.5%)	
Father of VR level of education*					
No formal	95	9.8	31 (7%)	64 (12.2%)	**0.001**
Primary	109	11.3	37 (8.4%)	72 (13.7%)	
Secondary	413	42.8	188 (42.6%)	225 (42.9%)	
Tertiary	348	36.1	185 (42%)	163 (31.1%)	
Mother of VR level of education*					
No formal	93	9.4	32 (7%)	61 (11.5%)	**0.003**
Primary	153	15.5	60 (13.1%)	93 (17.5%)	
Secondary	442	44.7	207 (45.2%)	235 (44.3%)	
Tertiary	300	30.4	159 (34.7%)	141 (26.6%)	
Father of VR occupation*					
Unemployed	64	6.5	18 (3.9%)	46 (8.7%)	**0.011**
Unskilled	361	36.5	162 (35.3%)	199 (37.5%)	
Semiskilled	471	47.6	231 (50.3%)	240 (45.2%)	
Skilled	94	9.5	48 (10.5%)	46 (8.7%)	
Mother of VR occupation*					
Unemployed	82	8.2	35 (7.4%)	47 (8.9%)	0.713
Unskilled	460	45.9	217 (46%)	243 (45.8%)	
Semiskilled	385	38.4	181 (38.3%)	204 (38.5%)	
Skilled	75	7.5	39 (8.3%)	36 (6.8%)	
Person who made the decision to vaccinate child[m]					
Parent	898	88.7	416 (87.9%)	482 (89.4%)	0.459
Elder sibling	37	3.7	12 (2.5%)	25 (4.6%)	0.076
Grandparent	56	5.5	28 (5.9%)	28 (5.2%)	0.615
Other relative	46	4.5	21 (4.4%)	25 (4.6%)	0.880
Other guardian	45	4.4	20 (4.2%)	25 (4.6%)	0.752
Neighbour/ Friend	42	4.2	17 (3.6%)	25 (4.6%)	0.406

Bold p-values indicate statistical significance

*Has missing variables VR—vaccine recipient [m]Multiple response allowed

and perception of social mobilization activities between urban and rural dwellers ($p < 0.05$). However, regarding overall programme satisfaction, a higher proportion of rural dwellers (34.0%) were very satisfied, compared to urban dwellers (24.3%) ($X^2 = 13.5221$ p = 0.001) (Table 5).

Majority (94.1%) had heard messages discouraging parents from vaccinating their wards. Sixty-four percent of the respondents heard such messages from WhatsApp, 53.0% heard such messages from a friend/relative and 31.7% heard such messages from a community member. A higher proportion of urban dwellers heard such messages via WhatsApp (Urban 68.3%, Rural

Table 2 Knowledge of HPV vaccine and cervical cancer among respondents

Variables	Total Sample		Urban	Rural	p-value
	Freq %	(n = 1012)	Freq (%) (n = 473)	Freq (%) (n = 539)	
Heard of HPV vaccine					
Yes	1012	100	473 (100%)	539 (100%)	–
First time respondent heard of HPV vaccine was during the HPV vaccine introduction programme					
Yes	836	82.6	389 (82.2%)	447 (82.9%)	0.773
No	176	17.4	84 (17.8%)	92 (17.1%)	
Source of information on HPV vaccine[m]					
Town announcer/market announcer	451	44.6	168 (35.5%)	283 (52.5%)	**0.001**
Radio	366	36.2	194 (41%)	172 (31.9%)	**0.003**
Social media	289	28.6	139 (29.4%)	150 (27.8%)	0.584
Banners/posters/handbills	265	26.2	108 (22.8%)	157 (29.1%)	0.023
Hospital/health center	237	23.4	103 (21.8%)	134 (24.9%)	0.248
Friends	178	17.6	90 (19%)	88 (16.3%)	0.260
Television	152	15	76 (16.1%)	76 (14.1%)	0.382
Community leader	140	13.8	44 (9.3%)	96 (17.8%)	**0.001**
Relatives	128	12.6	65 (13.7%)	63 (11.7%)	0.327
WDC meeting/advocacy meeting	49	4.8	25 (5.3%)	24 (4.5%)	0.538
Newspaper/magazine	42	4.2	15 (3.2%)	27 (5%)	0.144
Church/pastor	31	3.1	13 (2.7%)	18 (3.3%)	0.586
School lecture	30	3	19 (4%)	11 (2%)	0.064
Mosque/Imam	14	1.4	5 (1.1%)	9 (1.7%)	0.405
Book	3	0.3	1 (0.2%)	2 (0.4%)	0.641
Benefit of HPV vaccine					
Prevents cervical cancer/cancers	853	84.3	398 (84.1%)	455 (84.4%)	**0.035**
Others	17	1.7	3 (0.6%)	14 (2.6%)	
Don't know	142	14	72 (15.2%)	70 (13%)	
Doses of HPV vaccine required					
1	688	68	299 (63.2%)	389 (72.2%)	**0.001**
2	60	5.9	23 (4.9%)	37 (6.9%)	
3	18	1.8	3 (0.6%)	15 (2.8%)	
4	246	24.3	148 (31.3%)	98 (18.2%)	
Who is to take HPV vaccine					
Babies	3	0.3	2 (0.4%)	1 (0.2%)	**0.001**
Young girls, any age	92	9.1	64 (13.5%)	28 (5.2%)	
Girls aged 9 to 14 years	833	82.3	357 (75.5%)	476 (88.3%)	
Adult women	10	1	10 (2.1%)	0 (0%)	
Not yet sexually active	27	2.7	13 (2.7%)	14 (2.6%)	
Sexually active girls and women	12	1.2	10 (2.1%)	2 (0.4%)	
Women HPV positive	4	0.4	2 (0.4%)	2 (0.4%)	
None of above	7	0.7	3 (0.6%)	4 (0.7%)	
Don't know	24	2.4	12 (2.5%)	12 (2.2%)	
Heard of cervical cancer					
Yes	630	67.5	280 (64.5%)	350 (70.1%)	0.105
No	274	29.4	142 (32.7%)	132 (26.5%)	
Don't know	29	3.1	12 (2.8%)	17 (3.4%)	
Heard of cervical cancer for the first time, during the HPV vaccine introduction programme					
Yes	349	55.4	139 (49.6%)	210 (60%)	**0.009**

