Knowledge Levels and Health Beliefs of Midwifery Students Regarding the HPV Vaccine: Cross-Sectional Study

Ebelik Bölümü Öğrencilerinin HPV Aşısına Yönelik Bilgi Düzeyleri ve Sağlık İnançları: Kesitsel Çalışma

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ABSTRACT Objective: This study aimed to assess the knowledge levels and health beliefs of midwifery students regarding the human papilloma virus (HPV) vaccine. **Material and Methods:** The study was conducted using an analytical cross-sectional design and included 260 actively enrolled students from the Midwifery Department of Kahramanmaraş Sütçü İmam University Faculty. Data were collected using a questionnaire form, the HPV Knowledge Scale, the health belief model scale for HPV and its vaccination. **Results:** Among the participants, 29.6% were 2nd-year students, and 98.1% were single. HPV knowledge was higher among students in advanced academic years, those who were married, and those with health insurance, while smoking was associated with lower knowledge (p<0.05). Higher perceived benefits, susceptibility, and severity correlated with greater knowledge, whereas perceived barriers had a negative association (p<0.05). Student with higher HPV knowledge scores reported fewer received barriers, especially in the 4th year and among those intending to get vaccinated. Higher income levels were linked to greater perceived benefits and susceptibility (p<0.05). **Conclusion:** The findings suggest that academic progression and socioeconomic factors play a critical role in shaping HPV-related awareness and beliefs. Therefore, educational interventions targeting midwifery students, particularly those in the early years of their training, should be designed to reduce misinformation, overcome barriers to vaccination, and reinforce positive perceptions that support the uptake of the HPV vaccine.

Keywords: Human papilloma virus; papilloma virus vaccines; health behavior; HPV vaccine; midwifery

ÖZET Amaç: Bu araştırmanın amacı, ebelik bölümü öğrencilerinin insan papilloma virüsü [human papillo mavirus (HPV)] aşısı hakkındaki bilgi düzeyi ve sağlık inançlarını ölçmektir. **Gereç ve Yöntemler:** Araştırma, analitik-kesitsel desende yürütülmüş olup, Kahramanmaraş Sütçü İmam Üniversitesi Ebelik Bölümünde aktif olarak eğitim gören 260 öğrenciyle yürütülmüştür. Veriler, anket formu, HPV Bilgi Ölçeği ve HPV Enfeksiyonu ve Aşılamasına İlişkin Sağlık İnanç Modeli kullanılarak toplanmıştır. **Bulgular:** Araştırmaya katılan öğrencilerin %29,6'sı 2. sınıf öğrencisiydi ve %98,1'i bekârdı. Sınıf düzeyi (3 ve 4. sınıflar), evli olma durumu ve sağlık sigortasına sahip olma, HPV bilgi düzeyini artıran faktörler olarak öne çıkarken, sigara kullanımı olumsuz bir etkide bulunmuştur (p<0,05). Ayrıca algılanan faydalar, duyarlılık ve ciddiyet bilgi düzeyini pozitif etkilerken, algılanan engellerin HPV bilgi düzeyini düşürdüğü belirlenmiştir (p<0,05). Öğrencilerin tümünün özellikle 4. sınıf öğrencilerin HPV ile ilgili bilgi düzeyi arttıkça algıladıkları engelleri azaltmakta bununla birlikte HPV aşısı yaptırmaya niyetli kişilerin algılanan engelleri azaltmaktadır (p<0,05). Gelir düzeyinin iyi olması öğrencilerin algıladıkları faydalar ve duyarlılık düzeylerini artırmaktadır (p<0,05). **Sonuç:** Çalışmamızda elde ettiğimiz bulgulara göre öğrencilerin sağlık inancı arttıkça bilgi düzeylerinin arttığı belirlenmiştir. Elde ettiğimiz bulgularda sınıf düzeyinin HPV bilgi ve sağlık inancı üzerinde etkili olduğu belirlenmiştir. Özellikle 4. sınıf öğrencilerinin HPV ile ilgili bilgi düzeylerinin daha yüksek ve sağlık inanç engellerinin daha düşük olması HPV bilgi düzeyini ve sağlık inançlarını geliştirmeye yönelik eğitim programlarının önemini göstermektedir.

