GMR
The Original

RELATIONSHIP OF HUMAN PAPILLOMA VIRUS VACCINATION KNOWLEDGE AND ACCEPTABILITY AMONG UNDERGRADUATE NURSING STUDENTS IN MEDICAL MEDICAL UNIVERSITY

Shabar Uddin[1*], Dr Husan Bano[2], Khushboo Chandio[3], Himat Ali Rind[4], Ali Gohar Lashari[5], Majid Ali Maitlo[6]

[1]MSN scholar, peoples nursing school liquat university of medical health sciences Jamshoro, Shabar.lashari@gmail.com
[2]Associate professor people's Nurisng school, husan.bano@lumhs.edu.pk
[3]lecture peoples nursing Lumhs Jamshoro, khushboo.chandio@lumhs.edu.pk
[4]MSN scholar, People's Nursing school, Liaquat university of medical and health sciences Jamshoro, himat2k8@yahoo.com
[5]MSN schalor, People's Nursing school, Liaquat university of medical and health sciences Jamshoro, aligoharlashari92@gmail.com
[6]Institute of Microbiology, Shah Abdul Latif University, Khairpur, majidmaitlo@gmail.com

ABSTRACT

Introduction: Human Papilloma Virus is one of the most common viral infections affecting the genital tract. It primarily infects the cervix and is associated with a variety of health problems in both males and females, including genital warts and several types of cancer, particularly cervical cancer

Objectives: To assess the knowledge regarding HPV and its vaccine among undergraduate nursing students.

Methods: A cross-sectional study was conducted among 228 undergraduate nursing students at Liaquat Medical University Data was composed by means of a organized self-administered survey. Descriptive statistics were used to summarize demographic characteristics, knowledge, and acceptability levels. Test of Chi-square was applied to determine the link among variables, with a significance level of $p < 0.05$.

Results: The mean age of participants was 23 ± 2 years. Most students had low knowledge regarding HPV (41.7%), while knowledge regarding the HPV vaccine was predominantly moderate (56.6%). The level of acceptability toward HPV vaccination was mainly moderate (40.4%). A statistically important connotation was originate among HPV knowledge and vaccine acceptability ($p = 0.04$). A highly significant association was observed between HPV vaccine knowledge and acceptability ($p < 0.001$).

Conclusion: Undergraduate nursing students demonstrated moderate knowledge regarding HPV immunization and moderate vaccine acceptability. Higher HPV vaccine knowledge was meaningfully associated with greater acceptability, highlighting the importance of educational interventions to improve awareness and promote HPV vaccination.

KEYWORDS: Human Papilloma Virus, HPV Vaccine, Knowledge, Acceptability, Nursing Students.

1. INTRODUCTION

Human Papiloma Virus (HPV) is viral infection is the most common infection of the genital organs especially uterus cervix and is the cause of various symptoms in both females and male [1]. There remain about one hundred dissimilar kinds of HPV viruses, which feast finished direct interaction, with sexual interaction and additional sorts of interaction with the venereal region, impending into indirect interaction with substances such as a toilet bench [2]. HPV causes cervical cancer and it varies from country to country and region to region, it is the fourth most common type of cancer in women worldwide [3]. About 570,000 females and 60,000 males get affected by HPV infection every year [4]. The World Health Organization (WHO) reported that 7.5% of cancer-related female deaths are due to cervical cancer, and is the most common out of all caused by HPV and ranks 3rd in females aged 15 to 44 and it is the 2nd leading cause of death in Asia. Up to date, there has been no nationwide screening of HPV in Pakistan to report the national prevalence of HPV infection [5].

HPV vaccination prevents cervical, head and neck, and ano-genital cancers. Here is in height-inevitability indication that HPV vaccinations guard in contradiction of cervical pre cancer in adolescent girls and women who are inoculated amid 15 and 26 ages of stage [6]. In older women, vaccinated between 25 to 45 years of age, the effects of HPV vaccine on pre cancer are smaller, which may be due to previous exposure to HPV[6]. HPV-related diseases through herd immunity. HPV vaccination should be directed at prepubescent children before [7]. According to WHO data, global initial-dose HPV immunization coverage between girls aged 9-14 is only around 31% as of 2024. In lower income countries under Gavi support, uptake has been increasing, but remains low (6% in 2023) for full immunization. In Pakistan specifically, several studies show that although more than half of participants may be aware of HPV and its vaccine (e.g. 65% in a cross-sectional study), very few have actually been vaccinated (3-20%) depending on the group [1]. Barriers include lack of awareness of vaccine availability, beliefs of not being at risk, concerns about cost, and insufficient inclusion in health curricula [8]. A recent cross sectional study done by in Pakistan among the adults between January 2022 to March 2022 in which the awareness of HPV Acceptability of its vaccine and associated factors were assessed. The study has suggested

that 65.2% adult were have knowledge HPV infection,61.9% were known HPV the cause of gentile warts 53.3% reported that HPV cause any type of cancer, the younger age was associated with HPV vaccine [9].
Nursing students are not just future nurses they are health educators, community role models**,** and will be expected to provide vaccine counselling and health promotion. In Pakistan (or similar settings), nursing students already see themselves as future health promoters and express positive attitudes toward health education. Thus knowing how much they know about HPV & how willing they are to vaccinate accept vaccine is very relevant. Knowledge and attitudes improve with higher education more exposure; so assessing their knowledge & acceptability across academic years can identify where gaps are, for example early vs later $_{\text{years}}$ [10]

1.1 Overview of HPV Vaccination

The HPV vaccine is designed to protect against the most common high-risk and low-risk types of HPV. Vaccines such as bivalent, quadrivalent, and nonavalent formulations provide immunity against HPV strains responsible for the majority of cervical cancer cases and genital warts. The vaccine is most effective when administered before the onset of sexual activity,
typically recommended for adolescents and young adults [11].
Despite its proven efficacy and safety, HPV vaccination uptake remnants suboptimal in many areas due to various barricades, including lack of mindfulness, misconceptions, cultural beliefs, and incomplete access to health care facilities [12].

1.2 Knowledge of HPV and Vaccination

Knowledge plays a crucial role in shaping health behaviors and decision-making. Adequate knowledge about HPV infection, its transmission, associated risks, and prevention methods significantly influences individuals' willingness to accept vaccination. Among healthcare students, particularly nursing students, knowledge is even more critical as they are future healthcare providers responsible for patient education and advocacy [13].
Though the HPV vaccination is harmless and real, it has had incomplete acceptance in the US, particularly in the qualified new mature populace. Here is robust indication that poor breadwinner information [14, 15].
Studies have shown that insufficient knowledge about HPV and its vaccine can lead to low acceptance rates, even among educated populations. Misconceptions regarding vaccine safety, side effects, and necessity further contribute to hesitancy [16].