Table 2 (continued)

Variables	Total Sample		Urban	Rural	p-value
	Freq %	(n = 1012)	Freq (%) (n = 473)	Freq (%) (n = 539)	
No	281	44.6	141 (50.4%)	140 (40%)	
Symptoms of cervical cancer known[m]					
Foul smelling vaginal discharge	303	48.1	135 (48.2%)	168 (48%)	0.957
Heavy vaginal bleeding	238	37.8	91 (32.5%)	147 (42%)	0.015
Vaginal bleeding between periods	193	30.6	57 (20.4%)	136 (38.9%)	**0.001**
Vaginal bleeding after intercourse	162	25.7	48 (17.1%)	114 (32.6%)	**0.001**
Vaginal bleeding after menopause	85	13.5	21 (7.5%)	64 (18.3%)	**0.001**
Lower abdominal pain	121	19.2	71 (25.4%)	50 (14.3%)	**0.001**
Weight loss	117	18.6	61 (21.8%)	56 (16%)	0.064
Don't know	147	23.3	75 (26.8%)	72 (20.6%)	0.067
Risk factors of cervical cancer known[m]					
Early age at first sex	270	42.9	109 (38.9%)	161 (46%)	0.075
Early age at first pregnancy	105	16.7	26 (9.3%)	79 (22.6%)	**0.001**
Many sexual partners	252	40	107 (38.2%)	145 (41.4%)	0.413
Partner with many partners	232	36.8	92 (32.9%)	140 (40%)	0.065
Many pregnancies	27	4.3	6 (2.1%)	21 (6%)	**0.018**
Use of tobacco	31	4.9	16 (5.7%)	15 (4.3%)	0.410
Infection with HPV	169	26.8	76 (27.1%)	93 (26.6%)	0.872
Poor hygiene	83	13.2	38 (13.6%)	45 (12.9%)	0.792
Sin against God	6	1	4 (1.4%)	2 (0.6%)	0.271
Fate/destiny	8	1.3	4 (1.4%)	4 (1.1%)	0.750
Hereditary	19	3	9 (3.2%)	10 (2.9%)	0.795
Prolonged use of oral contraceptives	15	2.4	4 (1.4%)	11 (3.1%)	0.161
Low immunity	46	7.3	27 (9.6%)	19 (5.4%)	**0.043**
Don't know	108	17.1	49 (17.5%)	59 (16.9%)	0.832
Heard of cervical cancer screening					
Yes	342	54.3	162 (57.9%)	180 (51.4%)	0.127
No	248	39.4	98 (35%)	150 (42.9%)	
Don't know	40	6.3	20 (7.1%)	20 (5.7%)	
Level of HPV vaccine knowledge					
Poor knowledge	178	17.6	107 (22.6%)	71 (13.2%)	**0.001**
Good knowledge	834	82.4	366 (77.4%)	468 (86.8%)	
Level of cervical cancer knowledge					
Poor knowledge	488	52.3	238 (54.8%)	250 (50.1%)	0.148
Good knowledge	445	47.7	196 (45.2%)	249 (49.9%)	

Bold p-values indicate statistical significance

[m] Multiple response allowed

60.9% $X^2 = 6.0673$ p = 0.014). A higher proportion of rural dwellers heard such messages from friend/relative (Urban 49.3%, Rural 56.2%, $X^2 = 4.8919$ p = 0.027) and from a community member (Urban 26.4%, Rural 36.4% $X^2 = 11.4847$ p = 0.001) (Table 6).

Father's level of education, mother's occupation, religion and place of residence were predictors of good knowledge of HPV vaccine. Fathers with tertiary education were three times more likely to have good knowledge of HPV vaccine, compared to those with no formal education (aOR 3.194, 95% CI 1.119–9.113, p-value = 0.03) Mothers with skilled employment were also three times more likely to have good HPV vaccine knowledge than the unemployed (aOR 3.841, 95% CI 1.053–14.014, p-value = 0.042). Respondents that practiced traditional

