



## ***Knowledge, attitudes, and behaviours of primary health care workers regarding HPV infection and prevention: an example from Türkiye***

### **Birinci basamak sağlık çalışanlarının HPV enfeksiyonu ve korunmaya ilişkin bilgi, tutum ve davranışları: Türkiye'den bir örnek**

İrem AKOVA<sup>1</sup>, Nagehan EKİCİ KOŞAROĞLU<sup>2</sup>, Esmâ KILIÇ<sup>2</sup>

#### **Abstract**

**Introduction:** This study aimed to determine the knowledge, attitudes, and behaviors of Turkish primary health care workers (HCWs) regarding human papillomavirus (HPV) infection, screening, and vaccines.

**Methods:** This cross-sectional study was conducted with family physicians and nurses/midwives working in family health centers (FHC) in Sivas province in the Central Anatolia Region of Türkiye between January 1, 2023 and February 15, 2023. The sociodemographic data form and HPV Knowledge Scale were used. The independent sample t-test, the F test (ANOVA) (post hoc Bonferroni test), and the chi-squared test were performed.

**Results:** The study was conducted with a total of 275 HCWs. Of the HCWs, 57.5% were nurses/midwives and 69.8% were female. All HCWs had heard of HPV, 97.8% had heard of the HPV test, and 84% had heard of the HPV vaccine. 79.3% had not recommended the HPV vaccine to pre-adolescents and 51.6% to people at risk. The most common reasons for this were the lack of information about HPV vaccines, their expense, and the lack of coverage by the government. The part with the lowest level of HPV knowledge was about the HPV vaccine. The total score of the scale was higher in males, physicians, and those who were working in the FHC unit where the adolescent rate was below 10%, in those who recommended the HPV vaccine, and in those who had not recommended the vaccine because it is expensive and not covered by the government. Conclusion: It is recommended to improve the lack of knowledge among HCWs, mainly those serving the adolescent population, about HPV vaccines. Government coverage of HPV vaccines may play a role in increasing the rate at which HCWs recommend these vaccines.

**Key words:** Human papillomavirus, HPV vaccines, health knowledge, attitudes, practice

#### **Özet**

**Giriş:** Bu çalışma, Türk birinci basamak sağlık çalışanlarının human papillomavirus (HPV) enfeksiyonu, taramaları ve aşıları ile ilgili bilgi, tutum ve davranışlarını belirlemeyi amaçlamıştır.

**Yöntem:** Bu kesitsel araştırma, 1 Ocak 2023 ile 15 Şubat 2023 tarihleri arasında Türkiye'nin İç Anadolu Bölgesi'ndeki Sivas ilinde aile sağlığı merkezlerinde (ASM) çalışan aile hekimleri ve hemşire/ebelerle yapıldı. Sosyodemografik veri formu ve HPV Bilgi Ölçeği kullanıldı. Bağımsız örneklem t-testi, F testi (ANOVA) (post hoc Bonferroni testi) ve ki-kare testi uygulandı. Bulgular: Çalışma toplam 275 sağlık çalışanı ile yürütüldü. Sağlık çalışanlarının %57,5'i hemşire/ebe ve %69,8'i kadındı. Tüm sağlık çalışanları HPV'yi duymuştu, %97,8'i HPV testini duymuştu ve %84'ü HPV aşısını duymuştu. %79,3'ü ergenlik öncesi çocuklara ve %51,6'sı risk altındaki kişilere HPV aşısını önermemişti. Bunun en sık nedenleri, HPV aşıları hakkında bilgi eksikliği, bunların maliyeti ve devlet tarafından karşılanmamasıydı. HPV bilgisinin en düşük olduğu kısım HPV aşısı ile ilgiliydi. Ölçek toplam puanı erkeklerde, hekimlerde, adolesan oranı %10'un altında olan ASM çalışanlarında, HPV aşısını önerenlerde ve pahalı olduğu ve devlet tarafından karşılanmadığı için aşığı önermeyenlerde daha yüksekti.

**Sonuç:** Başta adolesan popülasyona hizmet veren sağlık çalışanları olmak üzere sağlık çalışanlarının HPV aşıları konusundaki bilgi eksikliğinin giderilmesi önerilmektedir. HPV aşılarının devlet tarafından karşılanması, sağlık çalışanlarının bu aşıları tavsiye etme oranını artırmada rol oynayabilir.