Anahtar Kelimeler: İnsan papilloma virüsü; papilloma virüsü aşısı; sağlık inancı; HPV aşısı; ebelik

Human papilloma virus (HPV) is one of the most common sexually transmitted infections globally, with the ability to infect the skin, genital mucosa, and oropharyngeal tissues.[1] Its association with multiple forms of cancer, particularly cervical cancer, makes it a pressing public health concern.[2] Cervical cancer, which is primarily caused by persistent infection with high-risk HPV types, results in over 250,000 deaths annually.[3] In 2022, it was reported as the 4th most common cancer in women, with an estimated 660,000 new cases and 350,000 deaths worldwide.[2] The burden of cervical cancer is not equally distributed across populations. It disproportionately affects women in low-income regions, especially those who are young and have limited access to education, screening, and timely treatment.[4]

Preventing HPV infections is critical in cervical cancer prevention, as persistent HPV infection is the primary cause of cervical cancer.[5] The HPV vaccine is a scientifically proven tool to reduce both infection rates and cervical cancer risk.[4] Vaccines targeting HPV types 16 and 18, which are responsible for at least 70% of cervical cancers, have shown high efficacy.[6] Nevertheless, global vaccination rates remain insufficient; only about 3% of eligible young individuals in low- and middle-income countries have been vaccinated.[7]

The World Health Organization (WHO) recommends vaccinating children aged 9 to 14 years for maximum protection against HPV-related diseases.[2] The 2030 target is based on 3 main goals: vaccinating 90% of girls by age 15, screening 70% of women aged 35 to 45 with a quality test, and providing treatment to 90% of those diagnosed with cervical disease.[8] According to WHO modeling projections, if these objectives are met, approximately 62 million deaths and 74 million new cases of cervical cancer could be prevented by 2120.[2]

In addition to its individual-level protection, the HPV vaccine contributes to herd immunity and long-term disease control. For these efforts to succeed, public understanding and acceptance of the vaccine are essential. Midwifery students, as future frontline healthcare providers, hold a distinctive role in promoting preventive health behaviors. Unlike many other healthcare professionals, midwives are often the first and most frequent point of contact for women across the reproductive lifespan. Their responsibilities encompass health education, vaccination counseling, and community outreach, positioning them as key influencers in public health communication, particularly concerning HPV awareness and vaccine uptake. While national and international studies have commonly assessed the level of knowledge midwifery students hold about the HPV vaccine, few have explored how their personal health beliefs relate to this knowledge.[9-13] To the best of our knowledge, there is a lack of published research specifically addressing the relationship between knowledge and health beliefs regarding HPV and its vaccine among midwifery students, particularly within the national context. This gap limits our understanding of how future midwives might shape community attitudes and behaviors related to HPV prevention.

This study aims to evaluate midwifery students' knowledge and health beliefs concerning HPV infection, HPV vaccination, and cervical cancer. By identifying specific informational gaps and belief-based barriers, the research intends to support the design of targeted educational interventions. Strengthening the preparedness of midwifery students in this area could enhance their future capacity to deliver effective counseling, increase vaccine uptake, and ultimately contribute to reducing the burden of cervical cancer through improved public health practice.

Based on these objectives, the study addresses the following research questions:

■ What is the level of knowledge among midwifery students regarding HPV infection, HPV vaccination, and cervical cancer?

■ What are the health beliefs of midwifery students concerning HPV and the HPV vaccine?

■ Is there a relationship between students' knowledge levels and their health beliefs regarding HPV and its vaccination?

MATERIAL AND METHODS

STUDY DESIGN AND SETTING

A cross-sectional study approach was used for this investigation. 260 undergraduate students enrolled in

the Kahramanmaraş Sütçü İmam University Health Sciences Department of Midwifery, situated in the centre of Kahramanmaraş, Türkiye, participated in the study. In the fall of 2024, the study's data was collected through in-person interviews. The Strengthening the Reporting of Observational Studies in Epidemiology statement was used to report the study.

POPULATION AND SAMPLE OF THE RESEARCH

The study was conducted in the Department of Midwifery at Kahramanmaraş Sütçü İmam University, where 318 female undergraduate students were actively enrolled. Inclusion criteria were being over 18 years old, currently enrolled, and voluntarily participating. Students who did not complete the questionnaire were excluded from the study. The G*Power 3.1.9.7 program was used to calculate the sample size. The computation was predicated on the medium effect size because no prior research had been done on the same topic.[14] The t-test for binary variables and the one-way analysis of variance (ANOVA) test for multiple variables were to be used in the analysis of the research data. When the medium effect size (0.50) for the t-test was computed with 80% power and 95% confidence interval, the sample size in the study carried out in the G*Power 3.1.9.7 program was determined to be 27. Then, using a medium effect size (0.25), 80% power, and 95% confidence interval, the sample size for a one-way ANOVA was calculated to be at least 180. (To account for potential data loss due to incomplete or unusable questionnaire responses, the final sample size was set at 216 students, representing a 20% increase above the minimum required). All students were invited to participate, and a total of 260 students took part in the study.