Table 3 Attitude towards cervical cancer and HPV vaccine

Attitudinal statements	Total Sample		Urban	Rural	p-value
	Freq	% (n = 1012)	Freq (%)	Freq (%)	
			(n = 473)	(n = 539)	
Cervical cancer is a severe disease					
Strongly agree	281	27.8	127 (26.8%)	154 (28.6%)	0.320
Agree	501	49.5	232 (49%)	269 (49.9%)	
Neutral	164	16.2	85 (18%)	79 (14.7%)	
Disagree	39	3.9	14 (3%)	25 (4.6%)	
Strongly disagree	27	2.7	15 (3.2%)	12 (2.2%)	
I/my spouse are not susceptible to cervical cancer					
Strongly agree	105	10.4	41 (8.7%)	64 (11.9%)	0.095
Agree	275	27.2	129 (27.3%)	146 (27.1%)	
Neutral	251	24.8	134 (28.3%)	117 (21.7%)	
Disagree	297	29.3	133 (28.1%)	164 (30.4%)	
Strongly disagree	84	8.3	36 (7.6%)	48 (8.9%)	
I/my spouse cannot have cervical cancer because we have spiritual protection					
Strongly agree	94	9.3	38 (8%)	56 (10.4%)	0.299
Agree	203	20.1	90 (19%)	113 (21%)	
Neutral	204	20.2	107 (22.6%)	97 (18%)	
Disagree	402	39.7	185 (39.1%)	217 (40.3%)	
Strongly disagree	109	10.8	53 (11.2%)	56 (10.4%)	
I/my spouse cannot have cervical cancer because we are not promiscuous					
Strongly agree	91	9	37 (7.8%)	54 (10%)	**0.048**
Agree	283	28	143 (30.2%)	140 (26%)	
Neutral	204	20.2	105 (22.2%)	99 (18.4%)	
Disagree	359	35.5	149 (31.5%)	210 (39%)	
Strongly disagree	75	7.4	39 (8.2%)	36 (6.7%)	
Cervical cancer cannot be prevented. It is a matter of fate					
Strongly agree	44	4.3	15 (3.2%)	29 (5.4%)	0.511
Agree	124	12.3	59 (12.5%)	65 (12.1%)	
Neutral	219	21.6	105 (22.2%)	114 (21.2%)	
Disagree	461	45.6	214 (45.2%)	247 (45.8%)	
Strongly disagree	164	16.2	80 (16.9%)	84 (15.6%)	
I have fears about the safety of HPV vaccine					
Strongly agree	44	4.3	10 (2.1%)	34 (6.3%)	**0.018**
Agree	358	35.4	168 (35.5%)	190 (35.3%)	
Neutral	216	21.3	109 (23%)	107 (19.9%)	
Disagree	301	29.7	145 (30.7%)	156 (28.9%)	
Strongly disagree	93	9.2	41 (8.7%)	52 (9.6%)	
I have doubts about the effectiveness of HPV vaccine					
Strongly agree	41	4.1	16 (3.4%)	25 (4.6%)	**0.036**
Agree	218	21.5	95 (20.1%)	123 (22.8%)	
Neutral	248	24.5	129 (27.3%)	119 (22.1%)	
Disagree	404	39.9	197 (41.6%)	207 (38.4%)	
Strongly disagree	101	10	36 (7.6%)	65 (12.1%)	
HPV vaccination can make girls promiscuous/start having sex early					
Strongly agree	14	1.4	4 (0.8%)	10 (1.9%)	0.694
Agree	92	9.1	41 (8.7%)	51 (9.5%)	
Neutral	180	17.8	87 (18.4%)	93 (17.3%)	
Disagree	511	50.5	240 (50.7%)	271 (50.3%)	
Strongly disagree	215	21.2	101 (21.4%)	114 (21.2%)	
I fear that HPV vaccination can make girls infertile					
Strongly agree	27	2.7	10 (2.1%)	17 (3.2%)	0.455
Agree	130	12.8	63 (13.3%)	67 (12.4%)	
Neutral	192	19	87 (18.4%)	105 (19.5%)	
Disagree	449	44.4	221 (46.7%)	228 (42.3%)	
Strongly disagree	214	21.1	92 (19.5%)	122 (22.6%)	
I have concerns about the minor side effects of HPV vaccine e.g. injection site pain, fever					
Strongly agree	57	5.6	16 (3.4%)	41 (7.6%)	**0.020**
Agree	427	42.2	209 (44.2%)	218 (40.4%)	
Neutral	216	21.3	110 (23.3%)	106 (19.7%)	
Disagree	226	22.3	103 (21.8%)	123 (22.8%)	
Strongly disagree	86	8.5	35 (7.4%)	51 (9.5%)	
I fear HPV vaccine may be harmful to health					
Strongly agree	24	2.4	6 (1.3%)	18 (3.3%)	0.158
Agree	150	14.8	70 (14.8%)	80 (14.8%)	
Neutral	232	22.9	118 (24.9%)	114 (21.2%)	
Disagree	469	46.3	219 (46.3%)	250 (46.4%)	
Strongly disagree	137	13.5	60 (12.7%)	77 (14.3%)	
I am likely to recommend HPV vaccination to others					
Strongly agree	158	15.6	71 (15%)	87 (16.1%)	**0.034**
Agree	569	56.2	281 (59.4%)	288 (53.4%)	
Neutral	191	18.9	91 (19.2%)	100 (18.6%)	
Disagree	72	7.1	24 (5.1%)	48 (8.9%)	
Strongly disagree	22	2.2	6 (1.3%)	16 (3%)	
Attitude towards cervical cancer					
Positive attitude	1012	100	473 (100%)	539 (100%)	
Attitude towards HPV vaccine					
Positive attitude	1012	100	473 (100%)	539 (100%)	

Bold p-values indicate statistical significance

religion were less likely to have good HPV vaccine knowledge and respondents who lived in rural communities had two times higher odds of having good knowledge of HPV vaccine (aOR 2.232, 95% CI 1.527–3.263, p-value ≤ 0.001) (Table 7). Relationship with vaccine