1.3 Acceptability of HPV Vaccination

Acceptability refers to the willingness of individuals to receive or recommend the HPV vaccine. It is influenced by multiple factors, including personal beliefs, cultural norms, perceived susceptibility to disease, and trust in healthcare systems. In the context of nursing students, acceptability is also shaped by professional responsibility and clinical exposure [17].
The health student residents is a exclusive population in the setting of HPV. They include the
following group of people, domestic physicians ,medicine, and other clinicians, primary care which will principal chats around the HPV vaccination. Though, they are also for myself linked to the HPV vaccination thesis as they are qualified for the vaccination themselves. In detail, they frequently reduction inside the highest-risk stage collection for HPV contagion, an stage collection in which persons are additional probable to trial with spoken sex, a main risk issue of said HPV [18].
Understanding the level of acceptability among undergraduate nursing students is essential because they serve as a bridge between healthcare systems and the community. Their attitudes toward vaccination can significantly impact public health outcomes through patient counseling and health promotion activities [19].

1.4 Role of Nursing Students in HPV Prevention

Undergraduate nursing students are key stakeholders in healthcare delivery and health education. As future nurses, they play an important role in promoting vaccination programs, educating patients, and reducing vaccine hesitancy. Their level of knowledge and acceptance of HPV vaccination directly influences their ability to advocate for preventive healthcare measures [20].
Enhancing their understanding and positive attitudes toward HPV vaccination can lead to improved vaccination coverage and reduced incidence of HPV-related diseases [21].
Nursing students also play a vital role in addressing myths and misconceptions surrounding Human Papillomavirus vaccination. In many communities, especially in developing countries, HPV vaccination is often associated with stigma due to its link with sexual transmission. As part of their training, nursing students are equipped with communication and counseling skills that enable them to provide culturally sensitive education. By delivering accurate and evidence-based information, they can help reduce fear, correct false beliefs, and encourage informed decision-making among patients and their families [22]. Furthermore, nursing students contribute to preventive healthcare through participation in community outreach programs, awareness campaigns, and immunization drives. Their involvement in such initiatives not only enhances public awareness but also strengthens their own understanding and professional competence. By actively engaging in health promotion activities related to HPV vaccination, nursing students can serve as role models and advocates for preventive practices, ultimately supporting efforts to decrease the occurrence of HPV-associated illnesses in the population **[23].** Another important issue is the limited accessibility of HPV vaccination services. The vaccine is not yet fully integrated into routine national immunization programs, and its cost can be a barrier for many individuals. As a result, even those who are willing to receive the vaccine may not proceed due to financial issues.

This study aimed to assess undergraduate nursing students' knowledge and acceptability of human papillomavirus (HPV) vaccination at a medical university and to examine the relationship between their level of knowledge regarding HPV and its vaccine and their acceptability of HPV vaccination. HPV is a major etiological factor associated with cervical cancer; however, limited awareness and suboptimal vaccine acceptability remain important public health concerns in Pakistan. Nursing students, as future healthcare professionals, play a vital role in providing evidence-based health information, educating patients, and promoting preventive healthcare practices within communities. Assessing their knowledge and attitudes toward HPV vaccination is therefore essential to identify potential knowledge gaps and factors influencing vaccine acceptability. Addressing these gaps through targeted educational interventions may strengthen their capacity to recommend and promote HPV vaccination, ultimately contributing to improved awareness and vaccination uptake

2. METHODOLOGY

2.1 Study Setting and Study design

The analytical cross sectional study was conducted between January to June 2026 at Liaquat University of Medical and Health Sciences, Jamshoro which is tertiary care Hospital in Sindh. After the Ethical approval from the Ethical Review Committee of LUMHS, Jamshoro, the
data was collected using a structured, adopted questionnaire [1]. All Participants were informed about the research objectives. Informed consent was obtained from all participants.

2.2 Sample Size

The total population of undergraduate nursing students in Peoples Nursing School, Jamshoro was 440. Using the Raosoft software sample size calculator with a 95% confidence level, 5% margin of error, and a response distribution of 50%, the required sample size was 206 students. To account for a possible 10% nonresponse rate, the adjusted sample size was established as 228 respondants

2.3 Sample Method

A stratified probability sampling technique was used. The total sample size was 228 undergraduate nursing students. The students were divided into four strata according to their year of study (1st, 2nd, 3rd, and 4th year). From each stratum, an equal number of 57 students was selected through simple random sampling using the student lists provided by the Medical University This ensured equal representation of all academic years and reduced sampling bias.

2.4 Suitability Standards

The study included undergraduate nursing students enrolled in the Bachelor of Science in Nursing (BSN) program who were aged 18 years or above and provided informed consent to participate. Students who were not enrolled in the BSN program, were unwilling to participate, or did not provide informed consent were excluded from the study.

2.5 Data Collection procedure

After obtaining approval from the Ethical Review Committee (ERC). The data was collected through structured adopted questionnaires. The questionnaire distributed among students in classrooms.

2.6 Data Collection Tool

A structured questionnaire used as the primary data collection tool. It consists of two sections:
The first section involved questions regarding Demographic variables like age, gender, year of study, residence).
The second were related to Human Papilloma Virus vaccination knowledge and acceptability, and factors influencing the acceptability of HPV vaccination. The questionnaire/tool permission was obtained via email [1].

2.7 Data Analysis procedure

Statistical analysis was performed by IBM SPSS version 27 for. Descriptive statistics (frequencies, percentages, mean, and standard deviation) was calculated. The chi square test was applied to identify the Relationship between independent and dependent variables. A p-value of <0.05 considered as statistically significant.

3. Ethical consideration:

Institutional permission for data collection was obtained from the concerned institute, Ethical approval was obtained from the Ethical Review Committee (ERC) at Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro No.LUMHS/REC/-1216. The research objective was briefed to all participants. Written agreement was obtained from the participants. Information sheets was provided in English Urdu, Sindhi to ensure clarity. Confidentiality was strictly maintained by assigning unique identification codes to participants and storing

3.1 Informed Consent

Written informed consent was obtained from each participant prior to enrollment in the study.

4. RESULTS

Table 4.1: Demographic characteristics of participants(n=228)

Variables	Categories	Frequency (n)	Percentage (%)
AGE	18-20	47	20.6
	21-23	73	32.0
	24-26	108	47.4
	18-20	47	20.6
YEAR OF STUDY	First year	106	46.5
	second year	63	27.6
	Third year	42	18.4
	Fourth year	17	7.5
	First year	106	46.5
	Second year	63	27.6
GENDER	Male	128	56.1
	Female	100	43.85

Among 228 participants, 108 (47.4%) were aged 24–26 years, followed by 73 (32.0%) aged

21–23 years and 47 (20.6%) aged 18–20 years. Regarding the year of study, 106 (46.5%) were in the 1st year, 63 (27.6%) were in the 2nd year, 42 (18.4%) were in the 3rd year, and 17 (7.5%) were in the 4th year. In terms of gender, 128 (56.1%) were male, while 100 (43.9%) were female as shown in table above.

