

Determinants of Parental Support for Human Papillomavirus Vaccination of Adolescent Girls in Ibadan, Nigeria

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Abstract

Introduction: Human papillomavirus (HPV) is a sexually transmitted infection associated with various health conditions including cervical, anal, and oropharyngeal cancers, as well as genital warts. Despite the availability of effective vaccines, HPV vaccine uptake among adolescent girls in Nigeria remains significantly low. Parental support is a key determinant of vaccine acceptance among this age group, particularly in culturally and religiously sensitive settings. This study aims to assess the determinants of parental support for HPV vaccination among mothers/female guardians of adolescent girls in Ibadan, Nigeria.

Methods: A descriptive cross-sectional study was conducted using a multistage random sampling approach in urban communities (Ibadan north and Ibadan Northwest) and rural (Ido and Lagelu). This study was conducted among 440 mothers/female guardians of girls aged 8–14 years, and data was collected through a structured, pretested questionnaire. The questionnaire captured socio-demographic information, SAGE vaccine hesitancy indicators. Descriptive statistics were used to summarize the data, while Chi-square tests and binary logistic regression were conducted to identify factors significantly associated with parental support for HPV vaccination.

Result: The mean ($\pm$ SD) age of respondents was 42.6 ($\pm$ 10.89) years, and most were married mothers, traders, and had secondary-level education. A total of 82.5% expressed willingness to vaccinate their adolescent daughters, while only 10.5% reported that their daughters had received the HPV vaccine. Bivariate analysis showed significant associations between willingness and community conformity ($\chi^2=27.29$, $p < 0.001$), family influence ($\chi^2=15.77$, $p < 0.001$), distrust in healthcare workers ($\chi^2=30.94$, $p < 0.001$), and cost considerations ($\chi^2=10.39$, $p = 0.001$). In multivariate logistic regression, refusal due to perceived community non-acceptance was the strongest predictor of unwillingness (AOR = 16.04, 95% CI: 2.44–105.31; $p = 0.004$), while family influence increased willingness (AOR = 4.05, 95% CI: 1.32–12.42; $p = 0.014$). Distrust in healthcare workers significantly reduced willingness to vaccinate (AOR = 0.19, 95% CI: 0.08–0.43; $p < 0.001$).

Conclusion: The decision to vaccinate adolescent girls against HPV among parents in Ibadan are shaped primarily by social norms, family influence, and trust in the healthcare system. The large willingness–uptake gap reflects systemic failures in access and delivery rather than resistance to vaccination. Improving uptake will therefore require community-based approaches, trust building with health workers, strengthened healthcare infrastructure, and financial support mechanisms to ensure equitable access.

INTRODUCTION

Human Papillomavirus (HPV) infection is the most common sexually transmitted disease, and HPV vaccination has proven to be an effective preventive measure for HPV-related infections. However, less than 30% of girls aged 8 to 14 worldwide have received the vaccine [1]. In 2018, global HPV immunization coverage was only 12.2%. Among the 61 million girls who were 15 years old that year, approximately 7,000 are expected to die from cervical cancer, mostly in low-and middle-income

countries due to low vaccine uptake [2]. Furthermore, 70% of girls worldwide live in countries where HPV vaccination is not yet part of the national immunization programs [3].

HPV vaccination rates continue to be lower in those classified as less developed countries. About 33.6% of girls 10 to 20 years of age in more developed countries receive a full series of HPV vaccination compared to only 2.7% in less developed countries [4]. HPV vaccine acceptance in Africa continues to be poor, there is a total acceptance rate of 41.38% in Africa [5] and a total acceptance rate of 35% for women in East Africa [6]. In Nigeria, the challenge associated with HPV uptake is also like that of other countries in Africa. By October 2023, HPV vaccination had also been integrated into the Nigerian healthcare system for 7.7 million girls aged 8 to 14 years [7]. Despite the availability of the vaccine, HPV infection continues to be a source of public health concern because more than 60% of pre-teen and teenage girls are identified with HPV infection, while 50 to 80% test positive for HPV 2 to 3 years following first onset of sex [8].