Table 4 Respondents' reasons for vaccinating wards

Reasons for vaccinating ward[m]	Total Sample		Urban	Rural	p-value
	Freq %	(n = 1012)	Freq (%) (n = 473)	Freq (%) (n = 539)	
To prevent cervical cancer	495	48.9	220 (46.5%)	268 (49.7%)	0.308
Because there is an ongoing campaign	488	48.2	74 (15.6%)	98 (18.2%)	0.284
Because it is free	388	38.3	184 (38.9%)	204 (37.8%)	0.731
I heard about it and felt I should bring my ward	262	25.9	112 (23.7%)	150 (27.8%)	0.133
A health worker advised for it	185	18.3	48 (10.1%)	89 (16.5%)	**0.003**
Social mobilization activities encouraged me to vaccinate my ward	172	17	228 (48.2%)	267 (49.5%)	0.672
I saw others vaccinating their wards	137	13.5	16 (3.4%)	10 (1.9%)	0.125
Due to community leader's advice	54	5.3	23 (4.9%)	31 (5.8%)	0.530
Due to friend's advice	42	4.2	5 (1.1%)	6 (1.1%)	0.932
Due to family member's advice	39	3.9	22 (4.7%)	17 (3.2%)	0.217
Due to religious leader's advice	26	2.6	96 (20.3%)	89 (16.5%)	0.120
Due to traditional leader's advice	11	1.1	25 (5.3%)	17 (3.2%)	0.090
No reason	3	0.3	2 (0.4%)	5 (0.9%)	0.334

Bold p-value indicates statistical significance

[m] Multiple response allowed

Table 5 Program satisfaction among respondents

Variables	Total Sample		Urban	Rural	p-value
	Freq (%)	(n = 1012)	Freq (%) (n = 473)	Freq (%) (n = 539)	
Confidence in competence of vaccinator					
Confident	717	70.8	329 (69.6%)	388 (72%)	0.313
Somewhat confident	283	28	136 (28.8%)	147 (27.3%)	
Not confident	12	1.2	8 (1.7%)	4 (0.7%)	
Confidence in the cleanliness of procedures					
Confident	758	74.9	353 (74.6%)	405 (75.1%)	0.881
Somewhat confident	244	24.1	116 (24.5%)	128 (23.7%)	
Not confident	10	1	4 (0.8%)	6 (1.1%)	
Perception of social mobilization					
Adequate	535	52.9	243 (51.4%)	292 (54.2%)	0.128
Somewhat adequate	354	35	162 (34.2%)	192 (35.6%)	
Not adequate	123	12.2	68 (14.4%)	55 (10.2%)	
Overall satisfaction of programme					
Very satisfied	298	29.4	115 (24.3%)	183 (34%)	**0.001**
Satisfied	640	63.2	327 (69.1%)	313 (58.1%)	
Not satisfied	74	7.3	31 (6.6%)	43 (8%)	

Bold p-value indicates statistical significance

Table 6 Source of discouraging messages on HPV vaccination

Variables	Total Sample		Urban	Rural	p-value
	Freq (%)	(n = 1012)	Freq (%) (n = 473)	Freq (%) (n = 539)	
Heard message discouraging parents from vaccinating their wards					
Yes	952	94.1	448 (94.7%)	504 (93.5%)	0.417
No	60	5.9	25 (5.3%)	35 (6.5%)	
Source of such messages[m]					
WhatsApp	651	64.3	323 (68.3%)	328 (60.9%)	**0.014**
Friend/ relative	536	53	233 (49.3%)	303 (56.2%)	**0.027**
Community member	321	31.7	125 (26.4%)	196 (36.4%)	**0.001**
Church	63	6.2	22 (4.7%)	41 (7.6%)	0.052
Traditional leader	54	5.3	21 (4.4%)	33 (6.1%)	0.235
Others	50	4.9	23 (4.9%)	27 (5%)	0.914
Mosque	42	4.2	18 (3.8%)	24 (4.5%)	0.607
Did not hear any discouraging message	49	4.8	21 (4.4%)	28 (5.2%)	0.577

Bold p-values indicate statistical significance

[m] Multiple response allowed

recipient, father's level of education, mother's occupation, were predictors of good knowledge of cervical cancer (Table 7).

Table 7 Logistic regression of Knowledge of HPV vaccine and cervical cancer

Variables	aOR	95% CI (Lower limit)	95% CI (Upper limit)	p-value
Knowledge of HPV vaccine				
Age of respondent				
20–30	1			
31–40	0.471	0.22	1.008	0.052
41–50	1.041	0.0468	2.315	0.921
61–72	0.391	0.166	0.922	0.032
Sex				
Male	1			
Female	1.295	0.713	2.354	0.395
Marital status				
Single	1			
Married/Cohabiting	0.524	0.27	1.019	0.057
Divorced/Separated	.9	0.316	2.565	0.844
Widowed	0.368	0.124	1.089	0.071
Ethnicity				
Yoruba	1			
Ibo	0.549	0.247	1.217	0.14
Hausa	1.663	0.4	6.915	0.048
Others	0.517	0.216	1.235	0.138
Fathers level of education				
No education	1			
Primary	3.455	1.302	9.167	**0.013**
Secondary	1.786	0.73	4.369	0.204
Tertiary	3.194	1.119	9.113	**0.03**
Mothers level of education				
No education	1			
Primary	0.787	0.318	1.944	0.603
Secondary	1.098	0.428	2.82	0.845
Tertiary	1.216	0.401	3.688	0.73
Fathers occupation				
Unemployed	1			
Unskilled	0.991	0.408	2.412	0.985
Semiskilled	0.663	0.266	1.653	0.378
Skilled	0.78	0.245	2.481	0.674
Mothers occupation				
Unemployed	1			
Unskilled	1.469	0.721	2.991	0.289
Semiskilled	1.149	0.532	2.482	0.724
Skilled	3.841	1.053	14.014	**0.042**
Religion				
Christianity	1			
Islam	0.724	0.487	1.076	0.11
Traditional	0.279	0.101	0.771	**0.014**
Place of residence				
Urban	1			
Rural	2.232	1.527	3.263	**< 0.001**
Knowledge of cervical cancer				
Relationship with VR				
Parent	1			
Sibling	1.152	0.5	2.653	0.74
Grandparent	2.393	1.035	5.537	**0.041**
Other relative	1.016	0.443	2.328	0.97
Neighbour/Friend	3.298	0.631	17.235	0.157
Other guardian	4.99	1.661	14.992	**0.004**
Fathers level of education				
No education	1			
Primary	0.655	0.291	1.474	0.307
Secondary	0.975	0.445	2.135	0.95
Tertiary	2.472	1.035	5.905	**0.042**
Mothers level of education				
No education	1			
Primary	1.479	0.678	3.224	0.325
Secondary	0.803	0.364	1.774	0.588
Tertiary	0.595	0.246	1.442	0.25
Fathers occupation				
Unemployed	1			
Unskilled	1.016	0.528	1.953	0.963
Semiskilled	0.723	0.369	1.418	0.345
Skilled	0.94	0.413	2.144	0.884
Mothers occupation				
Unemployed	1			
Unskilled	1.25	0.692	2.256	0.46
Semiskilled	1.169	0.623	2.193	0.626
Skilled	3.087	1.307	7.291	**0.01**
Place of residence				
Urban	1			
Rural	1.195	0.901	1.585	0.216