DEPENDENT AND INDEPENDENT VARIABLES

The dependent variables of the study were the participants' mean scores on the Health Belief Model Scale for HPV and Its Vaccination (HBMS-HPVV) and the HPV Knowledge Scale (HPV-KS). The HBMS-HPVV consists of four sub-dimensions: perceived benefits, perceived susceptibility, perceived severity, and perceived barriers, which assess participants' health beliefs regarding HPV infection and vaccination. Each sub-dimension was analyzed sep-

arately. The HPV-KS measures participants' overall knowledge of HPV. The independent variables included the sociodemographic characteristics of the midwifery students, their HPV-related experiences, sexual experiences, and general knowledge of HPV. Sociodemographic variables comprised age, year of study, economic status, and marital status. HPV-related experiences included prior knowledge of the vaccine, exposure to HPV education, and family history of HPV infection or cervical cancer.

DATA COLLECTION METHODS

Face-to-face interviews were conducted in classrooms during the hours when the students were not in class to gather research data. During the questionnaire filling process, the researchers were present in the classroom and answered the possible questions encountered by the students and provided support to the students in parts that were not understood or needed to be explained. Thus, the questionnaire filling process was carried out under the supervision and guidance of the researchers, and a direct interaction was provided with the students during the filling of the questionnaires.

DATA COLLECTION FORMS

A questionnaire, the "HPV-KS", and the "HBMS-HPVV" were used to gather research data between October 22, 2024, and November 8, 2024.

Questionnaire Form

There are 18 items on the questionnaire, which was developed after a review of the literature. This form was utilized to collect sociodemographic data and health-related.[11,12,15,16]

The Human Papilloma Virus Knowledge Scale

The HPV-KS, developed by Waller et al. in 2013, assesses individuals' knowledge of HPV.[17] Its Turkish adaptation and psychometric validation were conducted by Demir Bozkurt and Özdemir.[18] He scale includes 33 items, each scored as 1 for correct and 0 for incorrect or "don't know" responses, yielding a total score between 0-33. Higher scores reflect greater HPV knowledge, including screening and vaccination. In the original adaptation study conducted by Demir Bozkurt and Özdemir, the internal

consistency of the scale was reported with a Cronbach's alpha coefficient of 0.96.[18] In the current study, the Cronbach's alpha value for the scale was calculated as 0.93, indicating high internal reliability.

The Health Belief Model Scale for Human Papilloma Virus and Its Vaccination

The HBMS-HPVV was originally developed by Kim and later adapted into Turkish by Guvenc et al., who also conducted its reliability analysis.[19,20] The 14-item HBMS-HPVV assesses health beliefs about HPV and vaccination through four subscales: perceived benefits, susceptibility, severity, and barriers. Items are rated on a four-point Likert scale, with higher scores reflecting stronger beliefs. The Turkish adaptation demonstrated acceptable internal consistency, with Cronbach's alpha values ranging from 0.71 to 0.78 across subscales.[20] In this study, Cronbach's alpha coefficients were 0.86 for perceived benefits, 0.83 for perceived susceptibility, 0.87 for perceived severity, and 0.79 for perceived barriers, indicating high internal consistency across all subscales.

Methods to Control Bias in the Study

Several measures were taken to minimize bias in this study. To prevent systematic error in participant selection, all undergraduate students from the department of midwifery at the faculty of health sciences were invited to participate. Participation was voluntary, and written informed consent was obtained. To minimize social desirability bias, especially considering the sensitivity of topics such as HPV and sexual health, the questionnaires were distributed and completed individually and anonymously in a setting where participants were physically spaced to ensure privacy. Although researchers coordinated data collection, they maintained a non-intrusive presence, avoiding observation or interference. Confidentiality was strictly upheld, with no personal identifiers recorded and all data analyzed in aggregate form.

ETHICAL APPROVAL

Ethical approval for the study was obtained from the Medical Research Ethics Committee of Kahramanmaraş Sütçü İmam University on October 21, 2024 (Protocol No: 263). Institutional permission was also granted by the Dean's Office of the Faculty of Health Sciences (date: October 22, 2024, no: 357943). The study was conducted in accordance with the Declaration of Helsinki. Prior to data collection, all participants were informed about the study's purpose, and both written and verbal informed consent was obtained.

STATISTICAL ANALYSIS

The data were analyzed using IBM SPSS Statistics 25. Descriptive statistics (frequency, percentage, mean, standard deviation, minimum, and maximum), t-tests, one-way ANOVA, and Pearson correlation analyses were employed. Tukey's "post hoc" test was used to identify group differences. No missing data were observed. Multiple linear regression analysis was conducted to determine the factors associated with HPV-KS and HBMS-HPVV scores. Variables with strong correlations to these outcomes were included in the model. A 95% confidence interval was applied, and p values below 0.05 were considered statistically significant.