Given the critical role of parental decision-making in adolescent vaccination, parental support for vaccination among teenage girls has a great role in HPV vaccination programs in countries such as Nigeria. However, parental reluctance is a phenomenon that hinders the uptake of the vaccine and this reluctance cuts across the globe; 54% of parents in China refused to give HPV vaccines to their daughters [9], and only 38% of mothers in Ethiopia showed a willingness to give HPV vaccines to their daughters [10]. In Ilorin, 19.5% of mothers with children in their adolescent ages showed reluctance to give HPV vaccines to their daughters because they were not sexually active [11]. This act of refusal/delay is known as vaccine hesitancy. Understanding the factors influencing parental support for the vaccination of their adolescent daughter in Ibadan would be of great importance in planning for intervention studies for increasing HPV vaccination among adolescent girls. This study aims to assess the determinants of parental support for HPV vaccination among parents of adolescent girls in Ibadan.

METHODOLOGY

Study Design and Setting

This cross-sectional analytic study collected primary data using a quantitative approach from mothers and female guardians of adolescent girls in selected urban and rural communities. The study was conducted in Ibadan, Oyo State, Nigeria, specifically in four Local Government Areas: Ibadan North (including Sango, Agbowo, Adeoyo, and Yemetu), Ibadan Northwest (Opoo, Oke Adu, Sapati), Ido (Siba), and Lagelu (Kute, Olowu, Nalende, Oke-Aremu). Data collection took place at the household level.

Study Population and Selection Criteria

The study population comprised mothers and female guardians of girls aged 8–14 years residing in the selected communities. Participants were included if they had a female child within this age range and were willing to participate in the study. However, mothers whose eligible children did not reside with

them in the community and those with mental illness affecting decision-making capacity were excluded from participation.

Sample Size and Sampling

The required sample size was calculated using the formula for single proportion studies ($n = Z^2pq/d^2$), where Z equals 1.96 for 95% confidence level, p equals 0.658 based on a previous study by Adebola et al. (2023) on mothers' willingness to vaccinate adolescents, q equals 0.342, and the margin of error (d) was set at 5%. This calculation yielded 346 participants, which was adjusted to 384 after accounting for a potential 10% non-response rate. A total of 440 eligible participants were ultimately recruited and enrolled in the study.

A four-stage sampling technique was employed to select participants. First, one senatorial zone was randomly selected from the three zones in Oyo State. Second, four Local Government Areas (two urban and two rural) were randomly selected from the senatorial zone. Third, two communities were randomly selected from each LGA. Finally, within each selected community, eligible households were chosen using systematic random sampling, with the sampling interval determined by dividing the total number of houses by the sample size allocated to that community. All eligible mothers in the selected households were interviewed, and those willing to participate were recruited into the study.

Data Collection and Instrument

Data was collected using an interviewer-administered semi-structured questionnaire containing both closed and open-ended questions. Data generated from the Ibadan HPV study (see appendix 1) based on SAGE expert recommendations and adapted specifically for HPV vaccination utilization, assessing contextual influences, trust in healthcare, vaccine-vaccination specific issues, and cost considerations. The instrument was pretested in Barika, Ibadan North LGA, a location distinct from the study sites. To ensure cultural appropriateness and comprehension, the questionnaire was translated into Yoruba and back-translated into English to maintain original meanings. The instrument demonstrated acceptable internal consistency with a Cronbach's alpha of 0.80.

Study Variables

The primary outcome variable was mothers' willingness to vaccinate their adolescent daughters. Independent variables included baseline socio-demographic data such as age, marital status, religion, occupation, educational attainment, monthly income, and wealth index, as well as the mode of HPV vaccine delivery. Intervening variables encompassed cost-benefit ratio calculations, safety concerns including side effects and previous experiences, confidence factors such as vaccine efficacy and trust in health authorities, complacency reflected in poor risk perception, constraints related to convenience and access, collective responsibility, and cultural contexts including religious and community beliefs.