**Anahtar kelimeler:** Human papillomavirüsü, HPV aşıları, sağlık bilgisi, tutum, uygulama

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<sup>1</sup> Department of Public Health, Faculty of Medicine, Sivas Cumhuriyet University, Sivas, Türkiye

<sup>2</sup> Provincial Health Directorate, Sivas, Türkiye

Address for Correspondence / Yazışma Adresi: İrem AKOVA, Department of Public Health, Faculty of Medicine, Sivas Cumhuriyet University, Türkiye

E-posta: irem-007@hotmail.com Tel:+905076516813

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## Introduction

Human papillomavirus (HPV) infection is a common public health threat due to increased morbidity, mortality, and costs associated with diseases such as genital warts and cervical, vulvar, anal, penile, and head and neck cancers.<sup>1,2</sup> It is the most common viral infection of the reproductive system and the main cause of cervical cancer.<sup>3</sup> Almost all cervical and anal cancers, 63-75% of vulvar, vaginal, and penile cancers, and approximately 70% of oropharyngeal cancers are attributable to HPV.<sup>4,5</sup>

Cervical cancer remains the primary threat of HPV infection. It is the fourth most common cancer among women globally, with an estimated 604,000 new cases and 342,000 deaths by 2020.<sup>3</sup> It was responsible for 7.5% of all female cancer-related deaths in 2018.<sup>3</sup> In Türkiye, it is one of the ten most common cancers in women, ranking ninth at a rate of 2.3%, and its incidence was found to be 4.3 per hundred thousand.<sup>6</sup> The incidence of cervical cancer in Türkiye is below that of many countries in the world that have developed and carried out national screening programs. However, the incidence of cervical cancer tends to increase slightly.<sup>7</sup>

HPV vaccination, screening and treatment of precancerous lesions are the most appropriate ways to prevent cervical cancer. Cervical cancer can be cured if diagnosed at an early stage and treated promptly.<sup>3</sup> It is the only cancer in which precursor lesions can be seen and an early diagnosis can be made before the cancer starts.<sup>7</sup> Comprehensive cervical cancer control includes primary prevention (vaccination against HPV), secondary prevention (screening and treatment of precancerous lesions), tertiary prevention (diagnosis and treatment of invasive cervical cancer), and palliative care.<sup>3</sup> Currently, despite early screening and serious awareness campaigns, only 46% of patients can be diagnosed at an early stage. When all patients were examined, the 5-year survival rate for cervical cancer was 67%. If it is detected in the early stage, that is, it has not extended to the surrounding tissues and has not metastasized to other organs at the time of diagnosis, the 5-year survival rate exceeds 90%.<sup>7</sup> This shows the importance of screening methods and the early diagnosis of cervical cancer.

Since the use of the HPV vaccine has been associated with a reduction in the prevalence of HPV-related diseases, HPV-related cancers, and HPV genotypes, it has been shown to be successful as a primary prevention intervention against cervical cancers, with no serious reported adverse effects.<sup>8</sup> In May 2017, the World Health Organization emphasized the importance of cervical cancer and other HPV-related diseases as a global public health threat, and recommended the inclusion of HPV vaccines in national immunization programs as part of a coordinated and comprehensive strategy.<sup>9</sup> HPV vaccines have not yet been included in the national immunization program in Türkiye.<sup>10</sup>

Primary health care workers (HCWs) play a key role in promoting HPV screening and vaccination, similar to the acceptance of all other health-related practices. To be effective, HCWs need detailed basic information about HPV and guidance on the best practice for communicating with their patients.<sup>11</sup> However, insufficient knowledge and awareness of the value of the HPV vaccine among HCWs has been found to be one of the biggest obstacles to successful vaccination campaigns.<sup>12</sup> In the literature, we observed that very few previous studies, both in Türkiye and in other countries, included primary HCWs. This study aimed to determine the knowledge, attitudes, and behaviors of Turkish primary HCWs regarding HPV infection, screening, and vaccines.