RESULTS

A total of 318 midwifery students were assessed for eligibility to participate in the study. As illustrated in Figure 1, 58 students were excluded: 15 students declined to participate and 43 were not present at the faculty on the days of data collection. The final study sample therefore comprised 260 students, all of whom completed the questionnaire in full and were included in the analysis.
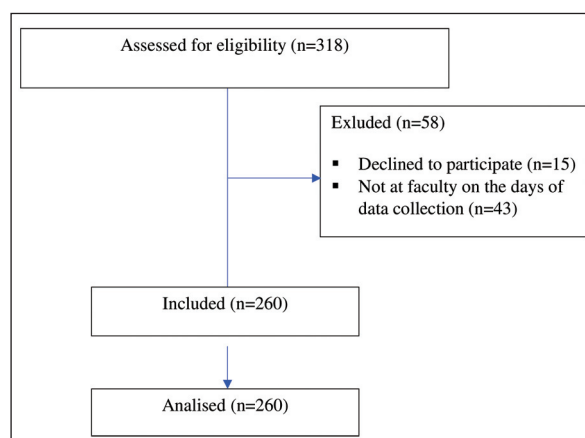

FIGURE 1: Strengthening the Reporting of Observational Studies in Epidemiology flow diagram for students enrollment

The majority of participants were 2ⁿᵈ-year students (29.6%). Most lived in nuclear families (78.1%) and had health insurance (68.8%). Among them, 11.9% were smokers, and 3.5% reported sexual experience. While 73.5% had received HPV-related education, only 35.8% found it sufficient. Additionally, 38.1% expressed willingness to get the HPV vaccine. Further details are provided in Table 1.

Students that took part in the study had an average overall HPV-KS score of 13.73 ± 7.84. The mean

TABLE 1: Comparison of the HPV-KS mean score according to various characteristics of students (n=260)				
Variables		**n (%)**	**HPV-KS**	**p value**
Class levels	1ˢᵗ year	36 (13.8)	7.80 ± 7.05^a	**0.001ᵃ**
	2ⁿᵈ year	77 (29.6)	10.96 ± 6.40^b	d>a.b.c; c>b
	3ʳᵈ year	72 (27.7)	15.00 ± 6.66^c	
	4ᵗʰ year	75 (28.8)	18.22 ± 7.74^d	
Marital status	Married	5 (1.9)	21.60 ± 5.12	**0.023ᵇ**
	Single	255 (98.1)	13.58 ± 7.81	
Health insurance status	Present	179 (68.8)	14.95 ± 7.42	**0.001ᵇ**
	Absent	81 (31.2)	11.04 ± 8.11	
Family type	Nuclear	203 (78.1)	14.18 ± 7.37	0.055ᵃ
	Extended	47 (18.1)	12.93 ± 9.36	
	Divorced	10 (3.8)	8.40 ± 8.01	
Living arrangements	Living with family/relatives	83 (31.9)	14.83 ± 8.66	0.229ᵃ
	Living in a student dormitory	164 (63.1)	13.35 ± 7.42	
	Living in a student apartment	13 (5.0)	11.61 ± 7.19	
The mother's education level	Illiterate	26 (10.9)	12.38 ± 8.33	0.456ᵃ
	Literate	21 (8.1)	12.00 ± 7.96	
	Primary school	169 (65.0)	13.75 ± 7.85	
	High school	36 (13.8)	15.47 ± 7.41	
	University	8 (3.1)	14.62 ± 7.78	
The father's education level	Illiterate	6 (2.3)	16.00 ± 8.92	0.403ᵃ
	Literate	9 (3.5)	13.22 ± 7.41	
	Primary school	136 (52.3)	12.95 ± 8.23	
	High school	64 (24.6)	14.09 ± 7.95	
	University	45 (17.3)	15.40 ± 6.23	
Economic status	Poor	64 (24.6)	12.78 ± 9.00	0.105ᵃ
	Moderate	172 (66.2)	13.67 ± 7.43	
	Good	24 (9.2)	16.75 ± 6.92	
Smoking status	Yes	31 (11.9)	10.51 ± 7.87	**0.015ᵇ**
	No	229 (88.1)	14.17 ± 7.75	
A family history of cervical cancer	Yes	6 (2.3)	18.33 ± 3.61	0.147ᵇ
	No	254 (97.7)	13.62 ± 7.88	
HPV vaccination intention	Yes	99 (38.1)	16.89 ± 7.49	**0.001ᵇ**
	No	161 (61.9)	11.79 ± 7.43	
Source of HPV vaccine information	Never heard of it before	13 (5.0)		0.055ᵃ
	Course/lecture	177 (68.1)	14.36 ± 7.68	
	Healthcare professional	17 (6.5)	16.70 ± 8.19	
	Family/friends	4 (1.5)	5.50 ± 11.00	
	Internet/social media	49 (18.9)	13.51 ± 6.36	
Sexual experience	Yes	9 (3.5)	17.55 ± 9.44	0.138‡
	No	251 (96.5)	13.60 ± 7.77	
Condom use (n=9)	Always	5 (55,6)	16.60 ± 6.80	0.451ᵃ
	Sometimes	2 (22,2)	25.00 ± 7.07	
	Never	2 (22,2)	12.50 ± 17.67	
HPV education in midwifery courses	Yes	191 (73.5)	15.58 ± 7.40	**0.001ᵇ**
	No	69 (26.5)	8.62 ± 6.72	
Adequacy of HPV-related courses	Yes	93 (35.8)	16.43 ± 7.49	**0.001ᵇ**
	No	167 (64.2)	12.23 ± 7.65	