Data Analysis

Collected data underwent daily entry, checking, and cleaning to ensure completeness and accuracy. The data were subsequently digitally checked for errors, entered, cleaned, and analyzed using IBM SPSS version 20. Variables were recoded where appropriate, and composite indexes for knowledge, perception, and willingness were computed through scoring and rating. Willingness was measured using responses to the section on contextual influences, trust in healthcare, and vaccine-vaccination-specific issues, which primarily consisted of negatively worded items assessing vaccine hesitancy on an agree/disagree scale. Scores above the midpoint indicated greater vaccine hesitancy (lower willingness), while those below were categorized as high willingness. Results were presented in tables with variables summarized using means with standard deviations, frequencies with percentages, and 95% confidence intervals as appropriate. Chi-square test and Fisher's exact test were applied to examine associations between categorical variables, and logistic regression models were constructed to identify factors predicting vaccination choices while controlling for confounders.

Ethical Considerations

Ethical approval

was obtained from the Oyo State Ministry of Health Ethical Review Committee under number NHREC/OYOSHRIEC/10/11/22. Throughout the study implementation, participant confidentiality and privacy were maintained during data collection, and voluntary informed consent was obtained from all respondents prior to their participation.

RESULT

Table 1 presents the socio-demographic characteristics of the respondents, including their age distribution, local government area, residential type, marital status, level of education, religion, relationship with the child, and occupation. The mean age of respondents was 42.57 years (SD $\pm$ 10.89). Out of the total respondents, 37.0% were aged 30–39 years, followed by 32.0% within the 40–49 years category, while those aged below 30 years constituted the lowest proportion (8.2%). Respondents were almost evenly distributed across local government areas, with the highest proportion from Ibadan North (31.1%) and the lowest from Lagelu (17.7%). Slightly more respondents resided in rural areas (51.6%) compared to urban areas (48.4%). The majority of respondents were married (91.1%), while 5.7% were widowed and 3.2% single. Regarding educational attainment, most respondents had secondary education (66.1%), followed by tertiary education (16.1%), while only 2.0% had no formal education. Christianity was the predominant religion (58.4%), followed by Islam (41.6%). Most participants were the mothers of the children (85.0%), while 15.0% served as female guardians. In terms of occupation, traders formed the largest group (60.5%), followed by entrepreneurs (27.7%), while occupations such as civil

servants, teachers, pastors, unemployed individuals, and nurses/midwives constituted much smaller proportions.

Table 1
Socio-demographic Characteristics of Respondents

Variables	Categories	Frequency (%)
Age in years	< 30	36 (8.2)
	30–39	163 (37.0)
	40–49	141 (32.0)
	> 50	100 (22.7)
Mean Age of respondents		42.57 (SD ± 10.89)
Local Government	Ibadan North	137 (31.1)
	Ibadan Northwest	89 (20.2)
	Ido	136 (30.9)
	Lagelu	78 (17.7)
Type Of Residence	Urban	213 (48.4)
	Rural	227 (51.6)
Marital Status	Single	14 (3.2)
	Married	401 (91.1)
	Widowed	25 (5.7)
Education Level	None	9 (2.0)
	Primary	69 (15.7)
	Secondary	291 (66.1)
	Tertiary	71(16.1)
Religion	Christian	257 (58.4)
	Muslim	183 (41.6)
Relationship with Child	Mother	374 (85.0)
	Female Guardian	66 (15.0)
Occupation	Trader	266 (60.5)
	Entrepreneur	122 (27.7)
	Civil Servant	9 (20.0)
	Teacher	13 (3.0)
	Pastor	5 (1.1)
	Unemployed	12 (0.5)

Variables	Categories	Frequency (%)
	Nurses /Midwives	13 (3.0)

Table 2 presents the level of willingness to vaccinate their adolescent daughters and HPV vaccine uptake among adolescents. Findings show that majority (82.5%) showed willingness to vaccinate their adolescent daughters, while 17.5% were not willing. Only 10.5% of respondents reported that their daughters had received the HPV vaccine, while a large majority (89.5%) had not accessed the vaccine. Among those who received the vaccine, the most common place of vaccination was the primary health care (PHC) center, accounting for 45.7%, followed by schools at 34.8%, homes at 13.0%, and clinics or hospitals at 6.5%. The mean age of daughters who received the HPV vaccine was 10.93 years with a standard deviation of ± 2.13 .

