

Determinants of cervical cancer knowledge among parents/guardians of girls aged 9–14 years in Irepodun, Osun State, Nigeria.

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Abstract

Background: Cervical cancer accounted for an estimated 13,676 new cases and 7,093 deaths in Nigeria in 2023, despite being largely preventable through human papillomavirus (HPV) vaccination and screening. Parents and guardians play an important role in informed HPV vaccination decisions. This study assessed the level and predictors of cervical cancer knowledge among parents and guardians of girls aged 9–14 years in Irepodun Local Government Area, Osun State, Nigeria.

Methods: A community-based descriptive cross-sectional study was conducted among 305 parents and guardians selected using multistage sampling. Data were collected using a pretested interviewer-administered questionnaire. Cervical cancer knowledge was assessed using a five-item scale and categorized as poor (0–2) or good (3–5). Data were analyzed using SPSS version 23. Associations were examined using Chi-square tests, followed by multivariable logistic regression. Statistical significance was set at $p < 0.05$.

Results: Although 55.7% had heard of cervical cancer, only 34.4% demonstrated good knowledge. Educational attainment, occupation, prior awareness, and information source were significantly associated with knowledge at bivariate analysis. After adjustment, respondents with primary (AOR = 8.3; 95% CI: 1.6–42.2), secondary (AOR = 6.0; 95% CI: 1.2–29.3), and tertiary education (AOR = 21.6; 95% CI: 4.0–117.3) had higher odds of good knowledge than those without formal education. Self-employed respondents had lower odds (AOR = 0.4; 95% CI: 0.2–1.0), while those previously aware of cervical cancer had higher odds (AOR = 14.2; 95% CI: 7.0–29.3).

Conclusion: Cervical cancer knowledge was low despite moderate awareness. Education and prior awareness were strong predictors of knowledge. Targeted community-based health education should strengthen accurate cervical cancer information, particularly among less-educated and rural populations, to support informed HPV vaccination decisions.

Keywords: Cervical cancer; Knowledge; Parents; Determinants; Girls; Nigeria

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INTRODUCTION

Cervical cancer accounted for an estimated 13,676 new cases and 7,093 deaths in Nigeria in 2023, despite being largely preventable through human papillomavirus (HPV) vaccination, cervical screening, and timely management of precancerous lesions [1]. Globally, cervical cancer is the fourth most common cancer among women, with approximately 660,000 new cases and 350,000 deaths reported in 2022; nearly 90% of the burden occurs in low- and middle-income countries, reflecting persistent inequities in access to preventive and treatment services [2,3]. These disparities highlight the need to strengthen primary prevention, particularly HPV vaccination, alongside screening and appropriate treatment.

Persistent infection with high-risk HPV types is the necessary cause of virtually all cervical cancer cases, with HPV-16 and HPV-18 accounting for approximately 70% of cases worldwide [3,4]. Although most HPV infections are transient and resolve spontaneously, persistent infections with high-risk types can progress through cervical intraepithelial neoplasia to invasive cervical cancer over several years [3,4]. HPV vaccination therefore represents a critical primary prevention strategy, particularly when administered before HPV exposure. The World Health Organization (WHO) recommends routine HPV vaccination for girls aged 9–14 years as part of its global strategy for cervical cancer elimination [3]. The effectiveness of this strategy depends not only on vaccine availability and programme delivery but also on informed acceptance and uptake among eligible populations.

Nigeria incorporated HPV vaccination into its National Programme on Immunization in October 2023, targeting girls aged 9–14 years [5]. This policy provides an important opportunity to reduce the future burden of cervical cancer; however, sustained programme impact requires adequate knowledge and

acceptance of HPV vaccination among parents and caregivers. Evidence from Nigeria indicates that parental knowledge, attitudes, and perceptions are associated with the willingness to vaccinate and the acceptance of HPV vaccination [6,7,8]. Parents and guardians who understand the relationship between HPV infection and cervical cancer may be better positioned to make informed vaccination decisions, whereas inadequate knowledge may contribute to misconceptions, hesitancy, and missed opportunities for prevention [6,7].