ᵃOne-way analysis of variance; ᵇt-test; HPV-KS: Human Papilloma Virus Knowledge Scale; HPV: Human papilloma virus; Values with p<0.05 are shown in bold.

TABLE 2: Comparison of the HBMS-HPVV subscales mean scores according to various characteristics of students (n=260)

Variables		Perceived benefits	p value	Perceived susceptibility	p value	Perceived severity	p value	Perceived barriers	p value
Class levels	1st year	2.13±0.77a	**0.001a** d>a.b.c; c>b	2.20±0.86a	**0.001a** d>a.b.c	2.31±0.89a	**0.000a** d>a.b.c	2.01±0.77a	**0.001a** a.b>d
	2nd year	2.67±0.67b		2.69±0.79b		3.16±0.69b		2.30±0.60b	
	3rd year	2.69±0.78c		2.73±0.85c		3.05±0.88c		1.89±0.65c	
	4th year	2.90±0.83d		2.88±0.85d		3.03±0.81d		1.81±0.62d	
Marital status	Married	3.00±0.74	0.179b	2.90±0.54	0.293b	2.90±0.37	0.418b	2.08±0.38	0.271b
	Single	2.66±0.79		2.68±0.86		2.98±0.86		2.00±0.68	
Health insurance status	Present	2.75±0.75	**0.006b**	2.73±0.81	0.105b	3.05±0.80	**0.015b**	2.00±0.66	**0.016b**
	Absent	2.48±0.85		2.59±0.95		2.80±0.94		1.68±0.86	
Family type	Nuclear	2.72±0.76	0.137a	2.71±0.82	0.311a	3.00±0.81	0.473a	2.01±0.65	0.930a
	Extended	2.55±0.87		2.65±0.95		2.94±0.94		2.06±0.74	
	Divorced	2.30±0.92		2.30±1.03		2.67±1.21		1.58±0.81	
Living arrangements	Living with family/relatives	2.78±0.83	0.323a	2.72±0.89	0.681a	2.97±0.89	0.948a	1.99±0.63	0.227a
	Living in a student dormitory	2.62±0.79		2.66±0.85		2.98±0.84		2.00±0.70	
	Living in a student apartment	2.61±0.55		2.84±0.77		2.90±0.76		2.15±0.60	
The mother's education level	Illiterate	2.34±0.64	0.078a	2.61±0.84	0.986a	2.80±0.76	0.823a	2.13±0.56	0.135a
	Literate	2.71±0.89		2.71±0.88		3.02±0.94		2.19±0.78	
	Primary school	2.65±0.80		2.68±0.88		2.99±0.89		1.99±0.69	
	High school	2.89±0.70		2.73±0.74		3.04±0.71		1.88±0.62	
	University	2.95±0.89		2.75±1.03		2.84±0.75		1.90±0.60	
The father's education level	Illiterate	2.44±0.50	0.208a	3.00±0.70	0.508a	2.87±0.66	0.634a	2.23±0.38	0.808a
	Literate	2.59±0.46		2.66±0.79		3.05±0.68		2.20±0.60	
	Primary school	2.59±0.81		2.65±0.90		2.94±0.88		1.96±0.70	
	High school	2.70±0.83		2.61±0.83		2.91±0.88		1.94±0.62	
	University	2.91±0.76		2.86±0.78		3.15±0.79		2.16±0.70	
Economic status	Poor	2.44±0.80a	**<0.001a** a c>a.b	2.48±0.87a	**0.005a** c>a.b	2.76±0.93	0.052a	1.86±0.69	0.619a
	Moderate	2.67±0.77b		2.70±0.84b		3.03±0.83		2.02±0.64	
	Good	3.29±0.61c		3.14±0.80c		3.17±0.72		2.27±0.76	
Smoking status	Yes	2.54±0.92	0.175b	2.48±0.87	0.076b	2.83±1.04	0.166b	1.95±0.72	0.157b
	No	2.69±0.77		2.72±0.85		2.99±0.82		2.01±0.67	
A family history of cervical cancer	Yes	3.16±0.45	0.063b	2.91±0.73	0.260b	3.37±0.56	0.126b	2.13±0.50	0.489b
	No	2.66±0.80		2.83±0.86		2.96±0.85		2.00±0.68	
HPV vaccination intention	Yes	2.88±0.84	**0.001b**	2.83±0.88	**0.019b**	3.08±0.81	0.057b	1.84±0.59	**<0.001b**
	No	2.54±0.73		2.60±0.83		2.91±0.87		2.11±0.70	
Source of HPV vaccine information	Course/lecture	2.70±0.77a	**0.011a** c<a.b.d	2.74±0.84	0.065a	3.04±0.80a	**0.004a** a.b.d>c	1.96±0.84	0.088a
	Healthcare professional	2.90±0.91b		2.79±0.84		2.86±0.83b		1.81±0.84	
	Family/friends	1.50±1.00c		1.62±1.25		1.62±1.25c		1.85±0.10	
	Internet/social media	2.75±0.64d		2.69±0.74		3.11±0.77d		2.32±0.62	
Sexual experience	Yes	3.14±0.74	**0.035b**	2.83±0.88	0.138b	3.08±0.81	0.451b	1.84±0.59	0.165b
	No	2.65±0.79		2.60±0.83		2.91±0.87		2.11±0.70	
Condom use (n=9)	Always	3.26±0.82	0.648a	3.30±0.44	0.185a	3.15±0.60	0.449a	2.44±0.95	0.245a
	Sometimes	3.33±0.94		2.50±0.70		2.62±0.17		1.90±0.42	
	Never	2.66±0.47		2.75±0.35		2.75±0.35		2.70±0.42	
HPV education in midwifery courses	Yes	2.76±0.76	**0.001b**	2.79±0.81	**0.001b**	3.10±0.78	**<0.001b**	1.93±0.61	**<0.001b**
	No	2.42±0.83		2.42±0.92		2.64±0.94		2.21±0.79	
Adequacy of HPV-related courses	Yes	2.89±0.82	**0.034b**	2.80±0.89	0.064b	3.05±0.76	0.130b	1.86±0.63	**0.001b**
	No	2.06±0.77		2.63±0.83		2.93±0.90		2.09±0.68	