Table 2
HPV Vaccination Willingness and Uptake

Variables	Category	Frequency (%)
Mothers Willingness to vaccinate daughter	Yes	363 (82.5)
	No	77 (17.5)
Daughter has received HPV vaccine	Yes	46 (10.5)
	No	394 (89.5)
Place of Vaccination	School	16 (34.8)
	PHC	21 (45.7)
	Clinic/hospital	3 (6.5)
	Home	6 (13.0)
Mean age of daughter that received HPV Vaccine		10.93 (SD ± 2.13)

Table 3 presents the distribution of factors influencing parental decision-making regarding vaccination. Overall, contextual influences were minimal for most respondents, with 96.6% reporting low contextual influence and only 3.4% indicating high contextual influence. Trust in healthcare authorities was high, as 94.8% of parents reported high trust in healthcare, while a small proportion (5.2%) expressed low trust.

Table 3
Distribution of Factors influencing Parental Decision Making

Factors	High Willingness n (%)	Low Willingness n(%)
Contextual Influences	425 (96.6)	15 (3.4)
Trust In Healthcare/ Authority	417(94.8)	23 (5.2)
Vaccine and Vaccination-Specific Issues	377 (85.7)	63 (14.3)
Cost and Calculation	405 (92.0)	35 (8.0)
<i>Note: Composite scores were dichotomized at the midpoint of the possible range for each domain: scores ≤ midpoint indicate high willingness and scores > midpoint indicate low willingness</i>		

With respect to vaccine- and vaccination-specific issues, the majority of respondents demonstrated high trust in vaccines (85.7%), whereas 14.3% reported low trust. Similarly, cost-related considerations appeared to have limited impact on parental decisions, with 92.0% indicating a low influence of cost and only 8.0% reporting a high influence of cost.

Table 4 presents how contextual beliefs and trust in healthcare systems shape parental willingness to vaccinate their adolescent daughters against HPV. Several contextual factors demonstrated statistically significant associations with willingness. Parents who reported they would not vaccinate because others in the community refuse showed significantly lower willingness ($X^2 = 27.294$, $p < 0.001$), indicating strong community conformity effects. Preference for traditional medicine was also significantly associated with reduced willingness ($X^2 = 10.670$, $p = 0.001$), suggesting cultural health practices play an important role.

Table 4

Contextual Influence and Trust in Healthcare influence on Parental Willingness to vaccinate daughter

Variable	Willingness to vaccinate daughters		X ² / Fisher's Exact	P value
	Yes (%)	No (%)		
Contextual Influence				
Community elders oppose HPV vaccine	22(78.6)	4 (14.3)	0.320	0.572
Agree	341(82.8)	71 (17.2)		
Disagree				
Religion opposes HPV vaccine	11 (78.6)	3(21.4)	0.155	0.694
Agree	352(82.6)	74(17.4)		
Disagree				
Won't vaccinate because others won't	6(35.3)	11(64.7)	27.294	< 0.001
Agree	357(84.4)	66(15.6)		
Disagree				
Preference for traditional medicine	27(64.3)	15(35.7)	10.670	0.001
Agree	336(84.4)	62(15.6)		
Disagree				
Friends' opinion influences decision	13(59.1)	9 (40.9)	8.790	0.003
Agree	350(83.7)	68 (16.3)		
Disagree				
Family opinion influences decision	29(61.7)	18(38.3)	15.765	< 0.001
Agree	334(85.0)	59(15.0)		
Disagree				
Wait to see reaction in other children	29(65.9)	15(34.1)	9.321	0.002
Agree	334(84.3)	62(15.7)		
Disagree				

Variable	Willingness to vaccinate daughters		X ² / Fisher's Exact	P value
	Yes (%)	No (%)		
Avoided HPV vaccine due to information heard Agree Disagree	15(51.7) 348(84.7)	14(48.3) 63(15.3)	20.637	< 0.001
Decision Depends on spouse discussion Agree Disagree	144(78.7) 219(85.2)	39(21.3) 38(14.8)	3.153	0.076
Trust in Healthcare and authority				
HPV vaccine is a foreign agenda to reduce population Agree Disagree	19(61.3) 344(84.1)	12(38.7) 65(15.9)	10.391	0.001
HPV vaccine is a government agenda to reduce fertility Agree Disagree	15(51.7) 348(84.7)	14(48.3) 63(15.3)	20.367	< 0.001
Do not trust Health workers Agree Disagree	43(59.7) 320(86.9)	29(40.3) 48(13.1)	30.936	< 0.001
Past negative health care experience Agree Disagree	20(71.4) 343(83.3)	8(28.6) 69(16.7)	2.539	0.111