Within the current body of available evidence, Nigerian studies have examined parental knowledge of cervical cancer and HPV vaccination, but much of the evidence has been generated from urban, healthcare-based, or non-rural populations [6,7,8]. Evidence from rural communities remains comparatively limited, despite potential differences in educational attainment, access to reliable health information, healthcare utilization, and exposure to organized health promotion activities [9]. Findings from urban or facility-based populations may therefore have limited applicability to rural communities where access to preventive information and services may differ.

In Irepodun Local Government Area (LGA), Osun State, evidence on cervical cancer knowledge among parents and guardians of girls eligible for HPV vaccination remains limited. Generating context-specific evidence is important for identifying knowledge gaps and determinants that can inform targeted health education, community engagement, and HPV vaccination promotion. Accordingly, this study assessed the level and predictors of cervical cancer knowledge among parents and guardians of girls aged 9–14 years in Irepodun LGA (Local Government Area), Osun State, Nigeria.

The add value of this study to the science

This study:

- Contributes to scientific knowledge by providing evidence on parental knowledge and perceptions of HPV vaccination and their influence on vaccine uptake and cervical cancer prevention.
- Informs the development of contextually appropriate interventions and strategies that enhance parental awareness, support informed decision-making, and improve participation in HPV vaccination programmes and broader cervical cancer prevention efforts.

METHODS

Study Design

A community-based analytical cross-sectional study was conducted among parents and guardians of girls aged 9–14 years in Irepodun Local Government Area (LGA), Osun State, Nigeria. The study employed a quantitative approach to assess cervical cancer knowledge and identify factors associated with knowledge among the study population.

Study Settings and Population

The study was conducted in Irepodun Local Government Area of Osun State, located in South-Western Nigeria. Irepodun LGA comprises eleven political wards and consists predominantly of rural communities where farming, trading, and small-scale businesses constitute the major occupations. Primary healthcare services are provided through several primary healthcare centres distributed across the LGA. The study area was selected because it represents a predominantly rural population where evidence on parental knowledge of cervical cancer remains limited despite the recent introduction of the national Human Papillomavirus (HPV) vaccination programme in Nigeria. The study population comprised parents and guardians of girls aged

9–14 years who were permanent residents of Irepodun LGA and had lived in the selected communities for at least six months before the survey.

Inclusion criteria

Participants were eligible if they were parents or guardians of at least one girl aged 9–14 years; were aged 18 years or older; had resided in the selected community for at least six months; and provided written informed consent to participate.

Where more than one eligible caregiver was present in a household, only one respondent was selected and interviewed to ensure independence of observations and prevent clustering of responses within households.

Exclusion criteria

Parents or guardians who were critically ill, unable to communicate effectively during data collection, or declined participation were excluded from the study.

Sample Size and Sampling

The minimum sample size was calculated using the single population proportion formula: $n = Z^2pq/d^2$. A prevalence of 23.6% was applied, based on the proportion of women with adequate knowledge of cervical cancer risk factors reported among women in an urban slum in Lagos, Southwest Nigeria [10]. With a 95% confidence level ($Z = 1.96$), 5% margin of error, and $q = 0.764$, the calculated sample size was 277. After adjusting for a 10% non-response rate, the minimum sample size was 305.

Because a multistage sampling technique was employed, participants were selected from multiple administrative levels within the study area. However, clustering was minimized through random selection at each sampling stage and by interviewing only one eligible respondent per household. A multistage sampling technique was employed to select

eligible parents and guardians of girls aged 9–14 years in Irepodun LGA [11]. At the first stage, six of the eleven political wards in the LGA were selected by simple random sampling using balloting without replacement, giving each ward an equal probability of selection. At the second stage, a sampling frame of eligible communities within each selected ward was obtained from local government and community administrative records, from which five communities were selected per ward using simple random sampling by balloting without replacement. At the third stage, a sampling frame of streets within each selected community was developed from available community administrative records and verified with community leaders and local administrative officials. Six streets were then selected from each community using simple random sampling by balloting without replacement. At the fourth stage, the first household on each selected street was identified using the bottle-spinning technique, whereby the direction indicated by a spun bottle determined the starting direction for household selection. Thereafter, eligible households were selected systematically until the required number of respondents for each street was obtained. Where more than one eligible parent or guardian was present in a household, one respondent was selected for interview.