## Materials and Methods

This cross-sectional study was conducted with family physicians and nurses/midwives providing primary healthcare services throughout Sivas province in the Central Anatolia Region of Türkiye between January 1, 2023, and February 15, 2023. The study population consisted of all family physicians (n=200) and family health workers (n=170) working in 27 family health centers (FHC) in the city center and 22 in the districts. The minimum sample size was calculated to be 189 using the  $n = \frac{DEFF * Np(1-p)}{[(d^2/Z^2(1-\alpha)/2 * (N-1) + p * (1-p))]}$  formula in the OpenEpi (Version 3) program (N= 370, effect value d= 5%, confidence interval= 95%, p= 50%). Persons who were not on duty at the time the questionnaires were distributed or who answered the questionnaires incompletely were excluded from the study.

The data collection tools were hand-delivered to the participants by the researchers and collected on the same day. No selection was made between FHCs. HCWs who did not want to fill out the questionnaire due to workload or who were not present at the FHC on the day the form was distributed for any reason, did not participate in the study. Individuals who agreed to participate in the study were informed of the study, and written informed consent was obtained. Data collection was performed in accordance with the Declaration of Helsinki. Approval was obtained from the Sivas Cumhuriyet University Non-invasive Clinical Research Ethics Committee (decision no:2022-11/29, date:16.11.2022).

Sociodemographic data form and HPV Knowledge Scale were used to obtain research data.

The sociodemographic data form consisted of 13 questions on age, sex, marital status, occupation, duration of professional work, place of work, number of populations defined to the FHC unit, ratio of adolescents aged 11-18,

information source about HPV vaccine, HPV vaccination recommendation to pre-adolescent children and people at risk, reason for not recommending HPV vaccine, and HPV test recommendation.

Waller et al. developed the HPV Knowledge Scale. This is a 35-item scale measuring knowledge levels regarding HPV, HPV vaccines, and screening tests.<sup>13</sup> The Turkish reliability and validity were established by Demir, and two items of the scale were excluded.<sup>14</sup> The final version of the scale, with 33 items, was administered to the participants. In scoring the scale, one point is given for each correct answer, while wrong answers and "I don't know" answers are scored as zero. The total scores obtained from the scale ranged from 0 to 33, with higher scores indicating higher knowledge.

The data obtained from the study were evaluated using SPSS 22.0. The skewness and kurtosis coefficients were calculated to determine the suitability of the numerical data for a normal distribution. Because the skewness and kurtosis values of the numerical data in the study were between -1 and + 1, it was considered to have a normal distribution.<sup>15</sup> Descriptive statistics are presented as means, standard deviations, and percentile distributions. Because the data met the parametric conditions, while comparing the means, the independent sample t-test was used for two independent groups, and the F test (ANOVA) was used for more than two groups (post hoc Bonferroni test, since the assumption of homogeneity was provided). Evaluation of the data obtained by counting was performed using the chi-squared test. The Cronbach's alpha value was calculated as 0.85 for the HPV Knowledge Scale.  $P < 0.05$  was considered significant.

## Results

Of the HCWs working in FHCs across the province, 275 agreed to participate (participation rate: 74.3%). Of the HCWs, 57.5% were nurses/midwives and 69.8% were female. Those who were married, who were working in the city center, and who were working in the FHC unit where the adolescent rate was 11-25% were in the majority. The source of information about HPV vaccines for 56% of HCWs was a professional source. More than half of the HCWs had not recommended HPV vaccination to pre-adolescents and at-risk individuals. The most common reason for this is a lack of knowledge regarding HPV vaccines. To date, 81.8% of HCWs have recommended HPV testing (Table 1).

**Table 1.** Characteristics of the health care workers (n=275)

Variables	n (%)	Mean ± SD
<b>Age</b>		39.0 ± 8.3
<b>Sex</b>		
Male	83 (30.2)	
Female	192 (69.8)	
<b>Marital status</b>		
Single/widow	59 (21.5)	
Married	216 (78.5)	
<b>Occupation</b>		
Physician	117 (42.5)	
Nurse/ midwife	158 (57.5)	
<b>Worked place of residence</b>		
City centre	145 (52.7)	
District/village	130 (47.3)	
<b>Years worked in the profession</b>		15.7 ± 8.3