Table 4.2: Knowledge and awareness about human papilloma virus

S.NO	Characteristics	Categories	n=228	Percentage
1	Before taking this survey, had you ever heard of Human Papillomavirus (HPV)?	Yes No	150 78	65.8 34.2
2	Do you know that HPV transmit	Yes No	168 60	73.7 26.3
3	Can HPV infect both men and women?	Yes No	156 72	68.4 31.6
4	Can HPVinfection occur without symptoms?	Yes No	210 18	92.1 7.9
5	Does HPV cause genital warts/lesions	Yes No	160 68	70.2 29.8
6	Have you ever heard about any relation between HPV and any type of cancer?	Yes No	45 183	19.7 80.3
7	Do you know that HPV can cause cancer	Yes No	137 91	60.1 39.9
8	Does cervical cancer have a screening test?	Yes No	15 213	6.6 93.4
9	Does HPV usually go away without treatment	Yes No	15 213	6.6 93.4
10	Can cancer of the neck of the womb (cervical cancer) be prevented?	Yes No	154 74	67.5 32.5
11	Do you know the modes of prevention of Human Papillomavirus (HPV)?	Yes No	149 79	65.4 34.6
12	Do you think that there is a high probability of contracting HPV infection?	Yes No	149 79	65.4 34.6

Knowledge and awareness about HPVVaccine				
S.NO	Characteristics	Category	n=228	Percentage
13	Do you have knowledge about any source of information regarding HPV vaccination and its prevention?	Yes No	149 79	65.4 34.6
14	Is there a vaccine that prevents HPV?	Yes No	149 79	65.4 34.6
15	Does the HPV vaccine prevent cervical cancer?	Yes No	221 7	96.9 3.1
16	Does the HPV vaccine protect against all types of cervical cancer?	Yes No	221 7	96.9 3.1
17	Do you know that male and female both should be vaccinated for HPV?	Yes No	122 106	53.5 46.5
18	Is the HPV vaccine only for people who are sexually active?	Yes No	122 106	53.5 46.5

Among 228 participants, 150 (65.8%) had heard of HPV, and 168 (73.7%) knew that HPV is transmissible. 156 (68.4%) recognized that HPV can infect both men and women, while 210 (92.1%) knew that HPV infection may occur without symptoms. Knowledge that HPV causes genital warts was reported by 160 (70.2%) participants. Only 45 (19.7%) had heard of the association between HPV and cancer, 137 (60.1%) knew that HPV can cause cancer. Awareness of cervical cancer screening of HPV was reported only 15 (6.6%)**.**15(6.6%) Reported that HPV usually go away without treatment, 154 (67.5%) knew that cervical cancer can be prevented.145(65.4) knew the mode of prevention from HPV 149, (65.4%)thinks that the high probability of contracting HPV infections.

Among 228 participants, 149 (65.4%) had knowledge of HPV vaccination and its information sources,149 (65.4%) knew about the availability of vaccine to prevent HPV infection. Almost all participants, 221 (96.9%) told that the HPV vaccine helps prevent cervical cancer. 122 (53.5%) identified that both males and females should receive the HPV vaccine, while the same number, 122 (53.5%)**,** responded that HPV vaccination in only for those who are sexually active

Table 4.3: Acceptance of HPV Vaccine

S.NO	**Characteristics**	**Category**	**n=228**	**Percentage**
1	Have you been vaccinated against HPV?	Yes No	86 142	37.7 62.3
2	Would you be willing to get vaccinated against HPV in the future?	Yes No	142 86	62.3 37.7
3	Would you consider your daughter to get vaccinated	Yes No	215 13	94.3 5.7
4	Would you like to receive information about HPV vaccination	Yes No	215 13	94.3 5.7
5	Do you believe that HPV vaccination is effective in preventing cervical cancer, and would you accept it based on this belief?	Yes No	227 1	99.6 0.4

Out of 228 participants, 86 (37.7%) had received the HPV vaccine,142 (62.3%) were eager to obtain the HPV vaccination in the future. A total of 215 (94.3%) would considers the HPV vaccination for their daughters. Similarly, 215 (94.3%) expressed interest in receiving information about HPV vaccination. Almost all

participants, 227 (99.6%), believed that HPV vaccination is effective in preventing cervical cancer and accepted the vaccine based on this belief.

TABLE NO. 4.4: Knowledge Regarding HPV N=228

Knowledge	Frequency	Percent
Low	95	41.7
Moderate	74	32.5
High	59	25.9
Total	228	100.0

Above table presents the level of knowledge regarding HPV among undergraduate nursing students. Out of 228 participants, 95 (41.7%) students had low knowledge regarding HPV, while 74 (32.5%) students demonstrated a moderate level of knowledge. In contrast, only 59 (25.9%) students had a high level of knowledge regarding HPV. Overall, the findings indicate that the majority of the participants possessed low to moderate knowledge about HPV.

TABLE NO.4.5: Knowledge Regarding HPV Vaccine N=228

Knowledge	Frequency	Percent
Low	13	5.7
Moderate	129	56.6
High	86	37.7
Total	228	100.0

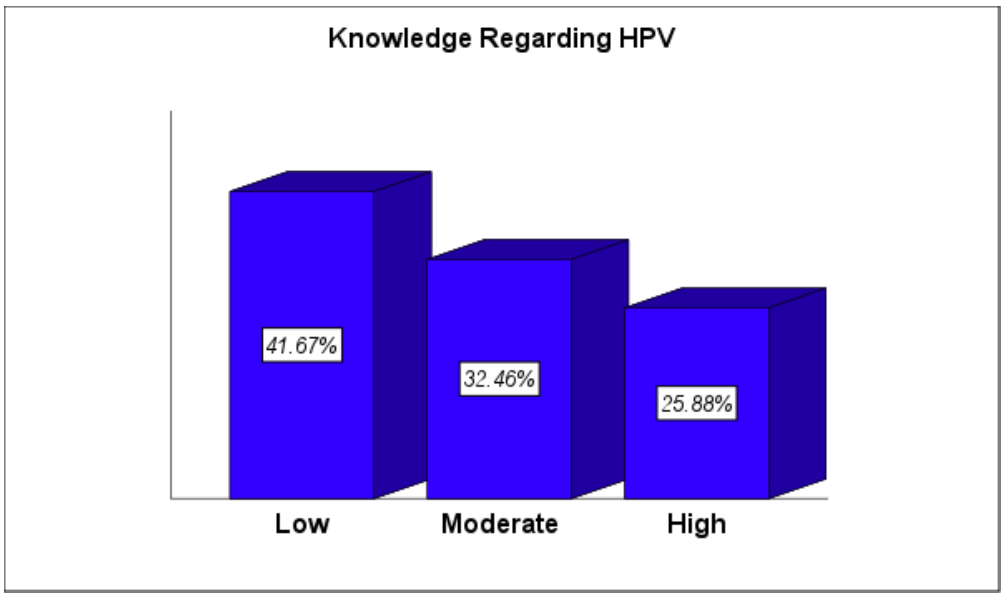


Figure 4.1. The standards of information regarding HPV among undergraduate nursing scholars Above table No. 4.5 shows and figure 4.1 show the level of knowledge regarding the HPV vaccine among undergraduate treatment scholars. Out of 228 participants, the majority of the students, 129 (56.6%), had a moderate level of information concerning the HPV vaccine. Furthermore, 86 (37.7%) students demonstrated a high level of

knowledge, while only 13 (5.7%) students had low knowledge regarding the HPV vaccine. Overall, the findings indicate that most participants possessed moderate to high knowledge about the HPV vaccine.