The dependent and independent variable of this study

The primary outcome variable was cervical cancer knowledge, measured using five items. The five knowledge items are presented in Appendix 1. The items assessed whether respondents knew that: (1) human papillomavirus (HPV) can cause cervical cancer; (2) HPV infection is a risk factor for cervical cancer; (3) cervical cancer is an inherited disease passed from parents to children; (4) HPV causes sores or growths in the genital area; and (5) HPV vaccination can protect against cervical cancer. All respondents were administered the knowledge questions

irrespective of whether they had previously reported hearing of cervical cancer. This approach enabled assessment of knowledge across the entire study population and minimized potential exclusion of respondents who could correctly identify specific cervical cancer or HPV-related facts despite reporting no prior awareness of cervical cancer.

Each correct response was assigned one point, while incorrect and “Don't know” responses were assigned zero points. The five items were summed up to produce a total knowledge score ranging from 0 to 5. Respondents who scored 3–5 points ($\geq 60.0\%$) were classified as having good cervical cancer knowledge, whereas those who scored 0–2 points ($< 60.0\%$) were classified as having poor cervical cancer knowledge [13]. For regression analysis, cervical cancer knowledge was coded as a binary dependent variable, with poor knowledge coded as 0 and good knowledge coded as 1. The independent variables comprised respondents' socio-demographic characteristics and selected awareness and information-related factors considered potentially associated with cervical cancer knowledge. These included age, marital status, education, relationship with parents/guardian, religion, gender, previous awareness of cervical cancer, and source of information about cervical cancer/HPV. These variables were assessed using structured questionnaire items and were categorized according to the study objectives and the distribution of responses in the dataset. At the bivariate level, associations between each independent variable and cervical cancer knowledge were assessed using the Chi-square test. Variables that met the predefined criterion for inclusion at the bivariate level were subsequently entered into the multivariable logistic regression model to identify factors independently associated with good cervical cancer knowledge.

Study instruments.

Primary data were collected in 2025 using a structured interviewer-administered

questionnaire adapted and modified from previously published studies on cervical cancer knowledge and HPV vaccination in Nigeria, including study [12], and other relevant peer-reviewed literature. The questionnaire was tailored to the study objectives and local context and comprised sections on socio-demographic characteristics, awareness of cervical cancer, sources of information, and knowledge of cervical cancer and HPV.

Validity and reliability of the instrument

The questionnaire was reviewed by experts in public health and epidemiology to assess its relevance, clarity, adequacy, and coverage of the study constructs. Based on their recommendations, items were revised and refined to ensure that the instrument adequately captured the study objectives and was appropriate for the local context. The questionnaire was pretested among respondents in a neighboring Local Government Area with socio-demographic characteristics comparable to those of the study population. The internal consistency of the five-item cervical cancer knowledge scale was assessed using Cronbach's alpha, which yielded a coefficient of 0.95, indicating excellent internal consistency. However, the high coefficient may partly reflect conceptual overlap among some items assessing closely related aspects of cervical cancer and HPV knowledge.

Statistical analysis

Data were entered, cleaned, and analyzed using IBM SPSS Statistics version 23. Descriptive statistics were used to summarize respondents' socio-demographic characteristics and study variables.

The adequacy of the multivariable logistic regression model was assessed using the Omnibus Test of Model Coefficients and the Hosmer–Lemeshow goodness-of-fit test. The Omnibus Test indicated that the fitted model significantly improved prediction compared with the intercept-only model ($p < 0.001$), while

the Hosmer–Lemeshow test demonstrated good model fit ($\chi^2 = 3.471$, $df = 8$, $p = 0.901$). Multicollinearity among the independent variables was assessed using tolerance values and variance inflation factors (VIF). No evidence of problematic multicollinearity was observed, with tolerance values ranging from 0.961 to 0.994 and VIF values ranging from 1.007 to 1.040."