**Table 1(..).** Characteristics of the health care workers (n=275)

<b>Proportion of adolescents aged 11-18 years defined to the FHC unit</b>		
≤ 10%	17 (6.2)	
11–25%	58 (21.1)	
> 25%	12 (4.4)	
Non-responded	188 (68.4)	
<b>Population defined to the FHC unit</b>		3035.3 ± 600.9
<b>Source of information about the HPV vaccine (n=231)</b>		
Professional resource (Scientific literature, course/congress, etc.)	131 (56.7)	
Media (Internet, newspaper, radio, television)	53 (22.9)	
Interpersonal discussion (with colleagues, relatives, or patients)	47 (20.3)	
<b>HPV vaccination recommendation for pre-adolescents</b>		
No	218 (79.3)	
Yes	57 (20.7)	
<b>HPV vaccination recommendation for people at risk</b>		
No	142 (51.6)	
Yes	133 (48.4)	
<b>The reason why no HPV vaccine has been recommended until now</b>		
Lack of information about HPV vaccines	101 (36.7)	
Expensive and not covered by the government	38 (13.8)	
Thinking it's not effective	3 (1.1)	
Thinking there are side effects	4 (1.5)	
Non-responded	129 (46.9)	
<b>HPV testing recommendation for people in the appropriate age range</b>		
No	50 (18.2)	
Yes	225 (81.8)	

*SD* Standard deviation, *FHC* Family Health Centre, *HPV* Human papilloma virus

All participants had heard of HPV infection. A total of 269 people (97.8%) had heard of the HPV test, whereas 231 (84%) had heard of the HPV vaccine. Table 2 presents the distribution of the frequency of correct responses to the HPV Knowledge Scale items according to the HCWs' recommendations for HPV vaccination and testing. Participants' general HPV knowledge score was 12.2±2.5, HPV testing knowledge score was 4.6±1.2, HPV vaccination knowledge score was 4.8±1.6, and HPV vaccine availability knowledge score was 1.1±0.9. The percentage of correct answers in seven of the 33 questions on the scale, three of which were on HPV vaccine availability knowledge, remained below 50%. The general HPV knowledge score was higher in those who recommended the HPV vaccine and testing ( $P < 0.001$  and  $P = 0.041$ , respectively). The HPV testing knowledge score was higher in those who recommended vaccines to pre-adolescents ( $P = 0.039$ ). The HPV vaccination knowledge score was higher in those recommending HPV vaccination ( $P = 0.002$  for pre-adolescents and  $P < 0.001$  for people at risk). The HPV vaccine availability knowledge score was also higher in those recommending the HPV vaccine ( $P < 0.001$  for pre-adolescents,  $P = 0.017$  for people at risk). Among all the statistically significant values, those who recommended HPV vaccine and testing had a higher rate of correct answers to the related questions (Table 2).

**Table 2.** Distribution of the frequency of correct responses to the HPV Knowledge Scale items according to the health care workers' recommendation for HPV vaccine and testing