TABLE NO. 4.6 : ACCEPTABILITY LEVEL N=228

Acceptability level	Frequency	Percent
Low	67	29.4
Moderate	92	40.4
High	69	30.3
Total	228	100.0

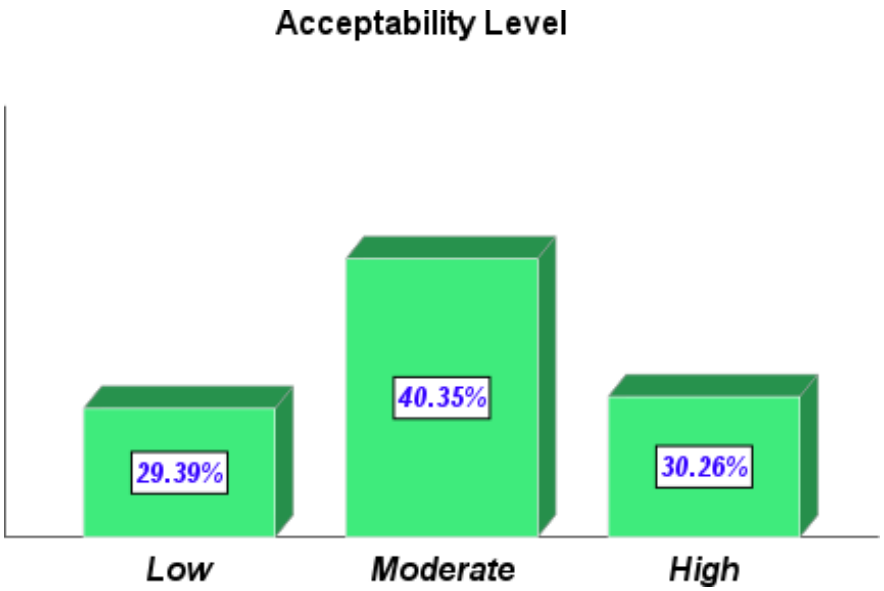


Figure 4. 2. the acceptability level of the HPV vaccine among undergraduate nursing students

The above table and figure illustrate the acceptability level of the HPV vaccine among undergraduate nursing students. Out of 228 participants, the majority of the students, 92 (40.4%), demonstrated a moderate level of acceptability toward the HPV vaccine. In addition, 69 (30.3%) students showed a high level of acceptability, while 67 (29.4%) scholars had a little equal of acceptability. Overall, the findings suggest that most participants had a moderate equal of acceptability concerning the HPV vaccination.

Table No .4.7. Association between HPV knowledge items and overall knowledge category (N = 228)

HPV Knowledge Item	Response	Low (n)	Moderate (n)	High (n)	Total	p-value
Before taking this survey, had you eve heard of Human Papillomavirus (HPV)?	No	67	9	2	78	<0.001
	Yes	28	65	57	150	
Do you know that HPV is transmitted?	No	51	9	0	60	<0.001
	Yes	44	65	59	168	
Can HPV infect both men and women?	No	70	2	0	72	<0.001

	Yes	25	72	59	156	
Can HPV infection occur withou symptoms?	No	18	0	0	18	<0.001
	Yes	77	74	59	210	
Does HPV cause genital warts/lesions?	No	61	7	0	68	<0.001
	Yes	34	67	59	160	
Have you ever heard about any relation between HPV and any type of cancer?	No	63	71	49	183	<0.001
	Yes	32	3	10	45	
Do you know that HPV can cause cancer?	No	58	32	1	91	<0.001
	Yes	37	42	58	137	
Does cervical cancer have a screening test?	No	90	74	49	213	0.20
	Yes	5	0	10	15	
Does HPV usually go away withou treatment?	No	90	74	49	213	0.10
	Yes	5	0	10	15	
Can cancer of the neck of the womb (cervical cancer) be prevented?	No	33	41	0	74	0.02
	Yes	62	33	59	154	
Do you know the modes of prevention o Human Papillomavirus (HPV)?	No	38	41	0	79	<0.001
	Yes	57	33	59	149	
Do you think that there is a high probability of contracting HPV infection?	No	38	41	0	79	<0.001
	Yes	57	33	59	149	

Table No .4.7 presents the association between individual HPV knowledge items and the overall HPV knowledge category among the participants. Most HPV knowledge items were significantly associated with the overall level of HPV knowledge ($p < 0.05$). Participants, who had heard of HPV, knew its mode of transmission, recognized that it can infect both men and women, understood that infection may occur without symptoms, and were aware of its relationship with genital warts, cancer, and prevention methods were more likely to have moderate or high knowledge levels. However, knowledge regarding cervical cancer screening ($p = 0.20$) and the natural clearance of HPV infection without treatment ($p = 0.10$) did not show a statistically significant association with the overall HPV knowledge category.

Table No. 4.8. Association between HPV vaccine Items and Overall HPV Vaccine Knowledge Category among Study Participants (N = 228)

HPV Vaccine Knowledge Item	Response	Low (n)	Moderate (n)	High (n)	Total	p-value
Do you have knowledge about any source o information regarding HPV vaccinatior and its prevention?	No	13	129	0	142	<0.001
	Yes	0	0	86	86	
Is there a vaccine that prevents HPV?	No	13	129	0	142	<0.001
	Yes	0	0	86	86	
Does the HPV vaccine prevent cervica cancer?	No	13	0	0	13	<0.001
	Yes	0	129	86	215	
Does the HPV vaccine protect against al types of cervical cancer?	No	13	0	0	13	<0.001
	Yes	0	129	86	215	
Do you know that both males and female should be vaccinated against HPV?	No	13	0	0	13	<0.001
	Yes	0	129	86	215	
Is the HPV vaccine only for people who are sexually active?	No	1	0	0	1	<0.001
	Yes	12	129	86	227	

Table No. 4.8 shows the association between HPV vaccine knowledge items and the overall HPV vaccine knowledge category. All vaccine-related knowledge items demonstrated a statistically significant association with the overall HPV vaccine knowledge level ($p < 0.001$). Participants with higher vaccine knowledge were more likely to know about the availability of the HPV vaccine, its role in preventing cervical cancer, the target population for vaccination, and reliable sources of information regarding HPV vaccination.

Table No 4.9. Association between Individual HPV Vaccine Acceptance Items and Overall HPV Vaccine Acceptance Category among Study Participants (N = 228)

HPV Vaccine Acceptance Item	Response	Low (n)	Moderate (n)	High (n)	Total	p-value
Q.1 Have you been vaccinated agains HPV?	No	66	88	32	186	<0.001
	Yes	1	4	37	42	

Q.2 If your answer to Question 1 of thi section was 'No', would you be willing to get vaccinated agains HPV in the future?	No	63	21	30	114	<0.001
	Yes	4	71	39	114	
Q.3 If you have a daughter(s), would you consider getting her/them vaccinated?	No	63	21	30	114	<0.001
	Yes	4	71	39	114	
Q.4 If you have a daughter(s) in the futur would you consider getting her/them vaccinated?	No	64	21	30	115	<0.001
	Yes	3	71	39	113	
Q.5 Would you like to receive information about HPV vaccination?	No	64	21	30	115	<0.001
	Yes	3	71	39	113	
Q.6 Do you believe that HPV vaccination is effective in preventing cervical cancer and would you accept it based on thi belief?	No	67	91	32	190	<0.001
	Yes	0	1	37	38	

Table No 4.9 presents the association between individual HPV vaccine acceptance items and the overall HPV vaccine acceptance category. All acceptance items were significantly associated with the overall level of HPV vaccine acceptance ($p < 0.001$). Participants with higher acceptance were more likely to report previous vaccination, express willingness to receive the HPV vaccine in the future, consider vaccinating their daughters, seek additional information about HPV vaccination, and believe on the vaccination is actual in stopping cervical growth.