Categorical variables were presented as frequencies and percentages. Associations between independent variables and cervical cancer knowledge were assessed using the Pearson Chi-square test. Variables with $p < 0.05$ at bivariate analysis were entered simultaneously into a multivariable binary logistic regression model to identify factors independently associated with good cervical cancer knowledge. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported, and statistical significance was determined at $p < 0.05$.

Although source of information was significantly associated with cervical cancer knowledge at the bivariate level, it was not included in the multivariable logistic regression because the variable was collected only from respondents who had previously heard of cervical cancer, resulting in substantial missing data for respondents who were unaware of the disease. Including this variable would have substantially reduced the sample size and compromised comparability across participants.

RESULTS

Awareness and Knowledge of Cervical Cancer

Among the 305 parents and guardians, 170 (55.7%) reported having previously heard of cervical cancer, whereas 135 (44.3%) had never heard of the disease. Overall, cervical cancer knowledge was generally low, with 200 (65.6%) respondents demonstrating poor

knowledge and 105 (34.4%) demonstrating good knowledge (Table 1).

Table 1. Awareness and Knowledge of Cervical Cancer (n=305)

<i>Variable</i>	<i>Awareness and Knowledge of Cervical Cancer</i>	
	Yes n (%)	No n (%)
Have you ever heard of cervical cancer?	170 (55.7)	135 (44.3)
Knowledge items		
HPV can cause cervical cancer	184 (60.3)	121 (39.7)
Cervical cancer is an inherited disease	99 (32.5)	206 (67.5)
HPV can cause sores or growths in genital	96 (31.5)	209 (68.5)
HPV vaccine protects against cervical cancer?	82 (26.9)	223 (73.1)
Overall knowledge level		
Good (score 3-5)	105 (34.4)	
Poor (score 0-2)	200 (65.6)	

Source: Primary data, 2025

Among the 170 respondents who had previously heard of cervical cancer, family members and friends were the most frequently reported source of information 87 (51.2%),

followed by healthcare providers 44 (25.9%), community health talks 22 (12.9%), mass media (television, radio, and the internet) 15 (8.8%), and schools 2 (1.2%) (Table 2).

Table 2. Source of Information on Cervical Cancer (n=170).

Source of Information	Frequency (n)	Percentage (%)
Where did you hear about cervical cancer?		
Family/Friend	87	51.2
Healthcare Provider	44	25.9
Community Health Talk	22	12.9
Media (TV, Radio, Internet)	15	8.8
School	2	1.2
Total	170	100.0

Source: Primary data, 2025

The association between respondents' socio-demographic characteristics, awareness of cervical cancer, source of information, and cervical cancer knowledge is presented in Table 3. Educational level, occupation, awareness of cervical cancer, and source of information were significantly associated with cervical cancer knowledge ($p < 0.05$). In contrast, respondents' age ($\chi^2 = 4.76$, $p = 0.093$), relationship to the eligible child ($\chi^2 = 8.18$, $p = 0.085$), gender (χ^2

$= 0.50$, $p = 0.480$), religion ($\chi^2 = 4.41$, $p = 0.110$), and marital status ($\chi^2 = 2.77$, $p = 0.429$) were not significantly associated with cervical cancer knowledge.

Respondents with tertiary education had the highest proportion of good cervical cancer knowledge 37/56 (66.1%), compared with those with secondary education 38/130 (29.2%), primary education 28/98 (28.6%), and

no formal education 2/21 (9.5%) ($\chi^2 = 34.10$, $p < 0.001$). Similarly, private sector employees 8/14 (57.1%) and civil servants 33/73 (45.2%) demonstrated higher proportions of good cervical cancer knowledge than self-employed 36/131 (28.0%) and unemployed respondents 27/86 (31.4%) ($\chi^2 = 10.13$, $p = 0.017$).

Respondents who had previously heard of cervical cancer demonstrated a significantly higher proportion of good cervical cancer knowledge 93/170 (54.7%) than those who had

never heard of the disease 12/135 (8.9%) ($\chi^2 = 71.98$, $p < 0.001$). Among respondents who had heard of cervical cancer, the reported source of information was also significantly associated with knowledge ($\chi^2 = 13.31$, $p = 0.010$). Respondents who reported the mass media 14/15 (93.3%) and schools 2/2 (100.0%) had the highest proportions of good knowledge; however, these estimates should be interpreted cautiously because they were based on small subgroup sizes.