	Total	HPV vaccination recommendation for pre-adolescents			HPV vaccination recommendation for people at risk			HPV testing recommendation		
		No	Yes	P	No	Yes	P	No	Yes	P
<b>General HPV Knowledge Score (n=275)</b>	12.2±2.5	11.9±2.6	13.2±1.5	<b>&lt;0.001</b>	11.7±2.7	12.8±2.1	<b>&lt;0.001</b>	11.6±3.2	12.3±2.3	<b>0.041</b>
HPV can cause cervical cancer	265(96.4)	208(95.4)	57(100.0)	0.129	134(94.4)	131(98.5)	0.105	45(90.0)	220(97.8)	<b>0.020</b>
A person can have HPV for many years without knowing it	264(96.0)	208(95.4)	56(98.2)	0.469	138(97.2)	126(94.7)	0.467	46(92.0)	218(96.9)	0.119
Having many sexual partners increases the risk of getting HPV	265(96.4)	209(95.9)	56(98.2)	0.693	136(95.8)	129(97.0)	0.751	46(92.0)	219(97.3)	0.087
HPV is very rare*	231(84.0)	181(83.0)	50(87.7)	0.511	115(81.0)	116(87.2)	0.213	39(78.0)	192(85.3)	0.286
HPV can be passed on during sexual intercourse	257(93.5)	201(92.2)	56(98.2)	0.134	133(93.7)	124(93.2)	0.886	46(92.0)	211(93.8)	0.751
HPV always has visible signs or symptoms*	236(85.8)	184(84.4)	52(91.2)	0.271	120(84.5)	116(87.2)	0.638	40(80.0)	196(87.1)	0.280
Using condoms reduces the risk of getting HPV	248(90.2)	198(90.8)	50(87.7)	0.651	127(89.4)	121(91.0)	0.821	41(82.0)	207(92.0)	0.061
HPV can cause HIV/AIDS*	158(57.5)	120(55.0)	38(66.7)	0.153	75(52.8)	83(62.4)	0.108	30(60.0)	128(56.9)	0.807
HPV can be transmitted through genital skin-to-skin contact	208(75.6)	159(72.9)	49(86.0)	0.062	99(69.7)	109(82.0)	<b>0.018</b>	34(68.0)	174(77.3)	0.227
Men cannot get HPV*	211(76.7)	161(73.9)	50(87.7)	<b>0.042</b>	99(69.7)	112(84.2)	<b>0.004</b>	41(82.0)	170(75.6)	0.429
Sex at a young age increases the risk of getting HPV	213(77.5)	165(75.7)	48(84.2)	0.233	103(72.5)	110(82.7)	<b>0.044</b>	36(72.0)	177(78.7)	0.405
There are many types of HPV	244(88.7)	188(86.2)	56(98.2)	<b>0.021</b>	120(84.5)	124(93.2)	<b>0.036</b>	40(80.0)	204(90.7)	0.056
HPV can cause genital warts	245(89.1)	189(86.7)	56(98.2)	<b>0.024</b>	119(83.8)	126(94.7)	<b>0.007</b>	43(86.0)	202(89.8)	0.600
HPV can be cured with antibiotics*	185(67.3)	140(64.2)	45(78.9)	0.051	82(57.7)	103(77.4)	<b>0.001</b>	28(56.0)	157(69.8)	0.087
Most sexually active people will be infected with HPV at some point in their lives	103(37.5)	73(33.5)	30(52.6)	<b>0.012</b>	48(33.8)	55(41.4)	0.196	16(32.0)	87(38.7)	0.472
HPV does not usually need to be treated	23(8.4)	18(8.3)	5(8.8)	0.539	11(7.7)	12(9.0)	0.870	7(14.0)	16(7.1)	0.152
<b>HPV Testing Knowledge Score (n=269)</b>	4.6±1.2	4.5±1.2	4.8±0.9	<b>0.039</b>	4.5±1.2	4.7±1.2	0.098	4.6±1.3	4.6±1.1	0.981
If a woman tests positive for HPV, she will definitely get cervical cancer*	237(88.1)	183(86.3)	54(94.7)	0.131	115(84.6)	122(91.7)	0.104	37(84.1)	200(88.9)	0.519