Bold p-values indicate statistical significance

Marital status, father's level of education, father's occupation, and religion were predictors of satisfaction with the HPV vaccination programme. Divorced/separated and widowed respondents were less likely to be satisfied with the programme. In cases where the wards fathers had tertiary education, the respondent was more likely to be satisfied with the programme (aOR 5.715, 95% CI 1.142–28.589, p-value = 0.034), and in cases where the wards fathers were employed, the respondents were more likely to be satisfied with the programme (Table 8).

Discussion

This study assessed the HPV vaccine knowledge, attitude and programme satisfaction among parents and caregivers of HPV vaccine recipients in Ogun State

Table 8 Logistic regression of overall programme satisfaction

Variables	aOR	95% CI (Lower limit)	95% CI (Upper limit)	p-value
Age of respondent				
20–30	1			
31–40	0.312	0.071	1.372	0.123
41–50	0.305	0.069	1.36	0.12
61–72	3.649	0.42	31.726	0.241
Sex				
Female	1			
Male	0.633	0.275	1.457	0.282
Marital status				
Single	1			
Married/Cohabiting	0.27	0.068	1.075	0.063
Divorced/Separated	0.14	0.028	0.707	**0.017**
Widowed	0.064	0.01	0.404	**0.003**
Ethnicity				
Yoruba	1			
Ibo	0.983	0.245	3.95	0.981
Hausa	0.319	0.083	1.226	0.096
Others	0.495	0.16	1.534	0.223
Fathers level of education				
No education	1			
Primary	3.053	0.85	10.961	0.087
Secondary	2.878	0.75	11.045	0.124
Tertiary	5.715	1.142	28.589	**0.034**
Mothers level of education				
No education	1			
Primary	1.201	0.344	4.197	0.774
Secondary	0.733	0.184	2.921	0.66
Tertiary	0.601	0.116	3.127	0.545
Fathers occupation				
Unemployed	1			
Unskilled	6.426	2.26	18.272	**< 0.001**
Semiskilled	3.62	1.252	10.462	**0.018**
Skilled	5.086	1.023	25.289	**0.047**
Mothers occupation				
Unemployed	1			
Unskilled	0.339	.1	1.151	0.083
Semiskilled	0.333	0.088	1.27	0.107
Skilled	1.48	0.133	16.482	0.75
Religion				
Christianity	1			
Islam	0.556	0.308	1.003	0.051
Traditional	0.141	0.043	0.462	**0.001**

Bold p-values indicate statistical significance

Nigeria, during the recent introduction of HPV vaccination into routine immunization. Over eighty percent of the respondents heard of HPV vaccine for the first time, during the HPV vaccination introduction program. Knowledge of HPV vaccination was high, all respondents had positive perception towards the HPV vaccine and cervical cancer, and programme satisfaction was high.

Most of the respondents had good knowledge of HPV vaccination. Most knew the benefit of HPV vaccination, majority knew that only one dose was required, and that girls aged 9 to 14 years were eligible to receive the vaccine. In a study in Meta Robi District, Oroma region, Ethiopia, few parents knew HPV vaccination protects against cervical cancer and only a few knew the age group eligible for the vaccine [21]. In Saudi Arabia, majority of the parents visiting a tertiary health facility did not know those who should receive HPV vaccination [22]. In both the Ethiopia and Saudi Arabia studies, HPV vaccination had been introduced 2 years and 12 years prior to the conduct of the studies respectively. Knowledge may be higher in our study due to ongoing awareness campaign efforts. Knowledge may have also been higher in our study because the study population was parents/caregivers of vaccine recipients, and not the general population. Adequate knowledge about vaccines is important to promote uptake, which could have contributing to the parents/caregivers immunizing their daughters in this study.

In our study, town/market announcers were the predominant source of information on HPV vaccination, as about forty percent had heard about the vaccine through this means. A higher proportion of rural dwellers heard about HPV vaccination from town/market announcers. Ogun State has many rural communities, and as such, this means can be effective in passing messages about vaccines. On the other hand, in a community-based cross-sectional study among parents in Debre Tabor Town, Ethiopia, the predominant source of information was radio/television and health extension workers [23]. Our study was carried out during vaccine introduction hence the use of town and market announcers is predominant, even in urban communities, as that was one of the communication strategies deployed.