Table 3. Factors Associated with knowledge of Cervical Cancer (n=305) (Bivariate Analysis)

Variable	Category	Poor n (%)	Good n (%)	χ^2	P-value
Age of parent/guardian (years)	≤39	59 (70.2)	25 (29.8)	4.76	0.093
	40-49	41 (55.4)	33 (44.6)		
	≥50	100 (68.0)	47 (32.0)		
Relationship of parent/guardian to daughters	Biological parent	129 (61.4)	81 (38.6)	8.18	0.085
	Relative	31 (66.0)	16 (34.0)		
	Stepparent	23 (82.1)	5 (17.9)		
	Grandparent	10 (83.3)	2 (16.7)		
	Legal guardian	7 (87.5)	1 (12.5)		
Gender	Female	135 (66.8)	67 (33.2)	0.50	0.480
	Male	65 (63.1)	38 (36.9)		
Education	Secondary	92 (70.8)	38 (29.2)	34.10	<0.001
	Primary	70 (71.4)	28 (28.6)		
	Tertiary	19 (33.9)	37 (66.1)		
	No formal education	19 (90.5)	2 (9.5)		
Occupation	Self-employed	95 (72.0)	36 (28.0)	10.13	0.017
	Unemployed	59 (68.6)	27 (31.4)		
	Civil servant	40 (54.8)	33 (45.2)		
	Private sector employee	6 (42.9)	8 (57.1)		
Religion	Islam	120 (69.0)	54 (31.0)	4.41	0.110
	Christianity	59 (57.8)	43 (42.2)		
	Traditional	21 (72.4)	8 (27.6)		
Marital status	Married	144 (63.7)	82 (36.3)	2.77	0.429
	Divorced	26 (74.3)	9 (25.7)		

	Single parent	21 (63.6)	12 (36.4)		
	Widowed	9 (81.8)	2 (18.2)		
Have you ever heard of cervical cancer?	No	123 (91.1)	12 (8.9)	71.98	<0.001
	Yes	77 (45.3)	93 (54.7)		
Source of Information	Family/Friend	38 (43.7)	49 (56.3)	13.31	0.010
	Healthcare provider	25 (56.8)	19 (43.2)		
	Community health talk	11 (50.0)	11 (50.0)		
	Media (TV, Radio, Internet)	1 (6.7)	14 (93.3)		
	School	0 (0.0)	2 (100.0)		

Source: Primary data, 2025

Variables that were statistically significant at the bivariate analysis were considered for multivariable logistic regression. However, although source of information was significantly associated with cervical cancer knowledge at the bivariate level, it was not included in the multivariable model because it was assessed only among respondents who had previously heard of cervical cancer ($n = 170$), which would have substantially reduced the analytical sample.

After adjusting for potential confounders, educational level, self-employed, and awareness of cervical cancer remained independently associated with cervical cancer knowledge (Table 4). Compared with respondents with no formal education, those with primary education were approximately eight times more likely to have good cervical cancer knowledge (AOR = 8.3, 95% CI: 1.6–42.2, $p = 0.011$). Likewise, respondents with secondary

education (AOR = 6.0, 95% CI: 1.2–29.3, $p = 0.028$) and tertiary education (AOR = 21.6, 95% CI: 4.0–117.3, $p < 0.001$) had significantly higher odds of good cervical cancer knowledge than respondents with no formal education.

Regarding occupation, self-employed respondents had significantly lower odds of good cervical cancer knowledge than unemployed respondents (AOR = 0.4, 95% CI: 0.2–0.9, $p = 0.025$). However, no significant associations were observed among civil servants (AOR = 1.0, 95% CI: 0.4–2.2, $p = 0.905$) or private sector employees (AOR = 0.9, 95% CI: 0.2–4.3, $p = 0.896$).

Respondents who had previously heard of cervical cancer were over fourteen times more likely to have good cervical cancer knowledge than those who had never heard of the disease (AOR = 14.2, 95% CI: 6.8–29.3, $p < 0.001$).