Social influence emerged as a major determinant. Parental decisions influenced by friends ($X^2 = 8.790$, $p = 0.003$) or family opinions ($X^2 = 15.765$, $p < 0.001$) were significantly less likely to vaccinate. Similarly, parents who preferred to wait and observe reactions in other children demonstrated lower willingness ($X^2 = 9.321$, $p = 0.002$). Avoidance of vaccination due to rumors or hearsay was also associated with significantly higher hesitancy ($X^2 = 20.637$, $p < 0.001$), however, discussing the decision with a spouse did not significantly affect willingness ($p = 0.076$).

Regarding trust in healthcare systems, beliefs that HPV vaccines are part of a foreign population-reduction agenda ($X^2 = 10.391$, $p = 0.001$) or government fertility control strategy ($X^2 = 20.367$, $p < 0.001$) were strongly associated with lower willingness, reflecting conspiracy-driven hesitation. Distrust in healthcare workers also significantly reduced willingness ($X^2 = 30.936$, $p < 0.001$), underscoring the importance of credible health communication. Parents with past negative healthcare experiences, however, showed no significant association with willingness ($p = 0.111$).

Table 5 presents how vaccine-specific concerns, cost considerations, and supportive attitudes influence parental willingness to vaccinate adolescent daughters against HPV. Most vaccine-related concerns, including lack of confidence in vaccine efficacy ($p = 0.732$), previous vaccination experiences ($p = 0.093$), concern about the number of vaccines ($p = 0.872$), and perceived difficulty of the vaccination schedule ($p = 0.778$), did not show statistically significant associations with willingness. This suggests that general concerns about vaccine logistics and previous exposure may not strongly discourage acceptance in this population.

Table 5
Vaccine-Vaccination Specific issues and Cost influence on Parental willingness to vaccinate their daughter

Variable	Willingness to vaccinate daughters		X ² / Fisher's Exact	P value
	Yes (%)	No (%)		
Vaccine and Vaccination Specific Issues				
Not confident that HPV vaccines are effective in preventing infection	83(81.4)	19(18.6)	0.117	0.732
Agree	280(82.8)	58(17.2)		
Disagree				
Previous experiences with vaccinations affect current decision	37(74.0)	13(26.0)	2.823	0.093
Agree	326(83.6)	64(16.4)		
Disagree				
Concerned about the number of vaccines	40(83.3)	8(16.7)	0.026	0.872
Agree	323(82.4)	69(17.6)		
Disagree				
HPV vaccination schedule too difficult to follow	25(80.6)	6(19.4)	0.079	0.778
Agree	338(82.6)	71(17.4)		
Disagree				
Not comfortable when HPV vaccines are given by unknown health worker	58(69.9)	25(30.1)	11.286	0.001
Agree	305(85.4)	52(14.6)		
Disagree				
Cost/Calculation				
Can afford to pay for the vaccine if not free	326(84.0)	62(16.0)	5.258	0.022
Agree	37(71.2)	15(28.8)		
Disagree				

Variable	Willingness to vaccinate daughters		X ² / Fisher's Exact	P value
	Yes (%)	No (%)		
Would be more willing to vaccinate daughter if free	344(84.1)	65 (15.9)	10.391	0.001
Agree	19(61.3)	12(38.7)		
Disagree				
Willingness and Support for HPV vaccination				
Would recommend HPV vaccines to family/friends	354(84.1)	67(15.9)	16.976	< 0.001
Agree	9 (47.4)	10 (52.6)		
Disagree				
Would allow daughter receive HPV vaccine if recommended by doctors	353 (84.2)	66 (15.8)	18.584	< 0.001
Agree	10 (47.6)	11 (52.4)		
Disagree				

However, discomfort when HPV vaccines are administered by known health workers showed a significant association ($X^2 = 11.286$, $p = 0.001$). Cost considerations were also important: parents who could afford the vaccine were more likely to be willing ($X^2 = 5.258$, $p = 0.022$), while willingness increased significantly among parents who preferred the vaccine to be provided free of charge ($X^2 = 10.391$, $p = 0.001$).