Other major sources of information in this study include radio, social media, banners/posters and hospital/health center. Many studies among youth show that the predominant source of information on HPV vaccine is from schools, internet/social media and from friends [24–26] and in a study among youth in Switzerland, school was by far, the predominant source of information [25]. Radio was a more common means of information than television in our study, unlike a study conducted among parents in the United States [27]. This may be because in Nigeria, many use battery charged radios for entertainment as televisions can only be powered by electricity which's supply is poor,

coupled with the recent increase in the cost of petrol to power generators in homes.

Attitude towards the vaccine was good for all the respondents which is not surprising, as they had immunized their wards. Even though more than ninety percent of respondents had heard messages aimed at discouraging parents from immunizing their wards, all the respondents had positive attitude towards the vaccine. Positive attitude, just like adequate knowledge has also been found to improve uptake of vaccines [28, 29].

In our study, the predominant reason parents chose to immunize their wards was to prevent cervical cancer. In a study carried out in Serbia, to prevent cancers was also a top-ranking motive to vaccinate one's child [30]. Other predominant reasons given by parents/caregivers for taking the vaccine for their wards in the current study, center around the fact that there were ongoing awareness activities in communities—"they heard about the vaccine and felt their ward should have it"; the vaccines were readily available without having to go the health facility—"there was a campaign"; and because it was free. This goes to show the importance of awareness generation activities, accessibility and affordability of vaccines in promoting uptake. In a study in the United States, the greatest motive of parents for vaccinating their child was advice by a paediatrician [31]. This was the fifth most common reason in our study, accounting for 18% of responses. In Nigeria, children don't have routine check-up visits to paediatricians or to the health facility, hence contact with health workers may be limited. This may be responsible for fewer parents in our study vaccinating their wards for this reason.

High programme satisfaction may also have influenced parents/caregivers decisions to immunize their wards, as most had a positive perception of—competence of vaccinators, social mobilization efforts, cleanliness of the vaccination procedures, and were satisfied with the overall programme. Programme satisfaction is an important factor driving utilization of health services [32–34]. Governments and health authorities should strive to improve all aspects of vaccine introduction programmes, to promote high satisfaction, which would likely increase vaccine uptake.

We collected data on exposure to HPV vaccination discouraging messages. Over ninety percent of respondents had heard messages discouraging HPV vaccination. Sixty-eight percent of respondents heard such messages via WhatsApp, even though only about thirty percent heard of HPV vaccine via social media. This may be because e-fliers and WhatsApp audio jingles were only available about two months to the immunization dates, leaving room for spread of misinformation and the need to extend the campaign dates by an extra month. WhatsApp voice notes containing vaccine misinformation also spread rapidly at about the same time in English and the local languages. Timely dissemination of correct information on vaccines is needed to mitigate against vaccine misinformation and disinformation. Even though we did not ask further questions on why the respondents still immunized their children, despite the discouraging messages, respondents immunized their wards majorly because the vaccine prevents cervical cancer, there was a campaign, and services were free. Further qualitative studies are needed to explore why some parents still immunize their wards despite hearing discouraging messages, and how they determine their source of truth.

Most of the respondents in our study were mothers of the vaccinated girls. Mothers with skilled occupation had higher knowledge of HPV vaccine and cervical cancer. Women in skilled occupations are likely to be more enlightened, hence their higher knowledge. Our study found that rural residents had higher knowledge of HPV vaccine. We also found that rural residents were more likely to hear about HPV vaccine from town/market announcers. This finding suggests that the use of town/market announcers may be adequate to provide basic information on eligibility for the vaccine, number of doses and benefit of the vaccine, which were the knowledge items assessed in this study.

Implications for policy and practice

Knowledge of HPV vaccine was high in our study, possibly because many parents of the vaccinated girls had secondary or tertiary education. It is important for government and non-governmental organizations, and ministries of health to intensify health education and health promotion activities among less educated population to further improve uptake of the vaccine. Continuous education of the populace is also needed to sustain the gains in knowledge of HPV vaccine.

Ministries of health, at district and state level, should encourage the use of mobile outreaches, targeting schools and communities from time to time, and not just rely on facility-based HPV immunization, as this was a motivator for vaccination reported in our study. Ministries of health, non-Governmental organizations and relevant agencies should ensure timely dissemination of information on vaccines. It is important for Governments and relevant health authorities to strive to improve all aspects of the HPV vaccination introduction programme as high

satisfaction with the programme can positively influence uptake of the vaccine.

Strengths and limitations of the study

This study was carried out during the introduction phase of HPV vaccination into routine immunization in Nigeria. To the best of our knowledge, this is the first of such studies assessing programme satisfaction, vaccine knowledge and attitude, reasons for vaccination and sources of vaccine information among parents/caregivers of HPV vaccine recipients in Nigeria. The large sample size of this study and the widespread data collection in both rural and urban communities, and in all 20 LGAs, enhances its generalizability in the region where the study was conducted. This study however does not explore the knowledge, attitude and programme satisfaction among parents/caregivers of adolescents who were not vaccinated. Future studies are planned to achieve this. Responses could also be prone to social desirability bias as data collection was done at the vaccination sites. Also, due to the cross-sectional study design, causality cannot be inferred. Nevertheless, this study provides important information which are crucial for formative evaluation and planning of the next phase of HPV vaccine introduction in Nigeria.