Table 4. Factors Associated with knowledge of Cervical Cancer ($n=305$) (Multivariate Analysis)

Variable	Category	AOR	95% CI	P-value
Education	Primary	8.3	(1.6 - 42.2)	0.011
	Secondary	6.0	(1.2 - 29.3)	0.028
	Tertiary	21.6	(4.0 - 117.3)	<0.001

	No formal education	1 (Ref)	-	-
Occupation	Self-employed	0.4	(0.2 - 0.9)	0.025
	Civil servant	1.0	(0.4 - 2.2)	0.905
	Private sector employee	0.9	(0.2 - 4.3)	0.896
	Unemployed	1 (Ref)	-	-
Have you ever heard of cervical cancer?	Yes	14.2	(6.8 - 29.3)	<0.001
	No	1 (Ref)	-	-

Source: Primary data, 2025

Discussion of Research Findings

Awareness of Cervical Cancer

The present study found that 170 (55.7%) of the 305 respondents had previously heard of cervical cancer, while 135 (44.3%) had not. This level of awareness was similar to the 53.5% reported among parents of adolescent girls in Surulere, Lagos, by Akinleye et al. [7]. However, awareness in the present study was substantially higher than the 11.4% reported among parents in Jos, Plateau State, by Anyaka et al. [8]. It was also lower than the 92.3% reported among women aged 30–49 years in Addis Ababa, Ethiopia [14], although the latter population differed considerably from the present study in setting, educational profile, and exposure to health services. Similarly, among women living with HIV in North-Central Nigeria, Atibioke et al. [15] reported 76.2% awareness, which was higher than the 55.7% observed in the present study. These differences may reflect variation in study populations, educational attainment, healthcare contact, geographical setting, and exposure to organized health-information activities.

Importantly, the moderate awareness observed in this study did not correspond to adequate overall knowledge. Although 55.7% had heard of cervical cancer, only 34.4% demonstrated good knowledge, indicating a substantial gap between disease recognition and comprehensive understanding. This pattern is consistent with evidence from North-Central

Nigeria, where 76.2% of women living with HIV were aware of cervical cancer but only 34.6% demonstrated comprehensive knowledge [15]. It also accords with the findings of Akinleye et al. [7] where 53.5% of parents had heard of cervical cancer, but only 19.0% demonstrated good knowledge of cervical cancer prevention. These findings suggest that exposure to the name of the disease does not necessarily provide sufficient understanding of its causes, risk factors, prevention, and the protective role of HPV vaccination.

The moderate awareness observed in this predominantly rural population may partly reflect increasing community sensitization following the introduction of Nigeria's national HPV vaccination programme in 2023. However, the 44.3% who had never heard of cervical cancer indicate that important information gaps remain. Strengthening community-based health education through primary healthcare facilities, schools, community leaders, and appropriate mass-media platforms may therefore be necessary to improve both awareness and the depth of knowledge required for informed HPV vaccination decisions.

Level of Knowledge of Cervical Cancer

Overall cervical cancer knowledge was low in the present study: 200 (65.6%) respondents had poor knowledge, while only 105 (34.4%) had good knowledge. This finding is higher than the

19.0% good knowledge of cervical cancer prevention reported among parents in Surulere, Lagos, by Akinleye et al. [7]. It was also higher than the very limited disease-specific knowledge reported among parents in Jos, where only 11.4% had heard of cervical cancer and 1.6% had knowledge of HPV [8]. However, the proportion with good knowledge in the present study was lower than the 42.7% reported among secondary-school girls in Enugu State [16], and lower than the 52.6% reported among women aged 30–49 years in Addis Ababa, Ethiopia [14]. Direct comparison should nevertheless be interpreted cautiously because the studies used different populations, questionnaires, knowledge domains, and classification thresholds.