Strong positive predictors of willingness were related to supportive attitudes. Parents who would recommend HPV vaccination to family or friends ($X^2 = 16.976$, $p < 0.001$) and those willing to allow vaccination if recommended by doctors ($X^2 = 18.584$, $p < 0.001$) demonstrated significantly higher willingness.

Table 6 presents that most contextual factors were not significant predictors of parental willingness after adjustment, except for a few key influences. Parents who reported that they would not vaccinate their daughter because others would not were significantly more likely to be unwilling to vaccinate in both the crude and adjusted models (AOR = 16.037, $p = 0.004$). While preference for traditional medicine and influence from friends and family were significant at the crude level, only family influence remained statistically significant after adjustment (AOR = 4.048, $p = 0.014$). Regarding trust in healthcare and authority, believing that HPV vaccines are part of a foreign or government fertility-reduction agenda was significant only in the crude analysis, but lost significance after adjustment. However, lack of trust in healthcare workers remained a strong and significant predictor of unwillingness to vaccinate in both

crude and adjusted models (AOR = 0.187, $p < 0.001$), while past negative healthcare experiences showed no significant association.

Table 6

Contextual Influence and Trust in Healthcare influence on Parental Willingness to vaccinate daughter (Logistic Regression)

Variables	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Contextual Influences				
Community elders oppose HPV vaccine	1	0.573	1	0.851
Agree	1.310 (0.513–3.347)		1.177(0.216–6.411)	
Disagree				
Religion opposes HPV vaccine	1	0.695	1	0.851
Agree	1.297(0.353–4.765)		0.364(0.038–3536)	
Disagree				
Won't vaccinate daughter because others won't	1	< 0.001	1	0.004
Agree	19.917 (3.545–27.744)		16.037(2.442–105.308)	
Disagree				
Preference for traditional medicine	1	0.002	1	0.375
Agree	3.011(1.515–5.984)		1.689(0.530–5.833)	
Disagree				
Friends' opinion influences decision	1	0.005	1	0.624
Agree	3.563(1.465–8.666)		0.642(0.109–3.773)	
Disagree				
Family's opinion influences decision	1	< 0.001	1	0.014
Agree	3.514(1.834–6.731)		4.048(1.320–12.417)	
Disagree				
Vaccination decision depends on spouse	1	0.077	1	0.110
Agree	1.561(0.953–2.557)		1.690(0.887–3.218)	
Disagree				
Trust in healthcare/ authority				
HPV vaccines are part of foreign agenda	1	0.002	1	0.852

Variables	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Contextual Influences				
Community elders oppose HPV vaccine	1	0.573	1	0.851
Agree	1.310 (0.513–3.347)		1.177(0.216–6.411)	
Disagree				
Agree	3.343(1.548–7.217)		1.237(0.132–11.557)	
Disagree				
HPV vaccine is a part of government agenda to reduce fertility	1	< 0.001	1	0.056
Agree	5.156(2.372–11.204)		6.222(0.954–40.575)	
Disagree				
Do not trust Healthcare workers	1	< 0.001	1	< 0.001
Disagree	0.222(0.127–0.389)		0.187(0.082–0.425)	
Agree				
Past negative health care experience reduce willingness to vaccinate	1	0.117	1	0.714
Agree	0.117 (0.842–4.698)		0.776(0.200–3.013)	
Disagree				

DISCUSSION

The study population comprised of mothers and female guardians of adolescent female children in Ibadan, characterized by diverse age ranges, occupations, and marital statuses. A total of 440 individuals participated in this research, with an average age of 42.57 years (SD $\pm$ 10.89). The majority were middle-aged, married, and from rural residence type. Most of the respondents held a secondary school education, and the occupational distribution were dominated by traders and entrepreneurs. Most of the respondents held a secondary school education, and the occupational distribution were dominated by traders and entrepreneurs.

A substantial gap was found between parents' willingness to vaccinate their adolescent children (82.5%) and those that actually received vaccinations (10.5%). The 82.5% willingness observed in Ibadan is notably higher than that reported in other Nigerian studies: Kano had 68% [13], Lagos had 65.8% [14]. Also, this rate of vaccination is consistent with what other studies have found as only 1.5% of adolescent girls in Ilorin has received the HPV vaccine [15]. This intention-behavior gap may be due to availability of

vaccines, cost, location of health care providers, and lack of information on vaccine schedules. Although the high rate of willingness to receive vaccinations is promising and presents opportunities for targeted intervention, there are still approximately 17.5% of parents that will need to be engaged through targeted efforts.