An HPV test can be done at the same time as a smear test	246(91.4)	192(90.6)	54(94.7)	0.428	123(90.4)	123(92.5)	0.704	38(86.4)	208(92.4)	0.233
An HPV test can determine how long you have had an HPV infection*	187(69.5)	140(66.0)	47(82.5)	<b>0.026</b>	87(64.0)	100(75.2)	<b>0.046</b>	33(75.0)	154(68.4)	0.493
HPV testing is used to determine if HPV vaccination is needed*	195(72.5)	153(72.2)	42(73.7)	0.952	95(69.9)	100(75.2)	0.327	31(70.5)	164(72.9)	0.884
When you have an HPV test, you will get the results the same day*	238(88.5)	186(87.7)	52(91.2)	0.618	118(86.8)	120(90.2)	0.485	36(81.8)	202(89.8)	0.210
If an HPV test shows that a woman does not have HPV, her risk of cervical cancer is low	133(49.4)	106(50.0)	27(47.4)	0.724	71(52.2)	62(46.6)	0.359	27(61.4)	106(47.1)	0.118
<b>HPV Vaccination Knowledge Score (n=231)</b>	4.8±1.6	4.7±1.6	5.5±1.3	<b>0.002</b>	4.4±1.6	5.3±1.5	<b>&lt;0.001</b>	4.6±1.4	4.9±1.6	0.299
Girls who have received the HPV vaccine do not need a Pap test when they are older*	197(85.3)	153(83.6)	44(91.7)	0.240	93(80.2)	104(90.4)	<b>0.044</b>	29(78.4)	168(86.6)	0.298
One of the HPV vaccines offers protection against genital warts	136(58.9)	106(57.9)	30(62.5)	0.683	62(53.4)	74(64.3)	0.092	20(54.1)	116(59.8)	0.640
HPV vaccines offer protection against all sexually transmitted infections*	188(81.4)	148(80.9)	40(83.3)	0.856	89(76.7)	99(86.1)	0.097	29(78.4)	159(82.0)	0.778
Someone who is vaccinated against HPV vaccine cannot develop cervical cancer*	174(75.3)	134(73.2)	40(83.3)	0.208	77(66.4)	97(84.3)	<b>0.002</b>	24(64.9)	150(77.3)	0.161
HPV vaccines offer protection against most cervical cancers	191(82.7)	147(80.3)	44(91.7)	0.102	93(80.2)	98(85.2)	0.401	34(91.9)	157(80.9)	0.168
Three doses are required for the HPV vaccine	106(45.9)	78(42.6)	28(58.3)	0.075	42(36.2)	64(55.7)	<b>0.003</b>	13(35.1)	93(47.9)	0.210
HPV vaccines are most effective when given to people who have never had sex	127(55.0)	91(49.7)	36(75.0)	<b>0.003</b>	58(50.0)	69(60.0)	0.127	21(56.8)	106(54.6)	0.955
<b>HPV Vaccine Availability Knowledge Score (n=231)</b>	1.1±0.9	1.0±0.9	1.5±0.8	<b>&lt;0.001</b>	0.9±0.8	1.2±0.9	<b>0.017</b>	0.9±0.9	1.1±0.9	0.298
HPV vaccine is recommended for all females ages 11-26 years	158(68.4)	117(63.9)	41(85.4)	<b>0.007</b>	76(65.5)	82(71.3)	0.344	22(59.5)	136(70.1)	0.279
HPV vaccine is licensed for women aged 30-45 years*	26(11.3)	19(10.4)	7(14.6)	0.573	10(8.6)	16(13.9)	0.287	4(10.8)	22(11.3)	0.926
Both HPV vaccines that are available (Gardasil & Cervarix) protect against both genital warts and cervical cancer*	12(5.2)	8(4.4)	4(8.3)	0.279	5(4.3)	7(6.1)	0.755	1(2.7)	11(5.7)	0.696
HPV vaccine is permitted for males aged 11-26 years	60(26.0)	39(21.3)	21(43.8)	<b>0.003</b>	22(19.0)	38(33.0)	<b>0.015</b>	9(24.3)	51(26.3)	0.964