The finding that only 34.4% demonstrated good knowledge despite 55.7% having previously heard of cervical cancer further indicates that awareness alone may be insufficient to produce comprehensive knowledge. Similar gaps have been documented elsewhere. For example, Atibioke et al. [15] reported 76.2% cervical cancer awareness but only 34.6% comprehensive knowledge among women living with HIV in North-Central Nigeria. Likewise, the Addis Ababa study found that 92.3% had heard of cervical cancer, but only 52.6% had good overall knowledge [14]. These findings support the distinction between simply having heard of cervical cancer and possessing sufficient knowledge of HPV infection, risk factors, prevention, screening, and vaccination.

The relatively low knowledge level in the present rural population may reflect limited access to structured health information and differences in educational attainment. In addition, 51.2% of respondents who had previously heard of cervical cancer identified family members or friends as their source of information, whereas only 25.9% identified healthcare providers. Informal interpersonal communication may increase exposure to health information but may not consistently

provide comprehensive or technically accurate information. Consequently, community-based interventions should prioritize structured, evidence-based education on cervical cancer, HPV infection, screening, and HPV vaccination through trusted primary healthcare and community platforms.

Sources of Information

Family members and friends were the most common source of information, reported by 51.2% of respondents who had previously heard of cervical cancer. Healthcare providers accounted for 25.9%, community health talks for 12.9%, mass media for 8.8%, and schools for 1.2%. The prominence of interpersonal communication is consistent with findings from Nigeria. Atibioke et al. [15] reported that 56.4% of women in Kwara State and 67.3% in Niger State obtained cervical cancer information from family or friends.

Although healthcare providers have an important role in delivering structured preventive health education, their contribution in this study was lower than that of family and friends. The limited contribution of schools may partly reflect the study population, which consisted of parents and guardians rather than students. The relatively small number identifying mass media as their source also limits conclusions regarding its role.

Although source of information was associated with knowledge at bivariate analysis, the high proportions of good knowledge among respondents reporting mass media and schools should not be interpreted as evidence that these channels are superior. Only 15 respondents reported mass media and two reported schools, making these estimates statistically unstable. Nevertheless, evidence among Nigerian female youth has suggested a positive association between social-media peer communication and knowledge of cervical cancer prevention [17]. Appropriately designed digital and peer-based communication may

therefore complement conventional community and health-facility education.

Predictors of Cervical Cancer Knowledge

Educational attainment was strongly associated with cervical cancer knowledge. Compared with respondents without formal education, those with primary, secondary, and tertiary education had 8.3-, 6.0-, and 21.6-fold higher odds of good knowledge, respectively. The high proportion of good knowledge among respondents with tertiary education at bivariate analysis, 66.1%, compared with 9.5% among those without formal education, further demonstrates a substantial educational gradient.

This finding is consistent with evidence from Addis Ababa, where women with higher educational attainment had higher odds of good cervical cancer knowledge (AOR = 2.23; 95% CI: 1.49–3.34) than women without formal education [14]. The larger magnitude observed for tertiary education in the present study may reflect differences in population characteristics, knowledge measurement, educational distribution, and exposure to health information.

Formal education may facilitate health literacy and comprehension of health messages and may improve the ability to identify and interpret health information. The finding therefore supports the need for communication strategies that are accessible to individuals with different levels of education, particularly in predominantly rural settings.

Self-employed respondents had 60% lower odds of good knowledge than unemployed respondents (AOR = 0.4; 95% CI: 0.2–0.9). At bivariate analysis, good knowledge was observed among 28.0% of self-employed respondents, compared with 31.4% of unemployed respondents, 45.2% of civil servants, and 57.1% of private-sector employees. Evidence specifically examining occupation as a determinant of parental cervical

cancer knowledge remains limited. The observed association may reflect differences in exposure to organized health information, work schedules, healthcare contact, or socioeconomic and educational characteristics. It should therefore be interpreted as an association rather than a causal relationship.

Previous awareness of cervical cancer was the strongest independent predictor identified. Respondents who had previously heard of cervical cancer had 14.2 times higher odds of good knowledge than those who had never heard of it (AOR = 14.2; 95% CI: 6.8–29.3). At bivariate analysis, 54.7% of those who had heard of cervical cancer demonstrated good knowledge compared with only 8.9% among those who had never heard of the disease.