aOne-way analysis of variance; bt-test; HBMS-HPVV: Health Belief Model Scale for Human Papilloma Virus and its Vaccination; HPV: Human papilloma virus. Values with p<0.05 are shown in bold.

TABLE 3: Correlations between HPV-KS and HBMS-HPVV subscales.					
		Perceived benefits	Perceived susceptibility	Perceived susceptibility	Perceived barriers
HPV-KS	r value	0.561	0.531	0.461	-0.492
	p value	**<0.001**	**<0.001**	**<0.001**	**<0.001**

HPV-KS: Human Papilloma Virus Knowledge Scale; HBMS-HPVV: Health belief Model Scale for Human Papilloma Virus and its Vaccination

scores for the HBMS-HPVV sub-dimensions are as follows: perceived barriers 2.01±0.67, perceived advantages 2.67±0.79, perceived susceptibility 2.69±0.86, and perceived severity 2.97±0.85.

The HPV-KS mean score was significantly different from the students' grade level, marital status, social security, and smoking status (p<0.05). Additionally, there was a significant difference (p<0.05) between the HPV-KS mean score and the intention to get vaccinated against HPV, the HPV education in midwifery courses, and the sufficiency of HPV-related courses (Table 1).

Perceived benefits scores differed significantly according to grade level, health insurance, economic status, HPV vaccination intention, source of vaccine information, sexual experience, HPV education, and adequacy of related courses (p<0.05). Perceived susceptibility scores showed significant variation with grade level, economic status, vaccination intention, and HPV education. Perceived severity was significantly associated with grade level, health insurance, source of information, and HPV education. Perceived barriers varied significantly based on grade level, health insurance, vaccination intention, HPV education, and course adequacy (p<0.05) (Table 2).

The students' HPV-KS scores demonstrated a weak negative link with perceived barriers (p<0.001), a low positive correlation with perceived severity, and a moderate positive correlation with perceived benefits and perceived susceptibility (Table 3).

Regression analysis revealed that HPV-KS was significantly influenced by several factors. Higher grade level (3rd and 4th year) (β=0.245, p<0.001), being married (β=0.092, p=0.039), and having health insurance (β=0.098, p=0.036) were associated with increased HPV knowledge. Conversely, smoking negatively impacted HPV-KS (β=-0.116, p=0.011).

Among health belief model dimensions, perceived benefits (β=0.240, p=0.009), perceived susceptibility (β=0.231, p<0.001), and perceived severity (β=0.072, p=0.046) were positively associated with HPV-KS, while perceived barriers had a negative effect (β=-0.068, p<0.001) (Table 4).