Table No. 4.10. Association of Characteristics with Level of Acceptability N=228

Characteristics	**Level of acceptability**			**P-Value**
	Low	**Moderate**	**High**	
Age 18-20	28	8	11	
21-23	23	42	8	<0.001
23-25	16	42	50	
Year of study				
1st year	30	57	19	<0.001
2nd year	19	26	18	
3rd year	15	8	19	
4th year	3	1	13	
HPV Knowledge				
Low	26	44	25	0.04
Moderate	21	34	19	
High	20	14	25	

HPV Vaccine Knowledge				
Low	3	8	2	<0.001
Moderate	54	45	30	
High	10	39	37	

Table 4.10 presents the association between participants' characteristics and the level of acceptability of the HPV vaccine among undergraduate nursing students. A statistically significant association was observed between age and level of acceptability ($p < 0.001$). Participants aged 23–25 years demonstrated the highest level of acceptability, with 50 students exhibiting high acceptability, whereas participants aged 18–20 years showed comparatively lower acceptability.

A significant association was also found between year of study and level of acceptability ($p < 0.001$). Fourth-year students demonstrated the highest level of acceptability, with 13 students reporting high acceptability, while first-year students were more likely to report moderate acceptability. Knowledge regarding HPV was significantly associated with the level of acceptability ($p = 0.04$). Students with high HPV knowledge showed greater vaccine acceptability, whereas those with low HPV knowledge were more likely to demonstrate low or moderate acceptability. Similarly, knowledge regarding the HPV vaccination showed a highly important connotation with vaccination acceptability ($p < 0.001$). Participants with high HPV vaccine knowledge were more likely to report high acceptability, while those with low vaccine knowledge predominantly exhibited low or moderate acceptability.

5. DISCUSSION

The current study investigated the relationship between awareness of Human Papillomavirus (HPV), knowledge of HPV vaccination, and vaccine acceptability among undergraduate nursing students at a medical University The findings provide important insights into students' understanding of HPV infection and vaccination and highlight the factors associated with vaccine acceptance. Given the future role of nursing students as frontline healthcare professionals, their knowledge and attitudes toward HPV vaccination may influence not only their personal vaccination decisions but also their ability to counsel patients and promote preventive health practices.

The predominant age group of participants was 24–26 years, accounting for 47.4% of the sample, with a mean age of 23 ± 2 years. Similarly, Shamsi et al. conducted study on 480 peoples and reported means age as 27 ± 10 years [1]. However, a multicenter study conducted among 1,056 university students in Punjab, Pakistan, reported a younger mean age of 19.5 ± 0.5 years, with 67.0% of participants aged 17–23 years [64].

The present study revealed that 41.7% of students had limited awareness of HPV, whereas 56.6% demonstrated moderate knowledge of the HPV vaccine. Likewise, Khan et al. reported that only 57% of university students had previously heard of HPV, 55% recognized its association with cervical cancer, and 40.5% did not know the mode of HPV broadcast [65]. However, Atif et al. found that only 31.3% of university students in Punjab had heard of HPV, 16.4% were aware of HPV vaccination obtainability, and 55.9% had below-average HPV knowledge [64]. These findings indicate that the moderate level of vaccine knowledge observed
in the present study is comparatively encouraging; however, the proportion of students with limited HPV awareness remains a major educational concern. Comparable knowledge deficiencies have also been documented internationally as well. Among 307 nursing students in Saudi Arabia, Abdelaliem et al. reported that 73.5% had a little level of HPV data, although 57% demonstrated moderate attitudes toward HPV vaccination [66]. Similarly, a study among healthcare students in western India found that knowledge regarding HPV vaccination was approximately 50%, despite more than 80% of participants demonstrating general knowledge of cancer [67]. In Ethiopia, only 41% of female university students demonstrated good HPV-related knowledge [68]. Collectively, these findings support the present observation that basic awareness of HPV does not necessarily translate into comprehensive knowledge of vaccination, dosing schedules, target age groups, transmission routes, or long-term preventive benefits.

The acceptability of HPV vaccination in the present study was predominantly moderate (40.4%), while 30.3% of students demonstrated high acceptability. This finding is broadly consistent with previous studies reporting favorable attitudes despite inadequate HPV knowledge [15,16]. Atif et al. observed that, although HPV vaccination acceptance between Pakistani university scholars was only 2.3%, nearly two-thirds demonstrated positive attitudes toward procurement HPV-associated info and vaccination [64]. Likewise, a Pakistani study among female undergraduate students reported that 77.1% intended to receive HPV vaccination in the future, although only 19.3% had actually been vaccinated [69]. These findings illustrate an important knowledge–intention–practice gap in Pakistan, where favorable attitudes do not necessarily result in vaccine uptake.

International comparisons show similar patterns. In Saudi Arabia, 57% of nursing students demonstrated

moderate attitudes toward HPV vaccination despite 73.5% having low HPV knowledge [66]. A western Indian study reported that more than 80% of healthcare students had a positive attitude toward HPV vaccination, yet only 7.72% were vaccinated; notably, 42.7% identified inadequate knowledge as a reason for non-vaccination [67]. In Ethiopia, only 30% of female university students expressed willingness to receive the vaccine, while 57.5% demonstrated a favorable perception of HPV and its vaccine [68]. The moderate acceptability identified in the current study may therefore reflect barriers extending beyond knowledge, including concerns regarding vaccine safety, limited accessibility, cost, sociocultural sensitivity surrounding sexually transmitted infections, and insufficient recommendation by healthcare professionals [15,16]. These factors are particularly relevant in Pakistan, where discussions concerning sexual and reproductive health may be socially sensitive and can restrict open communication regarding HPV prevention [64].

A statistically significant association was identified between general HPV knowledge and vaccine acceptability ($p = 0.04$), while HPV vaccine-specific knowledge demonstrated a highly significant association with acceptability ($p < 0.001$). Students with greater vaccine knowledge were more likely to express favorable attitudes toward receiving or recommending HPV vaccination. These findings strongly support previous evidence suggesting that knowledge is a major determinant of HPV vaccine attitudes and acceptance. Among Saudi nursing students, HPV knowledge accounted for approximately 48% of the variance in attitudes toward vaccination, indicating that knowledge was an important predictor of vaccine-related attitudes [66]. Similarly, research from Ethiopia demonstrated that good HPV vaccine knowledge was significantly associated with vaccine utilization, with knowledgeable students being more than twice as likely to utilize the vaccination (AOR = 2.36; 95% CI: 1.48–3.76) [70]. The present findings therefore reinforce health behavior theories suggesting that accurate knowledge may increase perceived susceptibility, perceived disease severity, and recognition of the benefits of preventive interventions [17,18].
The stronger association between vaccine-specific knowledge and acceptability ($p < 0.001$), compared with general HPV knowledge ($p = 0.04$), is particularly noteworthy. This suggests that knowing about HPV infection alone may be insufficient to influence vaccination decisions. Instead, students may require specific information regarding vaccine efficacy, safety, recommended age groups, dose schedules, and cancer-prevention benefits. This interpretation is supported by Pakistani evidence showing that physician recommendations were the strongest influence on students' HPV vaccination decisions, followed by parental and peer recommendations [64,65]. Therefore, educational interventions should move beyond general HPV awareness and provide clear, evidence-based vaccine counseling.