However, awareness should not be interpreted as sufficient in itself. In this study, 55.7% had heard of cervical cancer, yet only 34.4% had good knowledge. Similar gaps have been reported in North-Central Nigeria and Addis Ababa [14,15]. Interventions should therefore move beyond increasing recognition of the disease and emphasize accurate, comprehensive, and practically relevant information.

Study Limitations

Several limitations should be considered. Cross-sectional design prevents establishing temporal or causal relationships between the identified factors and cervical cancer knowledge; observed associations should therefore be interpreted as correlational. Residual confounding from unmeasured factors, including previous exposure to health education programmes, access to healthcare services, and socioeconomic circumstances, cannot be excluded.

Previous awareness and sources of information were self-reported and may have been affected by recall or social desirability bias. Data collection by trained research assistants using a standardized, pretested

interviewer-administered questionnaire in a private setting was used to reduce potential measurement errors. The knowledge instrument demonstrated high internal consistency (Cronbach's $\alpha = 0.95$), although this does not eliminate recall or reporting bias.

Some adjusted associations, particularly tertiary education, had wide confidence intervals, indicating imprecision that may reflect small subgroup sizes. In addition, although multistage sampling was used, the statistical analysis did not account for clustering introduced by the sampling design. Categories of information sources such as mass media ($n = 15$) and schools ($n = 2$) also contained few respondents; findings involving these categories should therefore be interpreted cautiously and should not be regarded as evidence of comparative effectiveness.

The five-item knowledge scale did not comprehensively assess HPV-specific knowledge, attitudes toward HPV vaccination, or vaccination uptake. Consequently, the study cannot establish whether cervical cancer knowledge translates into positive attitudes or actual HPV vaccination uptake. The study was conducted in a single, predominantly rural LGA in Osun State, which may limit generalizability to other populations, particularly urban populations and settings outside Osun State.

Study Implications

The findings highlight the need to strengthen cervical cancer prevention and HPV vaccination education, as good knowledge was limited despite moderate prior awareness. Health education should provide information on cervical cancer, HPV, risk factors, prevention, and vaccination. Communication strategies should be accessible to individuals with different educational levels, using simple language and appropriate approaches through primary healthcare facilities, community outreach, and trained health workers. Parents and guardians with lower educational

attainment or limited exposure should receive attention. Trusted information channels should be strengthened, while future studies should assess whether targeted education improves knowledge, vaccine acceptance, and vaccination uptake.

CONCLUSION

This study concluded that cervical cancer awareness among parents and guardians of girls aged 9–14 years in Irepodun Local Government Area was moderate, while overall knowledge remained limited. Educational attainment, prior awareness of cervical cancer, and self-employment were significant determinants of better knowledge. These findings suggest that increasing awareness alone is insufficient to achieve adequate knowledge. Strengthening community-based health education through primary healthcare facilities, schools, community outreach programmes, and appropriate mass media platforms should be prioritized to improve the quality of cervical cancer information provided to parents and guardians. Interventions should particularly target individuals with lower educational attainment and underserved rural populations to support informed decision-making regarding HPV vaccination and contribute to cervical cancer prevention efforts in Nigeria.

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Author contributions

AJ conceived and designed the study, provided administrative support and study materials, and collected and assembled the data.

AJ performed data analysis and interpretation. AJ drafted the manuscript and critically revised it for important intellectual content. The author read and approved the final manuscript.

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Ethics approval and consent to participate

Ethical approval for the study was obtained from the Osun State Health Research Ethics Committee (Approval No. OSHREC/PRS/569T/884). Permission to conduct the study was also obtained from the Irepodun Local Government Area authorities and traditional leaders of the selected communities. Participants were informed about the study's purpose, procedures, potential benefits and risks, and their rights before participation. Information was provided in clear and understandable language, with translation into Yoruba for participants who did not speak English. Written informed consent was obtained from all participants; for participants who were unable to read or write, a thumbprint was obtained as evidence of consent. Participation was voluntary, and participants were informed of their right to withdraw at any stage without penalty. Consent included permission to use the collected data for academic purposes and publication, with measures taken to ensure that no personally identifiable information was disclosed.

Competing interests

The authors declare that they have no competing interests.

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