\*False, Tests used: Chi-square test and independent sample t-test

A total of 231 HCWs who had heard about HPV, HPV test, and HPV vaccine completed the entire HPV Knowledge Scale. Table 3 shows the distribution of the HPV Knowledge Scale results according to the characteristics. The total HPV Knowledge Scale score of HCWs was  $22.2 \pm 4.9$ . The total score of the scale was higher in males ( $P = 0.005$ ) and physicians ( $P < 0.001$ ), in those working in the FHC unit where the adolescent rate was below 10% (compared to more than 25%) (post hoc  $P = 0.041$ ), in those recommending HPV vaccine to pre-adolescence ( $P < 0.001$ ), in those recommending HPV vaccine to people at risk ( $P = 0.001$ ), and in those not recommending HPV vaccine because it is expensive and not covered by the government (according to those who think there is a lack of information) (post hoc  $P = 0.027$ ) (Table 3).

**Table 3.** Distribution of HPV Knowledge Scale results according to the characteristics of the health care workers ( $n=231$ ).

Variables	n (%)	Total Scale Score (Mean $\pm$ SD)	
		<b>22.2 <math>\pm</math> 4.9</b>	
<b>Sex</b>			
Male	66(28.6)	24.2 $\pm$ 4.1	t=2.830
Female	165(71.4)	22.6 $\pm$ 4.0	<b>P=0.005</b>
<b>Marital status</b>			
Single/widow	46(19.9)	23.3 $\pm$ 4.2	t=0.473
Married	185(80.1)	22.9 $\pm$ 4.1	<b>P=0.673</b>
<b>Occupation</b>			
Physician	100(43.3)	24.6 $\pm$ 3.8	t=5.153
Nurse/ midwife	131(56.7)	21.9 $\pm$ 3.9	<b>P&lt;0.001</b>
<b>Worked place of residence</b>			
City centre	131(56.7)	23.0 $\pm$ 4.3	t=-0.095
District/village	100(43.3)	23.1 $\pm$ 3.9	<b>P=0.924</b>
<b>Proportion of adolescents aged 11-18 years defined to the FHC unit (n=74)*</b>			
1. $\leq 10\%$	12 (16.2)	25.3 $\pm$ 3.8	F=3.293
2. 11–25%	51(68.9)	23.5 $\pm$ 4.5	<b>P=0.043</b>
3. $> 25\%$	11(14.9)	20.7 $\pm$ 3.8	
<i>Post hoc test results</i>		<b>1&gt;3, P=0.041</b>	
<b>Source of information about the HPV vaccine</b>			
Professional resource (Scientific literature, course/congress, etc.)	131(56.7)	23.3 $\pm$ 4.2	F=1.108
Media (Internet, newspaper, radio, television)	53(22.9)	22.2 $\pm$ 3.9	<b>P=0.332</b>
Interpersonal discussion (with colleagues, relatives, or patients)	47(20.3)	23.2 $\pm$ 4.0	
<b>HPV vaccination recommendation for pre-adolescents</b>			
No	183(79.2)	22.5 $\pm$ 4.2	t=-4.799
Yes	48(20.8)	25.1 $\pm$ 3.0	<b>P&lt;0.001</b>
<b>HPV vaccination recommendation for people at risk</b>			
No	116(50.2)	22.1 $\pm$ 3.7	t=-3.408
Yes	115(49.8)	23.9 $\pm$ 4.3	<b>P=0.001</b>
<b>The reason why no HPV vaccine has been recommended until now (n=119)*</b>			
1. Lack of information about HPV vaccines	82(68.9)	21.4 $\pm$ 3.7	F=3.445
2. Expensive and not covered by the government	32(26.9)	23.8 $\pm$ 3.1	<b>P=0.019</b>
3. Thinking it's not effective	2(1.7)	22.0 $\pm$ 1.4	
4. Thinking there are side effects	3(2.5)	22.3 $\pm$ 4.0	
<i>Post hoc test results</i>		<b>2&gt;1, P=0.027</b>	
<b>HPV testing recommendation for people in the appropriate age range</b>			
No	37(16.0)	22.5 $\pm$ 3.8	t=-0.874
Yes	194(84.0)	23.1 $\pm$ 4.2	<b>P=0.383</b>

SD Standard deviation, \*Those who did not respond were excluded from the analysis. Tests used: Independent sample t-test and one-way ANOVA (post hoc Bonferroni test)

## Discussion

In this study, the knowledge, attitudes, and behaviors of Turkish primary HCWs regarding HPV infection, HPV screening, and HPV vaccines were analysed. In the current study, some HCWs had not heard of HPV testing and vaccination, even at a low rate. In a study conducted with female primary HCWs, approximately ten years ago, 87.4% of the participants had heard about the Pap smear test, which was much lower than the value we found in the current study.<sup>16</sup> In recent studies with HCWs, most of whom were physicians, the rates of those who had heard of the HPV vaccine were 87.2% and 94.4%, respectively.<sup>17,18</sup> The reason why these rates were found to be higher may be the high number of physicians in these studies. In fact, as in the current study, it has been reported that the level of HPV knowledge of physicians is higher than that of other HCWs.<sup>19</sup>

Similar to our study, some studies reported that the most frequently referenced source of information about HPV vaccines was professional resources (courses/congresses, scientific literature, expert physician opinions, etc.).<sup>17,19</sup> It has also been determined that the knowledge level of HPV and HPV vaccines is higher among those who use professional sources as information sources.<sup>19</sup> Although we did not find any statistical significance, this was also true in the current study.

It has been stated that HCWs require more training on HPV-related issues.<sup>20</sup> In the current study, the section with the lowest level of HPV knowledge was on HPV vaccine availability. In a study conducted with female HCWs in a university hospital, Güven et al. reported that the awareness of HCWs regarding HPV infection and cervical cancer was insufficient.<sup>18</sup> However, it was found that the level of HPV knowledge was higher in those working in preventive health services.<sup>19</sup> A high knowledge level of HCWs working in preventive health services in the name of protection from HPV infection is desired and necessary.