Conclusion

Most of the respondents had good knowledge of HPV vaccination and less than half had good knowledge of cervical cancer. Town/market announcers was a good source of information on HPV vaccine, and also radio, social media, banners/posters. All respondents had good attitude towards the HPV vaccine despite hearing discouraging messages. Reasons for taking the HPV vaccine center around it protecting against cervical cancer, its availability, affordability and awareness, by reason of campaign and vaccine introduction activities. Most of the respondents were satisfied with programme. Discouraging messages were widely circulated via WhatsApp.

Ministries of Health can conduct campaign activities including outreaches and awareness generation activities to improve uptake of HPV vaccination. The use of WhatsApp as a platform to improve awareness and provide accurate information about the HPV vaccine could be intensified, in a bid to tackle/prevent misinformation in subsequent campaigns. Further studies can explore vaccine accepters motivation factors despite discouraging messages heard.

Abbreviations

ASIR Age-standardized incidence rate
ASMR Age-standardized mortality rate
GAVI The vaccine alliance
HPV Human papillomavirus
LGA Local government area
LMIC Low- and middle-income country
VR Vaccine recipient

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12978-024-01913-y.

Additional file 1. Quantitative data on the Knowledge and Attitude towards HPV vaccine and programme satisfaction of HPV immunization introduction program in Ogun State, Nigeria

Acknowledgements

We are very grateful to the State Technical Facilitators, independent monitors, and the LGA monitoring teams (comprising of Medical Officers of Health, Local Immunization Officers, Health Educators, Monitoring and Evaluation officers, and Disease Surveillance and Notification Officers) who collected data for the study.

Author contributions

TO and EAO conceptualized the study. TO and EAO had the primary responsibility of designing of the study protocol. JOO, KO, SBS, TOO, CCA, OTI were involved in data collection. TO conducted the data analysis. SAO, WAE, OAR, AOT, TS, OBO, were involved in data and result interpretation. TO wrote the first draft of the manuscript. EAO and MOC provided oversight for the stages of the research. MRB, OOO and AB-T provided critical input in manuscript writing. All authors reviewed the manuscript and have read and approved the final manuscript.

Funding

Ogun State Primary Health Care Development Board.

Availability of data and materials

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from Ogun State Health Research Ethical Review Committee (Approval Number: OGHREC/467/190). Written informed consent was obtained from all participants and participants were not coerced. All data from the study were handled with confidentiality.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Department of Community Medicine and Primary Care, Federal Medical Center Abeokuta, Abeokuta, Ogun State, Nigeria. [2]Ogun State Primary Health Care Development Board, Oke-Mosan, Abeokuta, Nigeria. [3]Ogun State Government, Oke-Mosan, Abeokuta, Nigeria. [4]World Health Organization, Abeokuta, Ogun State, Nigeria. [5]Department of Community Health and Primary Care, College of Medicine, University of Lagos, Lagos, Nigeria. [6]Guttmacher Institute, New York, USA. [7]Department of Public Health, Chrisland University, Abeokuta, Ogun State, Nigeria. [8]Faculty of Epidemiology and Public Health, London School of Hygeine and Tropical Medicine, London, UK.

Received: 12 June 2024 Accepted: 15 November 2024
Published online: 04 December 2024

References

1. Bruni L, Albero G, Rowley J, Alemany L, Arbyn M, Giuliano AR, et al. Global and regional estimates of genital human papillomavirus prevalence