Significant associations were also observed between vaccine acceptability and age ($p < 0.001$), year of study ($p < 0.001$), and program transfer status ($p < 0.001$). Older and senior students demonstrated greater vaccine acceptability, possibly due to increased academic exposure, clinical experience, and maturity in health-related decision-making. This finding is consistent with research from Ethiopia, where year of study was significantly associated with willingness to receive HPV vaccination [68]. Studies among healthcare students have also suggested that students with greater exposure to clinical education possess better knowledge and more favorable attitudes toward HPV prevention [66,67]. The higher acceptability among senior nursing students in the present study may therefore reflect cumulative exposure to subjects such as microbiology, oncology, community health nursing, reproductive health, and preventive medicine.

Students attending the morning shift also demonstrated greater vaccine acceptability. Although the underlying reasons cannot be definitively established from the present cross-sectional data, this difference may be associated with variations in academic schedules, access to faculty and
institutional resources, participation in health education activities, or differences in student characteristics. Further investigation is required to determine whether study shift independently influences HPV vaccine acceptability or represents the effect of other academic and sociodemographic factors.

The findings of the present study have important implications for nursing education and public health in Pakistan. Globally, cervical cancer accounted for approximately 660,000 new cases and 350,000 deaths in 2022, with nearly 90% of the burden occurring in low- and middle-income countries [71]. Persistent infection with high-risk HPV types is the principal cause of cervical cancer, making HPV vaccination a fundamental component of cervical cancer prevention [71]. The World Health Organization has emphasized HPV vaccination as a central pillar of the global strategy for cervical cancer elimination and estimates that implementation of the elimination strategy could prevent approximately 60 million cervical cancer cases and 45 million deaths over the next century [72].

Within this context, nursing students represent an important target group for HPV education. As future frontline healthcare professionals, nurses are expected to provide vaccine counseling, address misconceptions, communicate vaccine safety information, and encourage preventive health behaviors. The moderate attitudes and significant knowledge gaps identified in the present study indicate that undergraduate nursing education should provide more structured HPV-related content. Integration of HPV epidemiology, modes of transmission, HPV-

associated cancers, vaccine safety and effectiveness, recommended vaccination schedules, and patient counseling into nursing curricula may improve both knowledge and vaccine acceptance. Regular awareness workshops, seminars, peer-education programs, and practical counseling sessions should also be implemented. Considering the strong influence of healthcare professionals on vaccination decisions reported in Pakistani studies [64,65], strengthening nurses' communication and counseling competencies may have broader benefits for community vaccine uptake.

The present study has several limitations. First, the single-institution design limits the generalizability of the findings to nursing students from other universities and geographical regions of Pakistan. Second, the use of self-reported data may have introduced recall and social desirability bias, particularly because HPV is associated with culturally sensitive sexual and reproductive health issues. Third, the cross-section project fixes not permit fundamental inference between HPV knowledge and vaccine acceptability. Additionally, factors such as socioeconomic status, previous healthcare provider recommendations, personal vaccination history, vaccine cost, religious perceptions, and exposure to misinformation were not comprehensively evaluated. Future multicenter longitudinal and interventional studies involving nursing and other healthcare students from different provinces of Pakistan are recommended. Such studies should assess whether structured HPV educational interventions produce sustained improvements in knowledge, vaccine acceptance, actual vaccine uptake, and students' willingness to recommend vaccination to patients.

Overall, the present findings demonstrate that nursing students possess moderate HPV vaccine knowledge and attitudes, but substantial gaps in HPV awareness remain. The significant association between vaccine-specific knowledge and acceptability highlights education as a potentially important modifiable determinant of HPV vaccination attitudes. Strengthening undergraduate nursing curricula, implementing regular evidence-based awareness programs, and developing practical vaccine counseling skills may enhance the preparedness of future nurses to contribute to HPV prevention and cervical cancer control in Pakistan.

6. CONCLUSION

This study assessed the relationship between HPV vaccination knowledge and acceptability among undergraduate nursing students. The findings showed that most students had moderate knowledge regarding the HPV vaccine and a moderate level of vaccine acceptability. A important relationship was found between HPV vaccine knowledge and acceptability, indicating that students with better knowledge were more likely to accept the vaccine. The study also found significant associations between acceptability and factors such as age, year of study, and program shift. Overall, the findings highlight the importance of improving HPV-related education among nursing students to enhance vaccine acceptance and support future efforts in HPV prevention and cervical cancer control.

7. RECOMMENDATIONS

Regular educational sessions and awareness programs on HPV infection and vaccination should be conducted for nursing students, while HPV-related content should be strengthened within the undergraduate nursing curriculum to enhance their knowledge and understanding. Workshops and seminars should also be organized to address misconceptions and promote positive attitudes toward HPV vaccination. Furthermore, nursing students should be encouraged to participate in health promotion activities focusing on HPV prevention and cervical cancer awareness. Universities should collaborate with healthcare organizations to disseminate accurate information and improve awareness regarding HPV vaccination. Additionally, further research should be conducted across different universities and larger study populations to gain a better understanding of the factors influencing HPV vaccine acceptability.

REFERENCES

1. Shamsi, U., et al., Human papillomavirus vaccine awareness and acceptability for primary prevention of cervical Cancer in Pakistan: a cross-sectional study. Asian Pacific Journal of Cancer Prevention: APJCP, 2024. 25(3): p. 813.
2. Farsi, N.J., et al., Human papillomavirus knowledge and vaccine acceptability among male medical students in Saudi Arabia. Human Vaccines & Immunotherapeutics, 2021. 17(7): p. 1968-1974.
3. Usca, Y. and H.S. Kocak, Knowledge, beliefs and vaccination status of nursing students about human papilloma virus. Asian Pacific Journal of Cancer Care, 2024. 9(3): p. 481-488.
4. Stelzle, D., et al., Estimates of the global burden of cervical cancer associated with HIV. The lancet global health, 2021. 9(2): p. e161-e169.
5. Minhas, S., et al., Prevalence and current scenario of HPV in Pakistan: A systematic review and meta-analysis. Open Access Macedonian Journal of Medical Sciences, 2022. 10(F): p. 371-379.
6. Simoens, C. and P.P. Martin-Hirsch, Prophylactic vaccination against human papillomaviruses to prevent cervical cancer and its precursors. Cochrane database of systematic reviews, 2018(5).
7. Athanasiou, A., et al., HPV vaccination and cancer prevention. Best Practice & Research Clinical Obstetrics & Gynaecology, 2020. 65: p. 109-124.
8. Sultana, R., Human Papilloma Virus Infection and HPV Vaccination: Awareness and Acceptability Among Medical Students. Journal of The Society of Obstetricians and Gynaecologists of Pakistan, 2024. 14(1): p. 35-39.