Regression analysis identified HPV knowledge as the strongest predictor across most health belief dimensions. It significantly increased perceived benefits (β=0.553, p<0.001), perceived susceptibility (β=0.545, p<0.001), and perceived severity (β=0.464, p<0.001), while reducing perceived barriers (β=-0.223, p=0.002). Additionally, having a good income level positively influenced perceived benefits (β=0.168, p=0.002) and susceptibility (β=0.140, p=0.009). Being a 4th-year student (β=-0.173, p=0.032) and intending to receive the HPV vaccine (β=-0.170, p=0.010) were both associated with lower perceived barriers (Table 5).

TABLE 4: Multiple regression of factors associated with HPV-KS				
Independent Variables	B	β	t value	p value
Constant	8.503	-	1.315	0.015
Class level (3rd and 4th year)	1.868	0.245	4.117	<0.001
Marital status (married)	5.260	0.092	2.076	0.039
Health insurance status (present)	1.662	0.098	2.103	0.036
Smoking status (Yes)	-2.814	-0.116	-2.556	0.011
HPV vaccination intention (Yes)	-1.275	-0.079	-1.609	0.109
HPV education in midwifery courses (Yes)	1.183	0.067	1.108	0.269
Adequacy of HPV-related courses (Yes)	0.806	0.049	0.987	0.324
Perceived benefits (total)	2.360	0.240	3.412	0.009
Perceived susceptibility (total)	2.103	0.231	3.269	<0.001
Perceived severity (total)	00.659	0.072	0.962	0.046
Perceived barriers (total)	-0.789	-0.068	-1.249	<0.001

HPV-KS: Human Papilloma Virus Knowledge Scale; HPV: Human papilloma virus; R^2=0.520; Adjusted R^2=0.499; F=24.430, p<0.001

TABLE 5: Multiple regression of factors associated with women's health beliefs for HPV and HPV vaccination				
Health beliefs	B	β	t value	p value
Perceived benefits				
Constant	1.302	-	2.131	0.034
Class level (3rd and 4th year)	0.026	0.034	0.489	0.625
Health insurance (present)	-0.026	-0.015	-0.276	0.783
Income status (good)	0.232	0.168	3.150	0.002
HPV vaccination intention (Yes)	0.009	-0.005	0.093	0.926
HPV vaccine source	0.019	0.030	0.364	0.615
Sexual experience (Yes)	-0.050	-0.011	0.504	0.830
HPV education in midwifery courses (Yes)	0.052	0.029	0.403	0.687
Adequacy of HPV-related courses (Yes)	0.062	0.039	0.672	0.501
HPV knowledge	0.056	0.553	9.089	<0.001
Perceived susceptibility				
Constant	1.467	-	3.864	<0.001
Class level (4th year)	-0.036	-0.043	-0.615	0.539
Income status (good)	0.215	0.140	2.628	0.009
HPV vaccination intention (Yes)	0.095	0.054	0.941	0.348
HPV education in midwifery courses (Yes)	-0.038	-0.019	-0.293	0.770
HPV knowledge	0.060	0.545	8.896	<0.001
Perceived severity				
Constant	2.804	-	8.427	<0.001
Class level (4th year)	-0.104	-0.127	-1.711	0.088
Social security (Yes)	-0.011	-0.006	-0.101	0.920
Knowledge source	0.018	0.026	0.415	0.678
HPV education in midwifery courses (Yes)	-0.195	-0.100	-1.349	0.179
HPV knowledge	0.050	0.464	7.067	<0.001
Perceived barriers				
Constant	1.258	-	3.571	<0.001
Class level (4th year)	-0.114	-0.173	-2.153	0.032
Health insurance status (present)	0.007	0.005	0.076	0.940
HPV vaccination intention (Yes)	-0.237	-0.170	-2.601	0.010
HPV education in midwifery courses (Yes)	0.116	0.076	0.957	0.339
Perceived education adequacy (Yes)	0.157	0.111	1.677	0.095
HPV knowledge	-0.019	-0.223	-3.160	0.002

HPV: Human papilloma virus; Perceived benefits: R^2=0.358, Adjusted R^2=0.334, F=14.691, p<0.001; Perceived susceptibility: R^2=0.304, Adjusted R^2=0.290, F=22.199, p<0.001; Perceived susceptibility: R^2=0.208, Adjusted R^2=0.192, F=12.692, p<0.001; Perceived barriers: R^2=0.108, Adjusted R^2=0.087, F=5.119, p<0.001

DISCUSSION

This study explored the knowledge and health beliefs of 260 undergraduate midwifery students regarding HPV and its vaccine, with a focus on how educational exposure and sociodemographic factors shape perceptions related to preventive health. Students in the upper academic years demonstrated significantly higher knowledge levels, consistent with prior studies in Türkiye, Bulgaria, and Iran.[10-12] A survey conducted among Iranian midwifery students found that HPV knowledge levels were similar across all academic years, possibly because HPV-related topics are commonly addressed in the upper years of the curriculum.[13] Similarly, another study reported that 3rd-year nursing students had the highest level of HPV knowledge.[21] These findings suggest that disparities in HPV knowledge may stem from differences in how and when such content is integrated into midwifery and nursing education programs, as also highlighted in a broader study involving university students.[22] Given that HPV education in most universities is limited to compulsory or elective health-related courses, these findings highlight the need for structured seminars and additional training to improve student awareness.