More than half of the HCWs included in the current study stated that they had never recommended the HPV vaccine to pre-adolescents or people at risk. In another study conducted in Türkiye, 62.5% of physicians and 74.2% of nurses stated that they did not even consider vaccinating their own children.<sup>21</sup> On the other hand, in a study conducted in Italy, contrary to studies in Türkiye, it was found that the rate of recommending the HPV vaccine by HCWs was over 80%.<sup>19</sup> In a study conducted among female HCWs in Cyprus, 83.5% of the participants were willing to vaccinate themselves to prevent cervical cancer.<sup>22</sup> The fact that Türkiye is a predominantly Muslim country and extramarital sexual intercourse is considered a sin according to Islamic belief, and that the incidence of cervical cancer caused by HPV (4.3 per hundred thousand) is quite low compared to the incidence in the world (13.3 per hundred thousand)<sup>3,23</sup>, may create the perception that the vaccine is unnecessary. However, when we looked at the prevalence of HPV, it was found to be 3.9-69.4% for different cytological types in the world<sup>23</sup>, whereas the prevalence found in studies conducted in Türkiye was not much different (3-28%).<sup>24,25</sup> This shows that the threat of HPV-related diseases maintains its importance also in Türkiye.

In one study, as we found in the current study, the most common reason why HCWs had not received HPV vaccine and had not recommended the vaccine until now was the lack of knowledge about the vaccine.<sup>17</sup> Believing that the HPV vaccine is unnecessary, thinking that it is expensive, having insufficient knowledge about the vaccine, thinking that it may have side effects, and not trusting the vaccine have been shown as reasons for hesitation by HCWs.<sup>21</sup> The second most common reason why the vaccine was not recommended in the current study was that it was expensive and was not covered by the government. In fact, in a study conducted in Türkiye, the majority of HCWs declared that they could vaccinate their own children only if HPV vaccines were included in the national vaccination calendar.<sup>21</sup>

In the current study, we found that the HPV knowledge score was higher in males, but another study conducted with HCWs reported that there was no significant difference according to sex.<sup>19</sup> This may be because all nurses/midwives we found with lower knowledge in our study were female. This finding also shows once again that the understanding of HPV as a female-specific disease has surpassed.<sup>26</sup> The low knowledge level of nurses and midwives is also an issue that needs to be emphasized. Previous studies have shown that HPV knowledge in nurses is an important precursor to a positive attitude towards vaccination.<sup>27,28</sup> Another significant difference in HPV knowledge score was the recommendation for the vaccine. In a study conducted in Italy, the HPV knowledge score of HCWs who recommended the vaccine to pre-adolescent children was higher, similar to the one in the current study.<sup>19</sup> However, it should also be mentioned that it is important to recommend the vaccine by the HCW, as well as to have the patient accept it. As a matter of fact, in their study, Szarewski et al. revealed that in some cases, a specialist's own knowledge would not be sufficient to meet the information needs of patients and to address their concerns.<sup>29</sup> It has been reported that HCWs should be supported by various educational initiatives that will enable them to convey health information efficiently, taking into account the perspectives of patients.<sup>30</sup> In the current study, we found that HCWs with a higher adolescent rate in the FHC unit had a lower knowledge score, but we could not find any data to compare with this in the literature. However, this situation is thought-provoking and has shown that some HCWs are not aware of the priorities of the society they serve. It is recommended to focus on this issue when providing HPV training to HCWs.

The strength of this study is that it was carried out with primary HCWs who are intertwined with the public and whose main task is to provide preventive health services. However, the limitation of the study is that it may be insufficient in terms of the representation of all primary HCWs in the country.

## Conclusion

We found that the part with the lowest level of HPV knowledge was about the HPV vaccine. In fact, the rate of HCWs who had not heard about the HPV vaccine was higher than that of those who had not heard about HPV and HPV testing. Contrary to what has been reported in publications from other countries, we found that more than half of the HCWs had not recommended the HPV vaccine to date. The most common reasons for this were the lack of information about HPV vaccines, being expensive, and not being covered by the government. It is a known fact that HPV infection causes many diseases, particularly cervical cancer. Although the incidence of cervical cancer in Türkiye seems relatively low, the prevalence of HPV is not very different from that in the world. Therefore, it is recommended to eliminate the lack of knowledge of HCWs, mainly those serving the adolescent population, about HPV vaccines and to cover HPV vaccines by the government.

## Disclosure of interest

The authors report there are no competing interests to declare.

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