Community conformity showed the strongest association with vaccination refusal ($X^2=27.294$, $p < 0.001$). Parents who would not vaccinate because others refuse were significantly less willing, emphasizing how social norms can override individual decision-making. This shows the importance of achieving early, visible uptake to create positive social proof [16]. Traditional medicine preference ($X^2=10.670$, $p = 0.001$) and family influence ($X^2=15.765$, $p < 0.001$) significantly reduced willingness, confirming that vaccination decisions are socially embedded rather than individual. This suggests that vaccine-skeptical attitudes cluster within families, requiring family-centered interventions rather than individual-focused approaches [17]. The 'wait and see' attitude ($X^2=9.321$, $p = 0.002$) reflects cautious parents who prefer others to assume initial risks, suggesting that testimonials from early adopters could be effective. Rumor avoidance strongly impacted willingness ($X^2=20.637$, $p < 0.001$), highlighting vaccination programs' vulnerability to misinformation that spreads rapidly through social networks [18]. Conspiracy beliefs linking HPV vaccines to foreign agendas ($X^2=10.391$, $p = 0.001$) or government fertility control ($X^2=20.367$, $p < 0.001$) represent barriers rooted in historical distrust of externally imposed health interventions [19].

Distrust in healthcare workers ($X^2=30.936$, $p < 0.001$) stood out as a significant barrier. Parents who lack trust in healthcare providers were much less likely to agree to vaccinate, highlighting that trust between providers and patients is crucial for vaccine acceptance [20]. Building this trust involves tackling systemic healthcare quality problems and improving how providers communicate.

Most vaccine-specific concerns, including doubts about efficacy ($p = 0.732$), previous vaccination experiences ($p = 0.093$), worries about vaccine quantities ($p = 0.872$), and scheduling challenges ($p = 0.778$), did not show significant links to willingness, implying that social and trust-related factors are more influential than technical aspects [21]. On the other hand, discomfort with unfamiliar health workers markedly lowered willingness ($X^2=11.286$, $p = 0.001$), indicating a culturally specific obstacle. Since HPV vaccination involves discussing sexual health within conservative Nigerian communities, parents tend to favor familiar, trusted healthcare providers.

Cost played a significant role in influencing willingness, with affordability ($X^2=5.258$, $p = 0.022$) and a preference for free vaccination ($X^2=10.391$, $p = 0.001$) both showing strong links. Although most participants claimed they could afford to pay, willingness increased when vaccines were provided free of charge, underscoring the importance of financial accessibility. In low- and middle-income countries, HPV vaccine uptake largely depends on free provision through national immunization programs [22]. Strong positive links were found between willingness and both recommending vaccination to others ($X^2=16.976$, $p < 0.001$) and accepting doctor recommendations ($X^2=18.584$, $p < 0.001$), which shows the influence of

professional authority. This high level of receptivity indicates that training healthcare workers to make confident, presumptive vaccine recommendations could effectively boost vaccination rates.

The multivariate analysis reveals which factors maintain independent associations with vaccination willingness after controlling for confounders, providing clearer guidance for intervention priorities. The persistence of community conformity (“won’t vaccinate because others won’t”) effects (Adjusted OR = 16.037, $p = 0.004$) as the strongest predictor in the fully adjusted model highlights that decisions made not through independent evaluation of risks and benefits but through observation and imitation of others’ choices. This finding supports social network interventions and community-based approaches rather than solely individual health education.

The sustained significance of family influence (Adjusted OR = 4.048, $p = 0.014$) after adjustment confirms that HPV vaccination decisions are made within family contexts rather than individually. In African contexts, maternal-child health decisions frequently require consultation with husbands, elder relatives, or extended family members [23]. The finding that 41.6% of parents reported vaccination decisions depend on spousal discussion though not statistically significant in final models, still indicates that father engagement is critical. Evidence from couple-based interventions in maternal-child health suggests that involving fathers increases uptake by 20–30% [24].