This study found that married students demonstrated higher levels of HPV knowledge, consistent with findings from a Greek study involving midwives and midwifery students.[23] One possible explanation is that married individuals may have more regular interactions with healthcare systems and greater concern about reproductive and sexual health, which increases their exposure to HPV-related information. In addition, sexually active individuals, regardless of marital status, have been shown to have better knowledge of the HPV vaccine, as indicated in prior studies with medical and nursing students.[16,18] These patterns suggest that sexual health behaviors may indirectly shape knowledge acquisition, though further research is needed to clarify the motivations and informational access of unmarried or sexually inactive individuals.

In terms of health risk behaviors, smokers were found to have significantly lower HPV knowledge levels. This aligns with previous research showing that nearly half of students who smoked were unaware of or unvaccinated against HPV.[24,25] Smoking may reduce motivation to seek health information and lower risk perception, especially in young people, leading to limited HPV knowledge and lower engagement with prevention. These findings emphasize the importance of addressing smoking in HPV education strategies.

An important contribution of this study is the relationship observed between health beliefs and

HPV knowledge. Specifically, students with higher knowledge reported fewer perceived barriers and stronger perceptions of benefits, susceptibility, and severity. These findings support the Health Belief Model and align with prior studies among Turkish nursing students.[15] The consistency across studies suggests that increasing HPV knowledge may effectively shape positive health beliefs, which in turn could foster behavioral intentions such as vaccine uptake.

This pattern was also evident across cultural contexts. For example, a study conducted with Thai parents found that greater HPV knowledge enhanced vaccine-related health beliefs.[26] Millar results were observed among Turkish women aged 21 to 64, and nursing students, indicating a consistent link between knowledge and beliefs across diverse demographic groups.[15,27] These findings reinforce the value of education programs not only to inform but also to influence perception and motivate preventive behavior. For maximum impact, HPV education should integrate both cognitive and affective components, particularly for youth and women.

Interestingly, while higher income levels were not associated with HPV knowledge in this study, they were linked to greater perceived benefits and susceptibility regarding HPV and its vaccine. This contrasts slightly with previous studies in Spain and Türkiye that found a positive correlation between income and knowledge.[16,18] One possible explanation is that even when knowledge is equalized, higher-income individuals may be more likely to act on that knowledge due to better access to healthcare and lower perceived logistical or financial barriers. Therefore, health beliefs may be more sensitive to socioeconomic context than raw knowledge alone, which is an important consideration for public health campaigns.

A novel and noteworthy finding of this study is that both being in the final year of study and intending to receive the HPV vaccine were associated with lower perceived barriers-an association not widely reported in existing literature. This may reflect greater clinical exposure and confidence among senior students, as well as a cognitive align-

ment between intention and belief. The influence of behavioral intent on perceptions of feasibility and control aligns with key principles of health behavior theory. These findings underscore the importance of promoting not only knowledge, but also motivation and action readiness within HPV education strategies.

The study's generalizability is limited due to its cross-sectional nature and self-reporting methodology, which may increase bias and misinterpret students' knowledge or beliefs about HPV. It is recommended to support the findings with prospective studies with larger participant groups and different universities, as the current state of affairs may not be fully understood.

CONCLUSION

The study demonstrates that factors such as grade level, marital status, and health insurance coverage significantly affect midwifery students' knowledge of HPV vaccination. Smoking was associated with lower knowledge, while greater awareness was linked to increased perceptions of benefits, susceptibility, and severity, and reduced perceived barriers. Senior students reported fewer barriers, likely due to accumulated education and clinical exposure. Higher income levels also corresponded with stronger health beliefs. These findings highlight the importance of targeted educational interventions aimed at improving HPV knowledge and addressing perceived barriers to enhance vaccine acceptance among future healthcare providers.

To strengthen HPV knowledge and health beliefs among midwifery students, HPV education should be introduced in the first year and supported with annual refresher modules. Incorporating interactive methods such as case-based learning, role-plays, and peer education can enhance engagement and practical application. National health policies should prioritize HPV vaccination, particularly for girls aged 9 to 14 and all women, by including the vaccine in the national immunization schedule and providing it free of charge to ensure equitable access. Additionally, in-service training for midwives and other healthcare professionals is essential to improve

the quality of counseling services and support broader public health efforts in HPV prevention.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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