9. Noreen, K., et al., Public Health Implications of Introducing Human Papillomavirus (HPV) Vaccination in Pakistan: A protocol for a mixed-method study to explore community perceptions and health system preparedness. Plos One, 2025. 20(5): p. e0323826.
10. Patrician, P.A., et al., Nurse well-being: A concept analysis. Nursing Outlook, 2022. 70(4): p. 639-650.
11. Chauhan, S., et al., Knowledge, attitude, and reasons for non-uptake of human papilloma virus vaccination among nursing students. BMC medicine, 2025. 23(1): p. 35.
12. Abdelaliem, S.M.F., et al. Knowledge and attitudes toward human papillomavirus and vaccination: a survey among nursing students in Saudi Arabia. in Healthcare. 2023. MDPI.
13. Akalin, A., Knowledge and attitude towards human papillomavirus and its vaccination and affecting factors among nursing and medical students: a questionnaire study. Journal of Obstetrics and Gynaecology, 2022. 42(7): p. 3315-3321.
14. Osazuwa-Peters, N., R.L. Rohde, and E.A. Boakye, HPV vaccination is safe—you don't have to whisper it. JAMA network open, 2021. 4(9): p. e2125124.
15. Sonawane, K., et al., Trends in human papillomavirus vaccine safety concerns and adverse event reporting in the United States. JAMA Network Open, 2021. 4(9): p. e2124502.
16. Iliyasu, Z., et al., Correlates of human papillomavirus vaccine knowledge and acceptability among medical and allied health students in Northern Nigeria. Journal of Obstetrics and Gynaecology, 2022. 42(3): p. 452-460.
17. Ejaz, M., et al., Human Papillomavirus associated prevention: knowledge, attitudes, and perceived risks among men who have sex with men and transgender women in Pakistan: a qualitative study. BMC Public Health, 2022. 22(1): p. 378.
18. Du, E.Y., et al., Medical students' knowledge of HPV, HPV vaccine, and HPV-associated head and neck cancer. Human vaccines & immunotherapeutics, 2022. 18(6): p. 2109892.
19. Regasa, T., E.G. Sendo, and J.T. Deressa, Human papillomavirus knowledge, perception, and willingness to receive vaccination among female university students in Addis Ababa University, Ethiopia, 2022: a cross-sectional study. SAGE Open Nursing, 2023. 9: p. 23779608231193554.
20. Shakurnia, A., et al., Awareness and knowledge of medical, nursing and midwifery students about human papillomavirus infection and its vaccine in Ahvaz Jundishapur university of medical sciences in 2020. Preventive Care in Nursing & Midwifery Journal, 2022. 12(4): p. 54-63.
21. Mishra, P., et al., Gap Analysis between Awareness and Acceptance of Human Papillomavirus Vaccination among Undergraduate Female Nursing Students and Paramedical Students in a Hospital of Western Uttar Pradesh: A Cross-sectional Observational Study. Journal of South Asian Federation of Obstetrics and Gynaecology, 2025. 17(S2): p. S147-S154.
22. Varer Akpinar, C. and S. Alanya Tosun, Knowledge and perceptions regarding Human Papillomavirus (HPV) and willingness to receive HPV vaccination among university students in a north-eastern city in Turkey. BMC women's health, 2023. 23(1): p. 299.
23. Panobianco, M.S., et al., Nursing students' knowledge on the human papillomavirus vaccine. Acta Paulista de Enfermagem, 2022. 35: p. eAPE02291.
24. Alwadai, M.S. and N. Abdulghani, Assessment of knowledge and attitudes toward human papillomavirus and its vaccination among female nursing students at Umm Al-Qura University, Saudi Arabia. Frontiers in Global Women's Health, 2025. 6: p. 1669950.
25. Gupta, G., R. Glueck, and P.R. Patel, HPV vaccines: Global perspectives. Human vaccines & immunotherapeutics, 2017. 13(6): p. 1421-1424.
26. Guillaume, D., et al., Global perspectives of determinants influencing HPV vaccine introduction and scale-up in low-and middle-income countries. PLoS One, 2024. 19(1): p. e0291990.
27. Braga, A., et al., Global Perspectives on HPV Vaccination: Achievements, Challenges, and Lessons from the Brazilian Experience. Vaccines, 2025. 13(11): p. 1106.
28. Doshi, R.H., et al., Feasibility and acceptability of nationwide HPV vaccine introduction in Senegal: Findings from community-level cross-sectional surveys, 2020. PLOS Global Public Health, 2022. 2(4): p. e0000130.
29. Enyan, N.I.E., et al., Acceptance of HPV Vaccination: A Systematic Review of Knowledge, Attitudes and Barriers Among Healthcare Practitioners in Low-and Middle-Income Countries. BioMed Research International, 2026. 2026(1): p. 9294978.
30. Atif, N., et al., From awareness to acceptance: understanding HPV and vaccine knowledge, attitudes and beliefs among university students in Punjab, Pakistan. Journal of Pharmaceutical Policy and Practice, 2025. 18(1): p. 2473023.
31. Qureshi, M.S., et al., AI based predictive acceptability model for effective vaccine delivery in healthcare systems. Scientific Reports, 2024. 14(1): p. 26657.
32. Aziz, H., et al., Distribution of HPV types in cervical cancer in Pakistan: implications for screening and vaccination programs. Journal of Clinical Laboratory Analysis, 2025. 39(1): p. e25130.
33. Li, M., et al., Factors influencing Chongqing nurses' HPV vaccination: a cross-sectional survey based on the 5C model. Frontiers in Public Health, 2026. 14: p. 1789086.
34. Ali, P.A., et al., Exploring the Landscape of HPV Vaccine Acceptability in Pakistan: A Systematic Review. Journal of Rawalpindi Medical College, 2025. 29(4).
35. Awais, M., et al., Knowledge attitudes and practices on HPV vaccination and cervical cancer among the Pakistani population. Discover Public Health, 2026. 23(1): p. 25.
36. Mihretie, G.N., et al., Female adolescents' knowledge and acceptability of human papillomavirus vaccine in