among men: a systematic review and meta-analysis. Lancet Glob Health. 2023;11:e1345–62.
2. de Martel C, Plummer M, Vignat J, Franceschi S. Worldwide burden of cancer attributable to HPV by site, country and HPV type. Int J Cancer. 2017;141:664–70.
3. Hull R, Mbele M, Makhafola T, Hicks C, Wang SM, Reis RM, et al. Cervical cancer in low and middle income countries (Review). Oncol Lett. 2020;20:2058–74.
4. WHO Regional Office for Africa. 2023. Available from: https://www.afro.who.int/health-topics/cancer (Accessed 08/09/2023)
5. ICO/IARC Information Centre. Nigeria—Key data on HPV and HPV-related cancers. 2023 Available from: https://hpvcentre.net/statistics/reports/NGA_FS.pdf (Accessed 08/09/2023).
6. National Cancer Institute. Human Papillomavirus (HPV) Vaccines. 2019. Available from: https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet (Accessed 08/09/2023).
7. Markowitz LE, Tsu V, Deeks SL, Cubie H, Wang SA, Vicari AS, et al. Human papillomavirus vaccine introduction—the first five years. Vaccine. 2012;30(SUPPL. 5):F139–48.
8. Adejoro L. Nigeria to get HPV vaccine November—WHO [Internet]. Punch. 2023 Available from: https://punchng.com/nigeria-to-get-hpv-vaccine-november-who/ (Accessed 08/09/2023).
9. Abujah R. Nigeria To Introduce HPV Vaccine, Routine Immunisation | Science Nigeria [Internet]. Punch. 2022. Available from: https://sciencenigeria.com/nigeria-to-introduce-hpv-vaccine-routine-immunisation/ (Accessed 08/09/2023).
10. Amponsah-Dacosta E, Blose N, Nkwinika VV, Chepkurui V. Human papillomavirus vaccination in South Africa: programmatic challenges and opportunities for integration with other adolescent health services? Front Public Health. 2022;10.
11. PATH. National Expanded Program on Immunization the. HPV Vaccination in Africa: Lessons Learned from a Pilot Program in Uganda. 2011. Available from: www.path.org/cervicalcancer https://media.path.org/documents/RH_hpv_lessons_learned_uganda.pdf (Accessed 12/09/2023).
12. Ladner J, Besson MH, Hampshire R, Tapert L, Chirenje M, Saba J. Assessment of eight HPV vaccination programs implemented in lowest income countries. BMC Public Health. 2012;12.
13. Ogunsola EA. Ogun State Primary Health Care Development Board, State Report On Human Papillomavirus Vaccine Introduction Held in 20 LGAs Of Ogun State Between 24t–28th October 2023.
14. Goyal RC. Research methodology for health professionals. New Delhi: Jaypee Brothers Medical Publishers; 2013.
15. Akinleye HW, Kanma-Okafor OJ, Okafor IP, Odeyemi KA. Parental willingness to vaccinate adolescent daughters against human papilloma virus for cervical cancer prevention in Western Nigeria. Pan Afr Med J. 2020;36:1–10.
16. Ajah LO, Iyoke CA, Ezeonu PO, Ugwu GO, Onoh RC, Ibo CC. Association between knowledge of cervical cancer / screening and attitude of teachers to immunization of adolescent girls with human papilloma virus vaccine in Abakaliki, Nigeria. Am J Cancer Prev. 2015;3:8–12.
17. Mukama T, Ndejjo R, Musabyimana A, Halage AA, Musoke D. Women's knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda. BMC Womens Health. 2017;17:9.
18. Olubodun T, Odukoya OO, Balogun MR. Knowledge, attitude and practice of cervical cancer prevention, among women residing in an Urban slum in Lagos, South West, Nigeria. Pan Afr Med J. 2019;32:130.
19. Olubodun T, Balogun MR, Olowoselu OI, Emina VA, Ugwuowo UU, Ogundele OO, Kerry M, Charles-Eromosele TO, Olubodun AB. Cervical cancer knowledge, risk factors and screening practices among women residing in Urban Slums of Lagos, Southwest. Nigeria West Afr J Med. 2022;39(6):595–602.
20. Aliu M, Okafor N, Aliu A, Olatubi M, Ademuyiwa G. Parental uptake of cervical cancer vaccine for their female adolescent in a city in Nigeria. Womens Health Bull. 2022;9:86–94.
21. Humnesa H, Aboma M, Dida N, Abebe M. Knowledge and attitude regarding human papillomavirus vaccine and its associated factors among parents of daughters age between 9–14 years in central Ethiopia, 2021. J Public Health Afr. 2022;13:1–16.
22. Tobaiqy MA, Mehdar SA, Altayeb TI, Saad TMAS. Parental knowledge, views, and perceptions of human papilloma virus infection and vaccination-cross-sectional descriptive study. J Family Med Prim Care. 2023;12:556–60.
23. Mihretie GN, Liyeh TM, Ayele AD, Belay HG, Yimer TS, Miskr AD. Knowledge and willingness of parents towards child girl HPV vaccination in Debre Tabor Town, Ethiopia: a community-based cross-sectional study. Reprod Health. 2022;19:1–12.
24. Rosen BL, Shew ML, Zimet GD, Ding L, Mullins TLK, Kahn JA. Human papillomavirus vaccine sources of information and adolescents' knowledge and perceptions. Glob Pediatr Health. 2017;4.
25. Schwendener CL, Kiener LM, Jafflin K, Rouached S, Juillerat A, Meier V, et al. HPV vaccine awareness, knowledge and information sources among youth in Switzerland: a mixed methods study. BMJ Open. 2022;12:1–11.
26. Kim J. The relationship of health beliefs with information sources and HPV vaccine acceptance among young adults in Korea. Int J Environ Res Public Health. 2018;15:1–11.
27. Vu M, Berg CJ, Pham NHT, Tiro JA, Escoffery C, Spring B, et al. U.S. Vietnamese parents' trusted sources of information and preferences for intervention messaging about HPV vaccination: a mixed methods study. PEC Innovation. 2023;3:100189.
28. Ndasauka Y, Twabi HS, Kainja J, Gunde AM, Makhumula-Mtimuni C. Knowledge, attitudes and demographic drivers for COVID-19 vaccine hesitancy in Malawi. Sci Rep. 2024;14.
29. Galadima AN, Zulkefli NAM, Said SM, Ahmad N. Factors influencing childhood immunisation uptake in Africa: a systematic review. BMC Public Health. 2021;21.
30. Štrbac M, Vuković V, Pustahija T, Nikolić N, Rajčević S, Ilić S, et al. Motives and attitudes of parents toward HPV vaccination: Results from the initial period of HPV vaccine rollout in Serbia. PLoS ONE. 2023;18(7):e0287295.
31. Victory M, Do TQN, Kuo YF, Rodriguez AM. Parental knowledge gaps and barriers for children receiving human papillomavirus vaccine in the Rio Grande Valley of Texas. Hum Vaccin Immunother. 2019;15:1678–87.
32. Mkperedem AA, Ogunlade P, Igbolekwu C, Arisukwu O, Afolabi AO, Adedayo RA. Healthcare service delivery perception among NHIS-HMO enrollees in Lagos hospitals. Humanit Soc Sci Commun. 2023;10.
33. Musakwa NO, Bor J, Nattey C, Lönnermark E, Nyasulu P, Long L, et al. Perceived barriers to the uptake of health services among first-year university students in Johannesburg, South Africa. PLoS ONE. 2021;16:e0245427.
34. Onyeneho NG, Amazigo U V., Njepuome NA, Nwaorgu OC, Okeibunor JC. Perception and utilization of public health services in Southeast Nigeria: implication for health care in communities with different degrees of urbanization. Int J Equity Health. 2016;15.

Publisher's Note