The persistent strong negative association between healthcare worker distrust and willingness (Adjusted OR = 0.187, $p < 0.001$) confirms that trust in providers is fundamental and cannot be compensated for by other factors. This finding emphasizes the critical importance of healthcare system strengthening, provider training in patient communication, and trust-building initiatives.

The loss of significance for several factors that were significant in crude analysis which includes traditional medicine preference, friends’ influence, conspiracy beliefs, affordability, and doctor recommendation, after adjustment suggests these factors operate through or are confounded by the retained significant variables.

The non-significance of socio-demographic variables (age, marital status, education, religion, employment) in the adjusted model reinforces that vaccination decisions in this context are driven more by social influence and healthcare system trust than by individual demographic characteristics.

CONCLUSION

This study investigated factors influencing parental willingness to vaccinate adolescent girls against HPV in Ibadan, Nigeria, and revealed a significant gap between expressed willingness (82.5%) and actual vaccine uptake (10.5%). This 72% disparity highlights persistent structural, social, and healthcare-system barriers preventing translation of intent into action.

Social influence was the strongest predictor of refusal. Parents who believed others would not vaccinate were 16 times more likely to refuse, while family influence also significantly reduced willingness. These

findings demonstrate that HPV vaccination decisions are socially embedded rather than individually determined. Trust in healthcare providers was another critical determinant; parents who distrusted health workers were five times less likely to support vaccination. Minority beliefs in conspiracy theories and historical distrust reflect deeper institutional challenges.

Contextual concerns such as reliance on traditional medicine, rumors, and “wait-and-see” attitudes showed initial association but lost significance when controlling for confounders, suggesting this act through social and trust-related pathways. Vaccine-specific concerns were comparatively weak predictors, indicating that hesitancy is driven more by system-level trust than by doubts about vaccine effectiveness or safety. Privacy concerns, particularly discomfort with receiving vaccines from familiar healthcare workers, were notable in this culturally conservative setting. High acceptance of healthcare provider recommendations (95.2%) presents a strong opportunity for intervention if trust is strengthened.

Overall, HPV vaccination decisions in Ibadan are shaped primarily by social norms, family influence, and trust in the healthcare system. The large willingness–uptake gap reflects systemic failures in access and delivery rather than resistance to vaccination. Improving uptake will therefore require community-based approaches, trust-building with health workers, strengthened healthcare infrastructure, and financial support mechanisms to ensure equitable access.

Limitations of the Study

While this study provides valuable insights, several limitations should be acknowledged. First, the cross-sectional design prevents causal inferences about the relationships between identified factors and vaccination willingness. Secondly, the study was conducted in Ibadan, limiting generalizability to other Nigerian contexts with different cultural, religious, and healthcare characteristics. Thirdly, the study assessed willingness rather than actual vaccination behavior, and while the implementation gap was documented, detailed barriers to translating willingness into action were not comprehensively explored. Finally, the study did not include male caregivers' perspectives, despite evidence that spousal discussion influences vaccination decision.

Declarations

Ethics approval

Ethical approval for this study was obtained from the Oyo State Ministry of Health Ethical Review Committee (Reference number: NHREC/OYOSHRIEC/10/11/22). All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments.

Consent to participate

Written informed consent was obtained from all respondents prior to participation after a full explanation of the study objectives and procedures. Participation was voluntary, and confidentiality and anonymity of respondents were strictly maintained throughout the study.

Consent for publication

Not Applicable

Availability of Data and Materials

Data from this study has not been made publicly available yet due to confidentiality of research participants, however it would be made available upon reasonable request. Requests on the data should be sent to the corresponding authors.

Competing Interests

The authors declare no competing interests during the process and reporting of this study

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Authors' contributions

MDD and AMA conceived and designed the study. MDD, AMA, contributed to the development and adaptation of the study instrument. AMA coordinated field data collection and supervised research assistants. SOA, FMA, STO, and OAO supported community entry, data collection, and quality assurance. AMA and performed data cleaning and statistical analysis. MDD and AMA interpreted the results and drafted the initial manuscript. All authors contributed to critical revision of the manuscript for important intellectual content, read and approved the final version, and agreed to be accountable for all aspects of the work.

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