Debre Tabor Town, Ethiopia: a cross-sectional study. BMJ open, 2023. 13(3): p. e061813.
37. López, N., et al., HPV knowledge and vaccine acceptability: a survey-based study among parents of adolescents (KAPPAS study). Infectious Agents and Cancer, 2022. 17(1): p. 55.
38. Anyaka, C.U., et al., Parental knowledge of HPV infection, cervical cancer and the acceptance of HPV vaccination for their children in Jos, Nigeria. Journal of West African College of Surgeons, 2024. 14(2): p. 146-153.
39. Dozie, U.W., et al., Knowledge, acceptability and willingness to receive HPV vaccine among women in Owerri municipal Imo state. Academic Journal of Health Sciences, 2024. 39(2): p. 37-45.
40. Rezq, K.A., et al., Knowledge, perception, and acceptance of HPV vaccination and screening for cervical cancer among Saudi females: a cross-sectional study. Vaccines, 2023. 11(7): p. 1188.
41. John, A., A.P. Abbah, and I.F. Sandøy, Associations of socioeconomic factors with parents' awareness and acceptability of HPV vaccination in sub-Saharan Africa-a systematic review and meta-analysis. BMC Public Health, 2025. 25(1): p. 3525.
42. López, N., et al., Factors influencing HPV knowledge and vaccine acceptability in parents of adolescent children: results from a survey-based study (KAPPAS study). Human Vaccines & Immunotherapeutics, 2022. 18(1): p. 2024065.
43. Ali, S.H. and S.H. Al-Mukhtar, Exploring Preventative Measures: The Role of Nurses in the Fight Against Cervical Cancer in Iraq. The Malaysian Journal of Nursing (MJN), 2025. 17(1): p. 53-64.
44. Branda, F., et al., Human papillomavirus (HPV) vaccination: progress, challenges, and future directions in global immunization strategies. Vaccines, 2024. 12(11): p. 1293.
45. Negesse Simegn, Y., et al., Knowledge and acceptability of the human papillomavirus vaccine and associated factors among adolescent girls in public primary schools in Dessie Town, South Wollo, Northeast Ethiopia, 2020: A cross-sectional study. BMJ open, 2024. 14(10): p. e083397.
46. Fang, P., et al., Factors influencing knowledge and acceptance of nonavalent human papillomavirus vaccine among university population in Southern China: a cross-sectional study. Cancer Control, 2024. 31: p. 10732748241293989.
47. Xiang, J. and X. Sun, Socioeconomic disparities in HPV vaccine uptake: multivariable analysis of vaccination data from Tianjin (2018–2023). Frontiers in Public Health, 2025. 13: p. 1428267.
48. Abuduxike, G., et al., Knowledge and awareness of parents towards human papillomavirus (HPV) and HPV vaccines, and vaccine acceptability in northern Cyprus. Journal of prevention, 2022. 43(2): p. 225-240.
49. Gould, J., et al., Social determinants of health and human papillomavirus vaccination uptake: a systematic review. Journal of Obstetrics and Gynaecology Canada, 2026: p. 103246.
50. Clay, P.A., et al., Updated estimate of the annual direct medical cost of screening and treatment for human papillomavirus associated disease in the United States. Vaccine, 2023. 41(14): p. 2376-2381.
51. Vincent, S.C., S. Al Yaquobi, and A. Al Hashmi, A systematic review of knowledge, attitudes, and factors influencing HPV vaccine acceptance among adolescents, parents, teachers, and healthcare professionals in the Middle East and North Africa (MENA) region. Cureus, 2024. 16(5): p. e60293.
52. Al Alawi, S., et al., Knowledge, attitudes and acceptance toward Human papillomavirus (HPV) vaccination: Perspectives of Muslim women and men. Vaccine, 2023. 41(13): p. 2224-2233.
53. Alber, J.M., et al., HPV vaccine-related beliefs and knowledge among adults 18–45 years old. American Journal of Health Education, 2021. 52(1): p. 30-36.
54. Grandahl, M., et al., Parents' knowledge, beliefs, and acceptance of the HPV vaccination in relation to their socio-demographics and religious beliefs: A cross-sectional study in Thailand. PloS one, 2018. 13(2): p. e0193054.
55. Ellingson, M.K., et al., Human papillomavirus vaccine effectiveness by age at vaccination: a systematic review. Human vaccines & immunotherapeutics, 2023. 19(2): p. 2239085.
56. Laprise, J.-F., et al., Effectiveness and cost-effectiveness of human papillomavirus vaccination through age 45 years in the United States. Annals of internal medicine, 2020. 172(1): p. 22-29.
57. Thaker, J., A.N. Albers, and S.R. Newcomer, Nurses' perceptions, experiences, and practices regarding human papillomavirus vaccination: results from a cross-sectional survey in Montana. BMC nursing, 2023. 22(1): p. 211.
58. Butler, S., HPV vaccination in primary care: what nurses need to know. Practice Nursing, 2026. 37(1): p. 18-22.
59. Tatarchuk, T., et al., Exploring awareness, attitudes and clinical practices of Ukrainian health professionals regarding human papillomavirus and vaccination: a qualitative study. BMJ open, 2025. 15(11): p. e089968.
60. Ward, M., et al., Knowledge and attitudes regarding human papillomavirus among active duty service members at a large military base. Military Medicine, 2023. 188(5-6): p. 1186-1191.
61. Dike, S.N., et al. An Education Intervention to Increase Human Papillomavirus Vaccination Confidence and Acceptability: A Randomized Controlled Trial. in Oncology Nursing Forum. 2023.
62. Umutesi, G., et al., Acceptability of single-dose HPV vaccination schedule among health-care professionals in Kenya: a mixed-methods study. JNCI Monographs, 2024. 2024(67): p. 358-370.
63. Soni, S., et al., Assessment of 5A's of Human Papilloma Virus Vaccination: Awareness, Attitude, Apprehension, Action Expected and Acceptability Amongst Health Care Providers, Medical Students, Para-Medical and Administration Staff in AIIMS Rajkot. Journal of Medical Virology, 2025. 97(2): p. e70231.
64. Atif N, Hashmi FK, Malik UR, et al. From awareness to acceptance: understanding HPV and vaccine knowledge, attitudes and beliefs among university students in Punjab, Pakistan. J Pharm Policy Pract. 2025;18(1):2473023. doi:10.1080/20523211.2025.2473023.

65. Khan TM, Buksh MA, Rehman IU, Saleem A. Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan. Papillomavirus Res. 2016;2:122-127. doi:10.1016/j.pvr.2016.06.001.
66. Abdelaliem SMF, Kuaia AM, Hadadi AA, Alhujayri AK, Al Anazi AA, Hajar AA, et al. Knowledge and attitudes toward human papillomavirus and vaccination: a survey among nursing students in Saudi Arabia. Healthcare (Basel). 2023;11(12):1766. doi:10.3390/healthcare11121766.
67. Patel NH, Parikh HS, Jasrai MR, Mewada PJ, Raithatha N. The study of the prevalence of knowledge and vaccination status of HPV vaccine among healthcare students at a tertiary healthcare center in Western India. J Obstet Gynaecol India. 2024;74(4):326-333. doi:10.1007/s13224-023-01891-4.
68. Regasa T, Sendo EG, Deressa JT. Human papillomavirus knowledge, perception, and willingness to receive vaccination among female university students in Addis Ababa University, Ethiopia, 2022: a cross-sectional study. SAGE Open Nurs. 2023;9:23779608231193554. doi:10.1177/23779608231193554.
69. Khan M, Zafar A, Muneer R, Siddiqui A, Khan SAK, Zafar A. Knowledge, attitude and practices regarding cervical cancer and human papilloma virus (HPV) vaccination. Pak J Med Dent. 2021;10(2):94-100.
70. Lakneh EA, Mersha EA, Asresie MB, Belay HG. Knowledge, attitude, and uptake of human papilloma virus vaccine and associated factors among female preparatory school students in Bahir Dar City, Amhara Region, Ethiopia. PLoS One. 2022;17(11). doi:10.1371/journal.pone.0276465.
71. International Agency for Research on Cancer. Cervical cancer. Lyon: International Agency for Research on Cancer; 2024.
72. World Health Organization. Human papillomavirus vaccines: WHO position paper, December 2022. Wkly Epidemiol Rec. 2022;97(50):645-672